

**QUALITY ASSURANCE PROGRAM (QAP)  
AND  
CEMS OPERATION PLAN**

**FOR**

**CONTINUOUS EMISSIONS MONITORING SYSTEMS**

**AT**

**ENVIROFOCUS TECHNOLOGIES, LLC LEAD-  
ACID BATTERY RECYCLING FACILITY LEAD  
SMELTER PROCESS & HYGIENE STACKS**

**PREPARED BY:  
SPECTRUM SYSTEMS, INC.  
3410 WEST NINE MILE ROAD  
PENSACOLA, FL 32526-7808**

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This document is intended to present the Quality Assurance Program (QAP) and CEMS Operation Plan for the CEMS at EnviroFocus Technologies, Lead-Acid Battery Recycling Facility, Lead Smelter Process & Hygiene Stacks, based on the specifications of 40 CFR 60 as provided by the US EPA and CEMS OP-1, version B as provided by the Florida Department of Environmental Protection. Spectrum Systems, Incorporated, however, makes no representation or warranty, express, implied or statutory with respect to, and assumes no responsibility for, the accuracy, completeness, sufficiency or usefulness of the information contained herein.

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## PREFACE

The Code of Federal Regulations, 40 CFR 60, requires a written quality assurance/quality control program of detailed, step-by-step procedures for the following activities.

- Calibration of CEMS
- Calibration Drift (CD) determination and adjustment of CEMS
- Preventive maintenance of CEMS
- Accuracy audit procedures
- Calculations and record-keeping and reporting
- Program of corrective action for malfunctioning CEMS

This manual contains such a Quality Assurance Program (QAP) / CEMS Operation Plan for the continuous emission monitoring system(s) (CEMS) at EnviroFocus Technologies' Lead-Acid Battery Recycling Facility, Lead Smelter Process & Hygiene Stacks. It is designed to satisfy federal, state and local requirements for a written quality assurance/quality control plan. It incorporates specifications as defined in the operating permit issued by the State of Florida and the Code of Federal Regulations (CFR) 40 Part 60.

This QAP/CEMS Operation Plan is a working document of procedures and specifications that can be used daily to ensure compliance with environmental regulations. Pertinent information and procedures are presented in step-by-step lists, flowcharts, fill-in forms, and other easy-to-use formats.

Briefly, the QAP is organized as follows.

SECTION 1 outlines the applicable CEMS regulations, both federal and state, and describes the basic QAP structure.

SECTION 2 provides descriptive information about EnviroFocus Technologies' Lead Smelter Process and Hygiene Stacks.

SECTION 3 describes the CEMS equipment installed at EnviroFocus Technologies' Lead Smelter Process and Hygiene Stacks.

SECTION 4 details the daily activities that are required to operate and maintain the CEMS in compliance. Activities include equipment checks recommended by the manufacturers and the calibration error or drift tests required by the applicable regulations.

SECTION 5 lists the weekly activities required to operate and maintain the CEMS equipment.

SECTION 6 lists the monthly procedures required to operate and maintain the CEMS equipment.

SECTION 7 describes the quarterly checks required to operate and maintain the CEMS equipment and the quarterly accuracy audits checks required to verify the accuracy of the monitoring equipment.

SECTION 8 provides all of the activities required semiannually to operate and maintain the CEMS equipment.

SECTION 9 provides all of the activities required annually to operate and maintain the CEMS equipment. It includes instrument/component checks and any annual tests/audits required by the applicable regulations.

SECTION 10 gives the corrective action procedures that are recommended by the equipment manufacturers. These are troubleshooting and corrective procedures that are used whenever an instrument/component malfunctions or is operating out of control.

SECTION 11 provides information on required reports and report samples, plus pertinent data calculation formulas.

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# **SECTION 1 INTRODUCTION**

This Quality Assurance Program (QAP) / CEMS Operation Plan includes all of the procedures, forms, and specifications required for EnviroFocus Technologies to maintain continuous emission monitoring system (CEMS) at their Lead-Acid Battery Recycling Facility located at 6505 Jewel Ave., Tampa, Florida 33619, in accordance with federal, state, and local regulations as defined by:

- 40 CFR 60
- State of Florida Department of Environmental Protection Operating Permit PSD-FL-404/0570057-020-AC

Strict adherence to these QAP procedures is necessary to maintain the CEMS, satisfy performance specifications, and produce the required data and reports. The advantages of a well-managed, ongoing QAP include minimal CEMS downtime, prolonged CEMS performance, and compliance with environmental regulations to avoid fines or other punitive actions.

## **1.1 APPLICABLE REQUIREMENTS**

Emissions at EnviroFocus Technologies' Lead-Acid Battery Recycling Facility, Lead Smelter Process and Hygiene Stacks, are governed by the federal regulations in 40 CFR 60, Subpart L, and the site's Title V Operating Permit. Compliance with NO<sub>x</sub>, SO<sub>2</sub>, and CO limits on the Process Stack and NO<sub>x</sub> and SO<sub>2</sub> on the Hygiene Stack are determined by use of a Continuous Emissions Monitoring System described in this Quality Assurance Program. Appendix F to 40 CFR 60 details Quality Assurance procedures for affected CEMS. Copies of pertinent regulatory documents are included as Appendix A (Federal Regulations) and Appendix B (Permit) of this document.

### ***1.1.1 MONITORING REQUIREMENTS***

#### **A. Required CEMS Components**

- NO<sub>x</sub> Continuous Emission Monitor
- SO<sub>2</sub> Continuous Emission Monitor
- CO Continuous Emission Monitor (Process Stack only)
- Volumetric Flow Monitor
- Data Acquisition and Handling System

### ***1.1.2 QA/QC REQUIREMENTS***

Required Quality Assurance and Quality Control procedures for the CEMS are outlined below. QA/QC requirements are based on 40 CFR 60, Appendices A, B, F and permit requirements. It is the responsibility of EnviroFocus Technologies to ensure the appropriate QA/QC procedures are being followed and that all applicable regulatory criteria are being met.

#### **A. Data Averaging/Missing Data Substitution**

##### *Data Averaging:*

- Data from pollutant and diluent monitors are reduced to one-hour averages. During a full operating hour, a minimum of two data points per hour (one data point in each of the 15-minute quadrants of the hour) is required to comply with 40 CFR 60.

For any operating hour in which required maintenance or quality-assurance activities are performed: (A) If the unit operates in two or more quadrants of the hour, a minimum of two valid data points, separated by at least 15 minutes, is required to calculate the hourly average; or (B) If the unit operates in only one quadrant of the hour, at least one valid data point is required to calculate the hourly average.

*Missing Data:* Monitor availability for the CEMS shall be 95% or greater in any calendar quarter in which the unit operated for more than 760 hours. In the event the applicable availability is not achieved, the facility shall provide the regulatory agency with a report identifying the problems in achieving the required availability and a plan of corrective actions that will be taken to achieve 95% availability. Failure to take corrective actions or continued failure to achieve the minimum monitor availability shall be a violation of the state operating permit.

#### **B. Cycle Time/Response Time**

Not to exceed 15 minutes for pollutant and diluent monitors.

### C. Tests and Audit Frequency

MONITOR	TEST/AUDIT	FREQUENCY
NO <sub>x</sub>	Two-point calibration drift	Daily
SO <sub>2</sub>	Two-point calibration drift	Daily
CO	Two-point calibration drift	Daily
Flow	Two-level calibration error check and an interference check	Daily **
NO <sub>x</sub>	CGA	Quarterly *
SO <sub>2</sub>	CGA	Quarterly *
CO	CGA	Quarterly *
NO <sub>x</sub>	RATA	Annually *
SO <sub>2</sub>	RATA	Annually *
CO	RATA	Annually *

\* 40 CFR 60 requires that each CEMS be audited at least once each calendar quarter for accuracy. The CGA may serve as the quarterly accuracy audit in three out of four quarters, but the RATA must be conducted at least once every four calendar quarters (i.e., annually).

\*\* Use of a backpurging system with ultrasonic flow monitors suffices in lieu of performing a daily interference check (ex: USI or Flowsic monitors). Use of an automatic daily purge system and automatic pressure/temp transducer checks suffices as the daily interference check for DP flow monitors (ex: EMRC monitors).

### D. Out-of-Control Periods

When the above tests are performed, regulations specify limits within which the equipment must perform. If these limits are exceeded, the CEMS is considered “out-of-

control”. An out-of-control CEMS must be repaired and the calibration drift check must be repeated. CEMS data acquired during an out-of-control period cannot be used in emissions compliance determinations, nor can it be counted toward meeting the requirements for minimum data availability.

The out-of-control period begins with the time of the failed test and ends with the time of a satisfactory check following corrective actions. An hour is not out-of-control if the corrective action and satisfactory check are completed in a short enough time to allow the required number of sampling points to be obtained in that hour. Out-of-control limits are given in the sections below corresponding to each test.

**E. Daily Calibration Checks**

According to CFR 60, calibration drift checks of the CEMS equipment must be performed on a daily basis.

*Out-Of-Control Periods:*

If the daily zero/span calibration drift for pollutant/diluent and flow monitors exceeds twice the applicable Performance Specifications 2, 3, and 6 (40 CFR Part 60, Appendix B) drift limits for five consecutive days, or if the drift exceeds four times the applicable performance specification drift limits in a single daily drift check, the CEMS is out of control. These limits are as follows:

NO <sub>x</sub> monitors (% span)	<b>5% for 5 days</b>	<b>10% for 1 day</b>
SO <sub>2</sub> monitors (%Span)	<b>5% for 5 days</b>	<b>10% for 1 day</b>
CO monitors	<b>5% for 5 days</b>	<b>10% for 1 day</b>
Flow Monitors	<b>6% for 5 days</b>	<b>12% for 1 day</b>

(NO<sub>x</sub>/SO<sub>2</sub>/CO Performance Specification = 2.5% span)

(Flow Performance Specification = 3% span)

**F. Cylinder Gas Audits (CGAs)**

According to CFR 60, periodic accuracy tests of the CEMS equipment must be performed (see chart above for frequencies). The quarterly test required by CFR 60 is the Cylinder Gas Audit, or CGA (alternatively, the Relative Accuracy Audit, or RAA). CFR 60 actually states that this test may be conducted in up to three out of four calendar quarters, quarters in which the RATA (see below) is not being used to assess accuracy.

*Out-Of-Control Periods:*

If the CGA accuracy of any monitor exceeds  $\pm 15\%$  of the average audit value (or  $\pm 5\text{ppm}$ , whichever is greater), the CEMS is out of control. (Calculate Accuracy as per Equation 1-1 in 40 CFR 60, Appendix F)

If excessive inaccuracy (CGA and/or RATA) occurs for two or more quarters, EnviroFocus must revise the quality control procedures contained in this QAP, or modify or replace the CEMS.

## **G. Relative Accuracy Test Audits (RATAs)**

According to CFR 60, a Relative Accuracy Test Audit (RATA) must be conducted to assess accuracy at the frequencies listed in the table above. This is typically annually for CEMS subject to 40 CFR 60. If the RATA Accuracy exceeds the limits below, the CEMS is out of control.

### *Out-Of-Control Periods:*

NO <sub>x</sub> / SO <sub>2</sub>	<b>20%</b> <sup>1</sup> or <b>10%</b> <sup>2</sup>
CO	<b>10%</b> <sup>3</sup> or <b>5%</b> <sup>4</sup>

- 1 - when average emissions during test are greater than 50 percent of the emission standard (RM used to calculate RA)
- 2 - when average emissions during test are less than 50 percent of the emission standard (emission standard used to calculate RA)
- 3 – when the average RM value is used to calculate RA
- 4 – when the applicable emission standard is used to calculate RA

If excessive inaccuracy (CGA and/or RATA) occurs for two or more quarters, EnviroFocus must revise the quality control procedures contained in this QAP, or modify or replace the CEMS.

### **1.1.3 REPORTS**

- Quarterly reports as required by 40 CFR 60.
- Required state reports are detailed in the permit (Appendix B of this manual).

### **1.1.4 OPERATING PERMIT REQUIREMENTS**

Operation EnviroFocus Technologies' Lead Smelter Process Stack is regulated by the Title V Permit, as provided in Appendix B of this manual. Refer to Appendix B for specific requirements related to pollutant emissions and CEMS operation.

## 1.2 QAP STRUCTURE

The Lead Smelter Process and Hygiene Stack QAP (Quality Assurance Program) is a closed-loop structure of quality assessment and control. CEMS quality is continuously evaluated in daily, weekly, monthly, quarterly, semiannual, and annual maintenance checks, as well as quarterly, and annual audits. If quality assessment results indicate CEMS data of unacceptable quality or a CEMS that is out of control according to regulatory specifications, specific corrective actions are performed. After any corrective action, the CEMS is re-evaluated for quality and performance to ensure proper operation and valid data.

Figure 1-1 illustrates the QAP closed-loop structure and provides references to the appropriate procedures. This illustration can be used by plant personnel as a guide to ensure that quality assurance procedures are performed.

The maintenance and corrective action procedures referenced (and contained in other sections of this manual) include the data forms that are used with each procedure. These forms are important because they guide maintenance personnel in the required procedures, provide a record of CEMS maintenance and quality assurance activities, and serve as a basis for evaluating CEMS performance and the overall effectiveness of the QAP.

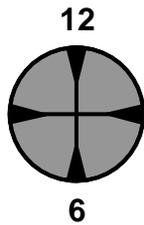
In order to facilitate equipment repair and achieve maximum system uptime, the Model 675 Dilution System is designed in a modular format so that critical replacement components may be inserted from the spare parts inventory if needed.

**NOTE:** It is recommended that all analyzers be taken **OUT OF SERVICE** before performing maintenance or corrective actions if the procedure being performed is likely to interfere with proper emissions monitoring and reporting. Use the PLC interface to take analyzers out of service.

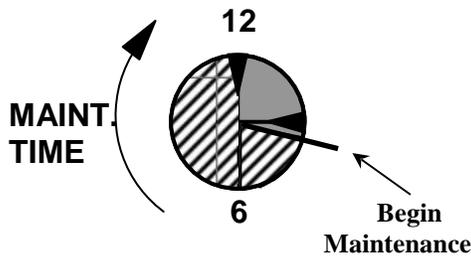
To calculate the hourly average, 40 CFR 60 requires a minimum of 4 data points per hour during full operating hours. Operating hours in which maintenance or quality-assurance activities are performed require a minimum of two valid data points, separated by 15 minutes (if the unit operates in two or more quadrants of the hour), or at least one valid data point, separated by at least 15 minutes (if the unit operates in only one quadrant of the hour). If these criteria are not met for any reason, data availability is reduced. If data availability for CEMS subject to the rules of 40 CFR 60 fall below the limits discussed above (95% or greater), missing data substitution procedures of 40 CFR 60 must be implemented.

For these reasons, the following guidelines are implemented to minimize CEMS downtime and maximize data availability.

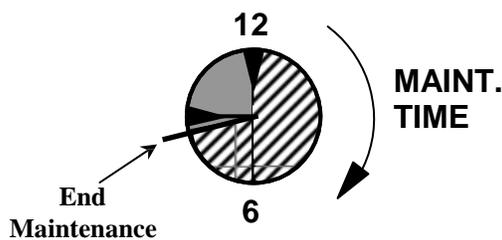
- Preventive maintenance checks (daily, monthly, etc.) and their associated corrective actions are started after the quarter hour in a given hourly period. This allows maximum working time without loss of average data. The rules defined in 40 CFR 60 states that two data points per hour, separated by 15 minutes, are sufficient to determine average emissions during operating hours in which maintenance or quality-assurance activities are performed. Data points are taken at 10 second intervals in the hour to calculate an hourly average. If maintenance is started after the quarter hour interval, almost an hour and a half is available for the maintenance activity before the data points in the next hour are lost, as illustrated below.



Four evenly spaced data points ( ▼ ) are normally used for hourly averaging.



If maintenance is started after the second data point (shortly after the quarter hour) two valid data points can still be collected for the first hour, with approximately 44 minutes for maintenance, plus ...



... approximately 44 minutes for maintenance in the second hour. The last two 15-minute intervals can then be used to collect data in the second hour.

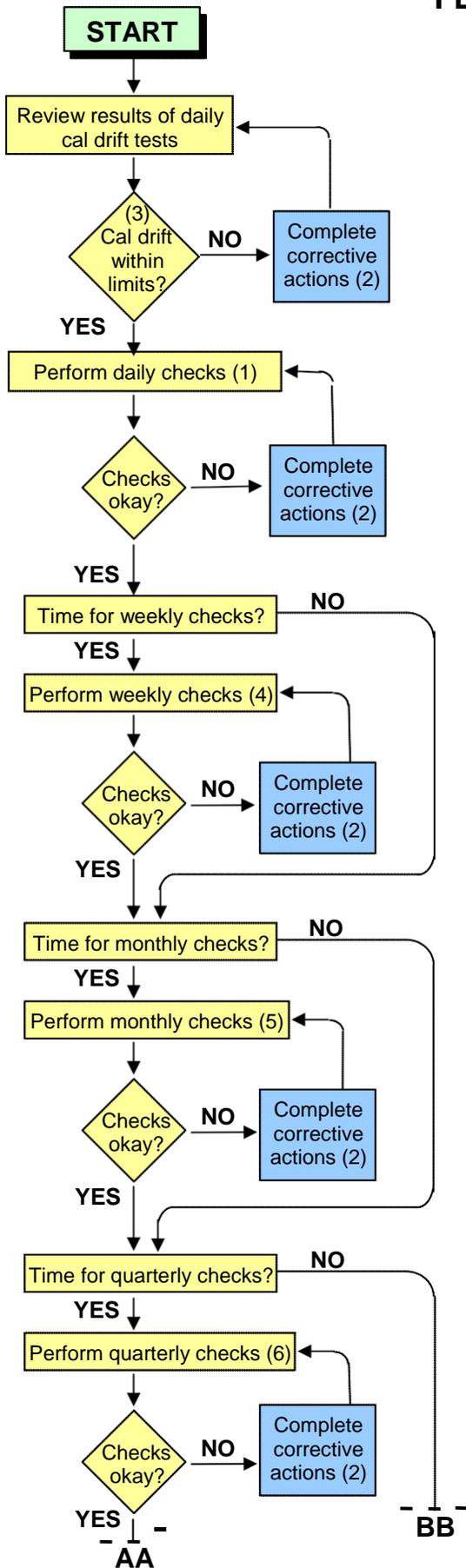
**NOTE:** Make sure that the maintenance time accounts for any “post-cal delay” period (configurable by system), which could result in a delay of several minutes before the first post-maintenance data point is collected.

- If the corrective actions required as a result of a forced or preventive maintenance check are excessive, a replacement monitor, if available, is installed. This allows time to examine and troubleshoot the problem component without adversely

affecting system operation or data collection. Figure 1-2 (left side) illustrates this process.

3. When a daily calibration error check shows an analyzer to be out of control, troubleshooting begins immediately. The following general steps are used to help isolate the problem. Figure 1-2 (right side) illustrates this process. (Refer to Section 10 for specific procedures for each analyzer.)
  - a. The out-of-control analyzer is visually inspected for normal operation (indicator lights, gauges, displays, etc.)
  - b. Another calibration is manually initiated. In some cases, the problem will clear itself and the new calibration check will show the analyzer to be within specifications.
  - c. The electronics checks recommended in the analyzer manufacturer's manuals are performed to check analyzer operation and help isolate the problem.
  - d. Internal voltages (lamps, PMTs, etc.) are checked to help isolate faulty components.
4. If there is a malfunction in any component or service of excessive duration is needed, a replacement component is installed while service is completed on the problem component.

# QAP ACTIVITY FLOW CHART



- NOTES:**
- (1) See Section 4 for daily activities
  - (2) See Section 10 for corrective actions
  - (3) See Section 1 for "out of control" periods
  - (4) See Section 5 for weekly activities
  - (5) See Section 6 for monthly activities
  - (6) See Section 7 for quarterly activities
  - (7) See Section 8 for semiannual activities
  - (8) See Section 9 for annual activities

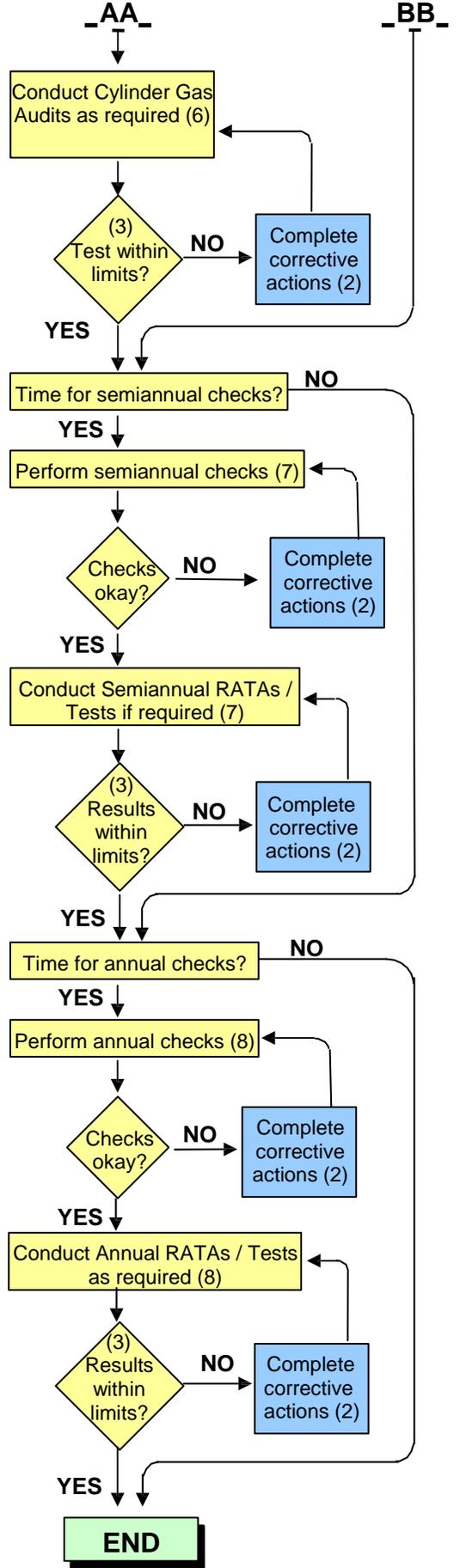


FIGURE 1-1

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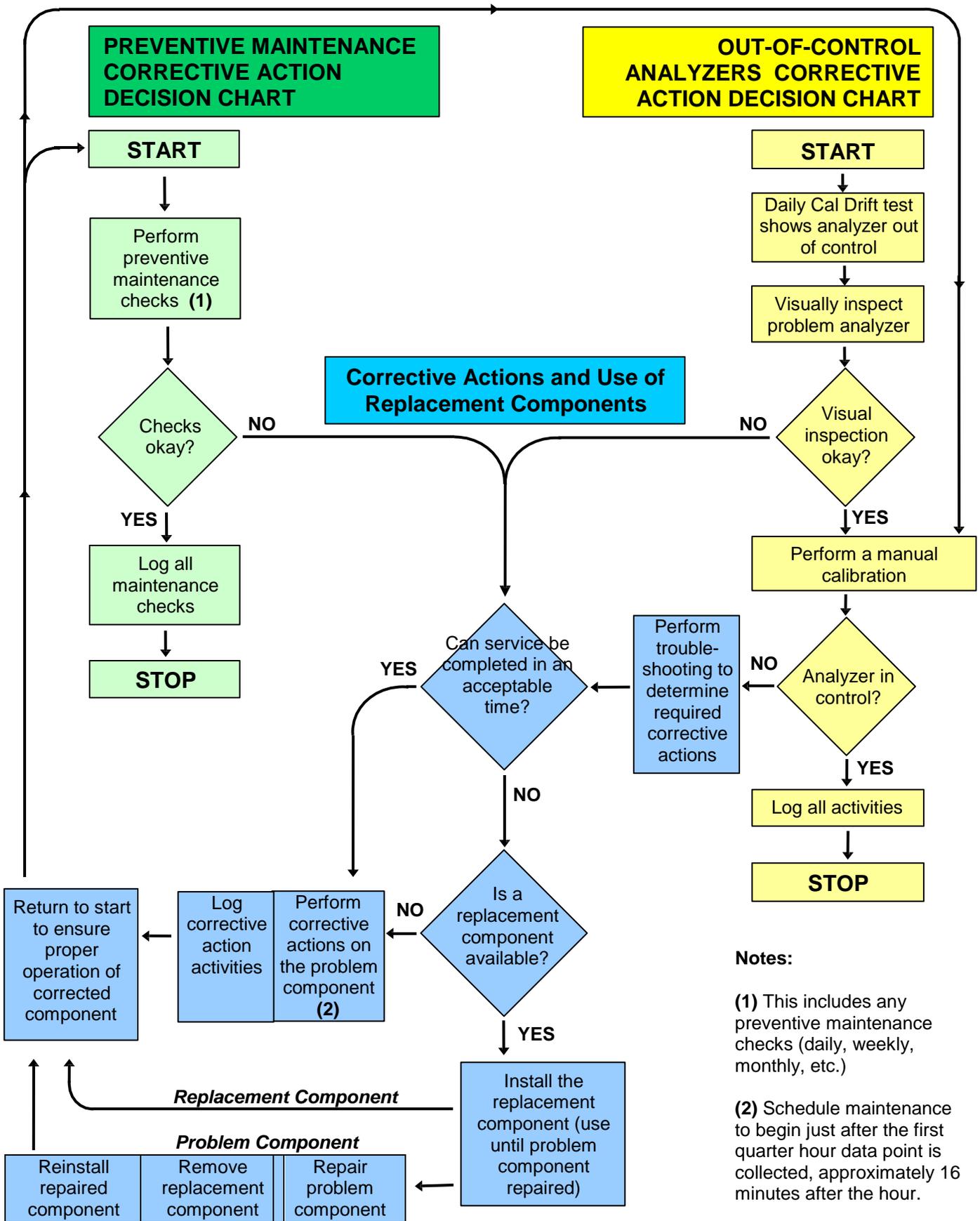


FIGURE 1-2

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## SECTION 2 PLANT/SITE OPERATION

### 2.1 UNIT DESCRIPTION

EnviroFocus Technologies operates a lead-acid battery recycling facility with a production capability of 150,000 tons per year of lead. The metallic lead and desulfurized lead salts from the battery breaker area are conveyed to the 40 ton per hour feed dryer to remove most of the moisture prior to being fed into the reverb furnace. The feed dryer is fueled by 10 mmBtu/hr natural gas burners. The reverb furnace is heated using 23 mmBtu/hr natural gas burners. Metallurgical coke will be combined with slag to help supply fuel for the blast furnace smelting process. Exhaust gases from both furnaces will be ducted to an afterburner, followed by a shaker-type baghouse and a wet scrubber before being combined with the exhaust gases from the feed dryer for discharge through the 130' process stack. Furnace tapping, charging and lead refining generate emissions that are termed as process fugitive emissions in the lead recycling process. This emissions unit includes the operations related to charging and tapping to collocate reverb and blast furnaces as well as the direct exhaust from the 10 refining kettles that receive and process lead from the furnaces. The emissions are captured by hooding, routed to a 72,000 acfm process fugitive emissions baghouse and exhausted through a 130' hygiene stack.

### 2.2 EMISSION STANDARDS

Emission standards applicable to Lead Smelter Process Stack at the EnviroFocus facility are governed by the US EPA in accordance with 40 CFR 60, plus the operating permit

### 2.3 QAP RESPONSIBILITIES

Responsibilities for implementation and maintenance of the QAP at EnviroFocus, Lead-Acid Battery Recycling Facility, are shared by various groups at EnviroFocus Technologies and Spectrum Systems, Inc.

*At the time of this writing*, the **Designated Representative** for EnviroFocus, is **Angela Fogarty (EnviroFocus Environmental Manager)**. She is responsible submitting the final reports to regulatory agencies in the appropriate format.

The **Environmental Manager** has the following responsibilities related to the QAP.

- Oversees ongoing implementation of the QAP and insures compliance.
- Enters reason codes/definitions for excess emission occurrences.
- Maintains files of CEMS data including reports, calibration error test results, QAP checklists, malfunction correction reports, etc.
- Compiles data in preparation for compliance reporting and submission to the applicable regulatory agencies
- Responsible for ensuring performance of the required periodic accuracy audits, including calibration gas audits (CGA), relative accuracy test audits (RATAs), etc.

The **Technical Manager** has the following responsibilities related to the QAP.

- Enters reason codes/definitions for excess emission occurrences.
- Implements alternate monitoring measures when required (e.g., stack opacity read by a trained observer during an outage of the opacity monitor).
- With assistance from the **Furnace Supervisor** when necessary, correct process upsets or other process conditions that result in excess emissions

The **Furnace Supervisors** have the following responsibilities related to the QAP.

- Perform daily CEMS preventive maintenance checks, such as verifying calibration error test results, etc.
- Monitor and respond to CEMS alarms on a 24-hour basis. Assistance from the **CEMS Maintenance Provider** and **EFT Maintenance** is provided as needed.
- Correct process upsets or other process conditions that result in excess emissions with assistance from the **Technical Manager** as needed.

The **EFT Maintenance Personnel** have the following responsibilities related to the QAP.

- With assistance from the **CEMS Maintenance Contractor**, perform all required corrective maintenance for the CEMS, including service to correct out-of-control conditions, service to eliminate CEMS alarm conditions, corrective actions required as a result of the preventive maintenance checks and any emergency service required to maintain the CEMS within operating specifications.

The **CEMS Maintenance Contractor (Spectrum Systems, Inc.)** has the following responsibilities related to the QAP.

- Perform all weekly, monthly, quarterly, semiannual and annual QAP preventive maintenance checks as defined in the QAP, and provide appropriate documentation.
- Performs quarterly accuracy audits (CGAs).
- Maintain a CEMS spare parts inventory.

The chain of custody for CEMS reports from the computer that prints out the reports at the CEMS location to the Designated Representative who submits them to the EPA is as follows: The Furnace Supervisors/Technical Manager submits Cal and Daily Reports to the EFT Environmental Manager, who is the Designated Representative at the time of this writing.

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## SECTION 3 CEMS DESCRIPTION

Teledyne Monitor Labs (TML) Model 675 Dilution Monitoring System is used to measure NO<sub>x</sub>, SO<sub>2</sub>, CO and Volumetric Flow at EnviroFocus Technologies, Lead Smelter Process Stack. NO<sub>x</sub>, SO<sub>2</sub> and Volumetric Flow is measured at EnviroFocus Technologies, Lead Smelter Hygiene Stack. These CEMS are described in the following paragraphs.

**Table 3-1 Analyzer Information – Process and Hygiene Stacks**

Unit	Analyzer	Ranges*	Manufacturer/Model	Serial No.
Process Stack	NO <sub>x</sub>	0-200 ppm	Teledyne Monitor Labs TML41	TBD
Process Stack	SO <sub>2</sub>	0-2,000 ppm	Teledyne Monitor Labs TML50	TBD
Process Stack	CO	0-2,000 ppm	Teledyne Monitor Labs TML30U	TBD
Process Stack	Flow	TBD in H <sub>2</sub> O	EMRC Flow Monitor	TBD
Hygiene Stack	NO <sub>x</sub>	0-200 ppm	Teledyne Monitor Labs TML41	TBD
Hygiene Stack	SO <sub>2</sub>	0-1,000 ppm	Teledyne Monitor Labs TML50	TBD
Hygiene Stack	Flow	TBD in H <sub>2</sub> O	EMRC Flow Monitor	TBD

\* Range was determined by permit conditions.

**Table 3-2 Sampling Location Information – Process and Hygiene Stacks**

Unit	Stack Exit Height (feet)	Platform Height (feet)	Stack ID (feet)	Accessed By?	Umbilical Length (Feet)
Process Stack	130	72	4.96	Ladder	~180
Hygiene Stack	130	43.3	6.96	Ladder	~110

### 3.1 TML MODEL 675 DILUTION MONITORING SYSTEM

The Model 675 is a dedicated continuous emission monitoring system using dilution sampling technology and low level pollutant analyzers to measure NO<sub>x</sub>, SO<sub>2</sub> and CO in accordance with the established regulations (Figure 3-1). Each phase of the sampling and analysis process is performed to maintain source compliance, while maximizing sensor reliability and equipment accuracy. The Model 675 network is composed of four subsystems -- sample acquisition, sample analysis, sample control, and sample support.

The sample acquisition subsystem includes the dilution probe, probe controller, sample transport and dilution air clean-up equipment. The dilution probe is an M & C SP2000-H. Constructed of stainless steel, the probe is mounted to a standard 4" mounting flange. This configuration is designed to withstand high operating temperatures. A filter for coarse particulate is mounted in the heated, "out-of-stack" dilution unit.

The heated sample transport umbilical includes 3/8" and 1/4" OD Teflon® gas lines. Lines include diluted sample, dilution air, bypass eductor air, calibration/back-purge, vacuum, and spare lines. The outer jacket of the umbilical is constructed of a polyurethane or PVC jacket. All umbilical compression fittings and interconnects are of either Swagelok® or Teflon® construction.

The dilution air clean-up system uses an air dryer / CO<sub>2</sub> scrubber and a CO scrubber. Using the plant compressed air supply, the dryer removes CO<sub>2</sub>, NO<sub>x</sub>, H<sub>2</sub>O, hydrocarbons, and particulate to provide dry, purified air for dilution. The CO scrubber is located prior to the CO<sub>2</sub> scrubber. This allows the CO<sub>2</sub> generated by the conversion of CO to be scrubbed by the air purifier. The dilution air supply is routed and stored in a clean air storage tank mounted in the CEMS rack.

The Dilution Plate monitors operation of the dilution probe, using a system of gauges, regulators, flowmeters and control devices. The Allen Bradley CompactLogix PLC and control module handles sampling, purging, and calibration cycles for the dilution system. The dilution air clean-up system provides scrubbed, dry air for the dilution and purging cycles. Calibration gas cylinders are connected to the CEMS system to provide the gases needed for daily zero and span calibration checks.

The sample analysis subsystem uses proven low level measurement technology to monitor NO<sub>x</sub>, SO<sub>2</sub>, CO, and Volumetric Flow. The Teledyne Monitor Labs Model TML41 measures NO<sub>x</sub>; the Teledyne Monitor Labs Model TML50 measures SO<sub>2</sub>; The Teledyne Monitor Labs Model TML30 measures CO and The EMRC Flow Monitor measures volumetric flow. See Sections 3.1.1 through 3.1.4 for additional information on each of these analyzers.

Sample control subsystem functions for the system are handled by an Allen Bradley PLC. The PLC integrates, controls and monitors all system functions including automatic calibrations and purges, fault/status monitoring, and cycle sequencing. The PLC also interfaces with the data acquisition and handling system used in conjunction with the Model 675. The configuration software in the PLC allows set-up of the sequence tables from an external personal computer when required.

The sample support subsystem consists of a CEMS rack with environmental controls, electrical distribution, uninterruptible power supply (UPS), and other components that provide the necessary operational environment for the system. An Uninterruptible Power Supply (UPS) provides backup power to support the CEMS equipment in the event of a primary power failure.

### **3.1.1 TELEDYNE MONITOR LABS TML-41 NO<sub>x</sub> ANALYZER**

Oxides of Nitrogen (NO<sub>x</sub>) are measured using a Teledyne Monitor Labs  analyzer. The  uses a gas-phase chemiluminescence detection to perform continuous analysis of nitric oxide (NO), total oxides of nitrogen (NO<sub>x</sub>), and nitrogen dioxide (NO<sub>2</sub>). The  analyzer design represents an advance in nitrogen oxides analysis technology achieved primarily by using adaptive microprocessor control of a single measurement channel. The instrument consists of a pneumatic system, a NO<sub>2</sub>-to-NO converter (MOLYCON), an O<sub>3</sub> generator, a reaction cell, a photo multiplier tube (PMT) detector and processing electronics.

The analysis of nitrogen oxides by means of chemiluminescence is generally acknowledged to be the best direct measurement technique. The method is based on the illumination of an activated molecular NO<sub>2</sub> species produced by the reaction between NO and O<sub>3</sub> in an evacuated chamber. The NO molecules react with ozone to form the activated species NO<sub>2</sub> and O<sub>2</sub>. As the activated species NO<sub>2</sub> reverts to a lower energy state, it emits broadband radiation from 500 to 3000 nm, with a maximum intensity at approximately 1100 nm. Because one NO molecule is required to form one (NO<sub>2</sub>) molecule, the intensity of the chemiluminescent reaction is directly proportional to the NO concentration in the sample. The PMT current is then directly proportional to the chemiluminescent intensity.

In practice, the light generated in the reaction cell comes not only from the reaction between NO and O<sub>3</sub>, but also from O<sub>3</sub> reaction with the cell walls and hydrocarbons in the sample. Additional chemiluminescence is produced, adding to the signal that is detected. Because changes in these reactions can be a primary source of zero drift, the  analyzer pneumatically switches the O<sub>3</sub> generator into the sample path once every 70 seconds. The analyzer performs a dynamic auto zero function by drawing

ambient air through the O<sub>3</sub> generator before entering the reaction cell. In this mode of operation, all chemiluminescence from NO and O<sub>3</sub> is hidden from the PMT. The signal generated during that time represents only the background and interference reaction and corresponds to a true zero offset of the instrument. It is electronically subtracted from all subsequent measurements to achieve very stable measurements.

This analyzer requires an external exhaust pump located in the bottom of the CEMS rack.

Refer to the NO<sub>x</sub> analyzer manual in the Systems Manual.

### **3.1.2 TELEDYNE MONITOR LABS TML-50 sensor SO<sub>2</sub> ANALYZER**

Sulfur dioxide (SO<sub>2</sub>) is measured using a Teledyne Monitor Labs **sensor ** analyzer. This analyzer is an advanced design analyzer which uses ultraviolet fluorescence technology to measure concentrations of SO<sub>2</sub>.

This analyzer measures the sample's SO<sub>2</sub> concentration based on the fluorescent radiation produced by SO<sub>2</sub> molecules when excited by ultraviolet radiation. The excitation ultraviolet is measured by a reference detector and the fluorescent radiation is measured by a photo multiplier tube (PMT). The two measurements are compared using a dual-channel technique to minimize the effects of variation in source intensity, optical contamination, and common PMT drift characteristics.

Aromatic hydrocarbons are removed by a unique “kicker” that uses differential partial pressure technique to selectively remove aromatics across a permeable membrane, without influencing the SO<sub>2</sub> sample.

The final concentration of SO<sub>2</sub> corrected for temperature and pressure changes, is displayed in units of parts per million.

Refer to the SO<sub>2</sub> analyzer manual in the Systems Manual.

### **3.1.3 TELEDYNE MONITOR LABS TML-30 sensor COANALYZER**

Carbon monoxide (CO) is measured by a Teledyne Monitor Labs **sensor ** analyzer. These analyzers employ a non-dispersive infrared (NDIR) photometer which uses gas filter correlation technology to measure low concentrations of CO accurately and reliably.

Infrared broadband radiation is passed through a rotating gas filter wheel where half of the wheel contains CO and half contains nitrogen. When the IR radiation passes through the CO half of the wheel, all wavelengths at which CO can absorb are completely

removed from the radiation, leaving those wavelengths that are unaffected by CO to create a reference beam.

When IR radiation passes through the nitrogen half of the wheel, CO-specific wavelengths are not removed from the radiation, and a measure beam attenuated by any CO in the sample is created. In effect, the rotation of the gas filter wheel creates a beam that alternates between reference and measure phases.

The alternating beam is passed through a multi-pass absorption cell where CO is monitored by measuring the attenuation of the measurement beam. Because both the reference and measure phases of the beam have the same source, detector, and optical path, only the amount of CO in the sample cell can affect the difference in intensity between the two phases. This methodology results in an instrument that is very insensitive to interfering gases, fluctuations in the IR source, vibration, and accumulation of dust on the optics.

The Ultralow CO analyzer utilizes gold-plated objective and field mirrors in the sample cell to maximize signal to noise performance. The optical bench is temperature-controlled to reduce instrument noise and temperature-related drift. Additionally, the Ultralow CO analyzer periodically monitors and corrects its baseline by routing an external air source through a heated platinum CO scrubber and into the optical bench. This Auto Reference function helps to correct any instrument drift and remove CO<sub>2</sub> interferences.

The final concentration of CO corrected for temperature and pressure changes is displayed in units of parts per million.

Refer to the CO analyzer manual in the Systems Manual.

### ***3.1.4 EMRC FLOW MONITOR***

The EMRC Gas Flow Monitor uses an insitu probe (type S pitot) to determine stack gas flow. Differential pressure is measured by open tubes on either side of the pitot (upstream and downstream relative to gas flow). Each open tube is directly connected to a signal conditioning module. After signal conditioning, the gas flow signal is channeled to the signal transducer module. The signal transducer produces a DC output which is routed to an electronic conditioner and interface. Temperature is measured by a separate thermocouple on the probe. The differential pressure and temperature signals thus generated are used to calculate gas velocity, when combined with a signal representing absolute stack pressure (input from another source) and assuming a gas density.

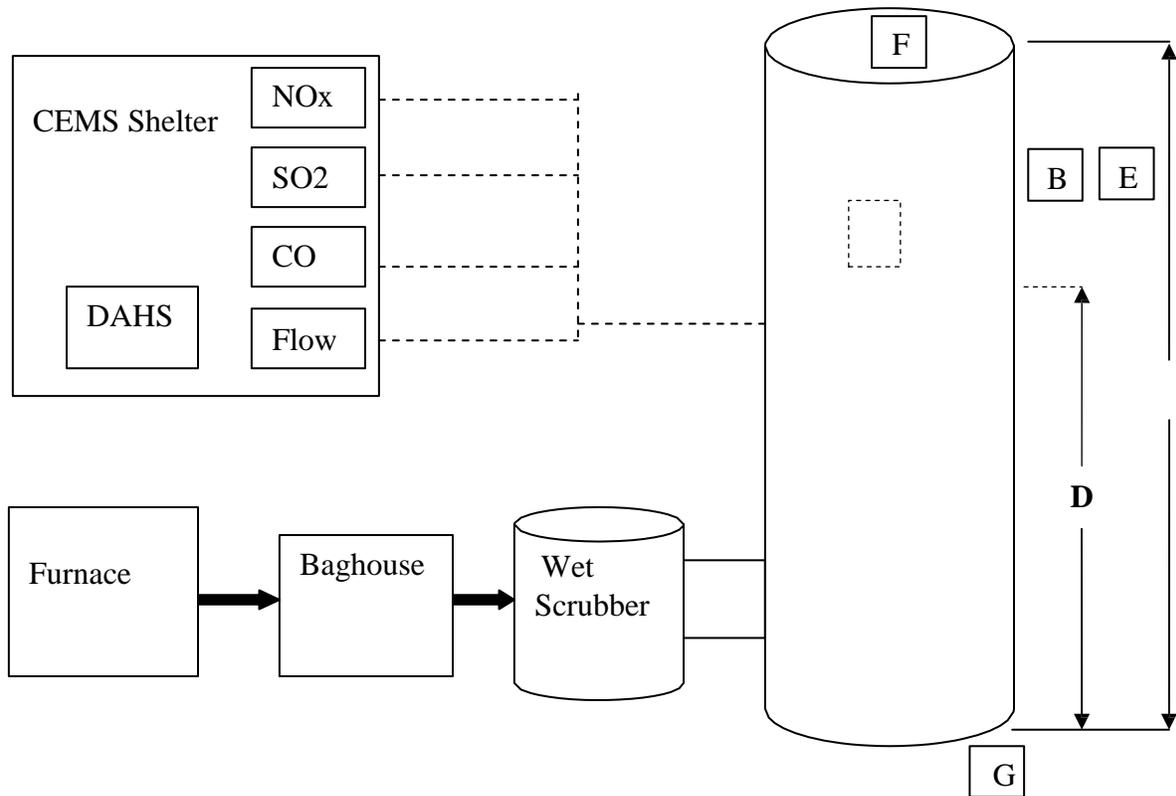
Refer to the Flow Monitor manual in the Systems Manual.

### **3.2 DATA ACQUISITION AND REPORTING**

Data acquisition and reporting functions are performed by Teledyne Monitor Labs RegPerfect®

The data acquisition system (DAS) includes an up to date server components complete with a printer. The server and workstation specifications vary. The DAS operates on Microsoft Windows Server operating system, Microsoft Office Professional and Microsoft SQL using Teledyne Monitor Labs RegPerfect software. RegPerfect includes a graphical user interface (GUI), Spotlight, which allows the operator to view real time alarms, real time data and current system parameters. RegPerfect collects, calculates and records data from the programmable logic controller through an Ethernet TCP/IP connection. This data may be reviewed in RegPerfect Reports. The DAS receives one-minute averages from the PLC for each parameter measured. The DAS performs the final data calculations and formats the data into reports required by local, state and federal agencies.

Refer to the DAS information in the Systems Manual.

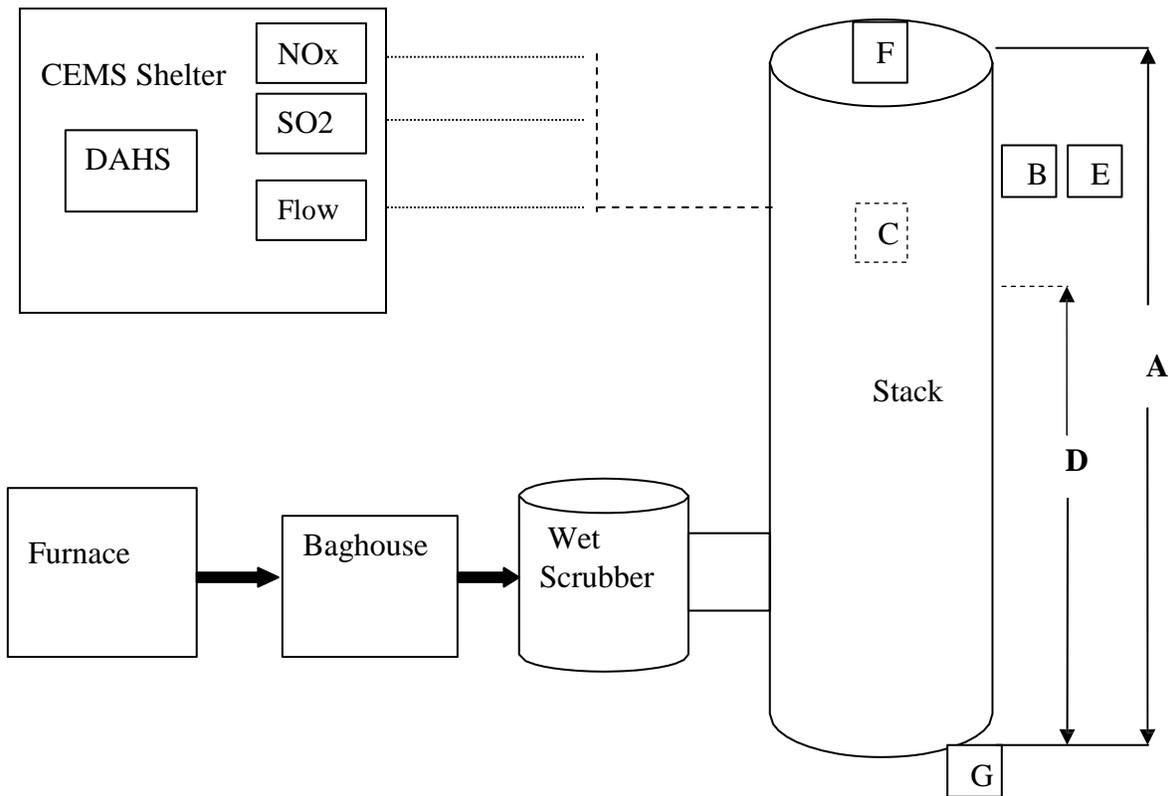


**Fig. 3-1 Process Stack Monitor Location**

**Monitor Location Information**

- A. Stack height above grade \_\_\_\_\_ 30.7 ft
- B. Stack diameter at test port \_\_\_\_\_ 4.9 ft
- C. Inside cross sect. area at test port \_\_\_\_\_ 18.9 ft<sup>2</sup>
- D Test port elevation
  - 1. Above grade \_\_\_\_\_ 72 ft
  - 2a. Above last disturbance \_\_\_\_\_ 18.8 ft
  - 2b. Stack diameters \_\_\_\_\_ 3.8
  - 3a. Prior to next disturbance \_\_\_\_\_ 58.8 ft
  - 3b. Stack diameters \_\_\_\_\_ 12
- E. Location of sample probe
  - 1. Above grade \_\_\_\_\_ 72 ft
  - 2a. Above last disturbance \_\_\_\_\_ 18.8 ft
  - 2b. Stack diameters \_\_\_\_\_ 3.8
  - 3a. Prior to next disturbance \_\_\_\_\_ 58.8 ft
  - 3b. Stack diameters \_\_\_\_\_ 12
- F. Inside cross sectional area at flue exit \_\_\_\_\_ 18.9ft<sup>2</sup>
- G. Stack base elevation \_\_\_\_\_ 30.7 ft

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**Fig. 3-2 Hygiene Stack Monitor Location**

**Monitor Location Information**

- A. Stack height above grade \_\_\_\_\_ 30.7 ft
- B. Stack diameter at test port \_\_\_\_\_ 7 ft
- C. Inside cross sect. area at test port \_\_\_\_\_ 38.5 ft<sup>2</sup>
- D Test port elevation
  - 1. Above grade \_\_\_\_\_ 43.3 ft
  - 2a. Above last disturbance \_\_\_\_\_ 19.5 ft
  - 2b. Stack diameters \_\_\_\_\_ 2.8
  - 3a. Prior to next disturbance \_\_\_\_\_ 7 ft
  - 3b. Stack diameters \_\_\_\_\_ 1
- E. Location of sample probe
  - 1. Above grade \_\_\_\_\_ 43.3 ft
  - 2a. Above last disturbance \_\_\_\_\_ 19.5 ft
  - 2b. Stack diameters \_\_\_\_\_ 2.8
  - 3a. Prior to next disturbance \_\_\_\_\_ 7 ft
  - 3b. Stack diameters \_\_\_\_\_ 1
- F. Inside cross sectional area at flue exit \_\_\_\_\_ 18.9ft<sup>2</sup>
- G. Stack base elevation \_\_\_\_\_ 30.7 ft

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## SECTION 4 DAILY ACTIVITIES

The daily activities required for the CEMS are contained in this section. Activities can generally be divided into three categories -- a check for active alarms, a check of the daily calibration error/drift test results for warning or out-of-control conditions, and routine preventive maintenance checks of the system and individual components.

Whenever warning, out-of-control or abnormal conditions are found, corrective actions are initiated as described in Section 10 of this manual and the equipment manufacturer's manuals.

Daily CEMS checks must be performed by the **Furnace Supervisors**.

The **Furnace Supervisors** must monitor for CEMS alarm conditions on a 24-hour basis, and correct alarm conditions if possible. If alarms are active and they are unable to correct the alarm condition, the **Technical Manager** must be notified immediately so that corrective actions can be taken.

The CEMS Daily Check form (Figure 4-1) must be completed as part of the daily routine. Each page of the form requires entry of the date and time, as well as the initials of the person performing the checks.

The remaining items on the form require entry of a value or an answer to an abbreviated yes or no (Y/N) question. All items must be completed each day. To answer the questions, enter a Y (yes) or N (no). The form is designed so that a Y (yes) answer to any question indicates a need for corrective action. In that way, the completed form can be scanned for Y responses to quickly determine what items need further attention. The values that must be recorded on the form are of help in detecting adverse trends and serve as an aid to troubleshooting.

### 4.1 ALARM CHECKS

The daily activities begin as early as possible each morning shift with a check for active system alarms, warnings or exceedances. Alarms, faults and exceedances can be checked on the Data Acquisition System (DAS) computer using the "Alarms" menu/screen. Note any active faults on the Daily Check form and initiate corrective actions as required.

Faults include such things as: Power Interrupt / UPS Alarm, Instrument Air Pressure Low Alarm, Instrument Rack High Temperature Alarm, Sample Probe Temperature Alarm, Exceedances, DAHS Faults, Analyzer General Faults, and General CEMS Faults.

The DAS fault includes a variety of conditions detected by the PLC including warning and out-of-control zero/span calibration check results.

## 4.2 CALIBRATION TESTS

Next, using the DAS computer, check the results of the daily calibration drift test for each measured parameter to determine if any warning or out-of-control conditions exist. Note on the Daily Check form if any analyzer is flagged in the warning or out-of-control condition. Out-of-control conditions require immediate corrective action. Warning conditions provide an early indication that problems may be developing. Warnings must be investigated and corrected to prevent out-of-control conditions from occurring. Following service to correct out-of-control or warning conditions, repeat the calibration drift check to ensure that the CEMS are operating within specifications.

The following table summarizes the calibration drift test warning and out-of-control limits that are currently used for the measured parameters, in accordance with 40 CFR 60.

<u>Parameter</u>	<u>Out-of-Control Limit</u>	<u>Warning Limit</u>
NO <sub>x</sub>	Not to exceed $\pm 5\%$ span for 5 consecutive days OR $\pm 10\%$ span for any 1 day	Not to exceed $\pm 2.5\%$ span
SO <sub>2</sub>	Not to exceed $\pm 5\%$ span for 5 consecutive days OR $\pm 10\%$ span for any 1 day	Not to exceed $\pm 2.5\%$ span
CO	Not to exceed $\pm 10\%$ span for 5 consecutive days OR $\pm 10\%$ span for any 1 day	Not to exceed $\pm 2.5\%$ span
Flow	Not to exceed $\pm 6\%$ span for 5 consecutive days OR $\pm 12\%$ span for any 1 day	Not to exceed $\pm 3\%$ span

**HINT:** When investigating out-of-control calibration drift test results, note whether or not all gas analyzers in the CEMS are drifting in the same direction. If so, this points to a problem with an element common to all analyzers such as calibration gas, sample probe, etc. If only a single analyzer is affected, perform troubleshooting on the individual analyzer and associated hardware.

## 4.3 DAILY CHECKS

After the calibration drift test evaluation and any required corrective actions are completed, the general system and analyzer checks must be completed. These are preventive maintenance checks that will help to identify problems that can lead to out-of-control conditions or other malfunctions. Begin with the general system checks described in the following paragraphs and itemized on the CEMS Daily Check form.

**CAUTION:** IF TAKING ANY STEP WHICH MAY RESULT IN INTERRUPTION OF POWER TO THE DAHS COMPUTER, IT IS RECOMMENDED THAT THE OPERATOR RUN A **PROPER SHUTDOWN PROCEDURE ON THE COMPUTER**, USING THE ONSCREEN COMMANDS. INTERRUPTION OF POWER WITHOUT PROPER SHUTDOWN MAY RESULT IN **SYSTEM LOCKUP AND DATA LOSS**.

### 4.3.1 GENERAL

- A. Listen for any leaks or other abnormalities in sound or smell. Check for unusual vibrations in any of the pumps.
- B. Check for normal temperature control within the CEMS shelter/rack.
- C. Check the plant air pressure gauge. It should read 90 psi or greater.
- D. Check the vacuum gauge on the probe controller and on the DAS computer. Record the value to two decimal places. The vacuum gauge reading should be more negative than -14.35" Hg. Minute changes in the reading over time indicate the need for corrective action.
- E. Check the dilution air pressure gauge on the probe controller and on the DAS computer. Record the value.
- F. Check and record the dilution ratio.
- G. Check and record the sample line temperature.
- H. Check and record the probe temperature.

#### **4.3.2 MODEL TML41 NO<sub>x</sub> ANALYZER**

- A. Record the current NO<sub>x</sub> effluent reading.
- B. Record the current sample flow rate to the analyzer. Flow rate may be checked by using the Test Function menu on the analyzer display. See Section 6.2 of the manufacturer's manual for more detail on sample flow rate. The analyzer's internal flow alarm can be programmed to go off if sample flow deviates from a desired range. See the manufacturer's manual for setting this alarm.

#### **4.3.3 MODEL TML50 CO<sub>2</sub> ANALYZER**

- A. Record the current SO<sub>2</sub> effluent reading.
- B. Record the current sample flow rate to the analyzer. Flow rate may be checked by using the Test Function menu on the analyzer display. See Section 6.2 of the manufacturer's manual for more detail on sample flow rate. The analyzer's internal flow alarm can be programmed to go off if sample flow deviates from a desired range. See the manufacturer's manual for setting this alarm.

#### **4.3.4 MODEL TML30 CO ANALYZER**

- A. Record the current CO effluent reading.

#### **4.3.5 EMRC FLOW MONITOR**

- A. Record the current flow reading.

#### **4.3.6 DMRS (DATA MANAGEMENT AND REPORTING SYSTEM) COMPUTER**

- A. Check the computer and printer for normal operation and adequate supplies. Is there a sufficient supply of printer paper? Is the paper feeding correctly? Is the printout legible? Does the printer cartridge need replacing? (If used)
- B. If a daily data backup is being performed (to a server, tape, etc.), verify that the daily data backup was successfully completed. If not, take corrective action. (If used)

## **4.4 SPARE PARTS**

A recommended spare parts inventory for the CEMS is given in Appendix C for reference.

## **4.5 DAILY LOG ENTRIES**

Any time corrective action is required for CEMS equipment, the Corrective Action Report form (Section 10) must be completed and a descriptive entry must be made in a daily log kept on site. In that way, the daily log will serve as a complete and easily accessible record of activities by date, time and responsible party. The DAS automatically records such things as alarms and daily calibration error checks and results.

Log entries are required for all CEMS corrective action activity regardless of the origin or cause of the problem. For example, any preventive maintenance check items (daily, weekly, monthly, etc.) found to be deficient or faulty require corrective action and a computer log entry. Corrective actions to correct warning or out-of-control calibration results must be documented in the daily log. Parts replacements or equipment upgrades must be recorded in the daily log.

Log entries must include sufficient detail so that anyone reading the entry can understand why the corrective action was needed, what procedures were performed, what parts were used, and the condition of the CEMS equipment following service activity. If the problem is first noted by one person and then referred to another person, department, or service contractor, all parties must make a log entry. The first person will describe the problem and note who was contacted for service. The service person will note what actions are taken, what parts are used, and the condition of the equipment following service. If service is delayed for any reason, entries should be made periodically to note the status of the equipment until the problem is corrected.

The following items must be included as applicable with each log entry.

1. Date and time the problem occurred
2. Name(s) of person who responds
3. Name(s) of any others involved in problem resolution
4. Corrective actions performed
5. Parts used (by part number)
6. Equipment readings/indicators
7. The last statement in any log entry should indicate one of the following:

- a. the problem was satisfactorily resolved, CEMS operating normally and within specs,
- b. the problem was not satisfactorily resolved and the continued activity required, or
- c. the problem was not satisfactorily resolved, the CEMS is out-of-control and the continued activity required.

The following are sample log entries that can be used as a guide to the type of entry and level of detail required.

### **SAMPLE #1**

Responded to rack temp. high alarm at 12:30, 11/12/93. HVAC thermostat incorrectly set. Thermostat adjusted at 12:50, 11/12/93. Alarm cleared. John Doe

Normal rack temp verified at 1:15 PM. John Doe

### **SAMPLE #2**

Out-of-control cal on NO<sub>x</sub> analyzer received at 8 PM, 12/15/93. Manual calibration initiated at 8:10 AM. Recal showed NO<sub>x</sub> analyzer within specs. Alarm cleared. John Doe

### **SAMPLE #3**

Out-of-control NO<sub>x</sub> analyzer alarm received at 8:15 AM, 12/20/93. Manual cal initiated at 8:30 AM. Analyzer still out-of-control. I&C supervisor contacted at 8:45 AM by John Doe.

Investigated OOC NO<sub>x</sub> analyzer alarm at 9:30 am, 12/20/93. All analyzers found to be drifting in the same direction. Probe maintenance and cleaning indicated. C. Greene. Probe pulled and cleaned at 10:00 am, 12/20/93. Reinstalled at 10:45 am. Manual calibration of all analyzer initiated. Out-of-control condition on NO<sub>x</sub> analyzer cleared. All analyzers within specs. C. Greene and R.

**ENVIROFOCUS TECHNOLOGIES, LLC.  
LEAD SMELTER PROCESS STACK  
CEMS DAILY CHECK FORM (page 1)**

	MON	TUE	WED	THU	FRI	SAT	SUN
<b>DATE:</b>							
<b>TIME STARTED:</b>							
<b>TIME COMPLETED:</b>							
<b>INITIALS:</b>							
<b>SYSTEM ALARM CHECKS</b>							
POWER INTERRUPT / UPS ALARM? (Y/N)							
AIR PRESSURE LOW? (Y/N)							
RACK TEMP HIGH? (Y/N)							
PROBE TEMPERATURE ALARM? (Y/N)							
DAHS FAULT? (Y/N)							
ANALYZER GENERAL FAULT? (Y/N)							
CEMS GENERAL FAULT? (Y/N)							
EXCEEDANCES? (Y/N)							
OTHERS? (SPECIFY)							
<b>CALIBRATION ERROR TESTS</b>							
ANY OOC CALIBRATIONS? (Y/N) (SEE DAILY LOG)							
ANY WARNING CALIBRATIONS? (Y/N) (SEE DAILY LOG)							
IF YES MARKED FOR EITHER OF THE ABOVE, PROVIDE SPECIFIC INFORMATION IN COMMENT SECTION.							
OOO = OUT OF CONTROL							
<b>COMMENTS</b>							

**ANY YES (Y) RESPONSE  
REQUIRES CORRECTIVE ACTION.**

(continued on next page)

FIGURE 4-1

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	MON	TUE	WED	THU	FRI	SAT	SUN
<b>DATE:</b>							
<b>TIME STARTED:</b>							
<b>TIME COMPLETED:</b>							
<b>INITIALS:</b>							
<b>GENERAL CHECKS</b>							
LEAKS IN EVIDENCE? (Y/N)							
UNUSUAL PUMP VIBRATIONS? (Y/N)							
PLANT AIR PRESSURE <90 PSI? (Y/N)							
RECORD SHELTER TEMPERATURE °F:							
RECORD VACUUM GAUGE VALUE:							
RECORD DILUTION AIR PRESS VALUE:							
RECORD DILUTION RATIO :1 :							
RECORD SAMPLE LINE TEMPERATURE °F:							
RECORD PROBE TEMPERATURE °F:							
<b>MODEL TML41 NOX ANALYZER</b>							
RECORD CURRENT EFFLUENT READ:							
RECORD CURRENT SAMPLE FLOW RATE:							
<b>MODEL TML50 SO2 ANALYZER</b>							
RECORD CURRENT EFFLUENT READ:							
RECORD CURRENT SAMPLE FLOW RATE:							
<b>MODEL TML30 CO ANALYZER</b>							
RECORD CURRENT EFFLUENT READ:							
RECORD CURRENT SAMPLE FLOW RATE:							
<b>MODEL EMRC FLOW MONITOR</b>							
RECORD CURRENT FLOW RATE:							
<b>DATA ACQUISITION SYSTEM</b>							
COMPUTER PAPER SUPPLY EXHAUSTED? (if used)(Y/N)							
TAPE BACKUP NOT COMPLETED? (if used) (Y/N)							
<b>COMMENTS</b>							

ANY YES (Y) RESPONSE  
REQUIRES CORRECTIVE ACTION.

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**ENVIROFOCUS TECHNOLOGIES, LLC.  
LEAD REFINING HYGIENE STACK  
CEMS DAILY CHECK FORM (page 1)**

	MON	TUE	WED	THU	FRI	SAT	SUN
<b>DATE:</b>							
<b>TIME STARTED:</b>							
<b>TIME COMPLETED:</b>							
<b>INITIALS:</b>							
<b>SYSTEM ALARM CHECKS</b>							
POWER INTERRUPT / UPS ALARM? (Y/N)							
AIR PRESSURE LOW? (Y/N)							
RACK TEMP HIGH? (Y/N)							
PROBE TEMPERATURE ALARM? (Y/N)							
DAHS FAULT? (Y/N)							
ANALYZER GENERAL FAULT? (Y/N)							
CEMS GENERAL FAULT? (Y/N)							
EXCEEDANCES? (Y/N)							
OTHERS? (SPECIFY)							
<b>CALIBRATION ERROR TESTS</b>							
ANY OOC CALIBRATIONS? (Y/N) (SEE DAILY LOG)							
ANY WARNING CALIBRATIONS? (Y/N) (SEE DAILY LOG)							
IF YES MARKED FOR EITHER OF THE ABOVE, PROVIDE SPECIFIC INFORMATION IN COMMENT SECTION.							
OOO = OUT OF CONTROL							
<b>COMMENTS</b>							

**ANY YES (Y) RESPONSE  
REQUIRES CORRECTIVE ACTION.**

(continued on next page)

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	MON	TUE	WED	THU	FRI	SAT	SUN
<b>DATE:</b>							
<b>TIME STARTED:</b>							
<b>TIME COMPLETED:</b>							
<b>INITIALS:</b>							
<b>GENERAL CHECKS</b>							
LEAKS IN EVIDENCE? (Y/N)							
UNUSUAL PUMP VIBRATIONS? (Y/N)							
PLANT AIR PRESSURE <90 PSI? (Y/N)							
RECORD SHELTER TEMPERATURE °F:							
RECORD VACUUM GAUGE VALUE:							
RECORD DILUTION AIR PRESS VALUE:							
RECORD DILUTION RATIO :1 :							
RECORD SAMPLE LINE TEMPERATURE °F:							
RECORD PROBE TEMPERATURE °F:							
<b>MODEL TML41 NOX ANALYZER</b>							
RECORD CURRENT EFFLUENT READ:							
RECORD CURRENT SAMPLE FLOW RATE:							
<b>MODEL TML50 SO2 ANALYZER</b>							
RECORD CURRENT EFFLUENT READ:							
RECORD CURRENT SAMPLE FLOW RATE:							
<b>MODEL EMRC FLOW MONITOR</b>							
RECORD CURRENT FLOW RATE:							
<b>DATA ACQUISITION SYSTEM</b>							
COMPUTER PAPER SUPPLY EXHAUSTED? (if used)(Y/N)							
TAPE BACKUP NOT COMPLETED? (if used) (Y/N)							
<b>COMMENTS</b>							

**ANY YES (Y) RESPONSE  
REQUIRES CORRECTIVE ACTION.**

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## SECTION 5 WEEKLY ACTIVITIES

The weekly activities for the CEMS are contained in this section. The activities consist of preventive maintenance routines designed to keep all CEMS components operating within specifications. Only those components that require weekly routines are listed here.

Performance of the weekly preventive maintenance routines is the responsibility of **CEMS Maintenance Contractor (Spectrum Systems, Inc)**.

The CEMS Weekly Check form (Figure 5-1) is completed as part of the weekly routine. The date/time the routines were started and completed and the initials of the person performing the procedures are recorded at the top of the form. The remaining items on the form require either a check mark (☑) to indicate that a procedure was completed or a Y (yes) or N (no) answer to check questions. A Y (yes) answer to any question indicates a need for corrective action. Corrective actions are provided in Section 10 of this manual and the manufacturer's manuals for equipment components.

Any time corrective action is required for CEMS equipment, the Corrective Action Report form (Section 10) must be completed and a descriptive entry must be made in the daily log as described in Section 4.5 of this manual.

The following paragraphs describe the required procedures and checks as outlined on the CEMS Weekly Check form.

**CAUTION: IF TAKING ANY STEP WHICH MAY RESULT IN INTERRUPTION OF POWER TO THE DAHS COMPUTER, IT IS RECOMMENDED THAT THE OPERATOR RUN A PROPER SHUTDOWN PROCEDURE ON THE COMPUTER, USING THE ONSCREEN COMMANDS. INTERRUPTION OF POWER WITHOUT PROPER SHUTDOWN MAY RESULT IN SYSTEM LOCKUP AND DATA LOSS.**

### 5.1 WEEKLY CHECKS

#### 5.1.1 GENERAL CHECKS

- A. Recalibrate analyzers if needed.

- B. Sweep and dust interior of shelter in the vicinity of the CEMS rack. Accumulated dust and dirt may interfere with proper operation of CEMS equipment. Inspect shelter interior for any obvious defects which may effect operation of CEMS equipment.

### **5.1.2 PLANT AIR SUPPLY**

- A. Inspect instrument air coalescing filters, replace as needed.

### **5.1.3 MODEL TML41 NO<sub>x</sub> ANALYZER**

- A. Replace particulate filter.
  - 1. Turn OFF the pump to prevent drawing debris into the sample line.
  - 2. Remove the CE Mark locking screw in the center of the front panel and open the hinged front panel and unscrew the knurled retaining ring of the filter assembly.
  - 3. Carefully remove the retaining ring, glass window, PTFE O-ring and filter element. Clean the glass and O-rings at least once monthly, weekly in very polluted areas.
  - 4. Install a new filter element, carefully centering it in the bottom of the holder.
  - 5. Re-install the PTFE O-ring with the **NOTCHES FACING UP**, the glass cover, then screw on the hold-down ring and hand-tighten the assembly. Inspect the visible seal between the edges of the glass window and the O-ring to assure proper tightness.
  - 6. To fulfill CE Mark safety requirements, the front panel locking screw must be installed at all times during operation of the analyzer.
  - 7. Re-start the analyzer.
- B. Inspect the external dryer media (if used), replace as needed.
- C. Verify Test Functions. Compare the test functions on the analyzer to the values measured on the instrument at the factory and recorded on the Final Test and Validation Data Form. See section 9.2 of the manufactures manual for details.

#### **5.1.4 MODEL TML50 SO<sub>2</sub> ANALYZER**

- A. Replace particulate filter.
1. Turn OFF the pump to prevent drawing debris into the sample line.
  2. Open the hinged front panel and unscrew the knurled retaining ring of the filter assembly.
  3. Carefully remove the retaining ring, glass window, PTFE O-ring and filter element. Clean the glass and O-rings at least once monthly, weekly in very polluted areas.
  4. Install a new filter element, carefully centering it in the bottom of the holder.
  5. Re-install the PTFE O-ring with the **NOTCHES FACING UP**, the glass cover, then screw on the hold-down ring and hand-tighten the assembly. Inspect the visible seal between the edges of the glass window and the O-ring to assure proper tightness.
  6. Re-start the analyzer.
- B. Verify Test Functions. Compare the test functions on the analyzer to the values measured on the instrument at the factory and recorded on the Final Test and Validation Data Form. See section 9.2 of the manufactures manual for details.

#### **5.1.5 MODEL TML30 CO ANALYZER**

- A. Replace particulate filter.
1. Turn OFF the pump to prevent drawing debris into the sample line.
  2. Open the hinged front panel and unscrew the knurled retaining ring of the filter assembly.
  3. Carefully remove the retaining ring, glass window, PTFE O-ring and filter element. Clean the glass and O-rings at least once monthly, weekly in very polluted areas.
  4. Install a new filter element, carefully centering it in the bottom of the holder.

5. Re-install the PTFE O-ring with the **NOTCHES FACING UP**, the glass cover, then screw on the hold-down ring and hand-tighten the assembly. Inspect the visible seal between the edges of the glass window and the O-ring to assure proper tightness.
6. Re-start the analyzer.

B. Verify Test Functions. Compare the test functions on the analyzer to the values measured on the instrument at the factory and recorded on the Final Test and Validation Data Form. See section 9.5 of the manufactures manual for details.

#### ***5.1.6 CALIBRATION GAS CYLINDERS***

- A. Record the expiration date and pressure of each calibration gas cylinder. Verify that each calibration gas cylinder has a minimum of 200 psig and is not expired. If the cylinder contains less than 200 psig or is expired, replace the cylinder.

NOTE: The calibration gas cylinders can be equipped with optional pressure switches that provide a warning when the pressure in the bottle drops below a preset level (adjustable from 190 to 600psi).

**ENVIROFOCUS TECHNOLOGIES, LLC.  
LEAD SMELTER PROCESS STACK  
CEMS WEEKLY CHECK FORM**

DATE: \_\_\_\_\_

TIME STARTED: \_\_\_\_\_

INITIALS: \_\_\_\_\_

TIME COMPLETED: \_\_\_\_\_

<b>GENERAL CHECKS</b>				
RECALIBRATE ANALYZERS IF NEEDED (9)				
SWEEP, DUST, INSPECT SHELTER INTERIOR (9)				
<b>PLANT AIR SUPPLY</b>				
INSPECT INSTRUMENT AIR COALESCING FILTER (9)				
<b>MODEL TML41 NOX ANALYZER</b>				
CHANGE PARTICULATE FILTER (9)				
EXTERNAL DRYER MEDIA EXHAUSTED? (if used) (Y/N)				
VERIFY TEST FUNCTIONS (9)				
ZERO / SPAN CHECK (EVALUATE OFFSET AND SLOPE) (9)				
<b>MODEL TML50 SO2 ANALYZER</b>				
CHANGE PARTICULATE FILTER (9)				
VERIFY TEST FUNCTIONS (9)				
ZERO / SPAN CHECK (EVALUATE OFFSET AND SLOPE) (9)				
<b>MODEL TML30 CO ANALYZER</b>				
CHANGE PARTICULATE FILTER (9)				
VERIFY TEST FUNCTIONS (9)				
<b>CALIBRATION GAS CYLINDERS</b>				
	<b>CV1</b>	<b>CV2</b>	<b>CV3</b>	<b>CV4</b>
EXPIRATION DATE				
CYLINDER PRESSURE				
<b>COMMENTS:</b>				

**ANY YES (Y) RESPONSE  
REQUIRES CORRECTIVE ACTION**

FIGURE 5-1

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## LEAD REFINING HYGIENE STACK CEMS WEEKLY CHECK FORM

DATE: \_\_\_\_\_

TIME STARTED: \_\_\_\_\_

INITIALS: \_\_\_\_\_

TIME COMPLETED: \_\_\_\_\_

<b>GENERAL CHECKS</b>				
RECALIBRATE ANALYZERS IF NEEDED (9)				
SWEEP, DUST, INSPECT SHELTER INTERIOR (9)				
<b>PLANT AIR SUPPLY</b>				
INSPECT INSTRUMENT AIR COALESCING FILTER (9)				
<b>MODEL TML41 NOX ANALYZER</b>				
CHANGE PARTICULATE FILTER (9)				
EXTERNAL DRYER MEDIA EXHAUSTED? (if used) (Y/N)				
VERIFY TEST FUNCTIONS (9)				
ZERO / SPAN CHECK (EVALUATE OFFSET AND SLOPE) (9)				
<b>MODEL TML50 SO2 ANALYZER</b>				
CHANGE PARTICULATE FILTER (9)				
VERIFY TEST FUNCTIONS (9)				
ZERO / SPAN CHECK (EVALUATE OFFSET AND SLOPE) (9)				
<b>CALIBRATION GAS CYLINDERS</b>				
	CV1	CV2	CV3	CV4
EXPIRATION DATE				
CYLINDER PRESSURE				
<b>COMMENTS:</b>				

**ANY YES (Y) RESPONSE  
REQUIRES CORRECTIVE ACTION**

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## SECTION 6 MONTHLY ACTIVITIES

The monthly activities for the CEMS are contained in this section. Figure 6-1 summarizes the required activities in a checklist format and the following paragraphs provide step-by-step instructions for each activity.

Performance of the monthly preventive maintenance routines is the responsibility of **CEMS Maintenance Contractor (Spectrum Systems, Inc)**.

The CEMS Monthly Check form (Figure 6-1) is completed as part of the monthly routine. The date/time the routines were started and completed, and the initials of the person performing the procedures are recorded at the top of the form. The remaining items on the form require either a check mark (☑) to indicate that a procedure was completed or a Y (yes) or N (no) answer to check questions. A Y (yes) answer to any question indicates a need for corrective action. Corrective actions are provided in Section 10 of this manual and the manufacturer's manuals for equipment components.

The following paragraphs describe the required procedures and checks as outlined on the CEMS Monthly Check form.

**CAUTION:** IF TAKING ANY STEP WHICH MAY RESULT IN INTERRUPTION OF POWER TO THE DAHS COMPUTER, IT IS RECOMMENDED THAT THE OPERATOR RUN A **PROPER SHUTDOWN PROCEDURE ON THE COMPUTER**, USING THE ONSCREEN COMMANDS. INTERRUPTION OF POWER WITHOUT PROPER SHUTDOWN MAY RESULT IN **SYSTEM LOCKUP AND DATA LOSS**.

### 6.1 MONTHLY CHECKS

#### 6.1.1 GENERAL CHECKS

- A. Inspect sample pump, rebuild head as needed.

#### 6.1.2 M&C SAMPLE PROBE

**CAUTION:** BEFORE REMOVING THE PROBE FROM THE STACK, ATTACH A TEMPORARY GROUNDING STRAP, AS STATIC ELECTRICITY CAN BUILD UP WHEN THE PROBE IS TAKEN OUT.

**CAUTION:** USE PROTECTIVE EQUIPMENT WHEN REMOVING THE PROBE FROM THE STACK AS THE PROBE WILL BE HEATED TO STACK TEMPERATURE. ALLOW THE PROBE TO COOL BEFORE PERFORMING ANY MAINTENANCE.

- A. Inspect the filter element using the following procedure.
1. Close ball valve (if fitted). Flush probe in case of toxic gases!
  2. Open pressure clamps and remove probe protective shield.
  3. Loosen U-bolt, swing retaining bolt to left, hold filter receptacle by the ring and draw out.
  4. Screw out the filter's knurled screw and remove filter element.
  5. Inspect filter element and replace if necessary.
  6. Check filter element gaskets and replace if necessary.
  7. Check the O-rings in the lid and replace if necessary.
  8. Clean filter chamber if necessary.
  9. If desired, it is now possible to rod through the probe tube to remove deposits.
  10. Replace filter receptacle, swing retaining bolt to the right, and tighten U-bolt firmly.
  11. Replace protective shield.
  12. Open ball valve (if fitted).
- B. Inspect probe straw (tube), remove built up particulate matter.

### **6.1.3 MODEL TML41 NO<sub>x</sub> ANALYZER**

- A. Inspect NO<sub>x</sub> exhaust pump for unusual vibrations or noises. Check the RCEL pressure reading, the value should be less than 10 in-Hg-A.

#### **6.1.4 SAMPLE TRANSPORT UMBILICAL**

- A. Inspect the probe umbilical for condensation or particle build up.

The integrity of the umbilical should be checked for possible tears and cracks to its protective coating. All supporting fixtures should be visually checked for possible damage. Sagging of the line may provide clues to improper support or insufficient clamps. Pay particular attention to objects left in the vicinity of the line. Sharp edges and improperly secured equipment could result in irreparable damage to the umbilical. Ensure that the line is not kinked at the penetration manifold and check the umbilical, especially near high traffic areas, for hand holds or compressions.

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**ENVIROFOCUS TECHNOLOGIES, LLC.  
LEAD SMELTER PROCESS STACK  
CEMS MONTHLY CHECK FORM**

DATE: \_\_\_\_\_

TIME STARTED: \_\_\_\_\_

INITIALS: \_\_\_\_\_

TIME COMPLETED: \_\_\_\_\_

<b>GENERAL CHECKS</b>	
INSPECT SAMPLE PUMP (9)	
<b>M&amp;C SAMPLE PROBE</b>	
INSPECT PROBE FILTER AND GASKETS (9)	
INSPECT PROBE STRAW (9)	
<b>MODEL TML41 NOX ANALYZER</b>	
INSPECT NO <sub>x</sub> PUMP (9)	
<b>SAMPLE UMBILICAL</b>	
VISIBLE CONDENSATION IN LINES? (Y/N)	
VISIBLE PARTICULE BUILD UP IN LINES? (Y/N)	
UMBILICAL BROKEN/CRACKED? (Y/N)	
UMBILICAL SAGGING/KINKED? (Y/N)	
<b>COMMENTS:</b>	

*ANY YES (Y) RESPONSE  
REQUIRES CORRECTIVE ACTION.*

FIGURE 6-1

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**LEAD REFINING HYGIENE STACK  
CEMS MONTHLY CHECK FORM**

DATE: \_\_\_\_\_

TIME STARTED: \_\_\_\_\_

INITIALS: \_\_\_\_\_

TIME COMPLETED: \_\_\_\_\_

<b>GENERAL CHECKS</b>	
INSPECT SAMPLE PUMP (9)	
<b>M&amp;C SAMPLE PROBE</b>	
INSPECT PROBE FILTER AND GASKETS (9)	
INSPECT PROBE STRAW (9)	
<b>MODEL TML41 NOX ANALYZER</b>	
INSPECT NO <sub>x</sub> PUMP (9)	
<b>SAMPLE UMBILICAL</b>	
VISIBLE CONDENSATION IN LINES? (Y/N)	
VISIBLE PARTICULE BUILD UP IN LINES? (Y/N)	
UMBILICAL BROKEN/CRACKED? (Y/N)	
UMBILICAL SAGGING/KINKED? (Y/N)	
<b>COMMENTS:</b>	

**ANY YES (Y) RESPONSE  
REQUIRES CORRECTIVE ACTION.**

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## SECTION 7 QUARTERLY ACTIVITIES

The quarterly activities required for the CEMS are contained in this section. Figure 7-1 summarizes the required activities in a checklist format and the following paragraphs provide step-by-step instructions for each activity.

Performance of the quarterly preventive maintenance routines and the quarterly cylinder gas audits (CGAs) rests with the **CEMS Maintenance Contractor (Spectrum Systems, Inc)**.

The CEMS Quarterly Check form (Figure 7-1) is completed as part of the quarterly routine. The date/time the routines were started and completed, and the initials of the person performing the procedures are recorded at the top of the form. The remaining items on the form require either a check mark (☉) to indicate that a procedure was completed or a Y (yes) or N (no) answer to check questions. A Y (yes) answer to any question indicates a need for corrective action. Corrective actions are provided in Section 10 of this manual and the manufacturer's manuals for equipment components.

The following paragraphs describe the required procedures and checks as outlined on the CEMS Quarterly Check form.

**CAUTION:** IF TAKING ANY STEP WHICH MAY RESULT IN INTERRUPTION OF POWER TO THE DAHS COMPUTER, IT IS RECOMMENDED THAT THE OPERATOR RUN A **PROPER SHUTDOWN PROCEDURE ON THE COMPUTER**, USING THE ONSCREEN COMMANDS. INTERRUPTION OF POWER WITHOUT PROPER SHUTDOWN MAY RESULT IN **SYSTEM LOCKUP AND DATA LOSS**.

### 7.1 QUARTERLY CHECKS

#### 7.1.1 GENERAL CHECKS

- A. Inspect all instruments for visible defects, loose connectors, cracked or clogged lines, excessive dirt or dust. Clean/repair as needed.

NOTE: do not use solvents or other cleaning products to clean the outside of the analyzers.

- B. Replace O<sub>3</sub> scrubber media. Refer to Teledyne System Manual.

- C. Replace NH<sub>3</sub> scrubber assembly. Refer to Teledyne System Manual.

### **7.1.2 MODEL TML41 NO<sub>x</sub> ANALYZER**

**CAUTION:** SOME INTERNAL COMPONENTS OF THE TML 41 CAN BE DAMAGED BY SMALL AMOUNTS OF STATIC ELECTRICITY. A PROPERLY GROUNDED ANTISTATIC WRIST STRAP MUST BE WORN WHILE HANDLING ANY INTERNAL COMPONENT. FOR MORE INFORMATION ABOUT APPROPRIATE SAFETY PRECAUTIONS, THE ANALYZER MANUFACTURER'S MANUAL.

- A. Review zero and span calibration values, adjust if needed.
- B. Replace the Zero Air Scrubber media (if used). See Section 9.3.5 of manufacturers manual.

### **7.1.3 MODEL TML50 SO<sub>2</sub> ANALYZER**

**CAUTION:** SOME INTERNAL COMPONENTS OF THE TML50 CAN BE DAMAGED BY SMALL AMOUNTS OF STATIC ELECTRICITY. A PROPERLY GROUNDED ANTISTATIC WRIST STRAP MUST BE WORN WHILE HANDLING ANY INTERNAL COMPONENT. FOR MORE INFORMATION ABOUT APPROPRIATE SAFETY PRECAUTIONS, SEE THE ANALYZER MANUFACTURER'S MANUAL.

- A. Review zero and span calibration values, adjust if needed.
- B. Replace the Zero Air Scrubber media (if used). See Section 9.3.5 of manufacturers manual.

### **7.1.4 MODEL EMRC FLOW MONITOR**

Conduct the following checks on the Model EMRC flow monitor, referring to the manufacturer's manual and the Teledyne System Manual for specific procedures.

- A. Pull the probe and inspect and clean the Pitot tubes.
- B. Verify the differential pressure transducer against the manometer, using the procedure on p. 4 of the manufacturer's manual.

- C. Check the blowback air pressure while the probe is purging. Shortly before a scheduled purge, remove the upper and lower Pitot lines at the probe. Purge intervals may be programmed to occur automatically at pre-set intervals, and may vary with application. Upon initiation of the purge, determine that air is flowing through the lines (the upper and lower lines will successively flow for about a minute each, but this time period may also vary with application).
- D. Check the Drierite desiccant and replace as needed. A blue color indicates active chemical, whereas turning pink indicates degradation. Replace Drierite when the pink coloration equals or exceeds  $\frac{3}{4}$  of the container length.
- E. Check the probe and pressure lines for leaks, using the procedure on p. 18 of the manufacturer's manual. Perform this check **AFTER** the previous checks, so that no subsequent leaks are caused due to removal or manipulation of the probe and lines.

#### **7.1.5 DATA ACQUISITION SYSTEM**

- A. DAS Server, refer to DAS manual.

#### **7.1.6 PROGRAMMABLE LOGIX CONTROLLER**

- A. Inspect PLC battery.

#### **7.1.7 TEMPERATURE ALARM**

- A. Adjust the temperature alarm setting. This procedure will prevent nuisance temperature alarms, while still allowing for early warning of high (or low) temperatures or HVAC failure. If there are alarms for both high and low temperatures, then there will be separate devices present for each.

Check and set the temperature alarm(s) in the following manner. The temperature alarm device(s) may be found on the rear of the instrument rack. For the high temperature alarm, with the CEMS shelter/rack HVAC operating under normal conditions, turn the dial down until a temperature alarm is initiated. From the alarm point, turn the dial back up approximately 10°F. If a low temperature alarm is used, repeat the procedure, first turning the dial up rather than down until an alarm is initiated, and then turning it back down 10°F.

## 7.2 QUARTERLY TESTS/AUDITS

### 7.2.2 CYLINDER GAS AUDITS

40 CFR 60 Appendix F requires that cylinder gas audits (CGAs) be performed each quarter for three out of four quarters in a calendar year, but no more than three quarters in succession. The CEMS with must be challenged with an audit gas of known concentration at two points within the following ranges:

Audit Point	Audit Range		
	Pollutant Monitors (SO <sub>2</sub> , NO <sub>x</sub> , and CO)	Diluent monitors for:	
		CO <sub>2</sub>	O <sub>2</sub>
1	20-30% of span value	5-8% by volume	4-6% by volume
2	50-60% of span value	10-14% by volume	8-12% by volume

Use audit gases that have been certified according to 40 CFR 60 Appendix F. Use separate audit gas cylinders for audit points 1 and 2. Do not dilute gas from audit cylinder when challenging the CEMS. Introduce calibration gas at the probe and operate each monitor in its normal sampling mode. That is, pass the audit gas through all sample lines, filters, scrubbers, conditioners, and other monitor components used during normal sampling and through as much of the sample probe as is practical.

Challenge the CEMS three times at each audit point, and use the average of the three responses in determining accuracy. Do not use the same gas twice in succession. For example, a typical sequence would be to test each monitor three times in sequence alternating low and high level gases (low-high-low-high-low-high). Use the formula provided in Section 11 of this document and Appendix F of 40 CFR 60. The results of these tests are recorded on a Quarterly Cylinder Gas Audit form as shown in Figure 7-3.

An out-of-control condition occurs if the CGA accuracy of any monitor exceeds **±15% of the average audit value** (or **±5ppm**, whichever is greater). If any of the accuracy values are greater than 15%, indicate on the CGA Data Form that the CEMS is out of control for that gas at that sampling location. Indicate whether or not any of the accuracy values for the preceding quarter resulted in out-of-control findings.

The out-of-control period begins with the time of the failed CGA and ends with the time that a satisfactory audit is performed following corrective action or monitor repair. During the period the monitor is out of control, recorded data may not be used in data averages and calculations, or counted towards meeting minimum data availability requirements.

**ENVIROFOCUS TECHNOLOGIES, LLC.  
LEAD SMELTER PROCESS STACK  
CEMS QUARTERLY CHECK FORM**

DATE: \_\_\_\_\_

TIME STARTED: \_\_\_\_\_

INITIALS: \_\_\_\_\_

TIME COMPLETED: \_\_\_\_\_

<b>GENERAL CHECKS</b>	
INSPECT ANALYZERS FOR VISUAL DEFECTS (9)	
REPLACE O3 SCRUBBER MEDIA (9)	
REPLACE NH3 SCRUBBER ASSEMBLY (9)	
<b>MODEL TML41 NOX ANALYZER</b>	
ZERO AND SPAN CALIBRATION (if needed) (9)	
REPLACE ZERO AIR SCRUBBER MEDIA (if used) (9)	
<b>MODEL TML50 SO2 ANALYZER</b>	
ZERO AND SPAN CALIBRATION (if needed) (9)	
REPLACE ZERO AIR SCRUBBER MEDIA (if used) (9)	
<b>MODEL EMRC FLOW MONITOR</b>	
INSPECT AND CLEAN PITOT TUBES (9)	
CHECK DP TRANSMITTER AGAINST MANOMETER (9)	
CHECK BLOWBACK AIR PRESSURE (9)	
CHECK DESSICANT (9)	
PERFORM LEAK CHECK (9)	
<b>DATA ACQUISITION SYSTEM (DAS)</b>	
DAS SERVER (refer to DAS manual) (9)	
<b>PROGRAM LOGIX CONTROLLER</b>	
INSPECT PLC BATTERY (9)	
<b>TEMPERATURE ALARM</b>	
ADJUST SETTING (9)	
<b>COMMENTS:</b>	

**ANY YES (Y) RESPONSE  
REQUIRES CORRECTIVE ACTION**

FIGURE 7-1

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**ENVIROFOCUS TECHNOLOGIES, LLC.  
LEAD SMELTER PROCESS STACK  
CYLINDER GAS AUDIT (CGA) DATA FORM**

DATE: \_\_\_\_\_  
INITIALS: \_\_\_\_\_

START TIME: \_\_\_\_\_  
COMPLETE TIME : \_\_\_\_\_

ANALYZER		NOx, ppm		SO2, ppm		CO, ppm	
CAL GAS RANGE		LOW	HIGH	LOW	HIGH	LOW	HIGH
Ca=CAL GAS VALUE							
ANALYZER	RUN #1						
RESPONSES (PPM OR %)	RUN #2						
	RUN #3						
Sum							
Cm = Sum ÷ 3 =							
ACCURACY %: [(Cm-Ca) ÷ Ca] X 100 =							
OUT-OF-CONTROL? ( ACCURACY  > 15%)							
OUT-OF-CONTROL FOR IMMEDIATELY PRECEDING QUARTER?							
<b>COMMENTS:</b>							

FIGURE 7-2

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**ENVIROFOCUS TECHNOLOGIES, LLC.  
LEAD REFINING HYGIENE STACK  
CEMS QUARTERLY CHECK FORM**

DATE: \_\_\_\_\_ TIME STARTED: \_\_\_\_\_

INITIALS: \_\_\_\_\_ TIME COMPLETED: \_\_\_\_\_

<b>GENERAL CHECKS</b>	
INSPECT ANALYZERS FOR VISUAL DEFECTS (9)	
REPLACE O3 SCRUBBER MEDIA (9)	
REPLACE NH3 SCRUBBER ASSEMBLY (9)	
<b>MODEL TML41 NOX ANALYZER</b>	
ZERO AND SPAN CALIBRATION (if needed) (9)	
REPLACE ZERO AIR SCRUBBER MEDIA (if used) (9)	
<b>MODEL TML50 SO2 ANALYZER</b>	
ZERO AND SPAN CALIBRATION (if needed) (9)	
REPLACE ZERO AIR SCRUBBER MEDIA (if used) (9)	
<b>MODEL EMRC FLOW MONITOR</b>	
INSPECT AND CLEAN PITOT TUBES (9)	
CHECK DP TRANSMITTER AGAINST MANOMETER (9)	
CHECK BLOWBACK AIR PRESSURE (9)	
CHECK DESSICANT (9)	
PERFORM LEAK CHECK (9)	
<b>DATA ACQUISITION SYSTEM (DAS)</b>	
DAS SERVER (refer to DAS manual) (9)	
<b>PROGRAM LOGIX CONTROLLER</b>	
INSPECT PLC BATTERY (9)	
<b>TEMPERATURE ALARM</b>	
ADJUST SETTING (9)	
<b>COMMENTS:</b>	

**ANY YES (Y) RESPONSE  
REQUIRES CORRECTIVE ACTION**

FIGURE 7-1

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## SECTION 8 SEMIANNUAL ACTIVITIES

The semiannual activities for the CEMS are contained in this section. Figure 8-1 summarizes the required activities in a checklist format and the following paragraphs provide step-by-step instructions for each activity.

Performance of the semiannual preventive maintenance routines is the responsibility of the **CEMS Maintenance Contractor (Spectrum Systems, Inc)**.

The CEMS Semiannual Check form (Figure 8-1) is completed as part of the semiannual routine. The date/time the routines were started and completed, and the initials of the person performing the procedures are recorded at the top of the form. The remaining items on the form require either a check mark (☑) to indicate that a procedure was completed or a Y (yes) or N (no) answer to check questions. A Y (yes) answer to any question indicates a need for corrective action. Corrective actions are provided in Section 10 of this manual and the manufacturer's manuals for equipment components.

The following paragraphs describe the required procedures and checks as outlined on the CEMS Semiannual Check form.

**CAUTION:** IF TAKING ANY STEP WHICH MAY RESULT IN INTERRUPTION OF POWER TO THE DAHS COMPUTER, IT IS RECOMMENDED THAT THE OPERATOR RUN A **PROPER SHUTDOWN PROCEDURE ON THE COMPUTER**, USING THE ONSCREEN COMMANDS. INTERRUPTION OF POWER WITHOUT PROPER SHUTDOWN MAY RESULT IN **SYSTEM LOCKUP AND DATA LOSS**.

### 8.1 SEMIANNUAL CHECKS

#### 8.1.1 MODEL TML50 SO<sub>2</sub> ANALYZER

**CAUTION:** SOME INTERNAL COMPONENTS OF THE TML50 CAN BE DAMAGED BY SMALL AMOUNTS OF STATIC ELECTRICITY. A PROPERLY GROUNDED ANTISTATIC WRIST STRAP MUST BE WORN WHILE HANDLING ANY INTERNAL COMPONENT. FOR MORE INFORMATION ABOUT APPROPRIATE SAFETY PRECAUTIONS, SEE THE ANALYZER MANUFACTURER'S MANUAL.

**CAUTION:** USE A SEPARATE, CALIBRATED FLOW METER CAPABLE OF MEASURING FLOWS BETWEEN 0 AND 1000 CM<sup>3</sup>/MIN TO MEASURE THE GAS FLOW RATE THROUGH THE ANALYZER. DO NOT USE THE BUILT IN FLOW MEASUREMENT VIEWABLE FROM THE FRONT PANEL OF THE INSTRUMENT.

- A. Perform a sample flow check.
1. Disconnect the sample inlet tubing from the rear panel SAMPLE port.
  2. Attach the outlet port of a flow meter to the sample inlet port on the rear panel. Insure that the inlet to the flow meter is at atmospheric pressure.
  3. The sample flow measured with the external flow meter should be 650 cm<sup>3</sup>/min  $\pm$  10%.

**ENVIROFOCUS TECHNOLOGIES, LLC.  
LEAD SMELTER PROCESS STACK  
CEMS SEMIANNUAL CHECK FORM**

DATE: \_\_\_\_\_ TIME STARTED: \_\_\_\_\_

INITIALS: \_\_\_\_\_ TIME COMPLETED: \_\_\_\_\_

<b>MODEL TML50 SO2 ANALYZER</b>	
PERFORM FLOW CHECK (9)	
<b>COMMENTS:</b>	

*ANY YES (Y) RESPONSE  
REQUIRES CORRECTIVE ACTION.*

FIGURE 8-1

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**LEAD REFINING HYGIENE STACK  
CEMS SEMIANNUAL CHECK FORM**

DATE: \_\_\_\_\_

TIME STARTED: \_\_\_\_\_

INITIALS: \_\_\_\_\_

TIME COMPLETED: \_\_\_\_\_

<b>MODEL TML50 SO2 ANALYZER</b>	
PERFORM FLOW CHECK (9)	
<b>COMMENTS:</b>	

*ANY YES (Y) RESPONSE  
REQUIRES CORRECTIVE ACTION.*

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## SECTION 9 ANNUAL ACTIVITIES

The annual activities required for the CEMS are contained in this section. Figure 9-1 summarizes the required activities in a checklist format and the following paragraphs provide step-by-step instructions for each activity.

Performance of the annual preventive maintenance routines is the responsibility of the **CEMS Maintenance Contractor (Spectrum Systems, Inc)**. Responsibility for the annual Relative Accuracy Test Audits (RATAs) rests with the **CEMS Testing Contractor**.

The CEMS Annual Check form (Figure 9-1) is completed as part of the annual routine. The date/time the routines were started and completed, and the initials of the person performing the procedures are recorded at the top of the form. The remaining items on the form require either a check mark (☑) to indicate that a procedure was completed or a Y (yes) or N (no) answer to check questions. A Y (yes) answer to any question indicates a need for corrective action. Corrective actions are provided in Section 10 of this manual and the manufacturer's manuals for equipment components.

The following paragraphs describe the required procedures and checks as outlined on the CEMS Annual Check form.

**CAUTION: IF TAKING ANY STEP WHICH MAY RESULT IN INTERRUPTION OF POWER TO THE DAHS COMPUTER, IT IS RECOMMENDED THAT THE OPERATOR RUN A PROPER SHUTDOWN PROCEDURE ON THE COMPUTER, USING THE ONSCREEN COMMANDS. INTERRUPTION OF POWER WITHOUT PROPER SHUTDOWN MAY RESULT IN SYSTEM LOCKUP AND DATA LOSS.**

### 9.1 ANNUAL CHECKS

#### 9.1.1 GENERAL CHECKS

- A. Rebuild sample pump head.

### 9.1.2 MODEL TML 41 NO<sub>x</sub> ANALYZER

**CAUTION:** SOME INTERNAL COMPONENTS OF THE TML41 CAN BE DAMAGED BY SMALL AMOUNTS OF STATIC ELECTRICITY. A PROPERLY GROUNDED ANTISTATIC WRIST STRAP MUST BE WORN WHILE HANDLING ANY INTERNAL COMPONENT. FOR MORE INFORMATION ABOUT APPROPRIATE SAFETY PRECAUTIONS, SEE THE ANALYZER MANUFACTURER'S MANUAL.

- A. Rebuild NO<sub>x</sub> exhaust pump. Instructions and diagrams are included with rebuild kit.
  
- B. Clean reaction cell window and replace O-rings.
  - 1. Turn the instrument and the vacuum off. Refer to Figure 9-5 in manufactures manual for the following procedure.
  - 2. Disconnect the black 1/4" exhaust tube and the 1/8" sample and ozone air tubes from the reaction cell. Disconnect the heater/Thermistor cable.
  - 3. Remove the four screws holding the reaction cell to the PMT housing and lift the cell and manifold out.
  - 4. The reaction cell will separate into two halves, the stainless steel manifold assembly, and the black plastic reaction cell with window, stainless steel cylinder, and O-rings.
  - 5. The reaction cell (both plastic part and stainless steel cylinder) and optical glass filter should be cleaned with methanol and a clean tissue and dried thereafter.
  - 6. Usually it is unnecessary to clean the ozone flow orifice since it is protected by a sintered filter. If test show that cleaning is necessary, refer to Section 9.3.9 of the manufacturers manual on how to clean the critical flow orifice.
  - 7. Do not remove the sample and ozone nozzles. They are Teflon threaded and require a special tool for reassembly. If necessary, the manifold with nozzles attached can be cleaned in an ultrasonic bath.

8. Reassemble in proper order and re-attach the reaction cell to the sensor housing. Reconnect pneumatics and heater connections, the re-attach the pneumatic sensor assembly and the cleaning procedure is complete.

C. Replace filter on air inlet of Perma Pure<sup>®</sup> dryer.

**CAUTION: RISK OF SIGNIFICANT LEAK. USE PROPER WRENCHES AND DO NOT TURN THE FITTING AGAINST THE PERMA PURE<sup>®</sup> DRYER. THIS MAY LOOSEN THE INNER TUBING AND CAUSE LARGE LEAKS. REFER TO FIGURE 9-2 IN MANUFACTURERS MANUAL.**

1. Check and write down the average RCEL pressure and the OZONE flow values.
2. Turn off the analyzer, unplug the power cord and remove the cover.
3. Unscrew the nut around the port of the filter using 5/8" and 9/16" wrenches and holding the actual fitting body steady with a 7/16" wrench.
4. Take off the old filter element and replace it with a suitable equivalent.
5. Holding the fitting steady with a 5/8" wrench, tighten the nut with your hands. If necessary use a second wrench but do not over-tighten the nut.
6. Replace the cover, plug in the power cord, and restart the analyzer.
7. Check the O<sup>3</sup> flow rate; it should be around 80 cm<sup>3</sup>/min  $\pm$  15. Check the RCEL pressure; it should be the same value as before.

D. Inspect pneumatic sub-system for leaks.

1. With the analyzer running for at least 30 minutes and stabilized; cap the sample inlet port (cap must be wrench tight.)
2. After several minutes, when the pressures have stabilized, note the sample pressure and the RCEL readings.
3. If both readings are equal to within 10% and less than 10 in-Hg-A, the instrument is free of large leaks. It is still possible the instrument has minor leaks. If a leak minor leak is suspected, refer to section 11.5.2 of the manufactures manual.

4. If both readings are  $< 10$  in-Hg-A, the pump is in good condition. A new pump will generate a pressure of about 4 in-Hg-A (at sea level).
- E. Replace critical flow orifice O-rings and sintered filters.
1. Turn off power to the instrument and vacuum pump. Remove the analyzer cover and locate the reaction cell. Refer to Figure 9-5, Figure 11-22, and Figure 3-4 of the manufacturer's manual for details.
  2. Unscrew the 1/8" sample and ozone air tubes from the reaction cell.
  3. Unscrew the orifice holder on the reaction cell with a 9/16" wrench.
  4. For orifices in the vacuum manifold; remove the connecting tube and unscrew the NPT fitting.
  5. Take out the components of the assembly: a spring, a sintered filter, two O-rings and the orifice. For the vacuum manifold only, you may need to use a scribe or pressure from the vacuum port to get the parts out of the manifold.
  6. Discard the two O-rings and the sintered filter and the critical flow orifice.
  7. Re-assemble the flow control assembly with the new parts as shown in Figure 9-6 of the manufacturer's manual and reconnect them to the reaction cell manifold or the vacuum manifold.
  8. Reconnect all tubing, power up the analyzer and pump and after a warm-up period of 30 minutes, carry out a leak test as described in Chapter 11 of the manufacturer's manual.
- F. Replace the NO<sub>2</sub> converter.

**CAUTION:** THE CONVERTER OPERATES AT 315<sup>o</sup> C. SEVERE BURNS CAN RESULT IF THE ASSEMBLY IS NOT ALLOWED TO COOL. DO NOT HANDLE THE ASSEMBLY UNTIL IT IS AT ROOM TEMPERATURE. THIS MAY TAKE SEVERAL HOURS.

1. Turn off the analyzer power, remove the cover, and allow the converter to cool.

2. Remove the top lid of the converter as well as the top layers of the insulation until the converter cartridge can be seen.
3. Remove the tube fittings from the converter.
4. Disconnect the power and thermocouple of the converter. Unscrew the grounding clamp of the power leads with a Phillips-head screw driver.
5. Remove the converter assembly (cartridge and heater band) from the can. Make a note of the orientation of the tubes relative to the heater cartridge.
6. Unscrew the band heater and loosen it, take out the old converter cartridge. The heater with the built-in thermocouple can be reused.
7. Wrap the heater band around the new replacement cartridge and tighten the screws using a high-temperature anti-seize agent such as copper paste. Make sure to use proper alignment of the heater with respect to the converter tubes.
8. Replace the converter assembly, route the cables through the holes in the can and reconnect them properly. Reconnect the grounding clamp around the heater leads for safe operation.
9. Re-attach the tube fittings to the converter and replace the insulation and cover.
10. Replace the instrument cover and power up the analyzer.
11. Allow the converter to burn-in for 24 hours, and then re-calibrate the instrument.

### ***9.1.3 MODEL TML50 SO<sub>2</sub> ANALYZER***

**CAUTION:** SOME INTERNAL COMPONENTS OF THE TML50 CAN BE DAMAGED BY SMALL AMOUNTS OF STATIC ELECTRICITY. A PROPERLY GROUNDED ANTISTATIC WRIST STRAP MUST BE WORN WHILE HANDLING ANY INTERNAL COMPONENT. FOR MORE INFORMATION ABOUT APPROPRIATE SAFETY PRECAUTIONS, SEE THE ANALYZER MANUFACTURER'S MANUAL.

**WARNING:** DO NOT LEAVE THE INSTRUMENT TURNED OFF FOR MORE THAN 8 HOURS WITHOUT REMOVING THE PERMEATION TUBE. DO NOT SHIP THE INSTRUMENT WITHOUT REMOVING THE PERMEATION TUBE. THE TUBE CONTINUES TO EMIT GAS, EVEN AT ROOM TEMPERATURE AND WILL CONTAMINATE THE ENTIRE INSTRUMENT.

- A. Replace the internal IZS permeation tube.
1. Turn off the analyzer, unplug the power cord and remove the cover.
  2. Locate the IZS oven in the rear left of the analyzer.
  3. Remove the top layer of insulation if necessary.
  4. Unscrew the black aluminum cover of the IZS oven (3 screws) using a medium Phillips-head screw driver.
  5. Remove the old permeation tube if necessary and replace it with the new tube. Make sure that the tube is placed into the larger of two holes and that the open permeation end of the tube (Teflon) is facing up.
  6. Re-attach the cover with the three screws and make sure that the sealing O-ring is properly in place and that the three screws are tightened evenly.
  7. Replace the analyzer cover, plug the power cord back in and turn on the analyzer.
  8. Carry out an IZS span check to see if the new permeation device works properly. The permeation rate may need several days to stabilize.
- B. Perform a pneumatic system leak check.

**CAUTION:** ONCE TUBE FITTINGS HAVE BEEN WETTED WITH SOAP SOLUTION UNDER A PRESSURIZED SYSTEM, DO NOT APPLY OR RE-APPLY VACUUM AS THIS WILL CAUSE SOAP SOLUTION TO BE SUCKED INTO THE INSTRUMENT, CONTAMINATING INSIDE SURFACES.

1. Turn off the power and remove the instrument cover.
2. Install a leak checker or a tank of gas (compressed, oil-free air or nitrogen) on the sample inlet at the rear panel.

3. Pressurize the instrument with the leak checker or tank of gas, allowing enough time to fully pressurize the instrument through the critical flow orifice. Check each tube connection (fittings, hose clamps) with soap bubble solution, looking for fine bubbles. Do not exceed 15 psi pressure.
  4. If the instrument has the zero and span valve option, the normally closed ports on each valve should also be separately checked. Connect the leak checker to the normally closed ports and check with soap bubble solution.
  5. If the analyzer is equipped with the IZS option, connect the leak checker to the dry air inlet and check with soap bubble solution.
  6. The leak-down rate of the indicated pressure should be less than 1 in-Hg-A (0.4 psi) in 5 minutes after the pressure is turned off.
  7. Clean soap solution from all surfaces, re-connect the sample and exhaust lines and replace the instrument cover. Restart the analyzer.
- C. Rebuild the sample pump. Instructions and diagrams are included with rebuild kit. Always perform a flow and leak check after rebuilding the sample pump.

#### **9.1.4 MODEL TML30 CO ANALYZER**

**CAUTION:** SOME INTERNAL COMPONENTS OF THE TML30 CAN BE DAMAGED BY SMALL AMOUNTS OF STATIC ELECTRICITY. A PROPERLY GROUNDED ANTISTATIC WRIST STRAP MUST BE WORN WHILE HANDLING ANY INTERNAL COMPONENT. FOR MORE INFORMATION ABOUT APPROPRIATE SAFETY PRECAUTIONS, SEE THE ANALYZER MANUFACTURER'S MANUAL.

- A. Rebuild the sample pump. Instructions and diagrams are included with rebuild kit. Always perform a flow and leak check after rebuilding the sample pump.
- B. Perform a leak check.
  1. With the analyzer running and flow stabilized; cap the sample inlet port (cap must be wrench tight.)
  2. After several minutes, when the pressures have stabilized, note the sample pressure reading.

3. If the reading is < 10 in-Hg, the pump is in good condition and the instrument is free of large leaks.
4. Check the sample gas flow. If the flow is < 10 cm<sup>3</sup>/min and stable, there are no large leaks in the instrument's pneumatics. If a leak is suspected, refer to section 12.3.3.2 of the manufacturer's manual.

C. Perform a sample flow check.

**CAUTION:** USE A SEPARATE, CALIBRATED FLOW METER CAPABLE OF MEASURING FLOWS BETWEEN 0 AND 1000 CM<sup>3</sup>/MIN TO MEASURE THE GAS FLOW RATE THROUGH THE ANALYZER. DO NOT USE THE BUILT IN FLOW MEASUREMENT VIEWABLE FROM THE FRONT PANEL OF THE INSTRUMENT.

1. Disconnect the sample inlet tubing from the rear panel SAMPLE port.
2. Attach the outlet port of a flow meter to the sample inlet port on the rear panel. Ensure that the inlet to the flow meter is at atmospheric pressure.
3. The sample flow measured with the external flow meter should be 800 cc<sup>3</sup>/min  $\pm$  10%.
4. Once an accurate measurement has been recorded by the method described above, adjust the analyzer's internal flow sensors. See Section 9.6.3 of the manufacturer's manual.

#### **9.1.5 AIR DRYER / CO<sub>2</sub> ABSORBER**

- A. Rebuild CO<sub>2</sub> absorber. Refer to manufacturer's manual in the Model 675 System Manual.

#### **9.1.6 CO SCRUBBER**

- A. Rebuild CO scrubber. Refer to manufacturer's manual in the Model 675 System Manual.

### **9.1.7 SO<sub>2</sub> / NO<sub>2</sub> SCRUBBER**

- A. Replace charcoal scrubber media. Refer to manufacturer's manual in the Model 675 System Manual.

### **9.1.8 SAMPLE UMBILICAL**

- A. Clean dilution sample line. Refer to manufacturer's manual in the Model 675 System Manual.

### **9.1.9 PROGRAMMABLE LOGIX CONTROLLER**

- A. Replace PLC battery. Refer to manufacturer's manual in the Model 675 System Manual.

## **9.2 ANNUAL TESTS/AUDITS**

### **9.2.1 RELATIVE ACCURACY TEST AUDITS**

40 CFR 60 Appendix F requires that a relative accuracy test audit (RATA) be performed on CEMS at least once every four calendar quarters (CGA audits are performed in the remaining three quarters). RATAs are conducted using the RA (relative accuracy) test procedures contained in 40 CFR 60, Appendix B for the appropriate gas.

The RATA will be conducted using the following Instrument Reference Methods

<u>Monitor</u>	<u>Reference Method</u>
NO <sub>x</sub>	Method 7
SO <sub>2</sub>	Method 6
CO	Method 10

Conduct the RATA according to the relative accuracy test procedures contained in 40 CFR 60, Appendix B, Performance Specifications. Use the formulae provided in Section 11 of this document and Appendix B of 40 CFR 60. The results of these tests are recorded on an Annual Relative Accuracy Test Audit form as shown in Figure 9-2.

Indicate on the RATA data form whether the relative accuracy of the CEMS exceeds the levels in the table below:

*Out-Of-Control Periods:*

NO <sub>x</sub> / SO <sub>2</sub>	<b>20%</b> <sup>1</sup> or <b>10%</b> <sup>2</sup>
CO	<b>10%</b> <sup>3</sup> or <b>5%</b> <sup>4</sup>

- 1 - when average emissions during test are greater than 50 percent of the emission standard (RM used to calculate RA)
- 2 - when average emissions during test are less than 50 percent of the emission standard (emission standard used to calculate RA)
- 3 - when average RM value is used to calculate RA (PS 4)
- 4 - when applicable emissions standard is used to calculate RA (PS 4)

Exceeding this specification means that the CEMS is out of control and corrective actions must be initiated immediately. Also indicate whether or not any of the accuracy values for the preceding quarter resulted in out-of-control findings.

The out-of-control period begins with the time of the failed RATA and ends with the time that a satisfactory audit is performed following corrective action or monitor repair. During the period the monitor is out of control, recorded data may not be used in data averages and calculations, or counted towards meeting minimum data availability requirements.

**ENVIROFOCUS TECHNOLOGIES, LLC.  
LEAD SMELTER PROCESS STACK  
CEMS ANNUAL CHECK FORM**

DATE: \_\_\_\_\_

TIME STARTED: \_\_\_\_\_

INITIALS: \_\_\_\_\_

TIME COMPLETED: \_\_\_\_\_

<b>GENERAL CHECKS</b>	
REBUILD SAMPLE PUMP (9)	
<b>MODEL TML41 NOX ANALYZER</b>	
REBUILD NOx EXHAUST PUMP (9)	
CLEAN REACTION CELL WINDOW / REPLACE O-RINGS (9)	
REPLACE FILTER ON AIR INLET OF PURMA PURE DRYER (9)	
INSPECT PNEUMATIC SUB-SYSTEM FOR LEAKS (9)	
REPLACE CRITICAL FLOW ORIFICE O-RINGS & SINTERED FILTERS (9)	
REPLACE NO2 CONVERTER (every 3 years or if efficiency <96%) (9)	
<b>MODEL TML50 SO2 ANALYZER</b>	
REPLACE INTERNAL IZS PERMEATION TUBE (9)	
PERFORM PNEUMATIC LEAK CHECK (9)	
REPLACE PUMP DIAPHRAGM (9)	
<b>MODEL TML30 CO ANALYZER</b>	
REPLACE PUMP DIAPHRAGM (9)	
PERFORM LEAK CHECK (9)	
PERFORM FLOW CHECK (9)	
<b>AIR DRYER / CO2 ABSORBER</b>	
REBUILD CO2 ABSORBER (9)	
<b>CO SCRUBBER</b>	
REBUILD CO SCRUBBER (9)	
<b>SO2 / NO2 SCRUBBER</b>	
REFILL CHARCOAL SCRUBBER MEDIA (9)	
<b>SAMPLE UMBILICAL</b>	
CLEAN DILUTION SAMPLE LINE (9)	
<b>PROGRAM LOGIX CONTROLLER</b>	
REPLACE PLC BATTERY (9)	
<b>COMMENTS:</b>	

*ANY YES (Y) RESPONSE  
REQUIRES CORRECTIVE ACTION*

FIGURE 9-1

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**ENVIROFOCUS TECHNOLOGIES, LLC.  
LEAD SMELTER PROCESS STACK  
RELATIVE ACCURACY TEST AUDIT FORM**

DATE: \_\_\_\_\_

START TIME: \_\_\_\_\_

INITIALS: \_\_\_\_\_

COMPLETE TIME: \_\_\_\_\_

RUN	DATE AND TIME	NOX (lbs/hr)			DATE AND TIME	SO2 (lbs/hr)			DATE AND TIME	CO (lbs/hr)		
		RM	M	DIFF		RM	M	DIFF		RM	M	DIFF
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
	AVERAGE	(Eq. 11-1)			AVERAGE				AVERAGE			
	CONFIDENCE COEFFICIENT	(Eq. 11-3)			CONFIDENCE COEFFICIENT				CONFIDENCE COEFFICIENT			
	RELATIVE ACCURACY	(Eq. 11-4)			RELATIVE ACCURACY				RELATIVE ACCURACY			
	OUT OF CONTROL? (Y/N)				OUT OF CONTROL? (Y/N)				OUT OF CONTROL? (Y/N)			
<b>COMMENTS:</b>												

See Section 11.2 for Equations.

FIGURE 9-2

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**ENVIROFOCUS TECHNOLOGIES, LLC.  
LEAD REFINING HYGIENE STACK  
CEMS ANNUAL CHECK FORM**

DATE: \_\_\_\_\_

TIME STARTED: \_\_\_\_\_

INITIALS: \_\_\_\_\_

TIME COMPLETED: \_\_\_\_\_

<b>GENERAL CHECKS</b>	
REBUILD SAMPLE PUMP (9)	
<b>MODEL TML41 NOX ANALYZER</b>	
REBUILD NOx EXHAUST PUMP (9)	
CLEAN REACTION CELL WINDOW / REPLACE O-RINGS (9)	
REPLACE FILTER ON AIR INLET OF PURMA PURE DRYER (9)	
INSPECT PNEUMATIC SUB-SYSTEM FOR LEAKS (9)	
REPLACE CRITICAL FLOW ORIFICE O-RINGS & SINTERED FILTERS (9)	
REPLACE NO2 CONVERTER (every 3 years or if efficiency <96%) (9)	
<b>MODEL TML50 SO2 ANALYZER</b>	
REPLACE INTERNAL IZS PERMEATION TUBE (9)	
PERFORM PNEUMATIC LEAK CHECK (9)	
REPLACE PUMP DIAPHRAGM (9)	
<b>AIR DRYER / CO2 ABSORBER</b>	
REBUILD CO2 ABSORBER (9)	
<b>SO2 / NO2 SCRUBBER</b>	
REFILL CHARCOAL SCRUBBER MEDIA (9)	
<b>SAMPLE UMBILICAL</b>	
CLEAN DILUTION SAMPLE LINE (9)	
<b>PROGRAM LOGIX CONTROLLER</b>	
REPLACE PLC BATTERY (9)	
<b>COMMENTS:</b>	

*ANY YES (Y) RESPONSE  
REQUIRES CORRECTIVE ACTION*

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**ENVIROFOCUS TECHNOLOGIES, LLC.  
LEAD REFINING HYGIENE STACK  
RELATIVE ACCURACY TEST AUDIT FORM**

DATE: \_\_\_\_\_ START TIME: \_\_\_\_\_  
INITIALS: \_\_\_\_\_ COMPLETE TIME: \_\_\_\_\_

RUN	DATE AND TIME	NOX (lbs/hr)			DATE AND TIME	SO2 (lbs/hr)		
		RM	M	DIFF		RM	M	DIFF
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
	AVERAGE	(Eq. 11-1)			AVERAGE			
	CONFIDENCE COEFFICIENT	(Eq. 11-3)			CONFIDENCE COEFFICIENT			
	RELATIVE ACCURACY	(Eq. 11-4)			RELATIVE ACCURACY			
	OUT OF CONTROL?	(Y/N)			OUT OF CONTROL?	(Y/N)		
<b>COMMENTS:</b>								

See Section 11.2 for Equations.

FIGURE 9-2

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## SECTION 10 CORRECTIVE ACTIONS

Once a system or component malfunction has been detected, prompt and effective corrective action is necessary to minimize CEMS downtime. Any time corrective actions are performed on any CEMS component, complete a Corrective Action Report form (Figure 10-1) and add comments to the daily log as described in Section 4.5 of this manual.

No attempt is made in this section to repeat the corrective action/troubleshooting procedures that are provided in the equipment manufacturer's manuals. Refer to those manuals for detailed procedures. Procedures not found in the equipment manufacturer's manuals are provided here.

**CAUTION:** IF TAKING ANY STEP WHICH MAY RESULT IN INTERRUPTION OF POWER TO THE DAHS COMPUTER, IT IS RECOMMENDED THAT THE OPERATOR RUN A **PROPER SHUTDOWN PROCEDURE ON THE COMPUTER**, USING THE ONSCREEN COMMANDS. INTERRUPTION OF POWER WITHOUT PROPER SHUTDOWN MAY RESULT IN **SYSTEM LOCKUP AND DATA LOSS**.

**NOTE:** It is recommended that all analyzers be taken **OUT OF SERVICE** before performing maintenance or corrective actions if the procedure being performed is likely to interfere with proper emissions monitoring and reporting. Use the HMI interface to take analyzers out of service.

### 10.1 SYSTEM ALARMS/INDICATORS

The following system alarms and indicators are programmed into the system.

- Power Interrupt / UPS Alarm
- Instrument Air Pressure Low Alarm
- Instrument Rack High Temperature Alarm
- Sample Probe Temperature Alarm
- Exceedances
- DAHS Faults
- Analyzer General Faults
- CEMS General Faults

All faults/indicators are displayed at the DAS computer. When any alarm occurs, immediate action must be taken to correct the problem as described below.

**A. Power Interrupt / UPS Alarm**

Check the AC power supply or the UPS for proper operation. Perform any necessary corrective actions on the UPS as described in the manufacturer's manual.

**B. Instrument Air Pressure Low Alarm**

Check for clogged dilution air lines. Check for leaks in the system. Check the plant air supply (90 psi is minimum).

**C. Instrument Rack High Temperature Alarm**

Check the air conditioner for proper operation and thermostat control. Refer to manufacturer's manuals for corrective actions.

**D. Sample Probe Temperature Alarm**

Examine the umbilical, probe and probe heater junction box. Contact the manufacturer for troubleshooting and corrective action procedures.

**E. Exceedances**

One or more measured parameters have exceeded established limits. If the problem is caused by a process upset, record the appropriate reason code in the CEMS database and initiate appropriate corrective actions. If the problem is caused by a component malfunction, replace the component or perform corrective actions as defined in this section of the manual and the appropriate manufacturer's manual.

**F. DAHS Faults, Analyzer General Faults, CEMS General Faults**

DAHS, Analyzer, and CEMS General Faults are caused by a variety of conditions including out-of-control calibrations, voltage reference faults, warm starts, cold starts, and restarts among others. Investigate the cause of the alarm and take appropriate action. Determine if the alarm is temporary or intermittent. If the problem is in the PLC, check the PLC fuse. If the PLC fails permanently, replace it with a spare and service the malfunctioning unit off-line.

DAHS and analyzer faults caused by out-of-control calibration error test results must be corrected. The procedures outlined in Section 1 and Figure 1-2 of this manual are recommended.

## **10.2 CALIBRATION**

### **A. Automatic Calibration**

The Model 675 Dilution System automatically initiates a calibration cycle once every 24 hours, using Protocol 1 zero and span gases. Calibration gases (zero and span for all appropriate gases) are sequentially injected at the dilution probe at an appropriate flow rate. The span gases selected provide the required concentrations at the installed dilution ratio (for dilution system) for the full scale range of each analyzer.

A complete automatic calibration cycle can be initiated at any time for maintenance or troubleshooting purposes using the DAS computer. This can be done either manually or automatically according to a preset schedule. Once the automatic calibration is initiated, it cannot be stopped or reset.

To manually initiate an automatic calibration cycle, select either “NO<sub>x</sub>” (High or Low if applicable), “SO<sub>2</sub>” or “CO” at the DAS display and select the “Start Cal” command. Accessing the “Start Cal” command through any one of these routes will initiate a full automatic calibration, flowing all calibration gases.

To set or change the scheduled time of the automatic calibration, refer to the DAS information in the Systems Manual

The start time for automatic calibration cannot be set at all zero (exactly midnight). The automatic calibration sequence must also not be set to overlap with any other scheduled sequences (backpurge, etc.).

### **B. Manual Calibration**

When analyzer zero and/or span adjustments are required as part of maintenance or corrective action procedures, manual calibration cycles for each analyzer can be initiated at the PLC as described in Appendix D of this manual.

### **C. System Calibration**

Calibration adjustment procedures for the gas analyzers are presented in Appendix D of this manual.

## 10.3 REPLACEMENT COMPONENTS

The Model 675 Dilution System is designed in a modular format that is intended to expedite troubleshooting in the event of a major component malfunction. Whenever extensive maintenance or troubleshooting is required on the components listed below, the problem component can be removed and replaced with a spare. "Extensive" maintenance is any procedure that requires more than one hour to complete.

### *Component Replacement Procedures*

Problem components can be removed and replacement components installed as described in the procedures below. The problem component can then be repaired on site or sent for factory repair.

#### **A. Rack Components**

To replace rack components, including the probe controller and all gas analyzers, use the following guidelines.

1. Turn power off at the front panel of the component, if a power switch is provided.
2. Remove all electrical connectors, making sure to maintain label integrity so the correct connections can be made when installing the replacement unit.
3. Remove all plumbing connections, making sure to maintain label integrity so the correct connections can be made when installing the replacement unit.
4. Remove the component from the rack.
5. Reverse the above steps to install the replacement component.

NOTE: Any time a replacement analyzer is installed, a linearity test (pollutant analyzers) or calibration error test (flow monitors) must be performed to ensure proper operation. In addition, when the repaired analyzer is reinstalled, perform the tests again on that instrument.

NOTE: Be sure to allow sufficient warm-up time for all analyzers.

## 10.4 MODEL TML41 NO<sub>x</sub> ANALYZER

**CAUTION:** TURN OFF POWER TO THE ANALYZER BEFORE PERFORMING ANY CORRECTIVE MAINTENANCE.

**CAUTION:** SOME INTERNAL COMPONENTS OF THE TML41 CAN BE DAMAGED BY SMALL AMOUNTS OF STATIC ELECTRICITY. A PROPERLY GROUNDED ANTISTATIC WRIST STRAP MUST BE WORN WHILE HANDLING ANY INTERNAL COMPONENT. FOR MORE INFORMATION ABOUT APPROPRIATE SAFETY PRECAUTIONS, SEE THE ANALYZER MANUFACTURER'S MANUAL.

### A. Troubleshooting

Potential problems and the recommended corrective action(s) are listed in the analyzer manufacturer's manual and the Systems Manual

### B. Startup

Each new or repaired analyzer shipped has the startup parameters in place so the analyzer can be installed immediately as a replacement for a malfunctioning analyzer. These parameters should not be changed, except under the direction of an authorized technician.

A summary of startup parameters can be found in the Systems Manual and the analyzer manufacturer's manual for the TML41 Analyzer. After installation according to the manufacturer's manual, use the following startup procedures to put the analyzer in service:

*Startup:* Turn the power on. Check to be sure the sample pump is operating. The power up screen will appear. Allow 30 minutes for the instrument to stabilize.

**NOTE:** It is best to turn the ozonator on and let the analyzer run overnight before calibration in order to obtain the most accurate information.

### C. Manual Calibration

Calibration procedures for the TML41 can be found in the analyzer manufacturer's manual or the Systems Manual.

## **D. Corrective Action Procedures**

Corrective action procedures can be found in the analyzer manufacturer's manual. Use these procedures as needed to check and/or correct specific analyzer conditions.

## **E. Replacement Procedures**

The TML41 manufacturer's manual includes step-by-step procedures for replacing and rebuilding subassemblies, including those listed below. Refer to that manual for these and other appropriate procedures.

- Pump Replacement
- Pump Rebuilding
- Photomultiplier Cooler Replacement
- Photomultiplier Tube Replacement
- PMT High Voltage Supply Replacement
- Reaction Chamber Cleaning and Removal
- NO<sub>2</sub>-to-NO Converter Replacement
- Ozonator Assembly Replacement
- Ozonator Transformer Replacement
- Fuse Replacement
- Scrubber replacement
- Fan Replacement
- Pressure Transducer Assembly Replacement
- Temperature Control Board Replacement
- I/O Expansion Board (Optional) Replacement
- Digital Output Board Replacement
- Motherboard Replacement
- Measurement Interface Board Replacement
- Flow Transducer Replacement
- Front Panel Board Replacement

## **10.5 MODEL TML50 SO<sub>2</sub> ANALYZER**

**CAUTION:** TURN OFF POWER TO THE ANALYZER BEFORE PERFORMING ANY CORRECTIVE MAINTENANCE.

**CAUTION:** SOME INTERNAL COMPONENTS OF THE TML50 CAN BE DAMAGED BY SMALL AMOUNTS OF STATIC ELECTRICITY. A PROPERLY GROUNDED ANTISTATIC WRIST STRAP MUST BE WORN WHILE HANDLING ANY INTERNAL COMPONENT. FOR MORE INFORMATION ABOUT

APPROPRIATE SAFETY PRECAUTIONS; SEE THE ANALYZER MANUFACTURER'S MANUAL.

### **A. Troubleshooting**

Potential problems and the recommended corrective action(s) are listed in the analyzer manufacturer's manual and the Systems Manual

### **B. Startup**

Each new or repaired analyzer shipped has the startup parameters in place so the analyzer can be installed immediately as a replacement for a malfunctioning analyzer. These parameters should not be changed, except under the direction of an authorized technician.

A summary of startup parameters can be found in the Systems Manual and the analyzer manufacturer's manual for the TML50 Analyzer. After installation according to the manufacturer's manual, use the following startup procedures to put the analyzer in service:

*Startup:* Turn the power on. Check to be sure the sample pump is operating. The power up screen will appear. Allow 30 minutes for the instrument to stabilize.

### **C. Manual Calibration**

Calibration procedures for the TML50 can be found in the analyzer manufacturer's manual or the Systems Manual.

### **D. Corrective Action Procedures**

Corrective action procedures can be found in the analyzer manufacturer's manual. Use these procedures as needed to check and/or correct specific analyzer conditions.

### **E. Replacement Procedures**

The TML50 manufacturer's manual includes step-by-step procedures for replacing and rebuilding subassemblies, including those listed below. Refer to that manual for these and other appropriate procedures.

- IR Source Replacement
- Correlation Filter Wheel Replacement
- Chopper Motor Replacement

- Optical Bench Replacement
- Optical Switch Replacement
- Bench Heater Assembly Replacement
- Preamplifier/Detector Assembly Replacement
- Pump Rebuilding
- Pump Replacement
- Pressure Transducer Replacement and Calibration
- Flow Transducer Replacement and Calibration
- Capillary Cleaning and Replacement
- Optional Zero/Span and Sample Solenoid Valve Replacement
- Analog Output Adjustment
- Ambient Temperature Calibration
- Fuse Replacement
- Fan Replacement
- I/O Expansion Board (Optional) Replacement
- Digital Output Board Replacement
- Motherboard Replacement
- Measurement Interface Board Replacement
- Front Panel Board Replacement

## **10.6 AIR DRYER / CO<sub>2</sub> ABSORBER**

**CAUTION:** PRIOR TO PERFORMING ANY MAINTENANCE ON THE GENERATOR(S), RELEASE ALL PRESSURE FROM THE SYSTEM USING THE SHUTOFF VALVE(S) AND DISCONNECT ELECTRICAL POWER.

### **A. Troubleshooting**

Potential problems and the recommended corrective action(s) are listed in the manufacturer's manual.

### **B. Corrective Action Procedures**

Procedures for pre-filter cartridge replacement can be found in the manufacturer's manual. No other corrective action is recommended except after consultation with the manufacturer.

### **C. Component Replacement Procedures**

The manufacturer recommends replacement of the components listed below only after consultation with the manufacturer to determine which components require replacement.

- Back Pressure Regulator
- Filter Tube
- Moisture Indicating Element
- Moisture Indicating Assembly
- Seal Set (Moisture Indicating)

## **10.7 M&C SAMPLE PROBE AND UMBILICAL**

**CAUTION: HIGH SURFACE TEMPERATURES! WEAR PROTECTIVE EQUIPMENT!**

### **A. Probe Filter Replacement/Cleaning**

To clean or replace the probe filter, use the procedures in Section 8 of this manual.

### **B. Spare Line Replacement**

The sample transport umbilical contains spare lines that can be substituted for other gas lines (cal/backpurge, etc.). Disconnect and reinstall fittings as required.

### **C. Removal/Replacement of Critical Orifice and Eductor**

If proper probe operation cannot be restored through cleaning and/or replacement of the filter, replacement of the eductor and/or critical orifice may be required. Refer to procedures in manufacturer's manual for instructions on removal and replacement of these parts.

## **10.8 COMPONENT CHANGE OUT AND DIAGNOSTIC TESTING**

### **A. Recertification and Diagnostic Test Policy**

Whenever the owner or operator makes a replacement, modification, or change in a certified CEMS that may significantly affect the ability of the system to accurately measure or record the concentrations, stack gas volumetric flow rate,

emission rate, or any other parameter deemed critical to the calculation of the above, the owner or operator may be required to conduct a CEMS performance evaluation. This CEMS performance evaluation may take one or two forms: recertification or diagnostic testing.

Recertification would require that the owner or operator conduct all of the tests that were performed during the initial test. Generally, this would be a RATA conducted during a stack test. Diagnostic testing would forego the RATA for less rigorous testing that ensures the continued proper operation of the monitoring system.

The State of Florida Department of Environmental Protection has developed the following list of probable events that would trigger diagnostic and/or recertification testing. For events that are not on this list please contact the Department for guidance.

<b>Recertification and Diagnostic Test Policy for Dilution-Extractive CEMS</b>					
<b>Description of Event</b>	<b>Event</b>	<b>RATA</b>	<b>Calibration</b>	<b>Submit</b>	<b>Comments</b>
Permanently replace NOx, SO2, O2, or CO2 analyzer with like kind analyzer.	R	X	X	X	Permanent replace of an analyzer is a recertification event, and thus all tests are required.
Permanently replace NOx, SO2, O2, or CO2 analyzer with new analyzer that is not a like-kind analyzer.	R	X	X	X	Permanent replace of an analyzer is a recertification event, and thus all tests are required.
Replace or repair any of the following components:					For repair or replacement of major components not listed here (e.g., major components of new technologies or monitoring technology not addressed in this policy), contact FDEP for a case-by-case determination.
Photomultiplier	D		X	A	
Lamp	D		X	A	
Internal analyzer particulate filter	D		X	A	
Analyzer vacuum pump	D		X	A	
Capillary tube	D		X	A	
Ozone generator	D		X	A	
Reaction chamber	D		X	A	
NO2 converter	D		X	A	
Ozonator dryer	D		X	A	
Sample Cell	D		X	A	
Optical filters	D		X	A	
Replace or repair circuit board	D		X	A	
Replace, repair or perform routine maintenance on a minor analyzer component, including, but not limited to:					
PMT base	D		X		For repair or replacement of other minor components that are not listed here perform a diagnostic calibration error test.
O-rings	D		X		
Optical windows	D		X		
High voltage power supply	D		X		We recommend that each facility develop its own list of major and minor components and document this list within their QA/QC plan. If there is any uncertainty whether a component is major or minor, contact FDEP for a case-by-case determination.
Zero air scrubber	D		X		
Thermistor	D		X		
Reaction chamber heater	D		X		
Photomultiplier cooler	D		X		
Photomultiplier cooler fins	D		X		
DC power supply	D		X		
Valve	D		X		

<b>Recertification and Diagnostic Test Policy for Dilution-Extractive CEMS</b>					
<b>Description of Event</b>	<b>Event</b>	<b>RATA</b>	<b>Calibration</b>	<b>Submit</b>	<b>Comments</b>
Display	D		X		
Replace or repair signal wiring in CEMS shelter	D		X		
Replace or repair sample tubing in CEMS shelter	D		X		Recommends performing both a pressure and vacuum leak check.
Replace or repair vacuum pump or pressure pump (not the analyzer pumps)			X		Recommends that a leak check be performed also.
Replace critical orifice in dilution system with orifice of different size.	R	X	X	X	Changing the size of the critical orifice (outside of the manufacturer's tolerances for individual orifices) will significantly change the dilution ratio, may cause moisture problems and could introduce additional bias into the CEM system. Therefore recertification testing must be performed.
Replace critical orifice in dilution system with orifice of the same size (within the manufacturer's specified tolerance).	D		X	A	
Disassemble and reassemble dilution probe for maintenance or service.	D		X	A	Recommends performing both a pressure and vacuum leak check.
Permanently replace umbilical line.	D	X	X	X	Recommends performing both a pressure and vacuum leak check. Bias may be introduced into the system when an umbilical line is replace, a RATA is therefore necessary.
Replace CEMS probe (same probe length, location, and dilution ratio).	D		X	A	Recommends performing both a pressure and vacuum leak check.
Change probe length and/or location	R	X	X	X	Permanent replacement of the probe location is a recertification event, thus all tests are required.
Routine probe filter maintenance (e.g. clean or replace coarse filter).	D		X		
Replace probe heater or sample line heaters	D		X		
Change from dilution CEMS to in-situ CEMS	R	X	X	X	Permanent replacement of the system is a recertification event, thus all tests are required.

<b>Recertification and Diagnostic Test Policy for Dilution-Extractive CEMS</b>					
<b>Description of Event</b>	<b>Event</b>	<b>RATA</b>	<b>Calibration</b>	<b>Submit</b>	<b>Comments</b>
Change from dilution CEMS to extractive CEMS	R	X	X	X	Permanent replacement of the system is a recertification event, thus all tests are required
Change from in-stack dilution to out-of-stack dilution methodology (or vice-versa).	R	X	X	X	This is considered to be equivalent to a monitoring system replacement. Permanent replacement of the system is a recertification event, thus all tests are required
Major modification to dilution air supply.	D		X	A	Recommends performing both a pressure and vacuum leak check.

“R” means recertification event and “D” means diagnostic test event.

“X” means that this test is required or that notification must be submitted.

“A” means that the facility need not submit notification to the Department, but instead should document such repairs or replacements and keep such documentation on site in a form suitable for inspection.

(3) Perform a formula verification and missing data routine verification (if missing data is used): Emission and heat input rate formulas must be verified at each unit or stack location. The results of these checks must be kept on-site in a format suitable for inspection.

(4) Contact DEP to discuss the appropriate diagnostic tests if other types of mathematical algorithms are changed or inserted in the DAHS.

<b>Recertification and Diagnostic Test Policy for Flow Monitors</b>					
<b>Description of Event</b>	<b>Event</b>	<b>RATA</b>	<b>Calibration</b>	<b>Submit</b>	<b>Comments</b>
Permanently replace flow monitor (includes like-kind monitor).	R	X	X	X	
Replace or repair major component of flow monitor, such as:					Keep the test data and calculated results on-site, in a format suitable for inspection.
Ultrasonic Transducer	D		X	A	
Ultrasonic transducer interface (electronics)	D		X	A	
Differential Pressure Probe	D		X	A	
Differential Pressure Probe Transducer/transmitter electronics	D		X	A	
Thermal Probe	D		X	A	
Thermal Electronics to condition/convert probe signal to calculated flow	D		X	A	
Replace or repair minor component of flow monitor, such as					
Ultrasonic Purge system components, such as filters or fans	D		X		Perform any diagnostic testing as recommended by the manufacturer.
Differential Pressure Back-purge probe cleaning system components	D		X		
Thermal Probe cleaning system components	D		X		
Change polynomial coefficients or K factors used to compute flow.	D	X	X	X	3 Load or normal load RATA may be required.

<b>Diagnostic Test Policy for DAHS</b>						
<b>Description of Event</b>	<b>Event</b>	<b>Formula</b>	<b>RATA</b>	<b>Calibration</b>	<b>Submit</b>	<b>Comments</b>
Replace entire DAHS (i.e. different vendor).	D	X		X	X	
Upgrade DAHS using existing hardware, same equations and algorithms to calculate emissions data	D	X			X	(3)
Change or insert new temperature, pressure, or molecular weight correction algorithms <sup>(4)</sup> in DAHS, for dilution systems.	D		X	X	X	DEP recommends these types of changes be made immediately prior to the RATAs for affected systems
Change or insert mathematical algorithm <sup>(4)</sup> in DAHS, for correcting measured NO concentration to total NOx	D		X	X	X	DEP recommends these types of changes be made immediately prior to the RATAs for affected systems

“R” means recertification event and “D” means diagnostic test event.

“X” means that this test is required or that notification must be submitted.

“A” means that the facility need not submit notification to the Department, but instead should document such repairs or replacements and keep such documentation on site in a form suitable for inspection.

(3) Perform a formula verification and missing data routine verification (if missing data is used): Emission and heat input rate formulas must be verified at each unit or stack location. The results of these checks must be kept on-site in a format suitable for inspection.

(4) Contact DEP to discuss the appropriate diagnostic tests if other types of mathematical algorithms are changed or inserted in the DAHS.

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**ENVIROFOCUS TECHNOLOGIES, LLC.  
LEAD SMELTER PROCESS STACK  
CORRECTIVE ACTION REPORT FORM**

<b>DATE:</b>	<b>INITIALS:</b>
<b>MALFUNCTION START DATE/TIME:</b>	<b>MALFUNCTION END DATE/TIME:</b>
<b>UNIT/SYSTEM:</b>	
<b>ANALYZER, MONITOR, COMPONENT SERVICED:</b>	
<b>AS FOUND PROBLEM/CONDITION (ALL DETAILS INCLUDING ALARMS ACTIVATED, ANALYZER VALUES, ETC.):</b>	
<b>CORRECTIVE ACTION TAKEN (INCLUDE ALL TESTS/CHECKS PERFORMED AND RESULTS):</b>	
<b>AS LEFT CONDITION (NOTE CORRECTED VALUES WHERE APPLICABLE):</b>	

FIGURE 10-1

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**LEAD REFINING HYGIENE STACK  
CORRECTIVE ACTION REPORT FORM**

<b>DATE:</b>	<b>INITIALS:</b>
<b>MALFUNCTION START DATE/TIME:</b>	<b>MALFUNCTION END DATE/TIME:</b>
<b>UNIT/SYSTEM:</b>	
<b>ANALYZER, MONITOR, COMPONENT SERVICED:</b>	
<b>AS FOUND PROBLEM/CONDITION (ALL DETAILS INCLUDING ALARMS ACTIVATED, ANALYZER VALUES, ETC.):</b>	
<b>CORRECTIVE ACTION TAKEN (INCLUDE ALL TESTS/CHECKS PERFORMED AND RESULTS):</b>	
<b>AS LEFT CONDITION (NOTE CORRECTED VALUES WHERE APPLICABLE):</b>	

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## **SECTION 11 DATA HANDLING**

### **11.1 RECORDKEEPING AND REPORTING**

Recordkeeping and reporting requirements are specified in 40 CFR 60 (§60.7, §60.49b (Subpart L) and Appendix F). Reporting requirements are also detailed in the operating permit. Refer to Appendices A and B of this document for more detail as contained in 40 CFR 60 regulations, and the permit, respectively.

The required reports cover an extensive amount of data about pollutant emissions, plant operating parameters, emission control efficiency, audit results, and calibrations. The data acquisition and handling system is capable of storing and retrieving data necessary for generating the required records and reports.

40 CFR 60 requires that records be kept on site and available for inspection for a period of at least Five (5) years. If the operating permit requires a longer data retention time, maintain all records and reports on site for a sufficient time period to meet that requirement.

## 11.2 CALCULATIONS

**NOTE:** Refer also to 40 CFR 60, Appendices B and F.

### RELATIVE ACCURACY

1. Calculate the arithmetic mean of the difference,  $\bar{d}$ , of the data set using the following equation.

$$\bar{d} = \frac{1}{n} \sum_{i=1}^n d_i \quad \text{(Eq. 11-1)}$$

Where:

$n$  = the number of data points

$\sum_{i=1}^n d_i$  = the algebraic sum of the individual differences,  $d_i$

$d_i$  = the difference between a reference method value and the corresponding CEMS value ( $RM_i - CEM_i$ ) at a given point in time,  $i$

2. Calculate the standard deviation,  $S_d$ , of the data set using the following equation.

$$S_d = \sqrt{\frac{\sum_{i=1}^n d_i^2 - \left[ \frac{\left( \sum_{i=1}^n d_i \right)^2}{n} \right]}{n - 1}} \quad \text{(Eq. 11-2)}$$

3. Calculate the confidence coefficient,  $cc$ , of the data set using the following equation.

$$cc = t_{0,975} \frac{S_d}{\sqrt{n}} \quad \text{(Eq. 11-3)}$$

Where:  $t_{0,975}$  = the t-value from Table 2-1, 40 CFR 60, Appendix B

4. Calculate the relative accuracy of data using the following equation.

$$RA = \frac{|\bar{d}| + |cc|}{\overline{RM}} \times 100 \quad (\text{Eq. 11-4})$$

Where:  $\overline{RM}$  = the arithmetic mean of the reference method values

$|\bar{d}|$  = the absolute value of the mean difference

$|cc|$  = the absolute value of the confidence coefficient

NOTE: 40 CFR 60 states that in cases where the average emissions for the test are less than 50 percent of the applicable standard, substitute the emission standard value in the denominator of in place of RM. In all other cases, use RM.

#### CGA ACCURACY CALCULATION

Calculation of the accuracy for cylinder gas audits:

$$A = \frac{C_m - C_a}{C_a} \times 100 \quad (\text{Eq. 11-5})$$

Where: A = Accuracy of the CEMS, percent

$C_m$  = Average CEMS response during audit in units of applicable standard or appropriate concentration

$C_a$  = Average audit value (CGA certified value or three-run average for RAA) in units of applicable standard or appropriate concentration

## POLLUTANT MASS EMISSION RATE CALCULATIONS

Calculate the mass emission rate using the following equation.

$$E_h = K C_h Q_h \quad (\text{Eq. F-1})$$

Where:  $E_h$  = Hourly pollutant mass emission rate during unit operation, lb/hr

$$K = 1.660 \times 10^{-7} \text{ for SO}_2 \text{ (lb/scf)/ppm}$$

$$1.194 \times 10^{-7} \text{ for NO}_x \text{ (lb/scf)/ppm}$$

$$7.255 \times 10^{-8} \text{ for CO (lb/scf)/ppm}$$

$C_h$  = Hourly pollutant concentration during unit operation, stack moisture basis, ppm

$Q_h$  = Hourly average volumetric flow rate during unit operation, stack moisture basis, scfh

## STACK FLOW ANALYZER CALCULATIONS

### Stack Velocity

Calculate the velocity of the stack gas using stack temperature and delta P measurements.

$$V_s = K_p \times C_p \times \sqrt{\Delta P_s} \times \sqrt{\frac{T_s}{P_s \times MW_s}} \quad (\text{Eq. 2-9})$$

### Volumetric Stack Flow STP conversion

Calculate volumetric stack flow using stack velocity.

$$Q_{sd} = 60 \frac{(1 - E_{ws})}{v_s A} \left( \frac{P_s}{P_{STD}} \right) \left( \frac{T_{STD}}{T_s} \right) \quad (\text{Eq. 2-10})$$

Where:  $Q_{sd}$  - Dry standard volumetric stack flow, dscf/min

$V_s$  - Stack velocity, ft/sec (calculated)

$T_S$  - Stack temperature, °R = °F + 460 (measured)

$T_{STD}$  - Absolute stack temperature, fixed value of 528 °R

$\Delta P_S$  - Stack differential pressure, in. H<sub>2</sub>O. (measured)

$K_P$  - Pitot Constant, fixed value of 85.49, dimensionless

$C_P$  - Pitot Coefficient, fixed value of 0.84 (typical for S-pitot type)

$P_S$  - Stack barometric pressure, in. Hg (operator entered constant)

$P_{STD}$  - Standard absolute pressure, fixed value of 29.92 in. Hg

$MW_S$  - Gas density, lb/lb-mole (operator entered constant)

$Area_S$  - Cross-sectional area of the stack, sq. ft (operator entered constant)

$B_{ws}$  - Proportion by volume of water vapor in gas stream, (%H<sub>2</sub>O/100) (operator entered constant)

60 - Conversion factor, sec/min

Volumetric Flow is calculated as follows:

a.  $AWCFM = (FPS) (Stack\ Area) (60)$

b.  $SWCFM = (AWCFM) \left( \frac{528}{T_S + 460} \right) \left( \frac{P_S \text{ Hg}}{29.92} \right)$

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## **11.3 SAMPLE REPORTS**

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**(INSERT SAMPLE REPORTS BELOW AS THEY BECOME AVAILABLE)**

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## **APPENDIX A**

### **40 CFR 60 Applicable Regulations**

- 40 CFR 60 Subpart A
- 40 CFR 60 Subpart L
- 40 CFR 60 Appendix B
- 40 CFR 60 Appendix F

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## **Title 40: Protection of Environment**

### **PART 60—STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES**

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#### **Subpart A—General Provisions**

##### **§ 60.1 Applicability.**

(a) Except as provided in subparts B and C, the provisions of this part apply to the owner or operator of any stationary source which contains an affected facility, the construction or modification of which is commenced after the date of publication in this part of any standard (or, if earlier, the date of publication of any proposed standard) applicable to that facility.

(b) Any new or revised standard of performance promulgated pursuant to section 111(b) of the Act shall apply to the owner or operator of any stationary source which contains an affected facility, the construction or modification of which is commenced after the date of publication in this part of such new or revised standard (or, if earlier, the date of publication of any proposed standard) applicable to that facility.

(c) In addition to complying with the provisions of this part, the owner or operator of an affected facility may be required to obtain an operating permit issued to stationary sources by an authorized State air pollution control agency or by the Administrator of the U.S. Environmental Protection Agency (EPA) pursuant to Title V of the Clean Air Act (Act) as amended November 15, 1990 (42 U.S.C. 7661). For more information about obtaining an operating permit see part 70 of this chapter.

(d) *Site-specific standard for Merck & Co., Inc.'s Stonewall Plant in Elkton, Virginia.* (1) This paragraph applies only to the pharmaceutical manufacturing facility, commonly referred to as the Stonewall Plant, located at Route 340 South, in Elkton, Virginia ("site").

(2) Except for compliance with 40 CFR 60.49b(u), the site shall have the option of either complying directly with the requirements of this part, or reducing the site-wide emissions caps in accordance with the procedures set forth in a permit issued pursuant to 40 CFR 52.2454. If the site chooses the option of reducing the site-wide emissions caps in accordance with the procedures set forth in such permit, the requirements of such permit shall apply in lieu of the otherwise applicable requirements of this part.

(3) Notwithstanding the provisions of paragraph (d)(2) of this section, for any provisions of this part except for Subpart Kb, the owner/operator of the site shall comply with the applicable provisions of this part if the Administrator determines that compliance with the provisions of this part is necessary for achieving the objectives of the regulation and the Administrator notifies the site in accordance with the provisions of the permit issued pursuant to 40 CFR 52.2454.

[40 FR 53346, Nov. 17, 1975, as amended at 55 FR 51382, Dec. 13, 1990; 59 FR 12427, Mar. 16, 1994; 62 FR 52641, Oct. 8, 1997]

##### **§ 60.2 Definitions.**

The terms used in this part are defined in the Act or in this section as follows:

*Act* means the Clean Air Act (42 U.S.C. 7401 *et seq.* )

*Administrator* means the Administrator of the Environmental Protection Agency or his authorized representative.

*Affected facility* means, with reference to a stationary source, any apparatus to which a standard is applicable.

*Alternative method* means any method of sampling and analyzing for an air pollutant which is not a reference or equivalent method but which has been demonstrated to the Administrator's satisfaction to, in specific cases, produce results adequate for his determination of compliance.

*Approved permit program* means a State permit program approved by the Administrator as meeting the requirements of part 70 of this chapter or a Federal permit program established in this chapter pursuant to Title V of the Act (42 U.S.C. 7661).

*Capital expenditure* means an expenditure for a physical or operational change to an existing facility which exceeds the product of the applicable "annual asset guideline repair allowance percentage" specified in the latest edition of Internal Revenue Service (IRS) Publication 534 and the existing facility's basis, as defined by section 1012 of the Internal Revenue Code. However, the total expenditure for a physical or operational change to an existing facility must not be reduced by any "excluded additions" as defined in IRS Publication 534, as would be done for tax purposes.

*Clean coal technology demonstration project* means a project using funds appropriated under the heading 'Department of Energy-Clean Coal Technology', up to a total amount of \$2,500,000,000 for commercial demonstrations of clean coal technology, or similar projects funded through appropriations for the Environmental Protection Agency.

*Commenced* means, with respect to the definition of *new source* in section 111(a)(2) of the Act, that an owner or operator has undertaken a continuous program of construction or modification or that an owner or operator has entered into a contractual obligation to undertake and complete, within a reasonable time, a continuous program of construction or modification.

*Construction* means fabrication, erection, or installation of an affected facility.

*Continuous monitoring system* means the total equipment, required under the emission monitoring sections in applicable subparts, used to sample and condition (if applicable), to analyze, and to provide a permanent record of emissions or process parameters.

*Electric utility steam generating unit* means any steam electric generating unit that is constructed for the purpose of supplying more than one-third of its potential electric output capacity and more than 25 MW electrical output to any utility power distribution system for sale. Any steam supplied to a steam distribution system for the purpose of providing steam to a steam-electric generator that would produce electrical energy for sale is also considered in determining the electrical energy output capacity of the affected facility.

*Equivalent method* means any method of sampling and analyzing for an air pollutant which has been demonstrated to the Administrator's satisfaction to have a consistent and quantitatively known relationship to the reference method, under specified conditions.

*Excess Emissions and Monitoring Systems Performance Report* is a report that must be submitted periodically by a source in order to provide data on its compliance with stated emission limits and operating parameters, and on the performance of its monitoring systems.

*Existing facility* means, with reference to a stationary source, any apparatus of the type for which a standard is promulgated in this part, and the construction or modification of which was commenced before the date of proposal of that standard; or any apparatus which could be altered in such a way as to be of that type.

*Force majeure* means, for purposes of §60.8, an event that will be or has been caused by circumstances beyond the control of the affected facility, its contractors, or any entity controlled by the affected facility that prevents the owner or operator from complying with the regulatory requirement to conduct performance tests within the specified timeframe despite the affected facility's best efforts to fulfill the obligation. Examples of such events are acts of nature, acts of war or terrorism, or equipment failure or safety hazard beyond the control of the affected facility.

*Isokinetic sampling* means sampling in which the linear velocity of the gas entering the sampling nozzle is equal to that of the undisturbed gas stream at the sample point.

*Issuance* of a part 70 permit will occur, if the State is the permitting authority, in accordance with the requirements of part 70 of this chapter and the applicable, approved State permit program. When the EPA is the permitting authority, issuance of a Title V permit occurs immediately after the EPA takes final action on the final permit.

*Malfunction* means any sudden, infrequent, and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.

*Modification* means any physical change in, or change in the method of operation of, an existing facility which increases the amount of any air pollutant (to which a standard applies) emitted into the

atmosphere by that facility or which results in the emission of any air pollutant (to which a standard applies) into the atmosphere not previously emitted.

*Monitoring device* means the total equipment, required under the monitoring of operations sections in applicable subparts, used to measure and record (if applicable) process parameters.

*Nitrogen oxides* means all oxides of nitrogen except nitrous oxide, as measured by test methods set forth in this part.

*One-hour period* means any 60-minute period commencing on the hour.

*Opacity* means the degree to which emissions reduce the transmission of light and obscure the view of an object in the background.

*Owner or operator* means any person who owns, leases, operates, controls, or supervises an affected facility or a stationary source of which an affected facility is a part.

*Part 70 permit* means any permit issued, renewed, or revised pursuant to part 70 of this chapter.

*Particulate matter* means any finely divided solid or liquid material, other than uncombined water, as measured by the reference methods specified under each applicable subpart, or an equivalent or alternative method.

*Permit program* means a comprehensive State operating permit system established pursuant to title V of the Act (42 U.S.C. 7661) and regulations codified in part 70 of this chapter and applicable State regulations, or a comprehensive Federal operating permit system established pursuant to title V of the Act and regulations codified in this chapter.

*Permitting authority* means:

(1) The State air pollution control agency, local agency, other State agency, or other agency authorized by the Administrator to carry out a permit program under part 70 of this chapter; or

(2) The Administrator, in the case of EPA-implemented permit programs under title V of the Act (42 U.S.C. 7661).

*Proportional sampling* means sampling at a rate that produces a constant ratio of sampling rate to stack gas flow rate.

*Reactivation of a very clean coal-fired electric utility steam generating unit* means any physical change or change in the method of operation associated with the commencement of commercial operations by a coal-fired utility unit after a period of discontinued operation where the unit:

(1) Has not been in operation for the two-year period prior to the enactment of the Clean Air Act Amendments of 1990, and the emissions from such unit continue to be carried in the permitting authority's emissions inventory at the time of enactment;

(2) Was equipped prior to shut-down with a continuous system of emissions control that achieves a removal efficiency for sulfur dioxide of no less than 85 percent and a removal efficiency for particulates of no less than 98 percent;

(3) Is equipped with low-NO<sub>x</sub> burners prior to the time of commencement of operations following reactivation; and

(4) Is otherwise in compliance with the requirements of the Clean Air Act.

*Reference method* means any method of sampling and analyzing for an air pollutant as specified in the applicable subpart.

*Repowering* means replacement of an existing coal-fired boiler with one of the following clean coal technologies: atmospheric or pressurized fluidized bed combustion, integrated gasification combined cycle, magnetohydrodynamics, direct and indirect coal-fired turbines, integrated gasification fuel cells, or as determined by the Administrator, in consultation with the Secretary of Energy, a derivative of one or more of these technologies, and any other technology capable of controlling multiple combustion emissions simultaneously with improved boiler or generation efficiency and with significantly greater waste reduction relative to the performance of technology in widespread commercial use as of November 15, 1990. Repowering shall also include any oil and/or gas-fired unit which has been awarded clean coal technology demonstration funding as of January 1, 1991, by the Department of Energy.

*Run* means the net period of time during which an emission sample is collected. Unless otherwise

specified, a run may be either intermittent or continuous within the limits of good engineering practice.

*Shutdown* means the cessation of operation of an affected facility for any purpose.

*Six-minute period* means any one of the 10 equal parts of a one-hour period.

*Standard* means a standard of performance proposed or promulgated under this part.

*Standard conditions* means a temperature of 293 K (68F) and a pressure of 101.3 kilopascals (29.92 in Hg).

*Startup* means the setting in operation of an affected facility for any purpose.

*State* means all non-Federal authorities, including local agencies, interstate associations, and State-wide programs, that have delegated authority to implement: (1) The provisions of this part; and/or (2) the permit program established under part 70 of this chapter. The term State shall have its conventional meaning where clear from the context.

*Stationary source* means any building, structure, facility, or installation which emits or may emit any air pollutant.

*Title V permit* means any permit issued, renewed, or revised pursuant to Federal or State regulations established to implement title V of the Act (42 U.S.C. 7661). A title V permit issued by a State permitting authority is called a part 70 permit in this part.

*Volatile Organic Compound* means any organic compound which participates in atmospheric photochemical reactions; or which is measured by a reference method, an equivalent method, an alternative method, or which is determined by procedures specified under any subpart.

[44 FR 55173, Sept. 25, 1979, as amended at 45 FR 5617, Jan. 23, 1980; 45 FR 85415, Dec. 24, 1980; 54 FR 6662, Feb. 14, 1989; 55 FR 51382, Dec. 13, 1990; 57 FR 32338, July 21, 1992; 59 FR 12427, Mar. 16, 1994; 72 FR 27442, May 16, 2007]

### § 60.3 Units and abbreviations.

Used in this part are abbreviations and symbols of units of measure. These are defined as follows:

(a) System International (SI) units of measure:

A—ampere g—

gram Hz—hertz

J—joule K—

degree Kelvin

kg—kilogram m—

meter

m<sup>3</sup>—cubic meter mg—

milligram—10<sup>-3</sup>gram mm—

millimeter—10<sup>-3</sup>meter Mg—

megagram—10<sup>6</sup> gram

mol—mole

N—newton

ng—nanogram— $10^{-9}$ gram

nm—nanometer— $10^{-9}$ meter

Pa—pascal

s—second

V—volt

W—watt

$\Omega$ —ohm

$\mu$ g—microgram— $10^{-6}$ gram

(b) Other units of measure:

Btu—British thermal unit

$^{\circ}$ C—degree Celsius (centigrade)

cal—calorie

cfm—cubic feet per minute

cu ft—cubic feet

dcf—dry cubic feet

dcm—dry cubic meter

dscf—dry cubic feet at standard conditions

dscm—dry cubic meter at standard conditions

eq—equivalent

$^{\circ}$ F—degree Fahrenheit

ft—feet

gal—gallon

gr—grain

g-eq—gram equivalent

hr—hour

in—inch

k—1,000

l—liter

lpm—liter per minute

lb—pound meq—

milliequivalent

min—minute

ml—milliliter

mol. wt.—molecular weight

ppb—parts per billion

ppm—parts per million

psia—pounds per square inch absolute

psig—pounds per square inch gage

°R—degree Rankine

scf—cubic feet at standard conditions scfh—

cubic feet per hour at standard conditions scm—

cubic meter at standard conditions sec—second

sq ft—square feet

std—at standard conditions

(c) Chemical nomenclature:

CdS—cadmium sulfide

CO—carbon monoxide

CO<sub>2</sub>—carbon dioxide

HCl—hydrochloric acid

Hg—mercury H<sub>2</sub>O—

water

H<sub>2</sub>S—hydrogen sulfide

H<sub>2</sub>SO<sub>4</sub>—sulfuric acid

N<sub>2</sub>—nitrogen NO—

nitric oxide

NO<sub>2</sub>—nitrogen dioxide

NO<sub>x</sub>—nitrogen oxides

O<sub>2</sub>—oxygen SO<sub>2</sub>—

sulfur dioxide SO<sub>3</sub>—

sulfur trioxide

SO<sub>x</sub>—sulfur oxides

(d) Miscellaneous:

A.S.T.M.—American Society for Testing and Materials

[42 FR 37000, July 19, 1977; 42 FR 38178, July 27, 1977]

#### § 60.4 Address.

(a) All requests, reports, applications, submittals, and other communications to the Administrator pursuant to this part shall be submitted in duplicate to the appropriate Regional Office of the U.S. Environmental Protection Agency to the attention of the Director of the Division indicated in the following list of EPA Regional Offices.

Region I (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont), Director, Air Management Division, U.S. Environmental Protection Agency, John F. Kennedy Federal Building, Boston, MA 02203.

Region II (New Jersey, New York, Puerto Rico, Virgin Islands), Director, Air and Waste Management Division, U.S. Environmental Protection Agency, Federal Office Building, 26 Federal Plaza (Foley Square), New York, NY 10278.

Region III (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia), Director, Air Protection Division, Mail Code 3AP00, 1650 Arch Street, Philadelphia, PA 19103–2029.

Region IV (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee), Director, Air and Waste Management Division, U.S. Environmental Protection Agency, 345 Courtland Street, NE., Atlanta, GA 30365.

Region V (Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin), Director, Air and Radiation Division, U.S. Environmental Protection Agency, 77 West Jackson Boulevard, Chicago, IL 60604–3590.

Region VI (Arkansas, Louisiana, New Mexico, Oklahoma, Texas); Director, Air, Pesticides, and Toxics Division; U.S. Environmental Protection Agency, 1445 Ross Avenue, Dallas, TX 75202.

Region VII (Iowa, Kansas, Missouri, Nebraska), Director, Air, RCRA, and Toxics Division, U.S. Environmental Protection Agency, 901 N. 5th Street, Kansas City, KS 66101.

Region VIII (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming) Director, Air and Toxics Technical Enforcement Program, Office of Enforcement, Compliance and Environmental Justice, Mail Code 8ENF–AT, 1595 Wynkoop Street, Denver, CO 80202–1129.

Region IX (Arizona, California, Hawaii and Nevada; the territories of American Samoa and Guam; the Commonwealth of the Northern Mariana Islands; the territories of Baker Island, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Midway Atoll, Palmyra Atoll, and Wake Islands; and certain U.S. Government activities in the freely associated states of the Republic of the Marshall Islands, the Federated States of Micronesia, and the Republic of Palau), Director, Air Division, U.S. Environmental Protection Agency, 75 Hawthorne Street, San Francisco, CA 94105.

Region X (Alaska, Oregon, Idaho, Washington), Director, Air and Waste Management Division, U.S. Environmental Protection Agency, 1200 Sixth Avenue, Seattle, WA 98101.

(b) Section 111(c) directs the Administrator to delegate to each State, when appropriate, the authority to implement and enforce standards of performance for new stationary sources located in such State. All information required to be submitted to EPA under paragraph (a) of this section, must also be submitted to the appropriate State Agency of any State to which this authority has been delegated (provided, that each specific delegation may except sources from a certain Federal or State reporting requirement). The appropriate mailing address for those States whose delegation request has been approved is as follows:

(A) [Reserved]

(B) State of Alabama: Alabama Department of Environmental Management, P.O. Box 301463,

Montgomery, Alabama 36130–1463.

(C) State of Alaska, Department of Environmental Conservation, Pouch O, Juneau, AK 99811.

(D) Arizona:

Arizona Department of Environmental Quality, 1110 West Washington Street, Phoenix, AZ 85007.

Maricopa County Air Quality Department, 1001 North Central Avenue, Suite 900, Phoenix, AZ 85004.

Pima County Department of Environmental Quality, 33 North Stone Avenue, Suite 700, Tucson, AZ 85701.

Pinal County Air Quality Control District, 31 North Pinal Street, Building F, Florence, AZ 85132.

Note: For tables listing the delegation status of agencies in Region IX, see paragraph (d) of this section.

(E) State of Arkansas: Chief, Division of Air Pollution Control, Arkansas Department of Pollution Control and Ecology, 8001 National Drive, P.O. Box 9583, Little Rock, AR 72209.

(F) California:

Amador County Air Pollution Control District, 12200–B Airport Road, Jackson, CA 95642.

Antelope Valley Air Quality Management District, 43301 Division Street, Suite 206, Lancaster, CA 93535.

Bay Area Air Quality Management District, 939 Ellis Street, San Francisco, CA 94109.

Butte County Air Quality Management District, 2525 Dominic Drive, Suite J, Chico, CA 95928.

Calaveras County Air Pollution Control District, 891 Mountain Ranch Road, San Andreas, CA 95249.

Colusa County Air Pollution Control District, 100 Sunrise Blvd., Suite A–3, Colusa, CA 95932–3246.

El Dorado County Air Quality Management District, 2850 Fairlane Court, Bldg. C, Placerville, CA 95667–4100.

Eastern Kern Air Pollution Control District, 2700 “M” Street, Suite 302, Bakersfield, CA 93301–2370.

Feather River Air Quality Management District, 1007 Live Oak Blvd., Suite B–3, Yuba City, CA 95991.

Glenn County Air Pollution Control District, 720 N. Colusa Street, P.O. Box 351, Willows, CA 95988–0351.

Great Basin Unified Air Pollution Control District, 157 Short Street, Suite 6, Bishop, CA 93514–3537.

Imperial County Air Pollution Control District, 150 South Ninth Street, El Centro, CA 92243–2801.

Lake County Air Quality Management District, 885 Lakeport Blvd., Lakeport, CA 95453–5405.

Lassen County Air Pollution Control District, 707 Nevada Street, Suite 1, Susanville, CA 96130.

Mariposa County Air Pollution Control District, P.O. Box 5, Mariposa, CA 95338.

Mendocino County Air Quality Management District, 306 E. Gobbi Street, Ukiah, CA 95482–5511.

Modoc County Air Pollution Control District, 619 North Main Street, Alturas, CA 96101.

Mojave Desert Air Quality Management District, 14306 Park Avenue, Victorville, CA 92392–2310.

Monterey Bay Unified Air Pollution Control District, 24580 Silver Cloud Court, Monterey, CA 93940.

North Coast Unified Air Quality Management District, 2300 Myrtle Avenue, Eureka, CA 95501–3327.

Northern Sierra Air Quality Management District, 200 Litton Drive, Suite 320, P.O. Box 2509, Grass Valley, CA 95945–2509.

Northern Sonoma County Air Pollution Control District, 150 Matheson Street, Healdsburg, CA 95448–4908.

Placer County Air Pollution Control District, 3091 County Center Drive, Suite 240, Auburn, CA 95603.

Sacramento Metropolitan Air Quality Management District, 777 12th Street, Third Floor, Sacramento, CA 95814–1908.

San Diego County Air Pollution Control District, 10124 Old Grove Road, San Diego, CA 92131–1649.

San Joaquin Valley Air Pollution Control District, 1990 E. Gettysburg, Fresno, CA 93726.

San Luis Obispo County Air Pollution Control District, 3433 Roberto Court, San Luis Obispo, CA 93401–7126.

Santa Barbara County Air Pollution Control District, 260 North San Antonio Road, Suite A, Santa Barbara, CA 93110–1315.

Shasta County Air Quality Management District, 1855 Placer Street, Suite 101, Redding, CA 96001–1759.

Siskiyou County Air Pollution Control District, 525 So. Foothill Drive, Yreka, CA 96097–3036.

South Coast Air Quality Management District, 21865 Copley Drive, Diamond Bar, CA 91765–4182.

Tehama County Air Pollution Control District, P.O. Box 8069 (1750 Walnut Street), Red Bluff, CA 96080–0038.

Tuolumne County Air Pollution Control District, 22365 Airport, Columbia, CA 95310.

Ventura County Air Pollution Control District, 669 County Square Drive, 2nd Floor, Ventura, CA 93003–5417.

Yolo-Solano Air Quality Management District, 1947 Galileo Court, Suite 103, Davis, CA 95616–4882.

Note: For tables listing the delegation status of agencies in Region IX, see paragraph (d) of this section.

(G) State of Colorado, Department of Public Health and Environment, 4300 Cherry Creek Drive South, Denver, CO 80222–1530.

Note: For a table listing Region VIII's NSPS delegation status, see paragraph (c) of this section.

(H) State of Connecticut, Bureau of Air Management, Department of Environmental Protection, State Office Building, 165 Capitol Avenue, Hartford, CT 06106.

(I) State of Delaware, Department of Natural Resources & Environmental Control, 89 Kings Highway, P.O. Box 1401, Dover, Delaware 19903.

(J) District of Columbia, Department of Public Health, Air Quality Division, 51 N Street, NE., Washington, DC 20002.

(K) State of Florida: Florida Department of Environmental Protection, Division of Air Resources Management, 2600 Blair Stone Road, MS 5500, Tallahassee, Florida 32399–2400.

(L) State of Georgia: Georgia Department of Natural Resources, Environmental Protection Division, 2 Martin Luther King Jr. Drive, SE., Suite 1152 East Floyd Tower, Atlanta, Georgia 30334–9000.

(M) Hawaii:

Clean Air Branch, Hawaii Department of Health, 919 Ala Moana Blvd., Suite 203, Honolulu, HI 96814.

Note: For tables listing the delegation status of agencies in Region IX, see paragraph (d) of this section.

(N) State of Idaho, Department of Health and Welfare, Statehouse, Boise, ID 83701.

(O) State of Illinois: Illinois Environmental Protection Agency, 1021 North Grand Avenue East, Springfield, Illinois 62794.

(P) State of Indiana: Indiana Department of Environmental Management, Office of Air Quality, 100 North Senate Avenue, Indianapolis, Indiana 46204.

(Q) State of Iowa: Iowa Department of Natural Resources, Environmental Protection Division, Air Quality Bureau, 7900 Hickman Road, Suite 1, Urbandale, IA 50322.

(R) State of Kansas: Kansas Department of Health and Environment, Bureau of Air and Radiation, 1000 S.W. Jackson, Suite 310, Topeka, KS 66612–1366.

(S) Commonwealth of Kentucky: Commonwealth of Kentucky, Energy and Environment Cabinet, Department of Environmental Protection, Division for Air Quality, 200 Fair Oaks Lane, 1st Floor, Frankfort, Kentucky 40610–1403.

Louisville Metro Air Pollution Control District, 850 Barret Avenue, Louisville, Kentucky 40204.

(T) State Louisiana: Louisiana Department of Environmental Quality, P.O. Box 4301, Baton Rouge, Louisiana 70821–4301. For a list of delegated standards for Louisiana (excluding Indian country), see paragraph (e)(2) of this section.

(U) State of Maine, Bureau of Air Quality Control, Department of Environmental Protection, State House, Station No. 17, Augusta, ME 04333.

(V) State of Maryland, Department of the Environment, 1800 Washington Boulevard, Suite 705, Baltimore, Maryland 21230.

(W) Commonwealth of Massachusetts, Division of Air Quality Control, Department of Environmental Protection, One Winter Street, 7th floor, Boston, MA 02108.

(X) State of Michigan: Michigan Department of Natural Resources and Environment, Air Quality Division, P.O. Box 30028, Lansing, Michigan 48909.

(Y) State of Minnesota: Minnesota Pollution Control Agency, Division of Air Quality, 520

Lafayette Road North, St. Paul, Minnesota 55155.

(Z) State of Mississippi: Mississippi Department of Environmental Quality, Office of Pollution Control, Air Division, 515 East Amite Street, Jackson, Mississippi 39201.

(AA) State of Missouri: Missouri Department of Natural Resources, Division of Environmental Quality, P.O. Box 176, Jefferson City, MO 65102.

(BB) State of Montana, Department of Environmental Quality, 1520 E. 6th Ave., PO Box 200901, Helena, MT 59620-0901.

Note: For a table listing Region VIII's NSPS delegation status, see paragraph (c) of this section.

(CC) State of Nebraska, Nebraska Department of Environmental Control, P.O. Box 94877, State House Station, Lincoln, NE 68509.

Lincoln-Lancaster County Health Department, Division of Environmental Health, 2200 St. Marys Avenue, Lincoln, NE 68502

(DD) Nevada:

Nevada Division of Environmental Protection, 901 South Stewart Street, Suite 4001, Carson City, NV 89701-5249.

Clark County Department of Air Quality and Environmental Management, 500 S. Grand Central Parkway, 1st Floor, P.O. Box 555210, Las Vegas, NV 89155-5210.

Washoe County Health District, Air Quality Management Division, 1001 E. 9th Street, Building A, Suite 115A, Reno, NV 89520.

Note: For tables listing the delegation status of agencies in Region IX, see paragraph (d) of this section.

(EE) State of New Hampshire, Air Resources Division, Department of Environmental Services, 64 North Main Street, Caller Box 2033, Concord, NH 03302-2033.

(FF) State of New Jersey: New Jersey Department of Environmental Protection, Division of Environmental Quality, Enforcement Element, John Fitch Plaza, CN-027, Trenton, NJ 08625.

(1) The following table lists the specific source and pollutant categories that have been delegated to the states in Region II. The (X) symbol is used to indicate each category that has been delegated.

	Subpart	State			
		New Jersey	New York	Puerto Rico	Virgin Islands
D	Fossil-Fuel Fired Steam Generators for Which Construction Commenced After August 17, 1971 (Steam Generators and Lignite Fired Steam Generators)	X	X	X	X
Da	Electric Utility Steam Generating Units for Which Construction Commenced After September 18, 1978	X		X	
Db	Industrial-Commercial-Institutional Steam Generating Units	X	X	X	X
E	Incinerators	X	X	X	X
F	Portland Cement Plants	X	X	X	X
G	Nitric Acid Plants	X	X	X	X
H	Sulfuric Acid Plants	X	X	X	X
I	Asphalt Concrete Plants	X	X	X	X

J	Petroleum Refineries—(All Categories)	X	X	X	X
K	Storage Vessels for Petroleum Liquids Constructed After June 11, 1973, and prior to May 19, 1978	X	X	X	X
Ka	Storage Vessels for Petroleum Liquids Constructed After May 18, 1978	X	X	X	
L	Secondary Lead Smelters	X	X	X	X
M	Secondary Brass and Bronze Ingot Production Plants	X	X	X	X
N	Iron and Steel Plants	X	X	X	X
O	Sewage Treatment Plants	X	X	X	X
P	Primary Copper Smelters	X	X	X	X
Q	Primary Zinc Smelters	X	X	X	X
R	Primary Lead Smelters	X	X	X	X
S	Primary Aluminum Reduction Plants	X	X	X	X
T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid Plants	X	X	X	X
U	Phosphate Fertilizer Industry: Superphosphoric Acid Plants	X	X	X	X
V	Phosphate Fertilizer Industry: Diammonium Phosphate Plants	X	X	X	X
W	Phosphate Fertilizer Industry: Triple Superphosphate Plants	X	X	X	X
X	Phosphate Fertilizer Industry: Granular Triple Superphosphate	X	X	X	X
Y	Coal Preparation Plants	X	X	X	X
Z	Ferrous Production Facilities	X	X	X	X
AA	Steel Plants: Electric Arc Furnaces	X	X	X	X
AAa	Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels in Steel Plants	X	X	X	
BB	Kraft Pulp Mills	X	X	X	
CC	Glass Manufacturing Plants	X	X	X	
DD	Grain Elevators	X	X	X	
EE	Surface Coating of Metal Furniture	X	X	X	
GG	Stationary Gas Turbines	X	X	X	
HH	Lime Plants	X	X	X	
KK	Lead Acid Battery Manufacturing Plants	X	X		
LL	Metallic Mineral Processing Plants	X	X	X	
MM	Automobile and Light-Duty Truck Surface Coating Operations	X	X		
NN	Phosphate Rock Plants	X	X		
PP	Ammonium Sulfate Manufacturing Plants	X	X		
QQ	Graphic Art Industry Publication Rotogravure Printing	X	X	X	X
RR	Pressure Sensitive Tape and Label Surface Coating Operations	X	X	X	
SS	Industrial Surface Coating: Large	X	X	X	

	Appliances				
TT	Metal Coil Surface Coating	X	X	X	
UU	Asphalt Processing and Asphalt Roofing Manufacture	X	X	X	
VV	Equipment Leaks of Volatile Organic Compounds in Synthetic Organic Chemical Manufacturing Industry	X		X	
WW	Beverage Can Surface Coating Industry	X	X	X	
XX	Bulk Gasoline Terminals	X	X	X	
FFF	Flexible Vinyl and Urethane Coating and Printing	X	X	X	
GGG	Equipment Leaks of VOC in Petroleum Refineries	X		X	
HHH	Synthetic Fiber Production Facilities	X		X	
JJJ	Petroleum Dry Cleaners	X	X	X	
KKK	Equipment Leaks of VOC from Onshore Natural Gas Processing Plants				
LLL	Onshore Natural Gas Processing Plants; SO <sub>2</sub> Emissions		X		
OOO	Nonmetallic Mineral Processing Plants		X	X	
PPP	Wool Fiberglass Insulation Manufacturing Plants		X	X	

(GG) State of New Mexico: New Mexico Environment Department, 1190 St. Francis Drive, P.O. Box 26110, Santa Fe, New Mexico 87502. Note: For a list of delegated standards for New Mexico (excluding Bernalillo County and Indian country), see paragraph (e)(1) of this section.

(i) Albuquerque-Bernalillo County Air Quality Control Board, c/o Environmental Health Department, P.O. Box 1293, Albuquerque, New Mexico 87103.

(ii) [Reserved]

(HH) New York: New York State Department of Environmental Conservation, 50 Wolf Road Albany, New York 12233, attention: Division of Air Resources.

(II) State of North Carolina: North Carolina Department of Environment and Natural Resources, Division of Air Quality, 1641 Mail Service Center, Raleigh, North Carolina 27699-1641.

Forsyth County Environmental Affairs, 537 North Spruce Street, Winston-Salem, North Carolina 27101.

Mecklenburg County Air Quality, 700 N. Tryon St., Suite 205, Charlotte, North Carolina 28202-2236.

Western North Carolina Regional Air Quality Agency, 49 Mount Carmel Road, Asheville, North Carolina 28806.

(JJ) State of North Dakota, Division of Air Quality, North Dakota Department of Health, P.O. Box 5520, Bismarck, ND 58506-5520.

Note: For a table listing Region VIII's NSPS delegation status, see paragraph (c) of this section.

(KK) State of Ohio:

(i) Medina, Summit and Portage Counties; Director, Akron Regional Air Quality Management District, 146 South High Street, Room 904, Akron, OH 44308.

(ii) Stark County; Director, Canton City Health Department, Air Pollution Control Division, 420 Market Avenue North, Canton, Ohio 44702-1544.

(iii) Butler, Clermont, Hamilton, and Warren Counties; Director, Hamilton County Department of Environmental Services, 250 William Howard Taft Road, Cincinnati, Ohio 45219-2660.

(iv) Cuyahoga County; Commissioner, Cleveland Department of Public Health, Division of Air Quality, 75 Erieview Plaza 2nd Floor, Cleveland, Ohio 44114.

(v) Clark, Darke, Greene, Miami, Montgomery, and Preble Counties; Director, Regional Air Pollution Control Agency, 117 South Main Street, Dayton, Ohio 45422-1280.

(vi) Lucas County and the City of Rossford (in Wood County); Director, City of Toledo, Division of Environmental Services, 348 South Erie Street, Toledo, OH 43604.

(vii) Adams, Brown, Lawrence, and Scioto Counties; Portsmouth Local Air Agency, 605 Washington Street, Third Floor, Portsmouth, OH 45662.

(viii) Allen, Ashland, Auglaize, Crawford, Defiance, Erie, Fulton, Hancock, Hardin, Henry, Huron, Marion, Mercer, Ottawa, Paulding, Putnam, Richland, Sandusky, Seneca, Van Wert Williams, Wood (Except City of Rossford), and Wyandot Counties; Ohio Environmental Protection Agency, Northwest District Office, Air Pollution Control, 347 North Dunbridge Road, Bowling Green, Ohio 43402.

(ix) Ashtabula, Carroll, Colombiana, Holmes, Lorain, and Wayne Counties; Ohio Environmental Protection Agency, Northeast District Office, Air Pollution Unit, 2110 East Aurora Road, Twinsburg, OH 44087.

(x) Athens, Belmont, Coshocton, Gallia, Guemsey, Harrison, Hocking, Jackson, Jefferson, Meigs, Monroe, Morgan, Muskingum, Noble, Perry, Pike, Ross, Tuscarawas, Vinton, and Washington Counties; Ohio Environmental Protection Agency, Southeast District Office, Air Pollution Unit, 2195 Front Street, Logan, OH 43138.

(xi) Champaign, Clinton, Highland, Logan, and Shelby Counties; Ohio Environmental Protection Agency, Southwest District Office, Air Pollution Unit, 401 East Fifth Street, Dayton, Ohio 45402-2911.

(xii) Delaware, Fairfield, Fayette, Franklin, Knox, Licking, Madison, Morrow, Pickaway, and Union Counties; Ohio Environmental Protection Agency, Central District Office, Air Pollution control, 50 West Town Street, Suite 700, Columbus, Ohio 43215.

(xiii) Geauga and Lake Counties; Lake County General Health District, Air Pollution Control, 33 Mill Street, Painesville, OH 44077.

(xiv) Mahoning and Trumbull Counties; Mahoning-Trumbull Air Pollution Control Agency, 345 Oak Hill Avenue, Suite 200, Youngstown, OH 44502.

(LL) State of Oklahoma, Oklahoma State Department of Health, Air Quality Service, P.O. Box 53551, Oklahoma City, OK 73152.

(i) Oklahoma City and County: Director, Oklahoma City-County Health Department, 921 Northeast 23rd Street, Oklahoma City, OK 73105.

(ii) Tulsa County: Tulsa City-County Health Department, 4616 East Fifteenth Street, Tulsa, OK 74112.

(MM) State of Oregon. (i) Oregon Department of Environmental Quality (ODEQ), 811 SW Sixth Avenue, Portland, OR 97204-1390, <http://www.deq.state.or.us>.

(ii) Lane Regional Air Pollution Authority (LRAPA), 1010 Main Street, Springfield, Oregon 97477, <http://www.lrapa.org>.

(NN)(i) City of Philadelphia, Department of Public Health, Air Management Services, 321 University Avenue, Philadelphia, Pennsylvania 19104.

(ii) Commonwealth of Pennsylvania, Department of Environmental Protection, Bureau of Air Quality Control, P.O. Box 8468, 400 Market Street, Harrisburg, Pennsylvania 17105.

(iii) Allegheny County Health Department, Bureau of Environmental Quality, Division of Air Quality, 301 39th Street, Pittsburgh, Pennsylvania 15201.

(OO) State of Rhode Island, Division of Air and Hazardous Materials, Department of Environmental Management, 291 Promenade Street, Providence, RI 02908.

(PP) State of South Carolina: South Carolina Department of Health and Environmental Control, 2600 Bull Street, Columbia, South Carolina 29201.

(QQ) State of South Dakota, Air Quality Program, Department of Environment and Natural Resources, Joe Foss Building, 523 East Capitol, Pierre, SD 57501–3181.

Note: For a table listing Region VIII's NSPS delegation status, see paragraph (c) of this section.

(RR) State of Tennessee: Tennessee Department of Environment and Conservation, Division of Air Pollution Control, 401 Church Street, 9th Floor, L&C Annex, Nashville, Tennessee 37243–1531.

Knox County Air Quality Management—Department of Public Health, 140 Dameron Avenue, Knoxville, TN 37917.

Air Pollution Control Bureau, Metropolitan Health Department, 311 23rd Avenue North, Nashville, TN 37203.

Chattanooga-Hamilton County Air Pollution Control Bureau, 6125 Preservation Drive, Chattanooga, TN 37416.

Memphis-Shelby County Health Department—Air Pollution Control Program, 814 Jefferson Avenue, Memphis, TN 38105.

(SS) State of Texas, Texas Air Control Board, 6330 Highway 290 East, Austin, TX 78723.

(TT) State of Utah, Division of Air Quality, Department of Environmental Quality, P.O. Box 144820, Salt Lake City, UT 84114–4820.

Note: For a table listing Region VIII's NSPS delegation status, see paragraph (c) of this section.

(UU) State of Vermont, Air Pollution Control Division, Agency of Natural Resources, Building 3 South, 103 South Main Street, Waterbury, VT 05676.

(VV) Commonwealth of Virginia, Department of Environmental Quality, 629 East Main Street, Richmond, Virginia 23219.

(WW) *State of Washington.* (i) Washington State Department of Ecology (Ecology), P.O. Box 47600, Olympia, WA 98504–7600, <http://www.ecy.wa.gov/>

(ii) Benton Clean Air Authority (BCAA), 650 George Washington Way, Richland, WA 99352–4289, <http://www.bcaa.net/>

(iii) Northwest Air Pollution Control Authority (NWAPA), 1600 South Second St., Mount Vernon, WA 98273–5202, <http://www.nwair.org/>

(iv) Olympic Regional Clean Air Agency (ORCAA), 909 Sleater-Kinney Road S.E., Suite 1, Lacey, WA 98503–1128, <http://www.orcaa.org/>

(v) Puget Sound Clean Air Agency (PSCAA), 110 Union Street, Suite 500, Seattle, WA 98101–2038, <http://www.pscleanair.org/>

(vi) Spokane County Air Pollution Control Authority (SCAPCA), West 1101 College, Suite 403, Spokane, WA 99201, <http://www.scapca.org/>

(vii) Southwest Clean Air Agency (SWCAA), 1308 NE. 134th St., Vancouver, WA 98685–2747, <http://www.swcleanair.org/>

(viii) Yakima Regional Clean Air Authority (YRCAA), 6 South 2nd Street, Suite 1016, Yakima, WA 98901, <http://co.yakima.wa.us/cleanair/default.htm>

(ix) The following table lists the delegation status of the New Source Performance Standards for the State of Washington. An “X” indicates the subpart has been delegated, subject to all the conditions and limitations set forth in Federal law and the letters granting delegation. Some authorities cannot be delegated and are retained by EPA. Refer to the letters granting delegation for a discussion of these retained authorities. The dates noted at the end of the table indicate the effective dates of Federal rules that have been delegated. Authority for implementing and enforcing any amendments made to these rules after these effective dates are not delegated.

#### NSPS Subparts Delegated to Washington Air Agencies

Subpart <sup>1</sup>	Washington							
	Ecology <sup>2</sup>	BCAA <sup>3</sup>	NWAPA <sup>4</sup>	ORCAA <sup>5</sup>	PSCAA <sup>6</sup>	SCAPCA <sup>7</sup>	SWCAA <sup>8</sup>	YRCAA <sup>9</sup>
A General Provisions	X	X	X	X	X	X	X	X
B Adoption and Submittal of State Plans for Designated Facilities								
C Emission Guidelines and Compliance Times								
Cb Large Municipal Waste Combustors that are Constructed on or before September 20, 1994 (Emission Guidelines and Compliance Times)								
Cc Municipal Solid Waste Landfills (Emission Guidelines and Compliance Times)								
Cd Sulfuric Acid Production Units (Emission Guidelines and Compliance Times)								
Ce Hospital/Medical/Infectious Waste Incinerators (Emission Guidelines and Compliance Times)								
D Fossil-Fuel-Fired Steam Generators for which Construction is Commenced after August 17, 1971	X	X	X	X	X	X	X	X
Da Electric Utility Steam Generating Units for which Construction is Commenced after September 18, 1978	X	X	X	X	X	X	X	X
Db Industrial-Commercial-Institutional Steam Generating Units	X	X	X	X	X	X	X	X
Dc Small Industrial-Commercial-Institutional Steam Generating Units	X	X	X	X	X	X	X	X
E Incinerators	X	X	X	X	X	X	X	X
Ea Municipal Waste Combustors for which Construction is Commenced after December 20, 1989 and on or before September 20, 1994	X	X	X	X	X	X	X	X
Eb—Large Municipal Waste Combustors		X		X	X	X		
Ec—Hospital/Medical/Infectious Waste Incinerators	X	X	X	X	X	X		
F Portland Cement Plants	X	X	X	X	X	X	X	X
G Nitric Acid Plants	X	X	X	X	X	X	X	X
H Sulfuric Acid Plants	X	X	X	X	X	X	X	X

I Hot Mix Asphalt Facilities	X	X	X	X	X	X	X	X
J Petroleum Refineries	X	X	X	X	X	X	X	X
K Storage Vessels for Petroleum Liquids for which Construction, Reconstruction, or Modification Commenced after June 11, 1973 and prior to May 19, 1978	X	X	X	X	X	X	X	X
Ka Storage Vessels for Petroleum Liquids for which Construction, Reconstruction, or Modification Commenced after May 18, 1978 and prior to July 23, 1984	X	X	X	X	X	X	X	X
Kb VOC Liquid Storage Vessels (including Petroleum Liquid Storage Vessels) for which Construction, Reconstruction, or Modification Commenced after July 23, 1984	X	X	X	X	X	X	X	X
L Secondary Lead Smelters	X	X	X	X	X	X	X	X
M Secondary Brass and Bronze Production Plants	X	X	X	X	X	X	X	X
N Primary Emissions from Basic Oxygen Process Furnaces for which Construction is Commenced after June 11, 1973	X	X	X	X	X	X	X	X
Na Secondary Emissions from Basic Oxygen Process Steel-making Facilities for which Construction is Commenced after January 20, 1983	X	X	X	X	X	X	X	X
O Sewage Treatment Plants	X	X	X	X	X	X	X	X
P Primary Copper Smelters	X	X	X	X	X	X	X	X
Q Primary Zinc Smelters	X	X	X	X	X	X	X	X
R Primary Lead Smelters	X	X	X	X	X	X	X	X
S Primary Aluminum Reduction Plants <sup>10</sup>	X							
T Phosphate Fertilizer Industry: Wet Process Phosphoric Acid Plants	X	X	X	X	X	X	X	X
U Phosphate Fertilizer Industry: Superphosphoric Acid Plants	X	X	X	X	X	X	X	X
V Phosphate Fertilizer Industry: Diammonium Phosphate Plants	X	X	X	X	X	X	X	X
W Phosphate Fertilizer Industry: Triple Superphosphate Plants	X	X	X	X	X	X	X	X
X Phosphate Fertilizer Industry: Granular Triple	X	X	X	X	X	X	X	X

Superphosphate Storage Facilities								
Y Coal Preparation Plants	X	X	X	X	X	X	X	X
Z Ferroalloy Production Facilities	X	X	X	X	X	X	X	X
AA Steel Plants: Electric Arc Furnaces Constructed after October 21, 1974 and on or before August 17, 1983	X	X	X	X	X	X	X	X
AAa Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed after August 7, 1983	X	X	X	X	X	X	X	X
BB Kraft Pulp Mills <sup>11</sup>	X							
CC Glass Manufacturing Plants	X	X	X	X	X	X	X	X
DD Grain Elevators	X	X	X	X	X	X	X	X
EE Surface Coating of Metal Furniture	X	X	X	X	X	X	X	X
GG Stationary Gas Turbines	X	X	X	X	X	X	X	X
HH Lime Manufacturing Plants	X	X	X	X	X	X	X	X
KK Lead-Acid Battery Manufacturing Plants	X	X	X	X	X	X	X	X
LL Metallic Mineral Processing Plants	X	X	X	X	X	X	X	X
MM Automobile and Light Duty Truck Surface Coating Operations	X	X	X	X	X	X	X	X
NN Phosphate Rock Plants	X	X	X	X	X	X	X	X
PP Ammonium Sulfate Manufacture	X	X	X	X	X	X	X	X
QQ Graphic Arts Industry: Publication Rotogravure Printing	X	X	X	X	X	X	X	X
RR Pressure Sensitive Tape and Label Surface Coating Standards	X	X	X	X	X	X	X	X
SS Industrial Surface Coating: Large Appliances	X	X	X	X	X	X	X	X
TT Metal Coil Surface Coating	X	X	X	X	X	X	X	X
UU Asphalt Processing and Asphalt Roof Manufacture	X	X	X	X	X	X	X	X
VV Equipment Leaks of VOC in Synthetic Organic Chemical Manufacturing Industry	X	X	X	X	X	X	X	X
WW Beverage Can Surface Coating Industry	X	X	X	X	X	X	X	X
XX Bulk Gasoline Terminals	X	X	X	X	X	X	X	X
AAA New Residential Wood Heaters								

BBB Rubber Tire Manufacturing Industry	X	X	X	X	X	X	X	X
DDD VOC Emissions from Polymer Manufacturing Industry	X	X	X	X	X	X	X	X
FFF Flexible Vinyl and Urethane Coating and Printing	X	X	X	X	X	X	X	X
GGG Equipment Leaks of VOC in Petroleum Refineries	X	X	X	X	X	X	X	X
HHH Synthetic Fiber Production Facilities	X	X	X	X	X	X	X	X
III VOC Emissions from Synthetic Organic Chemical Manufacturing Industry Air Oxidation Unit Processes	X	X	X	X	X	X	X	X
JJJ Petroleum Dry Cleaners	X	X	X	X	X	X	X	X
KKK Equipment Leaks of VOC from Onshore Natural Gas Processing Plants	X	X	X	X	X	X	X	X
LLL Onshore Natural Gas Processing: SO <sub>2</sub> Emissions	X	X	X	X	X	X	X	X
NNN VOC Emissions from Synthetic Organic Chemical Manufacturing Industry Distillation Operations	X	X	X	X	X	X	X	X
OOO Nonmetallic Mineral Processing Plants			X		X		X	
PPP Wool Fiberglass Insulation Manufacturing Plants	X	X	X	X	X	X	X	X
QQQ VOC Emissions from Petroleum Refinery Wastewater Systems	X	X	X	X	X	X	X	X
RRR VOCs from Synthetic Organic Chemical Manufacturing Industry Reactor Processes	X	X	X	X	X	X	X	X
SSS Magnetic Tape Coating Facilities	X	X	X	X	X	X	X	X
TTT Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines	X	X	X	X	X	X	X	X
UUU Calciners and Dryers in Mineral Industries	X	X	X	X	X	X	X	X
VVV Polymeric Coating of Supporting Substrates Facilities	X	X	X	X	X	X	X	X
WWW Municipal Solid Waste Landfills	X	X	X	X	X	X	X	X
AAAA Small Municipal Waste Combustion Units for which Construction is Commenced after August 30, 1999 or for	X	X		X	X	X		X

which Modification or Reconstruction is Commenced after June 6, 2001								
BBBB Small Municipal Waste Combustion Units Constructed on or before August 30, 1999 (Emission Guidelines and Compliance Times)								
CCCC Commercial and Industrial Solid Waste Incineration Units for which Construction is Commenced after November, 30, 1999 or for which Modification or Reconstruction is Commenced on or after June 1, 2001	X	X		X	X	X		X
DDDD Commercial and Industrial Solid Waste Incineration Units that Commenced Construction on or before November 30, 1999 (Emission Guidelines and Compliance Times)								

<sup>1</sup>Any authority within any subpart of this part that is not delegable, is not delegated. Please refer to Attachment B to the delegation letters for a listing of the NSPS authorities excluded from delegation.

<sup>2</sup>Washington State Department of Ecology, for 40 CFR 60.17(h)(1), (h)(2), (h)(3) and 40 CFR part 60, subpart AAAA, as in effect on June 6, 2001; for 40 CFR part 60, subpart CCCC, as in effect on June 1, 2001; and for all other NSPS delegated, as in effect February 20, 2001.

<sup>3</sup>Benton Clean Air Authority, for 40 CFR 60.17(h)(1), (h)(2), (h)(3) and 40 CFR part 60, subpart AAAA, as in effect on June 6, 2001; for 40 CFR part 60, subpart CCCC, as in effect on June 1, 2001; and for all other NSPS delegated, as in effect February 20, 2001.

<sup>4</sup>Northwest Air Pollution Authority, for all NSPS delegated, as in effect on July 1, 2000.

<sup>5</sup>Olympic Regional Clean Air Authority, for 40 CFR 60.17(h)(1), (h)(2), (h)(3) and 40 CFR part 60, subpart AAAA, as in effect on June 6, 2001; for 40 CFR part 60, subpart CCCC, as in effect on June 1, 2001; and for all other NSPS delegated, as in effect February 20, 2001.

<sup>6</sup>Puget Sound Clean Air Authority, for all NSPS delegated, as in effect on July 1, 2002.

<sup>7</sup>Spokane County Air Pollution Control Authority, for 40 CFR 60.17(h)(1), (h)(2), (h)(3) and 40 CFR part 60, subpart AAAA, as in effect on June 6, 2001; for 40 CFR part 60, subpart CCCC, as in effect on June 1, 2001; and for all other NSPS delegated, as in effect February 20, 2001.

<sup>8</sup>Southwest Clean Air Agency, for all NSPS delegated, as in effect on July 1, 2000.

<sup>9</sup>Yakima Regional Clean Air Authority, for 40 CFR 60.17(h)(1), (h)(2), (h)(3) and 40 CFR part 60, subpart AAAA, as in effect on June 6, 2001; for 40 CFR part 60, subpart CCCC, as in effect on June 1, 2001; and for all other NSPS delegated, as in effect February 20, 2001.

<sup>10</sup>Subpart S of this part is not delegated to local agencies in Washington because the Washington State Department of Ecology retains sole authority to regulate Primary Aluminum Plants, pursuant to Washington Administrative Code 173-415-010.

<sup>11</sup>Subpart BB of this part is not delegated to local agencies in Washington because the Washington State Department of Ecology retains sole authority to regulate Kraft and Sulfite Pulping Mills, pursuant to Washington State Administrative Code 173-405-012 and 173-410-012.

(XX) State of West Virginia, Department of Environmental Protection, Division of Air Quality, 601 57th

Street, SE., Charleston, West Virginia 25304.

(YY) State of Wisconsin: Wisconsin Department of Natural Resources, 101 South Webster St., P.O. Box 7921, Madison, Wisconsin 53707-7921.

(ZZ) State of Wyoming, Department of Environmental Quality, Air Quality Division, Herschler Building, 122 West 25th Street, Cheyenne, WY 82002.

Note: For a table listing Region VIII's NSPS delegation status, see paragraph (c) of this section.

(AAA) Territory of Guam: Guam Environmental Protection Agency, P.O. Box 22439 GMF, Barrigada, Guam 96921.

Note: For tables listing the delegation status of agencies in Region IX, see paragraph (d) of this section.

(BBB) Commonwealth of Puerto Rico: Commonwealth of Puerto Rico Environmental Quality Board, P.O. Box 11488, Santurce, PR 00910, Attention: Air Quality Area Director (see table under §60.4(b)(FF)(1)).

(CCC) U.S. Virgin Islands: U.S. Virgin Islands Department of Conservation and Cultural Affairs, P.O. Box 578, Charlotte Amalie, St. Thomas, VI 00801.

(DDD) American Samoa: American Samoa Environmental Protection Agency, P.O. Box PPA, Pago Pago, American Samoa 96799.

Note: For tables listing the delegation status of agencies in Region IX, see paragraph (d) of this section.

(EEE) Commonwealth of the Northern Mariana Islands: CNMI Division of Environmental Quality, P.O. Box 501304, Saipan, MP 96950.

Note: For tables listing the delegation status of agencies in Region IX, see paragraph (d) of this section.

(c) The following is a table indicating the delegation status of New Source Performance Standards for Region VIII.

**Delegation Status of New Source Performance Standards**

[(NSPS) for Region VIII]

Subpart	CO	MT	ND	SD	UT	WY
A—General Provisions	(*)	(*)	(*)	(*)	(*)	(*)
D—Fossil Fuel Fired Steam Generators	(*)	(*)	(*)	(*)	(*)	(*)
Da—Electric Utility Steam Generators	(*)	(*)	(*)	(*)	(*)	(*)
Db—Industrial-Commercial—Institutional Steam Generators	(*)	(*)	(*)	(*)	(*)	(*)
Dc—Industrial-Commercial-Institutional Steam Generators	(*)	(*)	(*)	(*)	(*)	(*)
E—Incinerators	(*)	(*)	(*)	(*)	(*)	(*)
Ea—Municipal Waste Combustors	(*)	(*)	(*)	(*)	(*)	(*)
Eb—Large Municipal Waste Combustors		(*)		(*)	(*)	(*)
Ec—Hospital/Medical/Infectious Waste Incinerators	(*)	(*)	(*)	(*)	(*)	(*)
F—Portland Cement Plants	(*)	(*)	(*)	(*)	(*)	(*)
G—Nitric Acid Plants	(*)	(*)	(*)		(*)	(*)
H—Sulfuric Acid Plants	(*)	(*)	(*)		(*)	(*)
I—Asphalt Concrete Plants	(*)	(*)	(*)	(*)	(*)	(*)
J—Petroleum Refineries	(*)	(*)	(*)		(*)	(*)
K—Petroleum Storage Vessels (after 6/11/73 & prior	(*)	(*)	(*)	(*)	(*)	(*)

to 5/19/78)						
Ka—Petroleum Storage Vessels (after 5/18/78 & prior to 7/23/84)	(*)	(*)	(*)	(*)	(*)	(*)
Kb—Petroleum Storage Vessels (after 7/23/84)	(*)	(*)	(*)	(*)	(*)	(*)
L—Secondary Lead Smelters	(*)	(*)			(*)	(*)
M—Secondary Brass and Bronze Production Plants	(*)	(*)			(*)	(*)
N—Primary Emissions from Basic Oxygen Process Furnaces (after 6/11/73)	(*)	(*)			(*)	(*)
Na—Secondary Emissions from Basic Oxygen Process Furnaces (after 1/20/83)	(*)	(*)			(*)	(*)
O—Sewage Treatment Plants	(*)	(*)	(*)	(*)	(*)	(*)
P—Primary Copper Smelters	(*)	(*)			(*)	(*)
Q—Primary Zinc Smelters	(*)	(*)			(*)	(*)
R—Primary Lead Smelters	(*)	(*)			(*)	(*)
S—Primary Aluminum Reduction Plants	(*)	(*)			(*)	(*)
T—Phosphate Fertilizer Industry: Wet Process Phosphoric Plants	(*)	(*)	(*)		(*)	(*)
U—Phosphate Fertilizer Industry: Superphosphoric Acid Plants	(*)	(*)	(*)		(*)	(*)
V—Phosphate Fertilizer Industry: Diammonium Phosphate Plants	(*)	(*)	(*)		(*)	(*)
W—Phosphate Fertilizer Industry: Triple Superphosphate Plants	(*)	(*)	(*)		(*)	(*)
X—Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities	(*)	(*)	(*)		(*)	(*)
Y—Coal Preparation Plants	(*)	(*)	(*)	(*)	(*)	(*)
Z—Ferroalloy Production Facilities	(*)	(*)	(*)		(*)	(*)
AA—Steel Plants: Electric Arc Furnaces (10/21/74–8/17/83)	(*)	(*)	(*)		(*)	(*)
AAa—Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels (after 8/7/83)	(*)	(*)	(*)		(*)	(*)
BB—Kraft Pulp Mills	(*)	(*)			(*)	(*)
CC—Glass Manufacturing Plants	(*)	(*)	(*)		(*)	(*)
DD—Grain Elevator	(*)	(*)	(*)	(*)	(*)	(*)
EE—Surface Coating of Metal Furniture	(*)	(*)	(*)		(*)	(*)
GG—Stationary Gas Turbines	(*)	(*)	(*)	(*)	(*)	(*)
HH—Lime Manufacturing Plants	(*)	(*)	(*)	(*)	(*)	(*)
KK—Lead-Acid Battery Manufacturing Plants	(*)	(*)	(*)		(*)	(*)
LL—Metallic Mineral Processing Plants	(*)	(*)	(*)	(*)	(*)	(*)
MM—Automobile & Light Duty Truck Surface Coating Operations	(*)	(*)	(*)		(*)	(*)
NN—Phosphate Rock Plants	(*)	(*)	(*)		(*)	(*)
PP—Ammonium Sulfate Manufacturing	(*)	(*)	(*)		(*)	(*)
QQ—Graphic Arts Industry: Publication Rotogravure Printing	(*)	(*)	(*)	(*)	(*)	(*)
RR—Pressure Sensitive Tape & Label Surface Coating	(*)	(*)	(*)	(*)	(*)	(*)

SS—Industrial Surface Coating: Large Applications	(*)	(*)	(*)		(*)	(*)
TT—Metal Coil Surface Coating	(*)	(*)	(*)		(*)	(*)
UU—Asphalt Processing & Asphalt Roofing Manufacture	(*)	(*)	(*)		(*)	(*)
VV—Synthetic Organic Chemicals Manufacturing: Equipment Leaks of VOC	(*)	(*)	(*)	(*)	(*)	(*)
WW—Beverage Can Surface Coating Industry	(*)	(*)	(*)		(*)	(*)
XX—Bulk Gasoline Terminals	(*)	(*)	(*)	(*)	(*)	(*)
AAA—Residential Wood Heaters	(*)	(*)	(*)	(*)	(*)	(*)
BBB—Rubber Tires	(*)	(*)	(*)		(*)	(*)
DDD—VOC Emissions from Polymer Manufacturing Industry	(*)	(*)	(*)		(*)	(*)
FFF—Flexible Vinyl & Urethane Coating & Printing	(*)	(*)	(*)		(*)	(*)
GGG—Equipment Leaks of VOC in Petroleum Refineries	(*)	(*)	(*)		(*)	(*)
HHH—Synthetic Fiber Production	(*)	(*)	(*)		(*)	(*)
III—VOC Emissions from the Synthetic Organic Chemical Manufacturing Industry Air Oxidation Unit Processes		(*)	(*)		(*)	(*)
JJJ—Petroleum Dry Cleaners	(*)	(*)	(*)	(*)	(*)	(*)
KKK—Equipment Leaks of VOC from Onshore Natural Gas Processing Plants	(*)	(*)	(*)		(*)	(*)
LLL—Onshore Natural Gas Processing: SO <sub>2</sub> Emissions	(*)	(*)	(*)		(*)	(*)
NNN—VOC Emissions from the Synthetic Organic Chemical Manufacturing Industry Distillation Operations	(*)	(*)	(*)	(*)	(*)	(*)
OOO—Nonmetallic Mineral Processing Plants	(*)	(*)	(*)	(*)	(*)	(*)
PPP—Wool Fiberglass Insulation Manufacturing Plants	(*)	(*)	(*)		(*)	(*)
QQQ—VOC Emissions from Petroleum Refinery Wastewater Systems	(*)	(*)	(*)		(*)	(*)
RRR—VOC Emissions from Synthetic Organic Chemistry Manufacturing Industry (SOCMI) Reactor Processes	(*)	(*)	(*)	(*)	(*)	(*)
SSS—Magnetic Tape Industry	(*)	(*)	(*)	(*)	(*)	(*)
TTT—Plastic Parts for Business Machine Coatings	(*)	(*)	(*)		(*)	(*)
UUU—Calciners and Dryers in Mineral Industries	(*)	(*)	(*)	(*)	(*)	(*)
VVV—Polymeric Coating of Supporting Substrates	(*)	(*)	(*)		(*)	(*)
WWW—Municipal Solid Waste Landfills	(*)	(*)	(*)	(*)	(*)	(*)
AAA—Small Municipal Waste Combustors		(*)	(*)		(*)	(*)
CCC—Commercial and Industrial Solid Waste Incineration Units		(*)	(*)		(*)	(*)
EEE—Other Solid Waste Incineration Units for Which Construction is Commenced After December 9, 2004, or for Which Modification or Reconstruction is Commenced On or After June 16, 2006						(*)

(\*) Indicates approval of State regulation.

(d) The following tables list the specific part 60 standards that have been delegated unchanged to the air pollution control agencies in Region IX. The (X) symbol is used to indicate each standard that has been

delegated. The following provisions of this subpart are not delegated: §§60.4(b), 60.8(b), 60.9, 60.11(b), 60.11(e), 60.13(a), 60.13(d)(2), 60.13(g), 60.13(i).

(1) *Arizona*. The following table identifies delegations for Arizona:

**Delegation Status for New Source Performance Standards for Arizona**

	Subpart	Air Pollution Control Agency			
		Arizona DEQ	Maricopa County	Pima County	Pinal County
A	General Provisions	X	X	X	X
D	Fossil-Fuel Fired Steam Generators Constructed After August 17, 1971	X	X	X	X
Da	Electric Utility Steam Generating Units Constructed After September 18, 1978	X	X	X	X
Db	Industrial-Commercial-Institutional Steam Generating Units	X	X	X	X
Dc	Small Industrial Steam Generating Units	X	X	X	X
E	Incinerators	X	X	X	X
Ea	Municipal Waste Combustors Constructed After December 20, 1989 and On or Before September 20, 1994	X	X	X	X
Eb	Municipal Waste Combustors Constructed After September 20, 1994	X	X	X	
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After June 20, 1996	X	X	X	
F	Portland Cement Plants	X	X	X	X
G	Nitric Acid Plants	X	X	X	X
H	Sulfuric Acid Plant	X	X	X	X
I	Hot Mix Asphalt Facilities	X	X	X	X
J	Petroleum Refineries	X	X	X	X
Ja	Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007				
K	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978	X	X	X	X
Ka	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984	X	X	X	X
Kb	Volatile Organic Liquid Storage	X	X	X	X

	Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984				
L	Secondary Lead Smelters	X	X	X	X
M	Secondary Brass and Bronze Production Plants	X	X	X	X
N	Primary Emissions from Basic Oxygen Process Furnaces for Which Construction is Commenced After June 11, 1973	X	X	X	X
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20, 1983	X	X	X	X
O	Sewage Treatment Plants	X	X	X	X
P	Primary Copper Smelters	X	X	X	X
Q	Primary Zinc Smelters	X	X	X	X
R	Primary Lead Smelters	X	X	X	X
S	Primary Aluminum Reduction Plants	X	X	X	X
T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid Plants	X	X	X	X
U	Phosphate Fertilizer Industry: Superphosphoric Acid Plants	X	X	X	X
V	Phosphate Fertilizer Industry: Diammonium Phosphate Plants	X	X	X	X
W	Phosphate Fertilizer Industry: Triple Superphosphate Plants	X	X	X	X
X	Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities	X	X	X	X
Y	Coal Preparation Plants	X	X	X	X
Z	Ferroalloy Production Facilities	X	X	X	X
AA	Steel Plants: Electric Arc Furnaces Constructed After October 21, 1974 and On or Before August 17, 1983	X	X	X	X
AAa	Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After August 7, 1983	X	X	X	X
BB	Kraft Pulp Mills	X	X	X	X
CC	Glass Manufacturing Plants	X	X	X	X
DD	Grain Elevators	X	X	X	X
EE	Surface Coating of Metal Furniture	X	X	X	X
FF	(Reserved)				
GG	Stationary Gas Turbines	X	X	X	X
HH	Lime Manufacturing Plants	X	X	X	X

KK	Lead-Acid Battery Manufacturing Plants	X	X	X	X
LL	Metallic Mineral Processing Plants	X	X	X	X
MM	Automobile and Light Duty Trucks Surface Coating Operations	X	X	X	X
NN	Phosphate Rock Plants	X	X	X	X
PP	Ammonium Sulfate Manufacture	X	X	X	X
QQ	Graphic Arts Industry: Publication Rotogravure Printing	X	X	X	X
RR	Pressure Sensitive Tape and Label Surface Coating Operations	X	X	X	X
SS	Industrial Surface Coating: Large Appliances	X	X	X	X
TT	Metal Coil Surface Coating	X	X	X	X
UU	Asphalt Processing and Asphalt Roofing Manufacture	X	X	X	X
VV	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry	X	X	X	X
VVa	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006	X			
WW	Beverage Can Surface Coating Industry	X	X	X	X
XX	Bulk Gasoline Terminals	X	X	X	X
AAA	New Residential Wool Heaters	X	X	X	X
BBB	Rubber Tire Manufacturing Industry	X	X	X	X
CCC	(Reserved)				
DDD	Volatile Organic Compounds (VOC) Emissions from the Polymer Manufacturing Industry	X	X	X	X
EEE	(Reserved)				
FFF	Flexible Vinyl and Urethane Coating and Printing	X	X	X	X
GGG	Equipment Leaks of VOC in Petroleum Refineries	X	X	X	X
GGGa	Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006	X			
HHH	Synthetic Fiber Production Facilities	X	X	X	X
III	Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical	X	X	X	X

	Manufacturing Industry (SOCMI) Air Oxidation Unit Processes				
JJJ	Petroleum Dry Cleaners	X	X	X	X
KKK	Equipment Leaks of VOC From Onshore Natural Gas Processing Plants	X	X	X	X
LLL	Onshore Natural Gas Processing: SO <sub>2</sub> Emissions	X	X	X	X
MMM	(Reserved)				
NNN	Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations	X	X	X	X
OOO	Nonmetallic Mineral Processing Plants	X	X	X	X
PPP	Wool Fiberglass Insulation Manufacturing Plants	X	X	X	X
QQQ	VOC Emissions From Petroleum Refinery Wastewater Systems	X	X	X	X
RRR	Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes	X	X		
SSS	Magnetic Tape Coating Facilities	X	X	X	X
TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines	X	X	X	X
UUU	Calciners and Dryers in Mineral Industries	X	X	X	
VVV	Polymeric Coating of Supporting Substrates Facilities	X	X	X	X
WWW	Municipal Solid Waste Landfills	X	X	X	
AAAA	Small Municipal Waste Combustion Units for Which Construction is Commenced After August 30, 1999 or for Which Modification or Reconstruction is Commenced After June 6, 2001	X	X	X	
CCCC	Commercial and Industrial Solid Waste Incineration Units for Which Construction Is Commenced After November 30, 1999 or for Which Modification or Reconstruction Is Commenced on or After June 1, 2001	X	X	X	
EEEE	Other Solid Waste Incineration Units for Which Construction is Commenced After December 9, 2004, or for Which Modification or Reconstruction is Commenced on or After June 16, 2006	X	X		

IIII	Stationary Compression Ignition Internal Combustion Engines	X			
JJJJ	Stationary Spark Ignition Internal Combustion Engines				
KKKK	Stationary Combustion Turbines	X			
GGGG	(Reserved)				

(2) *California*. The following tables identify delegations for each of the local air pollution control agencies of California.

(i) Delegations for Amador County Air Pollution Control District, Antelope Valley Air Pollution Control District, Bay Area Air Quality Management District, and Butte County Air Pollution Control District are shown in the following table:

**Delegation Status for New Source Performance Standards for Amador County APCD, Antelope Valley APCD, Bay Area AQMD, and Butte County AQMD**

	Subpart	Air pollution control agency			
		Amador County APCD	Antelope Valley APCD	Bay Area AQMD	Butte County APCD
A	General Provisions				
D	Fossil-Fuel Fired Steam Generators Constructed After August 17, 1971			X	
Da	Electric Utility Steam Generating Units Constructed After September 18, 1978			X	
Db	Industrial-Commercial-Institutional Steam Generating Units			X	
Dc	Small Industrial Steam Generating Units			X	
E	Incinerators			X	
Ea	Municipal Waste Combustors Constructed After December 20, 1989 and On or Before September 20, 1994			X	
Eb	Municipal Waste Combustors Constructed After September 20, 1994				
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After June 20, 1996				
F	Portland Cement Plants			X	
G	Nitric Acid Plants			X	
H	Sulfuric Acid Plants			X	
I	Hot Mix Asphalt Facilities			X	
J	Petroleum Refineries			X	
K	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978			X	

Ka	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984			X	
Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984			X	
L	Secondary Lead Smelters			X	
M	Secondary Brass and Bronze Production Plants			X	
N	Primary Emissions from Basic Oxygen Process Furnaces for Which Construction is Commenced After June 11, 1973			X	
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20, 1983			X	
O	Sewage Treatment Plants			X	
P	Primary Copper Smelters			X	
Q	Primary Zinc Smelters			X	
R	Primary Lead Smelters			X	
S	Primary Aluminum Reduction Plants			X	
T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid Plants				
U	Phosphate Fertilizer Industry: Superphosphoric Acid Plants			X	
V	Phosphate Fertilizer Industry: Diammonium Phosphate Plants			X	
W	Phosphate Fertilizer Industry: Triple Superphosphate Plants			X	
X	Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities			X	
Y	Coal Preparation Plants			X	
Z	Ferroalloy Production Facilities			X	
AA	Steel Plants: Electric Arc Furnaces Constructed After October 21, 1974 and On or Before August 17, 1983			X	
AAa	Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After August 7, 1983			X	
BB	Kraft pulp Mills			X	

CC	Glass Manufacturing Plants			X	
DD	Grain Elevators			X	
EE	Surface Coating of Metal Furniture			X	
FF	(Reserved)				
GG	Stationary Gas Turbines			X	
HH	Lime Manufacturing Plants			X	
KK	Lead-Acid Battery Manufacturing Plants			X	
LL	Metallic Mineral Processing Plants			X	
MM	Automobile and Light Duty Trucks Surface Coating Operations			X	
NN	Phosphate Rock Plants			X	
PP	Ammonium Sulfate Manufacture			X	
QQ	Graphic Arts Industry: Publication Rotogravure Printing			X	
RR	Pressure Sensitive Tape and Label Surface Coating Operations			X	
SS	Industrial Surface Coating: Large Appliances			X	
TT	Metal Coil Surface Coating			X	
UU	Asphalt Processing and Asphalt Roofing Manufacture			X	
VV	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry			X	
WW	Beverage Can Surface Coating Industry			X	
XX	Bulk Gasoline Terminals				
AAA	New Residential Wool Heaters			X	
BBB	Rubber Tire Manufacturing Industry			X	
CCC	(Reserved)				
DDD	Volatile Organic Compounds (VOC) Emissions from the Polymer Manufacturing Industry			X	
EEE	(Reserved)				
FFF	Flexible Vinyl and Urethane Coating and Printing			X	
GGG	Equipment Leaks of VOC in Petroleum Refineries			X	
HHH	Synthetic Fiber Production Facilities			X	
III	Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes				
JJJ	Petroleum Dry Cleaners			X	

KKK	Equipment Leaks of VOC From Onshore Natural Gas Processing Plants			X	
LLL	Onshore Natural Gas Processing: SO2 Emissions				
MMM	(Reserved)				
NNN	Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations			X	
OOO	Nonmetallic Mineral Processing Plants			X	
PPP	Wool Fiberglass Insulation Manufacturing Plants			X	
QQQ	VOC Emissions From Petroleum Refinery Wastewater Systems				
RRR	Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes				
SSS	Magnetic Tape Coating Facilities			X	
TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines			X	
UUU	Calciners and Dryers in Mineral Industries			X	
VVV	Polymeric Coating of Supporting Substrates Facilities			X	
WWW	Municipal Solid Waste Landfills				

(ii) [Reserved]

(iii) Delegations for Glenn County Air Pollution Control District, Great Basin Unified Air Pollution Control District, Imperial County Air Pollution Control District, and Kern County Air Pollution Control District are shown in the following table:

**Delegation Status for New Source Performance Standards for Glenn County APCD, Great Basin Unified APCD, Imperial County APCD, and Kern County APCD**

	Subpart	Air pollution control agency			
		Glenn County APCD	Great Basin Unified APCD	Imperial County APCD	Kern County APCD
A	General Provisions		X		X
D	Fossil-Fuel Fired Steam Generators Constructed After August 17, 1971		X		X
Da	Electric Utility Steam Generating Units Constructed After September 18, 1978		X		X
Db	Industrial-Commercial-Institutional Steam Generating		X		X

	Units				
Dc	Small Industrial Steam Generating Units		X		X
E	Incinerators		X		X
Ea	Municipal Waste Combustors Constructed After December 20, 1989 and On or Before September 20, 1994		X		
Eb	Municipal Waste Combustors Constructed After September 20, 1994				
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After June 20, 1996				
F	Portland Cement Plants		X		X
G	Nitric Acid Plants		X		X
H	Sulfuric Acid Plants		X		
I	Hot Mix Asphalt Facilities		X		X
J	Petroleum Refineries		X		X
K	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978		X		X
Ka	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984		X		X
Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984		X		X
L	Secondary Lead Smelters		X		X
M	Secondary Brass and Bronze Production Plants		X		X
N	Primary Emissions from Basic Oxygen Process Furnaces for Which Construction is Commenced After June 11, 1973		X		X
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20, 1983		X		X
O	Sewage Treatment Plants		X		X
P	Primary Copper Smelters		X		X
Q	Primary Zinc Smelters		X		X
R	Primary Lead Smelters		X		X
S	Primary Aluminum Reduction		X		X

	Plants				
T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid Plants		X		X
U	Phosphate Fertilizer Industry: Superphosphoric Acid Plants		X		X
V	Phosphate Fertilizer Industry: Diammonium Phosphate Plants		X		X
W	Phosphate Fertilizer Industry: Triple Superphosphate Plants		X		X
X	Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities		X		X
Y	Coal Preparation Plants		X		X
Z	Ferroalloy Production Facilities		X		X
AA	Steel Plants: Electric Arc Furnaces Constructed After October 21, 1974 and On or Before August 17, 1983		X		X
AAa	Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After August 7, 1983		X		X
BB	Kraft pulp Mills		X		X
CC	Glass Manufacturing Plants		X		X
DD	Grain Elevators		X		X
EE	Surface Coating of Metal Furniture		X		X
FF	(Reserved)				
GG	Stationary Gas Turbines		X		X
HH	Lime Manufacturing Plants		X		X
KK	Lead-Acid Battery Manufacturing Plants		X		X
LL	Metallic Mineral Processing Plants		X		X
MM	Automobile and Light Duty Trucks Surface Coating Operations		X		X
NN	Phosphate Rock Plants		X		X
PP	Ammonium Sulfate Manufacture		X		X
QQ	Graphic Arts Industry: Publication Rotogravure Printing		X		X
RR	Pressure Sensitive Tape and Label Surface Coating Operations		X		X
SS	Industrial Surface Coating: Large Appliances		X		X
TT	Metal Coil Surface Coating		X		X
UU	Asphalt Processing and Asphalt Roofing Manufacture		X		X
VV	Equipment Leaks of VOC in the Synthetic Organic Chemicals		X		X

	Manufacturing Industry				
WW	Beverage Can Surface Coating Industry		X		X
XX	Bulk Gasoline Terminals				
AAA	New Residential Wool Heaters		X		X
BBB	Rubber Tire Manufacturing Industry		X		X
CCC	(Reserved)				
DDD	Volatile Organic Compounds (VOC) Emissions from the Polymer Manufacturing Industry		X		X
EEE	(Reserved)				
FFF	Flexible Vinyl and Urethane Coating and Printing		X		X
GGG	Equipment Leaks of VOC in Petroleum Refineries		X		X
HHH	Synthetic Fiber Production Facilities		X		X
III	Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes		X		X
JJJ	Petroleum Dry Cleaners		X		X
KKK	Equipment Leaks of VOC From Onshore Natural Gas Processing Plants		X		X
LLL	Onshore Natural Gas Processing: SO2 Emissions				X
MMM	(Reserved)				
NNN	Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations		X		X
OOO	Nonmetallic Mineral Processing Plants		X		X
PPP	Wool Fiberglass Insulation Manufacturing Plants		X		X
QQQ	VOC Emissions From Petroleum Refinery Wastewater Systems		X		X
RRR	Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes				X
SSS	Magnetic Tape Coating Facilities		X		X
TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines		X	X	
UUU	Calciners and Dryers in Mineral Industries		X		X
VVV	Polymeric Coating of Supporting		X		X

	Substrates Facilities				
WWW	Municipal Solid Waste Landfills				X

(iv) Delegations for Lake County Air Quality Management District, Lassen County Air Pollution Control District, Mariposa County Air Pollution Control District, and Mendocino County Air Pollution Control District are shown in the following table:

**Delegation Status for New Source Performance Standards for Lake County Air Quality Management District, Lassen County Air Pollution Control District, Mariposa County Air Pollution Control District, and Mendocino County Air Pollution Control District**

	Subpart	Air pollution control agency			
		Lake County AQMD	Lassen County APCD	Mariposa County AQMD	Mendocino County AQMD
A	General Provisions	X			X
D	Fossil-Fuel Fired Steam Generators Constructed After August 17, 1971	X			X
Da	Electric Utility Steam Generating Units Constructed After September 18, 1978	X			X
Db	Industrial-Commercial-Institutional Steam Generating Units	X			
Dc	Small Industrial Steam Generating Units	X			X
E	Incinerators	X			X
Ea	Municipal Waste Combustors Constructed After December 20, 1989 and On or Before September 20, 1994	X			X
Eb	Municipal Waste Combustors Constructed After September 20, 1994				
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After June 20, 1996				
F	Portland Cement Plants	X			X
G	Nitric Acid Plants	X			X
H	Sulfuric Acid Plants	X			X
I	Hot Mix Asphalt Facilities	X			X
J	Petroleum Refineries	X			X
K	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978	X			X
Ka	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced	X			X

	After May 18, 1978, and Prior to July 23, 1984				
Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984	X			X
L	Secondary Lead Smelters	X			X
M	Secondary Brass and Bronze Production Plants	X			X
N	Primary Emissions from Basic Oxygen Process Furnaces for Which Construction is Commenced After June 11, 1973	X			X
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20, 1983	X			X
O	Sewage Treatment Plants	X			X
P	Primary Copper Smelters	X			X
Q	Primary Zinc Smelters	X			X
R	Primary Lead Smelters	X			X
S	Primary Aluminum Reduction Plants	X			X
T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid Plants	X			X
U	Phosphate Fertilizer Industry: Superphosphoric Acid Plants	X			X
V	Phosphate Fertilizer Industry: Diammonium Phosphate Plants	X			X
W	Phosphate Fertilizer Industry: Triple Superphosphate Plants	X			X
X	Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities	X			X
Y	Coal Preparation Plants	X			X
Z	Ferroalloy Production Facilities	X			X
AA	Steel Plants: Electric Arc Furnaces Constructed After October 21, 1974 and On or Before August 17, 1983	X			X
AAa	Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels	X			X

	Constructed After August 7, 1983				
BB	Kraft Pulp Mills	X			X
CC	Glass Manufacturing Plants	X			X
DD	Grain Elevators	X			X
EE	Surface Coating of Metal Furniture	X			X
FF	(Reserved)				
GG	Stationary Gas Turbines	X			X
HH	Lime Manufacturing Plants	X			X
KK	Lead-Acid Battery Manufacturing Plants	X			X
LL	Metallic Mineral Processing Plants	X			X
MM	Automobile and Light Duty Trucks Surface Coating Operations	X			X
NN	Phosphate Rock Plants	X			X
PP	Ammonium Sulfate Manufacture	X			X
QQ	Graphic Arts Industry: Publication Rotogravure Printing	X			X
RR	Pressure Sensitive Tape and Label Surface Coating Operations	X			X
SS	Industrial Surface Coating: Large Appliances	X			X
TT	Metal Coil Surface Coating	X			X
UU	Asphalt Processing and Asphalt Roofing Manufacture	X			X
VV	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry	X			X
WW	Beverage Can Surface Coating Industry	X			X
XX	Bulk Gasoline Terminals				
AAA	New Residential Wool Heaters	X			X
BBB	Rubber Tire Manufacturing Industry	X			X
CCC	(Reserved)				
DDD	Volatile Organic Compounds (VOC) Emissions from the Polymer Manufacturing Industry	X			X
EEE	(Reserved)				
FFF	Flexible Vinyl and Urethane Coating and Printing	X			X
GGG	Equipment Leaks of VOC in Petroleum Refineries	X			X

HHH	Synthetic Fiber Production Facilities	X			X
III	Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes	X			X
JJJ	Petroleum Dry Cleaners	X			X
KKK	Equipment Leaks of VOC From Onshore Natural Gas Processing Plants	X			X
LLL	Onshore Natural Gas Processing: SO2 Emissions	X			X
MMM	(Reserved)				
NNN	Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations	X			X
OOO	Nonmetallic Mineral Processing Plants	X			X
PPP	Wool Fiberglass Insulation Manufacturing Plants	X			X
QQQ	VOC Emissions From Petroleum Refinery Wastewater Systems	X			X
RRR	Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes	X			
SSS	Magnetic Tape Coating Facilities	X			X
TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines				
UUU	Calciners and Dryers in Mineral Industries	X			X
VVV	Polymeric Coating of Supporting Substrates Facilities	X			X
WWW	Municipal Solid Waste Landfills	X			

(v) Delegations for Modoc County Air Pollution Control District, Mojave Desert Air Quality Management District, Monterey Bay Unified Air Pollution Control District, and North Coast Unified Air Pollution Control District are shown in the following table:

**Delegation Status for New Source Performance Standards for Modoc County Air Pollution Control District, Mojave Desert Air Quality Management District, Monterey Bay Unified Air Pollution Control District, and North Coast Unified Air Pollution Control District**

	<b>Air pollution control agency</b>

	<b>Subpart</b>	<b>Modoc County APCD</b>	<b>Mojave Desert AQMD</b>	<b>Monterey Bay Unified APCD</b>	<b>North Coast Unified AQMD</b>
A	General Provisions	X		X	X
D	Fossil-Fuel Fired Steam Generators Constructed After August 17, 1971	X	X	X	X
Da	Electric Utility Steam Generating Units Constructed After September 18, 1978	X		X	X
Db	Industrial-Commercial-Institutional Steam Generating Units	X		X	X
Dc	Small Industrial Steam Generating Units			X	
E	Incinerators	X	X	X	X
Ea	Municipal Waste Combustors Constructed After December 20, 1989 and On or Before September 20, 1994				
Eb	Municipal Waste Combustors Constructed After September 20, 1994				
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After June 20, 1996				
F	Portland Cement Plants	X	X	X	X
G	Nitric Acid Plants	X	X	X	X
H	Sulfuric Acid Plants	X	X	X	X
I	Hot Mix Asphalt Facilities	X	X	X	X
J	Petroleum Refineries	X	X	X	X
K	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978	X	X	X	X
Ka	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984	X		X	X
Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984	X		X	X
L	Secondary Lead Smelters	X	X	X	X
M	Secondary Brass and Bronze Production Plants	X	X	X	X
N	Primary Emissions from Basic Oxygen Process Furnaces for	X	X	X	X

	Which Construction is Commenced After June 11, 1973				
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20, 1983	X		X	X
O	Sewage Treatment Plants	X	X	X	X
P	Primary Copper Smelters	X		X	X
Q	Primary Zinc Smelters	X		X	X
R	Primary Lead Smelters	X		X	X
S	Primary Aluminum Reduction Plants	X		X	X
T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid Plants	X	X	X	X
U	Phosphate Fertilizer Industry: Superphosphoric Acid Plants	X	X	X	X
V	Phosphate Fertilizer Industry: Diammonium Phosphate Plants	X	X	X	X
W	Phosphate Fertilizer Industry: Triple Superphosphate Plants	X	X	X	X
X	Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities	X	X	X	X
Y	Coal Preparation Plants	X	X	X	X
Z	Ferroalloy Production Facilities	X		X	X
AA	Steel Plants: Electric Arc Furnaces Constructed After October 21, 1974 and On or Before August 17, 1983	X	X	X	X
AAa	Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After August 7, 1983	X		X	X
BB	Kraft pulp Mills	X		X	X
CC	Glass Manufacturing Plants	X		X	X
DD	Grain Elevators	X		X	X
EE	Surface Coating of Metal Furniture	X		X	X
FF	(Reserved)				
GG	Stationary Gas Turbines	X		X	X
HH	Lime Manufacturing Plants	X		X	X
KK	Lead-Acid Battery Manufacturing Plants	X		X	X
LL	Metallic Mineral Processing Plants	X		X	X
MM	Automobile and Light Duty Trucks Surface Coating Operations	X		X	X

NN	Phosphate Rock Plants	X		X	X
PP	Ammonium Sulfate Manufacture	X		X	X
QQ	Graphic Arts Industry: Publication Rotogravure Printing	X		X	X
RR	Pressure Sensitive Tape and Label Surface Coating Operations	X		X	X
SS	Industrial Surface Coating: Large Appliances	X		X	X
TT	Metal Coil Surface Coating	X		X	X
UU	Asphalt Processing and Asphalt Roofing Manufacture	X		X	X
VV	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry	X		X	X
WW	Beverage Can Surface Coating Industry	X		X	X
XX	Bulk Gasoline Terminals				
AAA	New Residential Wool Heaters	X		X	X
BBB	Rubber Tire Manufacturing Industry	X		X	X
CCC	(Reserved)				
DDD	Volatile Organic Compounds (VOC) Emissions from the Polymer manufacturing Industry	X		X	
EEE	(Reserved)				
FFF	Flexible Vinyl and Urethane Coating and Printing	X		X	X
GGG	Equipment Leaks of VOC in Petroleum Refineries	X		X	X
HHH	Synthetic Fiber Production Facilities	X		X	X
III	Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes				
JJJ	Petroleum Dry Cleaners	X		X	X
KKK	Equipment Leaks of VOC From Onshore Natural Gas Processing Plants	X		X	X
LLL	Onshore Natural Gas Processing: SO2 Emissions	X		X	X
MMM	(Reserved)				
NNN	Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations	X		X	
OOO	Nonmetallic Mineral Processing Plants	X		X	X
PPP	Wool Fiberglass Insulation	X		X	X

	Manufacturing Plants				
QQQ	VOC Emissions From Petroleum Refinery Wastewater Systems	X		X	X
RRR	Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes				
SSS	Magnetic Tape Coating Facilities	X		X	X
TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines	X		X	X
UUU	Calciners and Dryers in Mineral Industries			X	
VVV	Polymeric Coating of Supporting Substrates Facilities			X	X
WWW	Municipal Solid Waste Landfills				

(vi) Delegations for Northern Sierra Air Quality Management District, Northern Sonoma County Air Pollution Control District, Placer County Air Pollution Control District, and Sacramento Metropolitan Air Quality Management District are shown in the following table:

**Delegation Status for New Source Performance Standards for Northern Sierra Air Quality Management District, Northern Sonoma County Air Pollution Control District, Placer County Air Pollution Control District, and Sacramento Metropolitan Air Quality Management District**

	Subpart	Air pollution control agency			
		Northern Sierra AQMD	Northern Sonoma County APCD	Placer County APCD	Sacramento Metropolitan AQMD
A	General Provisions		X		X
D	Fossil-Fuel Fired Steam Generators Constructed After August 17, 1971		X		X
Da	Electric Utility Steam Generating Units Constructed After September 18, 1978		X		X
Db	Industrial-Commercial-Institutional Steam Generating Units				X
Dc	Small Industrial Steam Generating Units				X
E	Incinerators		X		X
Ea	Municipal Waste Combustors Constructed After December 20, 1989 and On or Before September 20, 1994				X
Eb	Municipal Waste Combustors Constructed After September 20, 1994				X

Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After June 20, 1996				X
F	Portland Cement Plants		X		X
G	Nitric Acid Plants		X		X
H	Sulfuric Acid Plants		X		X
I	Hot Mix Asphalt Facilities		X		X
J	Petroleum Refineries		X		X
K	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978		X		X
Ka	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984		X		X
Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984				X
L	Secondary Lead Smelters		X		X
M	Secondary Brass and Bronze Production Plants		X		X
N	Primary Emissions from Basic Oxygen Process Furnaces for Which Construction is Commenced After June 11, 1973		X		X
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20, 1983				X
O	Sewage Treatment Plants		X		X
P	Primary Copper Smelters		X		X
Q	Primary Zinc Smelters		X		X
R	Primary Lead Smelters		X		X
S	Primary Aluminum Reduction Plants		X		X
T	Phosphate Fertilizer		X		X

	Industry: Wet Process Phosphoric Acid Plants				
U	Phosphate Fertilizer Industry: Superphosphoric Acid Plants		X		X
V	Phosphate Fertilizer Industry: Diammonium Phosphate Plants		X		X
W	Phosphate Fertilizer Industry: Triple Superphosphate Plants		X		X
X	Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities		X		X
Y	Coal Preparation Plants		X		X
Z	Ferroalloy Production Facilities		X		X
AA	Steel Plants: Electric Arc Furnaces Constructed After October 21, 1974 and On or Before August 17, 1983		X		X
AAa	Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After August 7, 1983				X
BB	Kraft pulp Mills		X		X
CC	Glass Manufacturing Plants		X		X
DD	Grain Elevators		X		X
EE	Surface Coating of Metal Furniture				X
FF	(Reserved)				
GG	Stationary Gas Turbines		X		X
HH	Lime Manufacturing Plants		X		X
KK	Lead-Acid Battery Manufacturing Plants				X
LL	Metallic Mineral Processing Plants				X
MM	Automobile and Light Duty Trucks Surface Coating Operations		X		X
NN	Phosphate Rock Plants				X
PP	Ammonium Sulfate Manufacture		X		X
QQ	Graphic Arts Industry: Publication Rotogravure Printing				X
RR	Pressure Sensitive Tape and Label Surface Coating Operations				X

SS	Industrial Surface Coating: Large Appliances				X
TT	Metal Coil Surface Coating				X
UU	Asphalt Processing and Asphalt Roofing Manufacture				X
VV	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry				X
WW	Beverage Can Surface Coating Industry				X
XX	Bulk Gasoline Terminals				
AAA	New Residential Wool Heaters				X
BBB	Rubber Tire Manufacturing Industry				X
CCC	(Reserved)				
DDD	Volatile Organic Compounds (VOC) Emissions from the Polymer Manufacturing Industry				X
EEE	(Reserved)				
FFF	Flexible Vinyl and Urethane Coating and Printing				X
GGG	Equipment Leaks of VOC in Petroleum Refineries				X
HHH	Synthetic Fiber Production Facilities				X
III	Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes				X
JJJ	Petroleum Dry Cleaners				X
KKK	Equipment Leaks of VOC From Onshore Natural Gas Processing Plants				X
LLL	Onshore Natural Gas Processing: SO2 Emissions				X
MMM	(Reserved)				
NNN	Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations				X
OOO	Nonmetallic Mineral				X

	Processing Plants				
PPP	Wool Fiberglass Insulation Manufacturing Plants				X
QQQ	VOC Emissions From Petroleum Refinery Wastewater Systems				X
RRR	Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes				X
SSS	Magnetic Tape Coating Facilities				X
TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines				X
UUU	Calciners and Dryers in Mineral Industries				X
VVV	Polymeric Coating of Supporting Substrates Facilities				X
WWW	Municipal Solid Waste Landfills				X

(vii) Delegations for San Diego County Air Pollution Control District, San Joaquin Valley Unified Air Pollution Control District, San Luis Obispo County Air Pollution Control District, and Santa Barbara County Air Pollution Control District are shown in the following table:

**Delegation Status for New Source Performance Standards for San Diego County Air Pollution Control District, San Joaquin Valley Unified Air Pollution Control District, San Luis Obispo County Air Pollution Control District, and Santa Barbara County Air Pollution Control District**

	Subpart	Air Pollution Control Agency			
		San Diego County APCD	San Joaquin Valley Unified APCD	San Luis Obispo County APCD	Santa Barbara County APCD
A	General Provisions	X	X	X	X
D	Fossil-Fuel Fired Steam Generators Constructed After August 17, 1971	X	X	X	X
Da	Electric Utility Steam Generating Units Constructed After September 18, 1978	X	X	X	X
Db	Industrial-Commercial-Institutional Steam Generating Units	X	X	X	X
Dc	Small Industrial Steam Generating Units	X	X	X	
E	Incinerators	X	X	X	X
Ea	Municipal Waste Combustors Constructed After December 20,	X	X	X	

	1989, and On or Before September 20, 1994				
Eb	Municipal Waste Combustors Constructed After September 20, 1994	X	X		
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After June 20, 1996	X			
F	Portland Cement Plants	X	X	X	
G	Nitric Acid Plants	X	X	X	
H	Sulfuric Acid Plants	X	X	X	
I	Hot Mix Asphalt Facilities	X	X	X	X
J	Petroleum Refineries	X	X	X	X
Ja	Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007				
K	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978	X	X	X	X
Ka	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984	X	X	X	X
Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984	X	X	X	X
L	Secondary Lead Smelters	X	X	X	X
M	Secondary Brass and Bronze Production Plants	X	X	X	X
N	Primary Emissions from Basic Oxygen Process Furnaces for Which Construction is Commenced After June 11, 1973	X	X	X	
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20, 1983	X	X	X	
O	Sewage Treatment Plants	X	X	X	X
P	Primary Copper Smelters	X	X	X	
Q	Primary Zinc Smelters	X	X	X	
R	Primary Lead Smelters	X	X	X	
S	Primary Aluminum Reduction Plants	X	X	X	

T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid Plants	X	X	X	
U	Phosphate Fertilizer Industry: Superphosphoric Acid Plants	X	X	X	
V	Phosphate Fertilizer Industry: Diammonium Phosphate Plants	X	X	X	
W	Phosphate Fertilizer Industry: Triple Superphosphate Plants	X	X	X	
X	Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities	X	X	X	
Y	Coal Preparation Plants	X	X	X	
Z	Ferroalloy Production Facilities	X	X	X	
AA	Steel Plants: Electric Arc Furnaces Constructed After October 21, 1974, and On or Before August 17, 1983	X	X	X	
AAa	Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After August 7, 1983	X	X	X	
BB	Kraft pulp Mills	X	X	X	
CC	Glass Manufacturing Plants	X	X	X	X
DD	Grain Elevators	X	X	X	X
EE	Surface Coating of Metal Furniture	X	X	X	
FF	(Reserved)				
GG	Stationary Gas Turbines	X	X	X	X
HH	Lime Manufacturing Plants	X	X	X	
KK	Lead-Acid Battery Manufacturing Plants	X	X	X	
LL	Metallic Mineral Processing Plants	X	X	X	
MM	Automobile and Light Duty Trucks Surface Coating Operations	X	X	X	
NN	Phosphate Rock Plants	X	X	X	
PP	Ammonium Sulfate Manufacture	X	X	X	
QQ	Graphic Arts Industry: Publication Rotogravure Printing	X	X	X	
RR	Pressure Sensitive Tape and Label Surface Coating Operations	X	X	X	
SS	Industrial Surface Coating: Large Appliances	X	X	X	
TT	Metal Coil Surface Coating	X	X	X	
UU	Asphalt Processing and Asphalt Roofing Manufacture	X	X	X	
VV	Equipment Leaks of VOC in the Synthetic Organic Chemicals	X	X	X	

	Manufacturing Industry				
VVa	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006				
WW	Beverage Can Surface Coating Industry	X	X	X	
XX	Bulk Gasoline Terminals				
AAA	New Residential Wool Heaters	X	X	X	X
BBB	Rubber Tire Manufacturing Industry	X	X	X	
CCC	(Reserved)				
DDD	Volatile Organic Compounds (VOC) Emissions from the Polymer Manufacturing Industry	X	X		
EEE	(Reserved)				
FFF	Flexible Vinyl and Urethane Coating and Printing	X	X	X	
GGG	Equipment Leaks of VOC in Petroleum Refineries	X	X	X	
GGGa	Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006				
HHH	Synthetic Fiber Production Facilities	X	X	X	
III	Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes	X	X		
JJJ	Petroleum Dry Cleaners	X	X	X	
KKK	Equipment Leaks of VOC From Onshore Natural Gas Processing Plants	X	X	X	
LLL	Onshore Natural Gas Processing: SO2 Emissions	X	X	X	
MMM	(Reserved)				
NNN	Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations	X	X		
OOO	Nonmetallic Mineral Processing Plants	X	X	X	X
PPP	Wool Fiberglass Insulation Manufacturing Plants	X	X	X	
QQQ	VOC Emissions From Petroleum Refinery Wastewater Systems	X	X	X	

RRR	Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes	X	X	X	
SSS	Magnetic Tape Coating Facilities	X	X	X	
TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines	X	X	X	
UUU	Calciners and Dryers in Mineral Industries	X	X	X	X
VVV	Polymeric Coating of Supporting Substrates Facilities	X	X	X	X
WWW	Municipal Solid Waste Landfills	X	X	X	X
AAAA	Small Municipal Waste Combustion Units for Which Construction is Commenced After August 30, 1999, or for Which Modification or Reconstruction is Commenced After June 6, 2001	X			
CCCC	Commercial and Industrial Solid Waste Incineration Units for Which Construction Is Commenced After November 30, 1999, or for Which Modification or Reconstruction Is Commenced on or After June 1, 2001	X			
EEEE	Other Solid Waste Incineration Units for Which Construction is Commenced After December 9, 2004, or for Which Modification or Reconstruction is Commenced on or After June 16, 2006	X			
GGGG	(Reserved)				
IIII	Stationary Compression Ignition Internal Combustion Engines				
JJJJ	Stationary Spark Ignition Internal Combustion Engines				
KKKK	Stationary Combustion Turbines				

(viii) Delegations for Shasta County Air Quality Management District, Siskiyou County Air Pollution Control District, South Coast Air Quality Management District, and Tehama County Air Pollution Control District are shown in the following table:

**Delegation Status for New Source Performance Standards for Shasta County Air Quality Management District, Siskiyou County Air Pollution Control District, South Coast Air Quality Management District, and Tehama County Air Pollution Control District**

	Subpart	Air Pollution Control Agency			
		Shasta County AQMD	Siskiyou County APCD	South Coast AQMD	Tehama County APCD

A	General Provisions	X	X	X	X
D	Fossil-Fuel Fired Steam Generators Constructed After August 17, 1971	X	X	X	X
Da	Electric Utility Steam Generating Units Constructed After September 18, 1978	X	X	X	X
Db	Industrial-Commercial-Institutional Steam Generating Units	X	X	X	X
Dc	Small Industrial Steam Generating Units	X	X	X	X
E	Incinerators		X	X	X
Ea	Municipal Waste Combustors Constructed After December 20, 1989 and On or Before September 20, 1994		X	X	X
Eb	Municipal Waste Combustors Constructed After September 20, 1994	X		X	
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After June 20, 1996	X			
F	Portland Cement Plants		X	X	X
G	Nitric Acid Plants		X	X	X
H	Sulfuric Acid Plants		X	X	X
I	Hot Mix Asphalt Facilities	X	X	X	X
J	Petroleum Refineries	X	X	X	X
Ja	Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007				
K	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978	X	X	X	X
Ka	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984	X	X	X	X
Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984	X	X	X	X
L	Secondary Lead Smelters	X	X	X	X
M	Secondary Brass and Bronze Production Plants	X	X	X	X
N	Primary Emissions from Basic Oxygen Process Furnaces for		X	X	X

	Which Construction is Commenced After June 11, 1973				
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20, 1983		X	X	X
O	Sewage Treatment Plants	X	X	X	X
P	Primary Copper Smelters	X	X	X	X
Q	Primary Zinc Smelters		X	X	X
R	Primary Lead Smelters		X	X	X
S	Primary Aluminum Reduction Plants		X	X	X
T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid Plants		X	X	X
U	Phosphate Fertilizer Industry: Superphosphoric Acid Plants		X	X	X
V	Phosphate Fertilizer Industry: Diammonium Phosphate Plants		X	X	X
W	Phosphate Fertilizer Industry: Triple Superphosphate Plants		X	X	X
X	Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities		X	X	X
Y	Coal Preparation Plants		X	X	X
Z	Ferroalloy Production Facilities		X	X	X
AA	Steel Plants: Electric Arc Furnaces Constructed After October 21, 1974 and On or Before August 17, 1983		X	X	X
AAa	Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After August 7, 1983		X	X	X
BB	Kraft pulp Mills		X	X	X
CC	Glass Manufacturing Plants	X	X	X	X
DD	Grain Elevators	X	X	X	X
EE	Surface Coating of Metal Furniture		X	X	X
FF	(Reserved)				
GG	Stationary Gas Turbines	X	X	X	X
HH	Lime Manufacturing Plants	X	X	X	X
KK	Lead-Acid Battery Manufacturing Plants		X	X	X
LL	Metallic Mineral Processing Plants		X	X	X
MM	Automobile and Light Duty Trucks Surface Coating Operations		X	X	X

NN	Phosphate Rock Plants		X	X	X
PP	Ammonium Sulfate Manufacture		X	X	X
QQ	Graphic Arts Industry: Publication Rotogravure Printing		X	X	X
RR	Pressure Sensitive Tape and Label Surface Coating Operations		X	X	X
SS	Industrial Surface Coating: Large Appliances		X	X	X
TT	Metal Coil Surface Coating		X	X	X
UU	Asphalt Processing and Asphalt Roofing Manufacture		X	X	X
VV	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry		X	X	X
VVa	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006				
WW	Beverage Can Surface Coating Industry		X	X	X
XX	Bulk Gasoline Terminals				
AAA	New Residential Wool Heaters	X	X	X	X
BBB	Rubber Tire Manufacturing Industry		X	X	X
CCC	(Reserved)				
DDD	Volatile Organic Compounds (VOC) Emissions from the Polymer Manufacturing Industry		X		X
EEE	(Reserved)				
FFF	Flexible Vinyl and Urethane Coating and Printing		X	X	X
GGG	Equipment Leaks of VOC in Petroleum Refineries		X	X	X
GGGa	Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006				
HHH	Synthetic Fiber Production Facilities		X	X	X
III	Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes		X	X	X
JJJ	Petroleum Dry Cleaners		X	X	X
KKK	Equipment Leaks of VOC From Onshore Natural Gas Processing Plants		X	X	X

LLL	Onshore Natural Gas Processing: SO <sub>2</sub> Emissions		X	X	X
MMM	(Reserved)				
NNN	Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations		X		X
OOO	Nonmetallic Mineral Processing Plants	X	X	X	X
PPP	Wool Fiberglass Insulation Manufacturing Plants		X	X	X
QQQ	VOC Emissions From Petroleum Refinery Wastewater Systems		X	X	X
RRR	Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes		X	X	X
SSS	Magnetic Tape Coating Facilities		X	X	X
TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines		X	X	X
UUU	Calciners and Dryers in Mineral Industries	X	X	X	X
VVV	Polymeric Coating of Supporting Substrates Facilities	X	X	X	X
WWW	Municipal Solid Waste Landfills		X	X	X
AAAA	Small Municipal Waste Combustion Units for Which Construction is Commenced After August 30, 1999 or for Which Modification or Reconstruction is Commenced After June 6, 2001	X			
CCCC	Commercial and Industrial Solid Waste Incineration Units for Which Construction Is Commenced After November 30, 1999 or for Which Modification or Reconstruction Is Commenced on or After June 1, 2001	X			
EEEE	Other Solid Waste Incineration Units for Which Construction is Commenced After December 9, 2004, or for Which Modification or Reconstruction is Commenced on or After June 16, 2006	X			
GGGG	(Reserved)				
IIII	Stationary Compression Ignition Internal Combustion Engines				
JJJJ	Stationary Spark Ignition Internal				

	Combustion Engines				
KKKK	Stationary Combustion Turbines				

(ix) Delegations for Tuolumne County Air Pollution Control District, Ventura County Air Pollution Control District, and Yolo-Solano Air Quality Management District are shown in the following table:

**Delegation Status for New Source Performance Standards for Tuolumne County Air Pollution Control District, Ventura County Air Pollution Control District, and Yolo-Solano Air Quality Management District**

	Subpart	Air Pollution Control Agency		
		Tuolumne County APCD	Ventura County APCD	Yolo-Solano AQMD
A	General Provisions	X	X	
D	Fossil-Fuel Fired Steam Generators Constructed After August 17, 1971	X	X	
Da	Electric Utility Steam Generating Units Constructed After September 18, 1978	X		
Db	Industrial-Commercial-Institutional Steam Generating Units	X	X	
Dc	Small Industrial Steam Generating Units	X		
E	Incinerators	X		
Ea	Municipal Waste Combustors Constructed After December 20, 1989 and On or Before September 20, 1994	X		
Eb	Municipal Waste Combustors Constructed After September 20, 1994	X		
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After June 20, 1996	X		
F	Portland Cement Plants	X		
G	Nitric Acid Plants	X		
H	Sulfuric Acid Plants	X		
I	Hot Mix Asphalt Facilities	X	X	
J	Petroleum Refineries	X	X	
Ja	Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007			
K	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978	X	X	
Ka	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984	X		

Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984	X		
L	Secondary Lead Smelters	X		
M	Secondary Brass and Bronze Production Plants	X		
N	Primary Emissions from Basic Oxygen Process Furnaces for Which Construction is Commenced After June 11, 1973	X		
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20, 1983	X		
O	Sewage Treatment Plants	X		
P	Primary Copper Smelters	X		
Q	Primary Zinc Smelters	X		
R	Primary Lead Smelters	X		
S	Primary Aluminum Reduction Plants	X		
T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid Plants	X		
U	Phosphate Fertilizer Industry: Superphosphoric Acid Plants	X		
V	Phosphate Fertilizer Industry: Diammonium Phosphate Plants	X		
W	Phosphate Fertilizer Industry: Triple Superphosphate Plants	X		
X	Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities	X		
Y	Coal Preparation Plants	X		
Z	Ferroalloy Production Facilities	X		
AA	Steel Plants: Electric Arc Furnaces Constructed After October 21, 1974 and On or Before August 17, 1983	X	X	
AAa	Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After August 7, 1983	X		
BB	Kraft pulp Mills	X		
CC	Glass Manufacturing Plants	X		
DD	Grain Elevators	X		
EE	Surface Coating of Metal Furniture	X		
FF	(Reserved)			
GG	Stationary Gas Turbines	X		
HH	Lime Manufacturing Plants	X		
KK	Lead-Acid Battery Manufacturing Plants	X		
LL	Metallic Mineral Processing Plants	X		

MM	Automobile and Light Duty Trucks Surface Coating Operations	X		
NN	Phosphate Rock Plants	X		
PP	Ammonium Sulfate Manufacture	X		
QQ	Graphic Arts Industry: Publication Rotogravure Printing	X		
RR	Pressure Sensitive Tape and Label Surface Coating Operations	X		
SS	Industrial Surface Coating: Large Appliances	X		
TT	Metal Coil Surface Coating	X		
UU	Asphalt Processing and Asphalt Roofing Manufacture	X		
VV	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry	X		
VVa	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006			
WW	Beverage Can Surface Coating Industry	X		
XX	Bulk Gasoline Terminals			
AAA	New Residential Wood Heaters	X		
BBB	Rubber Tire Manufacturing Industry	X		
CCC	(Reserved)			
DDD	Volatile Organic Compounds (VOC) Emissions from the Polymer Manufacturing Industry	X		
EEE	(Reserved)			
FFF	Flexible Vinyl and Urethane Coating and Printing	X		
GGG	Equipment Leaks of VOC in Petroleum Refineries	X		
GGGa	Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006			
HHH	Synthetic Fiber Production Facilities	X		
III	Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes	X		
JJJ	Petroleum Dry Cleaners	X		
KKK	Equipment Leaks of VOC From Onshore Natural Gas Processing Plants	X		
LLL	Onshore Natural Gas Processing: SO2 Emissions	X		
MMM	(Reserved)			

NNN	Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations	X		
OOO	Nonmetallic Mineral Processing Plants	X	X	
PPP	Wool Fiberglass Insulation Manufacturing Plants	X		
QQQ	VOC Emissions From Petroleum Refinery Wastewater Systems	X		
RRR	Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes	X		
SSS	Magnetic Tape Coating Facilities	X		
TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines	X		
UUU	Calciners and Dryers in Mineral Industries	X		
VVV	Polymeric Coating of Supporting Substrates Facilities	X		
WWW	Municipal Solid Waste Landfills	X	X	
AAAA	Small Municipal Waste Combustion Units for Which Construction is Commenced After August 30, 1999 or for Which Modification or Reconstruction is Commenced After June 6, 2001	X		
CCCC	Commercial and Industrial Solid Waste Incineration Units for Which Construction Is Commenced After November 30, 1999 or for Which Modification or Reconstruction Is Commenced on or After June 1, 2001	X		
EEEE	Other Solid Waste Incineration Units for Which Construction is Commenced After December 9, 2004, or for Which Modification or Reconstruction is Commenced on or After June 16, 2006			
GGGG	(Reserved)			
IIII	Stationary Compression Ignition Internal Combustion Engines			
JJJJ	Stationary Spark Ignition Internal Combustion Engines			
KKKK	Stationary Combustion Turbines			

(3) *Hawaii*. The following table identifies delegations for Hawaii:

Delegation Status for New Source Performance Standards for Hawaii:

**Delegation Status for New Source Performance Standards for Hawaii**

	<b>Subpart</b>	<b>Hawaii</b>

A	General Provisions	X
D	Fossil-Fuel Fired Steam Generators Constructed After August 17, 1971	X
Da	Electric Utility Steam Generating Units Constructed After September 18, 1978	X
Db	Industrial-Commercial-Institutional Steam Generating Units	X
Dc	Small Industrial Steam Generating Units	X
E	Incinerators	X
Ea	Municipal Waste Combustors Constructed After December 20, 1989 and On or Before September 20, 1994	X
Eb	Municipal Waste Combustors Constructed After September 20, 1994	X
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After June 20, 1996	X
F	Portland Cement Plants	X
G	Nitric Acid Plants	
H	Sulfuric Acid Plants	
I	Hot Mix Asphalt Facilities	X
J	Petroleum Refineries	X
Ja	Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007	
K	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978	X
Ka	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984	X
Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984	X
L	Secondary Lead Smelters	
M	Secondary Brass and Bronze Production Plants	
N	Primary Emissions from Basic Oxygen Process Furnaces for Which Construction is Commenced After June 11, 1973	
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20, 1983	
O	Sewage Treatment Plants	X
P	Primary Copper Smelters	
Q	Primary Zinc Smelters	
R	Primary Lead Smelters	
S	Primary Aluminum Reduction Plants	
T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid Plants	
U	Phosphate Fertilizer Industry: Superphosphoric Acid Plants	
V	Phosphate Fertilizer Industry: Diammonium Phosphate Plants	
W	Phosphate Fertilizer Industry: Triple Superphosphate Plants	
X	Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities	
Y	Coal Preparation Plants	X

Z	Ferroalloy Production Facilities	
AA	Steel Plants: Electric Arc Furnaces Constructed After October 21, 1974 and On or Before August 17, 1983	X
AAa	Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After August 7, 1983	X
BB	Kraft pulp Mills	
CC	Glass Manufacturing Plants	
DD	Grain Elevators	
EE	Surface Coating of Metal Furniture	
FF	(Reserved)	
GG	Stationary Gas Turbines	X
HH	Lime Manufacturing Plants	
KK	Lead-Acid Battery Manufacturing Plants	
LL	Metallic Mineral Processing Plants	
MM	Automobile and Light Duty Trucks Surface Coating Operations	
NN	Phosphate Rock Plants	
PP	Ammonium Sulfate Manufacture	
QQ	Graphic Arts Industry: Publication Rotogravure Printing	
RR	Pressure Sensitive Tape and Label Surface Coating Operations	
SS	Industrial Surface Coating: Large Appliances	
TT	Metal Coil Surface Coating	
UU	Asphalt Processing and Asphalt Roofing Manufacture	
VV	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry	X
VVa	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006	
WW	Beverage Can Surface Coating Industry	X
XX	Bulk Gasoline Terminals	X
AAA	New Residential Wool Heaters	
BBB	Rubber Tire Manufacturing Industry	
CCC	(Reserved)	
DDD	Volatile Organic Compounds (VOC) Emissions from the Polymer Manufacturing Industry	
EEE	(Reserved)	
FFF	Flexible Vinyl and Urethane Coating and Printing	
GGG	Equipment Leaks of VOC in Petroleum Refineries	X
GGGa	Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006	
HHH	Synthetic Fiber Production Facilities	
III	Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes	
JJJ	Petroleum Dry Cleaners	X
KKK	Equipment Leaks of VOC From Onshore Natural Gas Processing Plants	

LLL	Onshore Natural Gas Processing: SO2 Emissions	
MMM	(Reserved)	
NNN	Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations	X
OOO	Nonmetallic Mineral Processing Plants	X
PPP	Wool Fiberglass Insulation Manufacturing Plants	
QQQ	VOC Emissions From Petroleum Refinery Wastewater	X
RRR	Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes	
SSS	Magnetic Tape Coating Facilities	
TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines	
UUU	Calciners and Dryers in Mineral Industries	X
VVV	Polymeric Coating of Supporting Substrates Facilities	X
WWW	Municipal Solid Waste Landfills	X
AAAA	Small Municipal Waste Combustion Units for Which Construction is Commenced After August 30, 1999 or for Which Modification or Reconstruction is Commenced After June 6, 2001	X
CCCC	Commercial and Industrial Solid Waste Incineration Units for Which Construction Is Commenced After November 30, 1999 or for Which Modification or Reconstruction Is Commenced on or After June 1, 2001	X
EEEE	Other Solid Waste Incineration Units for Which Construction is Commenced After December 9, 2004, or for Which Modification or Reconstruction is Commenced on or After June 16, 2006	
GGGG	(Reserved)	
IIII	Stationary Compression Ignition Internal Combustion Engines	
JJJJ	Stationary Spark Ignition Internal Combustion Engines	
KKKK	Stationary Combustion Turbines	

(4) Nevada. The following table identifies delegations for Nevada:

**Delegation Status for New Source Performance Standards for Nevada**

	Subpart	Air Pollution Control Agency		
		Nevada DEP	Clark County	Washoe County
A	General Provisions	X	X	X
D	Fossil-Fuel Fired Steam Generators Constructed After August 17, 1971	X	X	X
Da	Electric Utility Steam Generating Units Constructed After September 18, 1978	X		
Db	Industrial-Commercial-Institutional Steam Generating Units	X		
Dc	Small Industrial Steam Generating Units	X		
E	Incinerators	X	X	X
Ea	Municipal Waste Combustors Constructed	X		

	After December 20, 1989 and On or Before September 20, 1994			
Eb	Municipal Waste Combustors Constructed After September 20, 1994	X		
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After June 20, 1996	X		
F	Portland Cement Plants	X	X	X
G	Nitric Acid Plants	X	X	
H	Sulfuric Acid Plants	X	X	
I	Hot Mix Asphalt Facilities	X	X	X
J	Petroleum Refineries	X	X	
Ja	Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007			
K	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978	X	X	X
Ka	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984	X	X	X
Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984	X		
L	Secondary Lead Smelters	X	X	X
M	Secondary Brass and Bronze Production Plants	X	X	
N	Primary Emissions from Basic Oxygen Process Furnaces for Which Construction is Commenced After June 11, 1973	X	X	
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20, 1983	X		
O	Sewage Treatment Plants	X	X	X
P	Primary Copper Smelters	X	X	X
Q	Primary Zinc Smelters	X	X	X
R	Primary Lead Smelters	X	X	X
S	Primary Aluminum Reduction Plants	X	X	
T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid Plants	X	X	
U	Phosphate Fertilizer Industry: Superphosphoric Acid Plants	X	X	
V	Phosphate Fertilizer Industry: Diammonium Phosphate Plants	X	X	
W	Phosphate Fertilizer Industry: Triple Superphosphate Plants	X	X	
X	Phosphate Fertilizer Industry: Granular	X	X	

	Triple Superphosphate Storage Facilities			
Y	Coal Preparation Plants	X	X	X
Z	Ferroalloy Production Facilities	X	X	
AA	Steel Plants: Electric Arc Furnaces Constructed After October 21, 1974 and On or Before August 17, 1983	X	X	
AAa	Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After August 7, 1983	X		
BB	Kraft pulp Mills	X	X	
CC	Glass Manufacturing Plants	X	X	
DD	Grain Elevators	X	X	X
EE	Surface Coating of Metal Furniture	X	X	X
FF	(Reserved)			
GG	Stationary Gas Turbines	X	X	X
HH	Lime Manufacturing Plants	X	X	X
KK	Lead-Acid Battery Manufacturing Plants	X	X	X
LL	Metallic Mineral Processing Plants	X	X	X
MM	Automobile and Light Duty Trucks Surface Coating Operations	X	X	X
NN	Phosphate Rock Plants	X	X	X
PP	Ammonium Sulfate Manufacture	X	X	
QQ	Graphic Arts Industry: Publication Rotogravure Printing	X	X	X
RR	Pressure Sensitive Tape and Label Surface Coating Operations	X	X	
SS	Industrial Surface Coating: Large Appliances	X	X	X
TT	Metal Coil Surface Coating	X	X	X
UU	Asphalt Processing and Asphalt Roofing Manufacture	X	X	X
VV	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry	X	X	X
VVa	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006			
WW	Beverage Can Surface Coating Industry	X	X	
XX	Bulk Gasoline Terminals	X	X	
AAA	New Residential Wool Heaters			
BBB	Rubber Tire Manufacturing Industry	X		
CCC	(Reserved)			
DDD	Volatile Organic Compounds (VOC) Emissions from the Polymer Manufacturing Industry	X		
EEE	(Reserved)			
FFF	Flexible Vinyl and Urethane Coating and Printing	X	X	
GGG	Equipment Leaks of VOC in Petroleum Refineries	X	X	

GGGa	Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006			
HHH	Synthetic Fiber Production Facilities	X	X	
III	Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes	X		
JJJ	Petroleum Dry Cleaners	X	X	X
KKK	Equipment Leaks of VOC From Onshore Natural Gas Processing Plants	X		
LLL	Onshore Natural Gas Processing: SO <sub>2</sub> Emissions	X		
MMM	(Reserved)			
NNN	Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations	X		
OOO	Nonmetallic Mineral Processing Plants	X	X	
PPP	Wool Fiberglass Insulation Manufacturing Plants	X	X	
QQQ	VOC Emissions From Petroleum Refinery Wastewater Systems	X		
RRR	Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes	X		
SSS	Magnetic Tape Coating Facilities	X		
TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines	X		
UUU	Calciners and Dryers in Mineral Industries	X		
VVV	Polymeric Coating of Supporting Substrates Facilities	X		
WWW	Municipal Solid Waste Landfills	X		
AAAA	Small Municipal Waste Combustion Units for Which Construction is Commenced After August 30, 1999 or for Which Modification or Reconstruction is Commenced After June 6, 2001	X		
CCCC	Commercial and Industrial Solid Waste Incineration Units for Which Construction Is Commenced After November 30, 1999 or for Which Modification or Reconstruction Is Commenced on or After June 1, 2001	X		
EEEE	Other Solid Waste Incineration Units for Which Construction is Commenced After December 9, 2004, or for Which Modification or Reconstruction is Commenced on or After June 16, 2006	X		
GGGG	(Reserved)			

IIII	Stationary Compression Ignition Internal Combustion Engines	X		
JJJJ	Stationary Spark Ignition Internal Combustion Engines	X		
KKKK	Stationary Combustion Turbines	X		

(5) *Guam*. The following table identifies delegations as of June 15, 2001:

**Delegation Status for New Source Performance Standards for Guam**

	<b>Subpart</b>	<b>Guam</b>
A	General Provisions	X
D	Fossil-Fuel Fired Steam Generators Constructed After August 17, 1971	X
Da	Electric Utility Steam Generating Units Constructed After September 18, 1978	
Db	Industrial-Commercial-Institutional Steam Generating Units	
Dc	Small Industrial Steam Generating Units	
E	Incinerators	
Ea	Municipal Waste Combustors Constructed After December 20, 1989 and On or Before September 20, 1994	
Eb	Municipal Waste Combustors Constructed After September 20, 1994	
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After June 20, 1996	
F	Portland Cement Plants	X
G	Nitric Acid Plants	
H	Sulfuric Acid Plants	
I	Hot Mix Asphalt Facilities	X
J	Petroleum Refineries	X
K	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978	X

(e) The following lists the specific part 60 standards that have been delegated unchanged to the air pollution control agencies in Region 6.

(1) *New Mexico*. The New Mexico Environment Department has been delegated all part 60 standards promulgated by EPA, except subpart AAA—Standards of Performance for New Residential Wood Heaters, as amended in the Federal Register through September 1, 2002.

(2) *Louisiana*. The Louisiana Department of Environmental Quality has been delegated all part 60 standards promulgated by EPA, except subpart AAA—Standards for Performance for New Residential Wood Heaters, as amended in the Federal Register through July 1, 2008.

**Delegation Status for Part 60 Standards—State of Louisiana**

<b>Subpart</b>	<b>Source category</b>	<b>LDEQ<sup>1</sup></b>
A	General Provisions	Yes.
D	Fossil Fueled Steam Generators (>250 MM BTU/hr). Including amendments issued January 28, 2009. (74 FR 5072)	Yes.
Da	Electric Utility Steam Generating Units (>250 MM BTU/hr). Including amendments issued January 28, 2009. (74 FR	Yes.

	5072)	
Db	Industrial-Commercial-Institutional Steam Generating Units (100 to 250 MM BTU/hr). Including amendments issued January 28, 2009. (74 FR 5072)	Yes.
Dc	Industrial-Commercial-Institutional Small Steam Generating Units (10 to 100 MM BTU/hr). Including amendments issued January 28, 2009. (74 FR 5072)	Yes.
E	Incinerators (>50 tons per day). Including amendments issued January 28, 2009. (74 FR 5072)	Yes.
Ea	Municipal Waste Combustors	Yes.
Eb	Large Municipal Waste Combustors	Yes.
Ec	Hospital/Medical/Infectious Waste Incinerators	Yes.
F	Portland Cement Plants	Yes.
G	Nitric Acid Plants	Yes.
H	Sulfuric Acid Plants	Yes.
I	Hot Mix Asphalt Facilities	Yes.
J	Petroleum Refineries	Yes.
Ja	Petroleum Refineries (After May 14, 2007). Including amendments issued July 28, 2008. (73 FR 43626)	Yes.
K	Storage Vessels for Petroleum Liquids (After 6/11/73 & Before 5/19/78)	Yes.
Ka	Storage Vessels for Petroleum Liquids (After 6/11/73 & Before 5/19/78)	Yes.
Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Stg/Vessels) After 7/23/84	Yes.
L	Secondary Lead Smelters	Yes.
M	Secondary Brass and Bronze Production Plants	Yes.
N	Primary Emissions from Basic Oxygen Process Furnaces (Construction Commenced After June 11, 1973)	Yes.
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities Construction is Commenced After January 20, 1983	Yes.
O	Sewage Treatment Plants	Yes.
P	Primary Copper Smelters	Yes.
Q	Primary Zinc Smelters	Yes.
R	Primary Lead Smelters	Yes.
S	Primary Aluminum Reduction Plants	Yes.
T	Phosphate Fertilizer Industry: Wet Process Phosphoric Plants	Yes.
U	Phosphate Fertilizer Industry: Superphosphoric Acid Plants	Yes.
V	Phosphate Fertilizer Industry: Diammonium Phosphate Plants	Yes.
W	Phosphate Fertilizer Industry: Triple Superphosphate Plants	Yes.
X	Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities	Yes.
Y	Coal Preparation Plants	Yes.
Z	Ferroalloy Production Facilities	Yes.
AA	Steel Plants: Electric Arc Furnaces After 10/21/74 & On or Before 8/17/83	Yes.
AAa	Steel Plants: Electric Arc Furnaces & Argon-Oxygen Decarburization Vessels After 8/07/83	Yes.

BB	Kraft Pulp Mills	Yes.
CC	Glass Manufacturing Plants	Yes.
DD	Grain Elevators	Yes.
EE	Surface Coating of Metal Furniture	Yes.
GG	Stationary Gas Turbines	Yes.
HH	Lime Manufacturing Plants	Yes.
KK	Lead-Acid Battery Manufacturing Plants	Yes.
LL	Metallic Mineral Processing Plants	Yes.
MM	Automobile & Light Duty Truck Surface Coating Operations	Yes.
NN	Phosphate Manufacturing Plants	Yes.
PP	Ammonium Sulfate Manufacture	Yes.
QQ	Graphic Arts Industry: Publication Rotogravure Printing	Yes.
RR	Pressure Sensitive Tape and Label Surface Coating Operations	Yes.
SS	Industrial Surface Coating: Large Appliances	Yes.
TT	Metal Coil Surface Coating	Yes.
UU	Asphalt Processing and Asphalt Roofing Manufacture	Yes.
VV	VOC Equipment Leaks in the SOCOMI Industry	Yes.
VVa	VOC Equipment Leaks in the SOCOMI Industry (After November 7, 2006)	Yes.
XX	Bulk Gasoline Terminals	Yes.
AAA	New Residential Wood Heaters	No
BBB	Rubber Tire Manufacturing Industry	Yes.
DDD	Volatile Organic Compound (VOC) Emissions from the Polymer Manufacturing Industry	Yes.
FFF	Flexible Vinyl and Urethane Coating and Printing	Yes.
GGG	VOC Equipment Leaks in Petroleum Refineries	Yes.
HHH	Synthetic Fiber Production	Yes.
III	VOC Emissions from the SOCOMI Air Oxidation Unit Processes	Yes.
JJJ	Petroleum Dry Cleaners	Yes.
KKK	VOC Equipment Leaks From Onshore Natural Gas Processing Plants	Yes.
LLL	Onshore Natural Gas Processing: SO <sub>2</sub> Emissions	Yes.
NNN	VOC Emissions from SOCOMI Distillation Operations	Yes.
OOO	Nonmetallic Mineral Processing Plants	Yes.
PPP	Wool Fiberglass Insulation Manufacturing Plants	Yes.
QQQ	VOC Emissions From Petroleum Refinery Wastewater Systems	Yes.
RRR	VOC Emissions from SOCOMI Reactor Processes	Yes.
SSS	Magnetic Tape Coating Operations	Yes.
TTT	Industrial Surface Coating: Plastic Parts for Business Machines	Yes.
UUU	Calciners and Dryers in Mineral Industries	Yes.
VVV	Polymeric Coating of Supporting Substrates Facilities	Yes.
WWW	Municipal Solid Waste Landfills	Yes.
AAAA	Small Municipal Waste Combustion Units (Construction is Commenced After 8/30/99 or Modification/Reconstruction is Commenced After 6/06/2001)	Yes.

CCCC	Commercial & Industrial Solid Waste Incineration Units (Construction is Commenced After 11/30/1999 or Modification/Reconstruction is Commenced on or After 6/01/2001)	Yes.
EEEE	Other Solid Waste Incineration Units (Constructed after 12/09/2004 or Modicatation/Reconstruction is commenced on or after 06/16/2004)	Yes.
IIII	Stationary Compression Ignition Internal Combustion Engines	Yes.
JJJJ	Stationary Spark Ignition Internal Combustion Engines. Including amendments issued October 8, 2008. (73 FR 59175)	Yes.
KKKK	Stationary Combustion Turbines (Construction Commenced After 02/18/2005)	Yes

<sup>1</sup>The Louisiana Department of Environmental Quality (LDEQ) has been delegated all Part 60 standards promulgated by EPA, except subpart AAA—Standards of Performance for New Residential Wood Heaters—as amended in the **Federal Register** through July 1, 2008.

(3) *Albuquerque-Bernalillo County Air Quality Control Board.* The Albuquerque-Bernalillo County Air Quality Control Board has been delegated all part 60 standards promulgated by EPA, except Subpart AAA—Standards of Performance for New Residential Wood Heaters; Subpart WWW—Standards of Performance for Municipal Solid Waste Landfills; Subpart Cc—Emissions Guidelines and Compliance Times for Municipal Solid Waste Landfills, as amended in the **Federal Register** through July 1, 2004.

[40 FR 18169, Apr. 25, 1975]

**Editorial Note:** For **Federal Register** citations affecting §60.4 see the List of CFR Sections Affected which appears in the Finding Aids section of the printed volume and on GPO Access.

#### § 60.5 Determination of construction or modification.

(a) When requested to do so by an owner or operator, the Administrator will make a determination of whether action taken or intended to be taken by such owner or operator constitutes construction (including reconstruction) or modification or the commencement thereof within the meaning of this part.

(b) The Administrator will respond to any request for a determination under paragraph (a) of this section within 30 days of receipt of such request.

[40 FR 58418, Dec. 16, 1975]

#### § 60.6 Review of plans.

(a) When requested to do so by an owner or operator, the Administrator will review plans for construction or modification for the purpose of providing technical advice to the owner or operator.

(b)(1) A separate request shall be submitted for each construction or modification project.

(2) Each request shall identify the location of such project, and be accompanied by technical information describing the proposed nature, size, design, and method of operation of each affected facility involved in such project, including information on any equipment to be used for measurement or control of emissions.

(c) Neither a request for plans review nor advice furnished by the Administrator in response to such request shall (1) relieve an owner or operator of legal responsibility for compliance with any provision of this part or of any applicable State or local requirement, or (2) prevent the Administrator from implementing or enforcing any provision of this part or taking any other action authorized by the Act.

[36 FR 24877, Dec. 23, 1971, as amended at 39 FR 9314, Mar. 8, 1974]

#### § 60.7 Notification and record keeping.

(a) Any owner or operator subject to the provisions of this part shall furnish the Administrator written notification or, if acceptable to both the Administrator and the owner or operator of a source, electronic notification, as follows:

(1) A notification of the date construction (or reconstruction as defined under §60.15) of an affected facility is commenced postmarked no later than 30 days after such date. This requirement shall not apply in the case of mass-produced facilities which are purchased in completed form.

(2) [Reserved]

(3) A notification of the actual date of initial startup of an affected facility postmarked within 15 days after such date.

(4) A notification of any physical or operational change to an existing facility which may increase the emission rate of any air pollutant to which a standard applies, unless that change is specifically exempted under an applicable subpart or in §60.14(e). This notice shall be postmarked 60 days or as soon as practicable before the change is commenced and shall include information describing the precise nature of the change, present and proposed emission control systems, productive capacity of the facility before and after the change, and the expected completion date of the change. The Administrator may request additional relevant information subsequent to this notice.

(5) A notification of the date upon which demonstration of the continuous monitoring system performance commences in accordance with §60.13(c). Notification shall be postmarked not less than 30 days prior to such date.

(6) A notification of the anticipated date for conducting the opacity observations required by §60.11(e)(1) of this part. The notification shall also include, if appropriate, a request for the Administrator to provide a visible emissions reader during a performance test. The notification shall be postmarked not less than 30 days prior to such date.

(7) A notification that continuous opacity monitoring system data results will be used to determine compliance with the applicable opacity standard during a performance test required by §60.8 in lieu of Method 9 observation data as allowed by §60.11(e)(5) of this part. This notification shall be postmarked not less than 30 days prior to the date of the performance test.

(b) Any owner or operator subject to the provisions of this part shall maintain records of the occurrence and duration of any startup, shutdown, or malfunction in the operation of an affected facility; any malfunction of the air pollution control equipment; or any periods during which a continuous monitoring system or monitoring device is inoperative.

(c) Each owner or operator required to install a continuous monitoring device shall submit excess emissions and monitoring systems performance report (excess emissions are defined in applicable subparts) and/or summary report form (see paragraph (d) of this section) to the Administrator semiannually, except when: more frequent reporting is specifically required by an applicable subpart; or the Administrator, on a case-by-case basis, determines that more frequent reporting is necessary to accurately assess the compliance status of the source. All reports shall be postmarked by the 30th day following the end of each six-month period. Written reports of excess emissions shall include the following information:

(1) The magnitude of excess emissions computed in accordance with §60.13(h), any conversion factor (s) used, and the date and time of commencement and completion of each time period of excess emissions. The process operating time during the reporting period.

(2) Specific identification of each period of excess emissions that occurs during startups, shutdowns, and malfunctions of the affected facility. The nature and cause of any malfunction (if known), the corrective action taken or preventative measures adopted.

(3) The date and time identifying each period during which the continuous monitoring system was inoperative except for zero and span checks and the nature of the system repairs or adjustments.

(4) When no excess emissions have occurred or the continuous monitoring system(s) have not been inoperative, repaired, or adjusted, such information shall be stated in the report.

(d) The summary report form shall contain the information and be in the format shown in figure 1 unless otherwise specified by the Administrator. One summary report form shall be submitted for each pollutant monitored at each affected facility.

(1) If the total duration of excess emissions for the reporting period is less than 1 percent of the total operating time for the reporting period and CMS downtime for the reporting period is less than 5 percent of the total operating time for the reporting period, only the summary report form shall be submitted and the excess emission report described in §60.7(c) need not be submitted unless requested by the Administrator.

(2) If the total duration of excess emissions for the reporting period is 1 percent or greater of the total operating time for the reporting period or the total CMS downtime for the reporting period is 5 percent or greater of the total operating time for the reporting period, the summary report form and the excess

emission report described in §60.7(c) shall both be submitted.

Figure 1—Summary Report—Gaseous and Opacity Excess Emission and Monitoring System Performance

Pollutant (Circle One—SO<sub>2</sub>/NO<sub>x</sub>/TRS/H<sub>2</sub>S/CO/Opacity)

Reporting period dates: From \_\_\_\_\_ to \_\_\_\_\_

Company:

Emission Limitation \_\_\_\_\_

Address:

Monitor Manufacturer and Model No. \_\_\_\_\_

Date of Latest CMS Certification or Audit \_\_\_\_\_

Process Unit(s) Description:

Total source operating time in reporting period<sup>1</sup> \_\_\_\_\_

Emission data summary <sup>1</sup>		CMS performance summary <sup>1</sup>	
1. Duration of excess emissions in reporting period due to:		1. CMS downtime in reporting period due to:	
a. Startup/shutdown		a. Monitor equipment malfunctions	
b. Control equipment problems		b. Non-Monitor equipment malfunctions	
c. Process problems		c. Quality assurance calibration	
d. Other known causes		d. Other known causes	
e. Unknown causes		e. Unknown causes	
2. Total duration of excess emission		2. Total CMS Downtime	
3. Total duration of excess emissions × (100) [Total source operating time]	% <sup>2</sup>	3. [Total CMS Downtime] × (100) [Total source operating time]	% <sup>2</sup>

<sup>1</sup>For opacity, record all times in minutes. For gases, record all times in hours.

<sup>2</sup>For the reporting period: If the total duration of excess emissions is 1 percent or greater of the total operating time or the total CMS downtime is 5 percent or greater of the total operating time, both the summary report form and the excess emission report described in §60.7(c) shall be submitted.

On a separate page, describe any changes since last quarter in CMS, process or controls. I certify that the information contained in this report is true, accurate, and complete.

\_\_\_\_\_  
Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

---

Date

(e)(1) Notwithstanding the frequency of reporting requirements specified in paragraph (c) of this section, an owner or operator who is required by an applicable subpart to submit excess emissions and monitoring systems performance reports (and summary reports) on a quarterly (or more frequent) basis may reduce the frequency of reporting for that standard to semiannual if the following conditions are met:

(i) For 1 full year (e.g., 4 quarterly or 12 monthly reporting periods) the affected facility's excess emissions and monitoring systems reports submitted to comply with a standard under this part continually demonstrate that the facility is in compliance with the applicable standard;

(ii) The owner or operator continues to comply with all recordkeeping and monitoring requirements specified in this subpart and the applicable standard; and

(iii) The Administrator does not object to a reduced frequency of reporting for the affected facility, as provided in paragraph (e)(2) of this section.

(2) The frequency of reporting of excess emissions and monitoring systems performance (and summary) reports may be reduced only after the owner or operator notifies the Administrator in writing of his or her intention to make such a change and the Administrator does not object to the intended change. In deciding whether to approve a reduced frequency of reporting, the Administrator may review information concerning the source's entire previous performance history during the required recordkeeping period prior to the intended change, including performance test results, monitoring data, and evaluations of an owner or operator's conformance with operation and maintenance requirements. Such information may be used by the Administrator to make a judgment about the source's potential for noncompliance in the future. If the Administrator disapproves the owner or operator's request to reduce the frequency of reporting, the Administrator will notify the owner or operator in writing within 45 days after receiving notice of the owner or operator's intention. The notification from the Administrator to the owner or operator will specify the grounds on which the disapproval is based. In the absence of a notice of disapproval within 45 days, approval is automatically granted.

(3) As soon as monitoring data indicate that the affected facility is not in compliance with any emission limitation or operating parameter specified in the applicable standard, the frequency of reporting shall revert to the frequency specified in the applicable standard, and the owner or operator shall submit an excess emissions and monitoring systems performance report (and summary report, if required) at the next appropriate reporting period following the noncomplying event. After demonstrating compliance with the applicable standard for another full year, the owner or operator may again request approval from the Administrator to reduce the frequency of reporting for that standard as provided for in paragraphs (e)(1) and (e)(2) of this section.

(f) Any owner or operator subject to the provisions of this part shall maintain a file of all measurements, including continuous monitoring system, monitoring device, and performance testing measurements; all continuous monitoring system performance evaluations; all continuous monitoring system or monitoring device calibration checks; adjustments and maintenance performed on these systems or devices; and all other information required by this part recorded in a permanent form suitable for inspection. The file shall be retained for at least two years following the date of such measurements, maintenance, reports, and records, except as follows:

(1) This paragraph applies to owners or operators required to install a continuous emissions monitoring system (CEMS) where the CEMS installed is automated, and where the calculated data averages do not exclude periods of CEMS breakdown or malfunction. An automated CEMS records and reduces the measured data to the form of the pollutant emission standard through the use of a computerized data acquisition system. In lieu of maintaining a file of all CEMS subhourly measurements as required under paragraph (f) of this section, the owner or operator shall retain the most recent consecutive three averaging periods of subhourly measurements and a file that contains a hard copy of the data acquisition system algorithm used to reduce the measured data into the reportable form of the standard.

(2) This paragraph applies to owners or operators required to install a CEMS where the measured data is manually reduced to obtain the reportable form of the standard, and where the calculated data averages do not exclude periods of CEMS breakdown or malfunction. In lieu of maintaining a file of all CEMS subhourly measurements as required under paragraph (f) of this section, the owner or operator shall retain all subhourly measurements for the most recent reporting period. The subhourly measurements shall be retained for 120 days from the date of the most recent summary or excess emission report submitted to the Administrator.

(3) The Administrator or delegated authority, upon notification to the source, may require the owner or operator to maintain all measurements as required by paragraph (f) of this section, if the Administrator or the delegated authority determines these records are required to more accurately assess the compliance status of the affected source.

(g) If notification substantially similar to that in paragraph (a) of this section is required by any other State or local agency, sending the Administrator a copy of that notification will satisfy the requirements of paragraph (a) of this section.

(h) Individual subparts of this part may include specific provisions which clarify or make inapplicable the provisions set forth in this section.

[36 FR 24877, Dec. 28, 1971, as amended at 40 FR 46254, Oct. 6, 1975; 40 FR 58418, Dec. 16, 1975; 45 FR 5617, Jan. 23, 1980; 48 FR 48335, Oct. 18, 1983; 50 FR 53113, Dec. 27, 1985; 52 FR 9781, Mar. 26, 1987; 55 FR 51382, Dec. 13, 1990; 59 FR 12428, Mar. 16, 1994; 59 FR 47265, Sep. 15, 1994; 64 FR 7463, Feb. 12, 1999]

### § 60.8 Performance tests.

(a) Except as specified in paragraphs (a)(1), (a)(2), (a)(3), and (a)(4) of this section, within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial startup of such facility, or at such other times specified by this part, and at such other times as may be required by the Administrator under section 114 of the Act, the owner or operator of such facility shall conduct performance test(s) and furnish the Administrator a written report of the results of such performance test(s).

(1) If a force majeure is about to occur, occurs, or has occurred for which the affected owner or operator intends to assert a claim of force majeure, the owner or operator shall notify the Administrator, in writing as soon as practicable following the date the owner or operator first knew, or through due diligence should have known that the event may cause or caused a delay in testing beyond the regulatory deadline, but the notification must occur before the performance test deadline unless the initial force majeure or a subsequent force majeure event delays the notice, and in such cases, the notification shall occur as soon as practicable.

(2) The owner or operator shall provide to the Administrator a written description of the force majeure event and a rationale for attributing the delay in testing beyond the regulatory deadline to the force majeure; describe the measures taken or to be taken to minimize the delay; and identify a date by which the owner or operator proposes to conduct the performance test. The performance test shall be conducted as soon as practicable after the force majeure occurs.

(3) The decision as to whether or not to grant an extension to the performance test deadline is solely within the discretion of the Administrator. The Administrator will notify the owner or operator in writing of approval or disapproval of the request for an extension as soon as practicable.

(4) Until an extension of the performance test deadline has been approved by the Administrator under paragraphs (a)(1), (2), and (3) of this section, the owner or operator of the affected facility remains strictly subject to the requirements of this part.

(b) Performance tests shall be conducted and data reduced in accordance with the test methods and procedures contained in each applicable subpart unless the Administrator (1) specifies or approves, in specific cases, the use of a reference method with minor changes in methodology, (2) approves the use of an equivalent method, (3) approves the use of an alternative method the results of which he has determined to be adequate for indicating whether a specific source is in compliance, (4) waives the requirement for performance tests because the owner or operator of a source has demonstrated by other means to the Administrator's satisfaction that the affected facility is in compliance with the standard, or (5) approves shorter sampling times and smaller sample volumes when necessitated by process variables or other factors. Nothing in this paragraph shall be construed to abrogate the Administrator's authority to require testing under section 114 of the Act.

(c) Performance tests shall be conducted under such conditions as the Administrator shall specify to the plant operator based on representative performance of the affected facility. The owner or operator shall make available to the Administrator such records as may be necessary to determine the conditions of the performance tests. Operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a performance test nor shall emissions in excess of the level of the applicable emission limit during periods of startup, shutdown, and malfunction be considered a violation of the applicable emission limit unless otherwise specified in the applicable standard.

(d) The owner or operator of an affected facility shall provide the Administrator at least 30 days prior notice of any performance test, except as specified under other subparts, to afford the Administrator the opportunity to have an observer present. If after 30 days notice for an initially scheduled performance test, there is a delay (due to operational problems, etc.) in conducting the scheduled performance test, the owner or operator of an affected facility shall notify the Administrator (or delegated State or local agency) as soon as possible of any delay in the original test date, either by providing at least 7 days prior notice of the rescheduled date of the performance test, or by arranging a rescheduled date with the Administrator (or delegated State or local agency) by mutual agreement.

(e) The owner or operator of an affected facility shall provide, or cause to be provided, performance

testing facilities as follows:

(1) Sampling ports adequate for test methods applicable to such facility. This includes (i) constructing the air pollution control system such that volumetric flow rates and pollutant emission rates can be accurately determined by applicable test methods and procedures and (ii) providing a stack or duct free of cyclonic flow during performance tests, as demonstrated by applicable test methods and procedures.

(2) Safe sampling platform(s).

(3) Safe access to sampling platform(s).

(4) Utilities for sampling and testing equipment.

(f) Unless otherwise specified in the applicable subpart, each performance test shall consist of three separate runs using the applicable test method. Each run shall be conducted for the time and under the conditions specified in the applicable standard. For the purpose of determining compliance with an applicable standard, the arithmetic means of results of the three runs shall apply. In the event that a sample is accidentally lost or conditions occur in which one of the three runs must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sample train, extreme meteorological conditions, or other circumstances, beyond the owner or operator's control, compliance may, upon the Administrator's approval, be determined using the arithmetic mean of the results of the two other runs.

(g) The performance testing shall include a test method performance audit (PA) during the performance test. The PAs consist of blind audit samples supplied by an accredited audit sample provider and analyzed during the performance test in order to provide a measure of test data bias. Gaseous audit samples are designed to audit the performance of the sampling system as well as the analytical system and must be collected by the sampling system during the compliance test just as the compliance samples are collected. If a liquid or solid audit sample is designed to audit the sampling system, it must also be collected by the sampling system during the compliance test. If multiple sampling systems or sampling trains are used during the compliance test for any of the test methods, the tester is only required to use one of the sampling systems per method to collect the audit sample. The audit sample must be analyzed by the same analyst using the same analytical reagents and analytical system and at the same time as the compliance samples. Retests are required when there is a failure to produce acceptable results for an audit sample. However, if the audit results do not affect the compliance or noncompliance status of the affected facility, the compliance authority may waive the reanalysis requirement, further audits, or retests and accept the results of the compliance test. Acceptance of the test results shall constitute a waiver of the reanalysis requirement, further audits, or retests. The compliance authority may also use the audit sample failure and the compliance test results as evidence to determine the compliance or noncompliance status of the affected facility. A blind audit sample is a sample whose value is known only to the sample provider and is not revealed to the tested facility until after they report the measured value of the audit sample. For pollutants that exist in the gas phase at ambient temperature, the audit sample shall consist of an appropriate concentration of the pollutant in air or nitrogen that can be introduced into the sampling system of the test method at or near the same entry point as a sample from the emission source. If no gas phase audit samples are available, an acceptable alternative is a sample of the pollutant in the same matrix that would be produced when the sample is recovered from the sampling system as required by the test method. For samples that exist only in a liquid or solid form at ambient temperature, the audit sample shall consist of an appropriate concentration of the pollutant in the same matrix that would be produced when the sample is recovered from the sampling system as required by the test method. An accredited audit sample provider (AASP) is an organization that has been accredited to prepare audit samples by an independent, third party accrediting body.

(1) The source owner, operator, or representative of the tested facility shall obtain an audit sample, if commercially available, from an AASP for each test method used for regulatory compliance purposes. No audit samples are required for the following test methods: Methods 3C of Appendix A-3 of Part 60, Methods 6C, 7E, 9, and 10 of Appendix A-4 of Part 60, Method 18 of Appendix A-6 of Part 60, Methods 20, 22, and 25A of Appendix A-7 of Part 60, and Methods 303, 318, 320, and 321 of Appendix A of Part 63. If multiple sources at a single facility are tested during a compliance test event, only one audit sample is required for each method used during a compliance test. The compliance authority responsible for the compliance test may waive the requirement to include an audit sample if they believe that an audit sample is not necessary. "Commercially available" means that two or more independent AASPs have blind audit samples available for purchase. If the source owner, operator, or representative cannot find an audit sample for a specific method, the owner, operator, or representative shall consult the EPA Web site at the following URL, <http://www.epa.gov/ttn/emc>, to confirm whether there is a source that can supply an audit sample for that method. If the EPA Web site does not list an available audit sample at least 60 days prior to the beginning of the compliance test, the source owner, operator, or representative shall not be required to include an audit sample as part of the quality assurance program for the compliance test. When ordering an audit sample, the source, operator, or representative shall give the sample provider an estimate for the concentration of each pollutant that is emitted by the source or the estimated concentration of each pollutant based on the permitted level and the name, address, and phone number of the compliance authority. The source owner, operator, or representative shall report the results for the audit sample along with a summary of the emission test results for the audited pollutant to the compliance authority and shall report the results of the audit sample to the AASP. The source owner, operator, or representative shall make both reports at the same time and in the same

manner or shall report to the compliance authority first and then report to the AASP. If the method being audited is a method that allows the samples to be analyzed in the field and the tester plans to analyze the samples in the field, the tester may analyze the audit samples prior to collecting the emission samples provided a representative of the compliance authority is present at the testing site. The tester may request and the compliance authority may grant a waiver to the requirement that a representative of the compliance authority must be present at the testing site during the field analysis of an audit sample. The source owner, operator, or representative may report the results of the audit sample to the compliance authority and report the results of the audit sample to the AASP prior to collecting any emission samples. The test protocol and final test report shall document whether an audit sample was ordered and utilized and the pass/fail results as applicable.

(2) An AASP shall have and shall prepare, analyze, and report the true value of audit samples in accordance with a written technical criteria document that describes how audit samples will be prepared and distributed in a manner that will ensure the integrity of the audit sample program. An acceptable technical criteria document shall contain standard operating procedures for all of the following operations:

(i) Preparing the sample;

(ii) Confirming the true concentration of the sample;

(iii) Defining the acceptance limits for the results from a well qualified tester. This procedure must use well established statistical methods to analyze historical results from well qualified testers. The acceptance limits shall be set so that there is 95 percent confidence that 90 percent of well qualified labs will produce future results that are within the acceptance limit range.

(iv) Providing the opportunity for the compliance authority to comment on the selected concentration level for an audit sample;

(v) Distributing the sample to the user in a manner that guarantees that the true value of the sample is unknown to the user;

(vi) Recording the measured concentration reported by the user and determining if the measured value is within acceptable limits;

(vii) The AASP shall report the results from each audit sample in a timely manner to the compliance authority and then to the source owner, operator, or representative. The AASP shall make both reports at the same time and in the same manner or shall report to the compliance authority first and then report to the source owner, operator, or representative. The results shall include the name of the facility tested, the date on which the compliance test was conducted, the name of the company performing the sample collection, the name of the company that analyzed the compliance samples including the audit sample, the measured result for the audit sample, and whether the testing company passed or failed the audit. The AASP shall report the true value of the audit sample to the compliance authority. The AASP may report the true value to the source owner, operator, or representative if the AASP's operating plan ensures that no laboratory will receive the same audit sample twice.

(viii) Evaluating the acceptance limits of samples at least once every two years to determine in cooperation with the voluntary consensus standard body if they should be changed;

(ix) Maintaining a database, accessible to the compliance authorities, of results from the audit that shall include the name of the facility tested, the date on which the compliance test was conducted, the name of the company performing the sample collection, the name of the company that analyzed the compliance samples including the audit sample, the measured result for the audit sample, the true value of the audit sample, the acceptance range for the measured value, and whether the testing company passed or failed the audit.

(3) The accrediting body shall have a written technical criteria document that describes how it will ensure that the AASP is operating in accordance with the AASP technical criteria document that describes how audit samples are to be prepared and distributed. This document shall contain standard operating procedures for all of the following operations:

(i) Checking audit samples to confirm their true value as reported by the AASP;

(ii) Performing technical systems audits of the AASP's facilities and operating procedures at least once every two years;

(iii) Providing standards for use by the voluntary consensus standard body to approve the accrediting body that will accredit the audit sample providers.

(4) The technical criteria documents for the accredited sample providers and the accrediting body shall be developed through a public process guided by a voluntary consensus standards body (VCSB). The VCSB shall operate in accordance with the procedures and requirements in the Office of Management

and Budget Circular A-119. A copy of Circular A-119 is available upon request by writing the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th Street, NW., Washington, DC 20503, by calling (202) 395-6880 or downloading online at [http://standards.gov/standards\\_gov/a119.cfm](http://standards.gov/standards_gov/a119.cfm). The VCSB shall approve all accrediting bodies. The Administrator will review all technical criteria documents. If the technical criteria documents do not meet the minimum technical requirements in paragraphs (g)(2) through (4) of this section, the technical criteria documents are not acceptable and the proposed audit sample program is not capable of producing audit samples of sufficient quality to be used in a compliance test. All acceptable technical criteria documents shall be posted on the EPA Web site at the following URL, <http://www.epa.gov/ttn/emc>.

[36 FR 24877, Dec. 23, 1971, as amended at 39 FR 9314, Mar. 8, 1974; 42 FR 57126, Nov. 1, 1977; 44 FR 33612, June 11, 1979; 54 FR 6662, Feb. 14, 1989; 54 FR 21344, May 17, 1989; 64 FR 7463, Feb. 12, 1999; 72 FR 27442, May 16, 2007; 75 FR 55646, Sept. 13, 2010]

### § 60.9 Availability of information.

The availability to the public of information provided to, or otherwise obtained by, the Administrator under this part shall be governed by part 2 of this chapter. (Information submitted voluntarily to the Administrator for the purposes of §§60.5 and 60.6 is governed by §§2.201 through 2.213 of this chapter and not by §2.301 of this chapter.)

### § 60.10 State authority.

The provisions of this part shall not be construed in any manner to preclude any State or political subdivision thereof from:

(a) Adopting and enforcing any emission standard or limitation applicable to an affected facility, provided that such emission standard or limitation is not less stringent than the standard applicable to such facility.

(b) Requiring the owner or operator of an affected facility to obtain permits, licenses, or approvals prior to initiating construction, modification, or operation of such facility.

### § 60.11 Compliance with standards and maintenance requirements.

(a) Compliance with standards in this part, other than opacity standards, shall be determined in accordance with performance tests established by §60.8, unless otherwise specified in the applicable standard.

(b) Compliance with opacity standards in this part shall be determined by conducting observations in accordance with Method 9 in appendix A of this part, any alternative method that is approved by the Administrator, or as provided in paragraph (e)(5) of this section. For purposes of determining initial compliance, the minimum total time of observations shall be 3 hours (30 6-minute averages) for the performance test or other set of observations (meaning those fugitive-type emission sources subject only to an opacity standard).

(c) The opacity standards set forth in this part shall apply at all times except during periods of startup, shutdown, malfunction, and as otherwise provided in the applicable standard.

(d) At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Administrator which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source.

(e)(1) For the purpose of demonstrating initial compliance, opacity observations shall be conducted concurrently with the initial performance test required in §60.8 unless one of the following conditions apply. If no performance test under §60.8 is required, then opacity observations shall be conducted within 60 days after achieving the maximum production rate at which the affected facility will be operated but no later than 180 days after initial startup of the facility. If visibility or other conditions prevent the opacity observations from being conducted concurrently with the initial performance test required under §60.8, the source owner or operator shall reschedule the opacity observations as soon after the initial performance test as possible, but not later than 30 days thereafter, and shall advise the Administrator of the rescheduled date. In these cases, the 30-day prior notification to the Administrator required in §60.7 (a)(6) shall be waived. The rescheduled opacity observations shall be conducted (to the extent possible) under the same operating conditions that existed during the initial performance test conducted under §60.8. The visible emissions observer shall determine whether visibility or other conditions prevent the opacity observations from being made concurrently with the initial performance test in accordance with procedures contained in Method 9 of appendix B of this part. Opacity readings of portions of plumes which contain condensed, uncombined water vapor shall not be used for purposes of determining compliance with opacity standards. The owner or operator of an affected facility shall make available,

upon request by the Administrator, such records as may be necessary to determine the conditions under which the visual observations were made and shall provide evidence indicating proof of current visible observer emission certification. Except as provided in paragraph (e)(5) of this section, the results of continuous monitoring by transmissometer which indicate that the opacity at the time visual observations were made was not in excess of the standard are probative but not conclusive evidence of the actual opacity of an emission, provided that the source shall meet the burden of proving that the instrument used meets (at the time of the alleged violation) Performance Specification 1 in appendix B of this part, has been properly maintained and (at the time of the alleged violation) that the resulting data have not been altered in any way.

(2) Except as provided in paragraph (e)(3) of this section, the owner or operator of an affected facility to which an opacity standard in this part applies shall conduct opacity observations in accordance with paragraph (b) of this section, shall record the opacity of emissions, and shall report to the Administrator the opacity results along with the results of the initial performance test required under §60.8. The inability of an owner or operator to secure a visible emissions observer shall not be considered a reason for not conducting the opacity observations concurrent with the initial performance test.

(3) The owner or operator of an affected facility to which an opacity standard in this part applies may request the Administrator to determine and to record the opacity of emissions from the affected facility during the initial performance test and at such times as may be required. The owner or operator of the affected facility shall report the opacity results. Any request to the Administrator to determine and to record the opacity of emissions from an affected facility shall be included in the notification required in §60.7(a)(6). If, for some reason, the Administrator cannot determine and record the opacity of emissions from the affected facility during the performance test, then the provisions of paragraph (e)(1) of this section shall apply.

(4) An owner or operator of an affected facility using a continuous opacity monitor (transmissometer) shall record the monitoring data produced during the initial performance test required by §60.8 and shall furnish the Administrator a written report of the monitoring results along with Method 9 and §60.8 performance test results.

(5) An owner or operator of an affected facility subject to an opacity standard may submit, for compliance purposes, continuous opacity monitoring system (COMS) data results produced during any performance test required under §60.8 in lieu of Method 9 observation data. If an owner or operator elects to submit COMS data for compliance with the opacity standard, he shall notify the Administrator of that decision, in writing, at least 30 days before any performance test required under §60.8 is conducted. Once the owner or operator of an affected facility has notified the Administrator to that effect, the COMS data results will be used to determine opacity compliance during subsequent tests required under §60.8 until the owner or operator notifies the Administrator, in writing, to the contrary. For the purpose of determining compliance with the opacity standard during a performance test required under §60.8 using COMS data, the minimum total time of COMS data collection shall be averages of all 6-minute continuous periods within the duration of the mass emission performance test. Results of the COMS opacity determinations shall be submitted along with the results of the performance test required under §60.8. The owner or operator of an affected facility using a COMS for compliance purposes is responsible for demonstrating that the COMS meets the requirements specified in §60.13(c) of this part, that the COMS has been properly maintained and operated, and that the resulting data have not been altered in any way. If COMS data results are submitted for compliance with the opacity standard for a period of time during which Method 9 data indicates noncompliance, the Method 9 data will be used to determine compliance with the opacity standard.

(6) Upon receipt from an owner or operator of the written reports of the results of the performance tests required by §60.8, the opacity observation results and observer certification required by §60.11(e)(1), and the COMS results, if applicable, the Administrator will make a finding concerning compliance with opacity and other applicable standards. If COMS data results are used to comply with an opacity standard, only those results are required to be submitted along with the performance test results required by §60.8. If the Administrator finds that an affected facility is in compliance with all applicable standards for which performance tests are conducted in accordance with §60.8 of this part but during the time such performance tests are being conducted fails to meet any applicable opacity standard, he shall notify the owner or operator and advise him that he may petition the Administrator within 10 days of receipt of notification to make appropriate adjustment to the opacity standard for the affected facility.

(7) The Administrator will grant such a petition upon a demonstration by the owner or operator that the affected facility and associated air pollution control equipment was operated and maintained in a manner to minimize the opacity of emissions during the performance tests; that the performance tests were performed under the conditions established by the Administrator; and that the affected facility and associated air pollution control equipment were incapable of being adjusted or operated to meet the applicable opacity standard.

(8) The Administrator will establish an opacity standard for the affected facility meeting the above requirements at a level at which the source will be able, as indicated by the performance and opacity tests, to meet the opacity standard at all times during which the source is meeting the mass or concentration emission standard. The Administrator will promulgate the new opacity standard in the Federal Register.

(f) Special provisions set forth under an applicable subpart shall supersede any conflicting provisions in

paragraphs (a) through (e) of this section.

(g) For the purpose of submitting compliance certifications or establishing whether or not a person has violated or is in violation of any standard in this part, nothing in this part shall preclude the use, including the exclusive use, of any credible evidence or information, relevant to whether a source would have been in compliance with applicable requirements if the appropriate performance or compliance test or procedure had been performed.

[38 FR 28565, Oct. 15, 1973, as amended at 39 FR 39873, Nov. 12, 1974; 43 FR 8800, Mar. 3, 1978; 45 FR 23379, Apr. 4, 1980; 48 FR 48335, Oct. 18, 1983; 50 FR 53113, Dec. 27, 1985; 51 FR 1790, Jan. 15, 1986; 52 FR 9781, Mar. 26, 1987; 62 FR 8328, Feb. 24, 1997; 65 FR 61749, Oct. 17, 2000]

#### **§ 60.12 Circumvention.**

No owner or operator subject to the provisions of this part shall build, erect, install, or use any article, machine, equipment or process, the use of which conceals an emission which would otherwise constitute a violation of an applicable standard. Such concealment includes, but is not limited to, the use of gaseous diluents to achieve compliance with an opacity standard or with a standard which is based on the concentration of a pollutant in the gases discharged to the atmosphere.

[39 FR 9314, Mar. 8, 1974]

#### **§ 60.13 Monitoring requirements.**

(a) For the purposes of this section, all continuous monitoring systems required under applicable subparts shall be subject to the provisions of this section upon promulgation of performance specifications for continuous monitoring systems under appendix B to this part and, if the continuous monitoring system is used to demonstrate compliance with emission limits on a continuous basis, appendix F to this part, unless otherwise specified in an applicable subpart or by the Administrator. Appendix F is applicable December 4, 1987.

(b) All continuous monitoring systems and monitoring devices shall be installed and operational prior to conducting performance tests under §60.8. Verification of operational status shall, as a minimum, include completion of the manufacturer's written requirements or recommendations for installation, operation, and calibration of the device.

(c) If the owner or operator of an affected facility elects to submit continuous opacity monitoring system (COMS) data for compliance with the opacity standard as provided under §60.11(e)(5), he shall conduct a performance evaluation of the COMS as specified in Performance Specification 1, appendix B, of this part before the performance test required under §60.8 is conducted. Otherwise, the owner or operator of an affected facility shall conduct a performance evaluation of the COMS or continuous emission monitoring system (CEMS) during any performance test required under §60.8 or within 30 days thereafter in accordance with the applicable performance specification in appendix B of this part. The owner or operator of an affected facility shall conduct COMS or CEMS performance evaluations at such other times as may be required by the Administrator under section 114 of the Act.

(1) The owner or operator of an affected facility using a COMS to determine opacity compliance during any performance test required under §60.8 and as described in §60.11(e)(5) shall furnish the Administrator two or, upon request, more copies of a written report of the results of the COMS performance evaluation described in paragraph (c) of this section at least 10 days before the performance test required under §60.8 is conducted.

(2) Except as provided in paragraph (c)(1) of this section, the owner or operator of an affected facility shall furnish the Administrator within 60 days of completion two or, upon request, more copies of a written report of the results of the performance evaluation.

(d)(1) Owners and operators of a CEMS installed in accordance with the provisions of this part, must 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 of this part. 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.

(e) Except for system breakdowns, repairs, calibration checks, and zero and span adjustments required under paragraph (d) of this section, all continuous monitoring systems shall be in continuous operation and shall meet minimum frequency of operation requirements as follows:

(1) All continuous monitoring systems referenced by paragraph (c) of this section for measuring opacity of emissions shall complete a minimum of one cycle of sampling and analyzing for each successive 10-second period and one cycle of data recording for each successive 6-minute period.

(2) All continuous monitoring systems referenced by paragraph (c) of this section for measuring emissions, except opacity, shall complete a minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive 15-minute period.

(f) All continuous monitoring systems or monitoring devices shall be installed such that representative measurements of emissions or process parameters from the affected facility are obtained. Additional procedures for location of continuous monitoring systems contained in the applicable Performance Specifications of appendix B of this part shall be used.

(g) When the effluents from a single affected facility or two or more affected facilities subject to the same emission standards are combined before being released to the atmosphere, the owner or operator may install applicable continuous monitoring systems on each effluent or on the combined effluent. When the affected facilities are not subject to the same emission standards, separate continuous monitoring systems shall be installed on each effluent. When the effluent from one affected facility is released to the atmosphere through more than one point, the owner or operator shall install an applicable continuous monitoring system on each separate effluent unless the installation of fewer systems is approved by the Administrator. When more than one continuous monitoring system is used to measure the emissions from one affected facility (e.g., multiple breechings, multiple outlets), the owner or operator shall report the results as required from each continuous monitoring system.

(h)(1) Owners or operators of all continuous monitoring systems for measurement of opacity shall reduce all data to 6-minute averages and for continuous monitoring systems other than opacity to 1-hour averages for time periods as defined in §60.2. Six-minute opacity averages shall be calculated from 36 or more data points equally spaced over each 6-minute period.

(2) For continuous monitoring systems other than opacity, 1-hour averages shall be computed as follows, except that the provisions pertaining to the validation of partial operating hours are only applicable for affected facilities that are required by the applicable subpart to include partial hours in the emission calculations:

(i) Except as provided under paragraph (h)(2)(iii) of this section, for a full operating hour (any clock hour with 60 minutes of unit operation), at least four valid data points are required to calculate the hourly average, *i.e.*, one data point in each of the 15-minute quadrants of the hour.

(ii) Except as provided under paragraph (h)(2)(iii) of this section, for a partial operating hour (any clock hour with less than 60 minutes of unit operation), at least one valid data point in each 15-minute quadrant of the hour in which the unit operates is required to calculate the hourly average.

(iii) For any operating hour in which required maintenance or quality-assurance activities are performed:

(A) If the unit operates in two or more quadrants of the hour, a minimum of two valid data points, separated by at least 15 minutes, is required to calculate the hourly average; or

(B) If the unit operates in only one quadrant of the hour, at least one valid data point is required to calculate the hourly average.

(iv) If a daily calibration error check is failed during any operating hour, all data for that hour shall be invalidated, unless a subsequent calibration error test is passed in the same hour and the requirements of paragraph (h)(2)(iii) of this section are met, based solely on valid data recorded after the successful calibration.

(v) For each full or partial operating hour, all valid data points shall be used to calculate the hourly average.

(vi) Except as provided under paragraph (h)(2)(vii) of this section, data recorded during periods of continuous monitoring system breakdown, repair, calibration checks, and zero and span adjustments shall not be included in the data averages computed under this paragraph.

(vii) Owners and operators complying with the requirements of §60.7(f)(1) or (2) must include any data

recorded during periods of monitor breakdown or malfunction in the data averages.

(viii) When specified in an applicable subpart, hourly averages for certain partial operating hours shall not be computed or included in the emission averages ( e.g. hours with < 30 minutes of unit operation under §60.47b(d)).

(ix) Either arithmetic or integrated averaging of all data may be used to calculate the hourly averages. The data may be recorded in reduced or nonreduced form ( e.g. , ppm pollutant and percent O<sub>2</sub> or ng/J of pollutant).

(3) All excess emissions shall be converted into units of the standard using the applicable conversion procedures specified in the applicable subpart. After conversion into units of the standard, the data may be rounded to the same number of significant digits used in the applicable subpart to specify the emission limit.

(i) After receipt and consideration of written application, the Administrator may approve alternatives to any monitoring procedures or requirements of this part including, but not limited to the following:

(1) Alternative monitoring requirements when installation of a continuous monitoring system or monitoring device specified by this part would not provide accurate measurements due to liquid water or other interferences caused by substances in the effluent gases.

(2) Alternative monitoring requirements when the affected facility is infrequently operated.

(3) Alternative monitoring requirements to accommodate continuous monitoring systems that require additional measurements to correct for stack moisture conditions.

(4) Alternative locations for installing continuous monitoring systems or monitoring devices when the owner or operator can demonstrate that installation at alternate locations will enable accurate and representative measurements.

(5) Alternative methods of converting pollutant concentration measurements to units of the standards.

(6) Alternative procedures for performing daily checks of zero and span drift that do not involve use of span gases or test cells.

(7) Alternatives to the A.S.T.M. test methods or sampling procedures specified by any subpart.

(8) Alternative continuous monitoring systems that do not meet the design or performance requirements in Performance Specification 1, appendix B, but adequately demonstrate a definite and consistent relationship between its measurements and the measurements of opacity by a system complying with the requirements in Performance Specification 1. The Administrator may require that such demonstration be performed for each affected facility.

(9) Alternative monitoring requirements when the effluent from a single affected facility or the combined effluent from two or more affected facilities is released to the atmosphere through more than one point.

(j) An alternative to the relative accuracy (RA) test specified in Performance Specification 2 of appendix B may be requested as follows:

(1) An alternative to the reference method tests for determining RA is available for sources with emission rates demonstrated to be less than 50 percent of the applicable standard. A source owner or operator may petition the Administrator to waive the RA test in Section 8.4 of Performance Specification 2 and substitute the procedures in Section 16.0 if the results of a performance test conducted according to the requirements in §60.8 of this subpart or other tests performed following the criteria in §60.8 demonstrate that the emission rate of the pollutant of interest in the units of the applicable standard is less than 50 percent of the applicable standard. For sources subject to standards expressed as control efficiency levels, a source owner or operator may petition the Administrator to waive the RA test and substitute the procedures in Section 16.0 of Performance Specification 2 if the control device exhaust emission rate is less than 50 percent of the level needed to meet the control efficiency requirement. The alternative procedures do not apply if the continuous emission monitoring system is used to determine compliance continuously with the applicable standard. The petition to waive the RA test shall include a detailed description of the procedures to be applied. Included shall be location and procedure for conducting the alternative, the concentration or response levels of the alternative RA materials, and the other equipment checks included in the alternative procedure. The Administrator will review the petition for completeness and applicability. The determination to grant a waiver will depend on the intended use of the CEMS data (e.g., data collection purposes other than NSPS) and may require specifications more stringent than in Performance Specification 2 (e.g., the applicable emission limit is more stringent than NSPS).

(2) The waiver of a CEMS RA test will be reviewed and may be rescinded at such time, following

successful completion of the alternative RA procedure, that the CEMS data indicate that the source emissions are approaching the level. The criterion for reviewing the waiver is the collection of CEMS data showing that emissions have exceeded 70 percent of the applicable standard for seven, consecutive, averaging periods as specified by the applicable regulation(s). For sources subject to standards expressed as control efficiency levels, the criterion for reviewing the waiver is the collection of CEMS data showing that exhaust emissions have exceeded 70 percent of the level needed to meet the control efficiency requirement for seven, consecutive, averaging periods as specified by the applicable regulation(s) [e.g., §60.45(g) (2) and (3), §60.73(e), and §60.84(e)]. It is the responsibility of the source operator to maintain records and determine the level of emissions relative to the criterion on the waiver of RA testing. If this criterion is exceeded, the owner or operator must notify the Administrator within 10 days of such occurrence and include a description of the nature and cause of the increasing emissions. The Administrator will review the notification and may rescind the waiver and require the owner or operator to conduct a RA test of the CEMS as specified in Section 8.4 of Performance Specification 2.

[40 FR 46255, Oct. 6, 1975; 40 FR 59205, Dec. 22, 1975, as amended at 41 FR 35185, Aug. 20, 1976; 48 FR 13326, Mar. 30, 1983; 48 FR 23610, May 25, 1983; 48 FR 32986, July 20, 1983; 52 FR 9782, Mar. 26, 1987; 52 FR 17555, May 11, 1987; 52 FR 21007, June 4, 1987; 64 FR 7463, Feb. 12, 1999; 65 FR 48920, Aug. 10, 2000; 65 FR 61749, Oct. 17, 2000; 66 FR 44980, Aug. 27, 2001; 71 FR 31102, June 1, 2006; 72 FR 32714, June 13, 2007]

**Editorial Note:** At 65 FR 61749, Oct. 17, 2000, §60.13 was amended by revising the words “ng/J of pollutant” to read “ng of pollutant per J of heat input” in the sixth sentence of paragraph (h). However, the amendment could not be incorporated because the words “ng/J of pollutant” do not exist in the sixth sentence of paragraph (h).

#### § 60.14 Modification.

(a) Except as provided under paragraphs (e) and (f) of this section, any physical or operational change to an existing facility which results in an increase in the emission rate to the atmosphere of any pollutant to which a standard applies shall be considered a modification within the meaning of section 111 of the Act. Upon modification, an existing facility shall become an affected facility for each pollutant to which a standard applies and for which there is an increase in the emission rate to the atmosphere.

(b) Emission rate shall be expressed as kg/hr of any pollutant discharged into the atmosphere for which a standard is applicable. The Administrator shall use the following to determine emission rate:

(1) Emission factors as specified in the latest issue of “Compilation of Air Pollutant Emission Factors,” EPA Publication No. AP-42, or other emission factors determined by the Administrator to be superior to AP-42 emission factors, in cases where utilization of emission factors demonstrates that the emission level resulting from the physical or operational change will either clearly increase or clearly not increase.

(2) Material balances, continuous monitor data, or manual emission tests in cases where utilization of emission factors as referenced in paragraph (b)(1) of this section does not demonstrate to the Administrator's satisfaction whether the emission level resulting from the physical or operational change will either clearly increase or clearly not increase, or where an owner or operator demonstrates to the Administrator's satisfaction that there are reasonable grounds to dispute the result obtained by the Administrator utilizing emission factors as referenced in paragraph (b)(1) of this section. When the emission rate is based on results from manual emission tests or continuous monitoring systems, the procedures specified in appendix C of this part shall be used to determine whether an increase in emission rate has occurred. Tests shall be conducted under such conditions as the Administrator shall specify to the owner or operator based on representative performance of the facility. At least three valid test runs must be conducted before and at least three after the physical or operational change. All operating parameters which may affect emissions must be held constant to the maximum feasible degree for all test runs.

(c) The addition of an affected facility to a stationary source as an expansion to that source or as a replacement for an existing facility shall not by itself bring within the applicability of this part any other facility within that source.

(d) [Reserved]

(e) The following shall not, by themselves, be considered modifications under this part:

(1) Maintenance, repair, and replacement which the Administrator determines to be routine for a source category, subject to the provisions of paragraph (c) of this section and §60.15.

(2) An increase in production rate of an existing facility, if that increase can be accomplished without a capital expenditure on that facility.

(3) An increase in the hours of operation.

(4) Use of an alternative fuel or raw material if, prior to the date any standard under this part becomes

applicable to that source type, as provided by §60.1, the existing facility was designed to accommodate that alternative use. A facility shall be considered to be designed to accommodate an alternative fuel or raw material if that use could be accomplished under the facility's construction specifications as amended prior to the change. Conversion to coal required for energy considerations, as specified in section 111(a)(8) of the Act, shall not be considered a modification.

(5) The addition or use of any system or device whose primary function is the reduction of air pollutants, except when an emission control system is removed or is replaced by a system which the Administrator determines to be less environmentally beneficial.

(6) The relocation or change in ownership of an existing facility.

(f) Special provisions set forth under an applicable subpart of this part shall supersede any conflicting provisions of this section.

(g) Within 180 days of the completion of any physical or operational change subject to the control measures specified in paragraph (a) of this section, compliance with all applicable standards must be achieved.

(h) No physical change, or change in the method of operation, at an existing electric utility steam generating unit shall be treated as a modification for the purposes of this section provided that such change does not increase the maximum hourly emissions of any pollutant regulated under this section above the maximum hourly emissions achievable at that unit during the 5 years prior to the change.

(i) Repowering projects that are awarded funding from the Department of Energy as permanent clean coal technology demonstration projects (or similar projects funded by EPA) are exempt from the requirements of this section provided that such change does not increase the maximum hourly emissions of any pollutant regulated under this section above the maximum hourly emissions achievable at that unit during the five years prior to the change.

(j)(1) Repowering projects that qualify for an extension under section 409(b) of the Clean Air Act are exempt from the requirements of this section, provided that such change does not increase the actual hourly emissions of any pollutant regulated under this section above the actual hourly emissions achievable at that unit during the 5 years prior to the change.

(2) This exemption shall not apply to any new unit that:

(i) Is designated as a replacement for an existing unit;

(ii) Qualifies under section 409(b) of the Clean Air Act for an extension of an emission limitation compliance date under section 405 of the Clean Air Act; and

(iii) Is located at a different site than the existing unit.

(k) The installation, operation, cessation, or removal of a temporary clean coal technology demonstration project is exempt from the requirements of this section. A *temporary clean coal control technology demonstration project*, for the purposes of this section is a clean coal technology demonstration project that is operated for a period of 5 years or less, and which complies with the State implementation plan for the State in which the project is located and other requirements necessary to attain and maintain the national ambient air quality standards during the project and after it is terminated.

(l) The reactivation of a very clean coal-fired electric utility steam generating unit is exempt from the requirements of this section.

[40 FR 58419, Dec. 16, 1975, as amended at 43 FR 34347, Aug. 3, 1978; 45 FR 5617, Jan. 23, 1980; 57 FR 32339, July 21, 1992; 65 FR 61750, Oct. 17, 2000]

### § 60.15 Reconstruction.

(a) An existing facility, upon reconstruction, becomes an affected facility, irrespective of any change in emission rate.

(b) "Reconstruction" means the replacement of components of an existing facility to such an extent that:

(1) The fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility, and

(2) It is technologically and economically feasible to meet the applicable standards set forth in this part.

(c) "Fixed capital cost" means the capital needed to provide all the depreciable components.

(d) If an owner or operator of an existing facility proposes to replace components, and the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility, he shall notify the Administrator of the proposed replacements. The notice must be postmarked 60 days (or as soon as practicable) before construction of the replacements is commenced and must include the following information:

- (1) Name and address of the owner or operator.
  - (2) The location of the existing facility.
  - (3) A brief description of the existing facility and the components which are to be replaced.
  - (4) A description of the existing air pollution control equipment and the proposed air pollution control equipment.
  - (5) An estimate of the fixed capital cost of the replacements and of constructing a comparable entirely new facility.
  - (6) The estimated life of the existing facility after the replacements.
  - (7) A discussion of any economic or technical limitations the facility may have in complying with the applicable standards of performance after the proposed replacements.
- (e) The Administrator will determine, within 30 days of the receipt of the notice required by paragraph (d) of this section and any additional information he may reasonably require, whether the proposed replacement constitutes reconstruction.
- (f) The Administrator's determination under paragraph (e) shall be based on:

- (1) The fixed capital cost of the replacements in comparison to the fixed capital cost that would be required to construct a comparable entirely new facility;
  - (2) The estimated life of the facility after the replacements compared to the life of a comparable entirely new facility;
  - (3) The extent to which the components being replaced cause or contribute to the emissions from the facility; and
  - (4) Any economic or technical limitations on compliance with applicable standards of performance which are inherent in the proposed replacements.
- (g) Individual subparts of this part may include specific provisions which refine and delimit the concept of reconstruction set forth in this section.

[40 FR 58420, Dec. 16, 1975]

#### § 60.16 Priority list.

##### Prioritized Major Source Categories

<b>Priority Number</b> <sup>1</sup>	<b>Source Category</b>
1.	Synthetic Organic Chemical Manufacturing Industry (SOCMI) and Volatile Organic Liquid Storage Vessels and Handling Equipment
	(a) SOCMI unit processes
	(b) Volatile organic liquid (VOL) storage vessels and handling equipment
	(c) SOCMI fugitive sources
	(d) SOCMI secondary sources
2.	Industrial Surface Coating: Cans
3.	Petroleum Refineries: Fugitive Sources
4.	Industrial Surface Coating: Paper

5.	Dry Cleaning
	(a) Perchloroethylene
	(b) Petroleum solvent
6.	Graphic Arts
7.	Polymers and Resins: Acrylic Resins
8.	Mineral Wool (Deleted)
9.	Stationary Internal Combustion Engines
10.	Industrial Surface Coating: Fabric
11.	Industrial-Commercial-Institutional Steam Generating Units.
12.	Incineration: Non-Municipal (Deleted)
13.	Non-Metallic Mineral Processing
14.	Metallic Mineral Processing
15.	Secondary Copper (Deleted)
16.	Phosphate Rock Preparation
17.	Foundries: Steel and Gray Iron
18.	Polymers and Resins: Polyethylene
19.	Charcoal Production
20.	Synthetic Rubber
	(a) Tire manufacture
	(b) SBR production
21.	Vegetable Oil
22.	Industrial Surface Coating: Metal Coil
23.	Petroleum Transportation and Marketing
24.	By-Product Coke Ovens
25.	Synthetic Fibers
26.	Plywood Manufacture
27.	Industrial Surface Coating: Automobiles
28.	Industrial Surface Coating: Large Appliances
29.	Crude Oil and Natural Gas Production
30.	Secondary Aluminum
31.	Potash (Deleted)
32.	Lightweight Aggregate Industry: Clay, Shale, and Slate <sup>2</sup>
33.	Glass
34.	Gypsum
35.	Sodium Carbonate
36.	Secondary Zinc (Deleted)
37.	Polymers and Resins: Phenolic
38.	Polymers and Resins: Urea-Melamine
39.	Ammonia (Deleted)
40.	Polymers and Resins: Polystyrene
41.	Polymers and Resins: ABS-SAN Resins
42.	Fiberglass
43.	Polymers and Resins: Polypropylene
44.	Textile Processing
45.	Asphalt Processing and Asphalt Roofing Manufacture
46.	Brick and Related Clay Products
47.	Ceramic Clay Manufacturing (Deleted)

48.	Ammonium Nitrate Fertilizer
49.	Castable Refractories (Deleted)
50.	Borax and Boric Acid (Deleted)
51.	Polymers and Resins: Polyester Resins
52.	Ammonium Sulfate
53.	Starch
54.	Perlite
55.	Phosphoric Acid: Thermal Process (Deleted)
56.	Uranium Refining
57.	Animal Feed Defluorination (Deleted)
58.	Urea (for fertilizer and polymers)
59.	Detergent (Deleted)
<i>Other Source Categories</i>	
Lead acid battery manufacture <sup>3</sup>	
Organic solvent cleaning <sup>3</sup>	
Industrial surface coating: metal furniture <sup>3</sup>	
Stationary gas turbines <sup>4</sup>	
Municipal solid waste landfills <sup>4</sup>	

<sup>1</sup>Low numbers have highest priority, e.g., No. 1 is high priority, No. 59 is low priority.

<sup>2</sup>Formerly titled "Sintering: Clay and Fly Ash".

<sup>3</sup>Minor source category, but included on list since an NSPS is being developed for that source category.

<sup>4</sup>Not prioritized, since an NSPS for this major source category has already been promulgated.

[47 FR 951, Jan. 8, 1982, as amended at 47 FR 31876, July 23, 1982; 51 FR 42796, Nov. 25, 1986; 52 FR 11428, Apr. 8, 1987; 61 FR 9919, Mar. 12, 1996]

### § 60.17 Incorporations by reference.

[Link to an amendment published at 76 FR 2835, Jan. 18, 2011.](#)

The materials listed below are incorporated by reference in the corresponding sections noted. These incorporations by reference were approved by the Director of the Federal Register on the date listed. These materials are incorporated as they exist on the date of the approval, and a notice of any change in these materials will be published in the Federal Register. The materials are available for purchase at the corresponding address noted below, and all are available for inspection at the Library (C267-01), U.S. EPA, Research Triangle Park, NC or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: [http://www.archives.gov/federal\\_register/code\\_of\\_federal\\_regulations/ibr\\_locations.html](http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html).

(a) The following materials are available for purchase from at least one of the following addresses: American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, Post Office Box C700, West Conshohocken, PA 19428-2959; or ProQuest, 300 North Zeeb Road, Ann Arbor, MI 48106.

(1) ASTM A99-76, 82 (Reapproved 1987), Standard Specification for Ferromanganese, incorporation by reference (IBR) approved for §60.261.

(2) ASTM A100-69, 74, 93, Standard Specification for Ferrosilicon, IBR approved for §60.261.

(3) ASTM A101-73, 93, Standard Specification for Ferrochromium, IBR approved for §60.261.

(4) ASTM A482-76, 93, Standard Specification for Ferrochromesilicon, IBR approved for §60.261.

(5) ASTM A483-64, 74 (Reapproved 1988), Standard Specification for Silicomanganese, IBR approved for §60.261.

- (6) ASTM A495–76, 94, Standard Specification for Calcium-Silicon and Calcium Manganese-Silicon, IBR approved for §60.261.
- (7) ASTM D86–78, 82, 90, 93, 95, 96, Distillation of Petroleum Products, IBR approved for §§60.562–2(d), 60.593(d), 60.593a(d), and 60.633(h).
- (8) ASTM D129–64, 78, 95, 00, Standard Test Method for Sulfur in Petroleum Products (General Bomb Method), IBR approved for §§60.106(j)(2), 60.335(b)(10)(i), and appendix A: Method 19, 12.5.2.2.3.
- (9) ASTM D129–00 (Reapproved 2005), Standard Test Method for Sulfur in Petroleum Products (General Bomb Method), IBR approved for §60.4415(a)(1)(i).
- (10) ASTM D240–76, 92, Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter, IBR approved for §§60.46(c), 60.296(b), and appendix A: Method 19, Section 12.5.2.2.3.
- (11) ASTM D270–65, 75, Standard Method of Sampling Petroleum and Petroleum Products, IBR approved for appendix A: Method 19, Section 12.5.2.2.1.
- (12) ASTM D323–82, 94, Test Method for Vapor Pressure of Petroleum Products (Reid Method), IBR approved for §§60.111(l), 60.111a(g), 60.111b(g), and 60.116b(f)(2)(ii).
- (13) ASTM D388–77, 90, 91, 95, 98a, 99 (Reapproved 2004)<sup>ε1</sup>, Standard Specification for Classification of Coals by Rank, IBR approved for §§60.24(h)(8), 60.41 of subpart D of this part, 60.45(f)(4)(i), 60.45(f)(4)(ii), 60.45(f)(4)(vi), 60.41Da of subpart Da of this part, 60.41b of subpart Db of this part, 60.41c of subpart Dc of this part, 60.251 of subpart Y of this part, and 60.4102.
- (14) ASTM D396–78, 89, 90, 92, 96, 98, Standard Specification for Fuel Oils, IBR approved for §§60.41b of subpart Db of this part, 60.41c of subpart Dc of this part, 60.111(b) of subpart K of this part, and 60.111a(b) of subpart Ka of this part.
- (15) ASTM D975–78, 96, 98a, Standard Specification for Diesel Fuel Oils, IBR approved for §§60.111(b) of subpart K of this part and 60.111a(b) of subpart Ka of this part.
- (16) ASTM D975–08a, Standard Specification for Diesel Fuel Oils, IBR approved for §§60.41b of subpart Db of this part and 60.41c of subpart Dc of this part.
- (17) ASTM D1072–80, 90 (Reapproved 1994), Standard Test Method for Total Sulfur in Fuel Gases, IBR approved for §60.335(b)(10)(ii).
- (18) ASTM D1072–90 (Reapproved 1999), Standard Test Method for Total Sulfur in Fuel Gases, IBR approved for §60.4415(a)(1)(ii).
- (19) ASTM D1137–53, 75, Standard Method for Analysis of Natural Gases and Related Types of Gaseous Mixtures by the Mass Spectrometer, IBR approved for §60.45(f)(5)(i).
- (20) ASTM D1193–77, 91, Standard Specification for Reagent Water, IBR approved for appendix A: Method 5, Section 7.1.3; Method 5E, Section 7.2.1; Method 5F, Section 7.2.1; Method 6, Section 7.1.1; Method 7, Section 7.1.1; Method 7C, Section 7.1.1; Method 7D, Section 7.1.1; Method 10A, Section 7.1.1; Method 11, Section 7.1.3; Method 12, Section 7.1.3; Method 13A, Section 7.1.2; Method 26, Section 7.1.2; Method 26A, Section 7.1.2; and Method 29, Section 7.2.2.
- (21) ASTM D1266–87, 91, 98, Standard Test Method for Sulfur in Petroleum Products (Lamp Method), IBR approved for §§60.106(j)(2) and 60.335(b)(10)(i).
- (22) ASTM D1266–98 (Reapproved 2003)<sup>e1</sup>, Standard Test Method for Sulfur in Petroleum Products (Lamp Method), IBR approved for §60.4415(a)(1)(i).
- (23) ASTM D1475–60 (Reapproved 1980), 90, Standard Test Method for Density of Paint, Varnish Lacquer, and Related Products, IBR approved for §60.435(d)(1), appendix A: Method 24, Section 6.1; and Method 24A, Sections 6.5 and 7.1.
- (24) ASTM D1552–83, 95, 01, Standard Test Method for Sulfur in Petroleum Products (High-Temperature Method), IBR approved for §§60.106(j)(2), 60.335(b)(10)(i), and appendix A: Method 19, Section 12.5.2.2.3.
- (25) ASTM D1552–03, Standard Test Method for Sulfur in Petroleum Products (High-Temperature Method), IBR approved for §60.4415(a)(1)(i).
- (26) ASTM D1826–77, 94, Standard Test Method for Calorific Value of Gases in Natural Gas Range by

Continuous Recording Calorimeter, IBR approved for §§60.45(f)(5)(ii), 60.46(c)(2), 60.296(b)(3), and appendix A: Method 19, Section 12.3.2.4.

(27) ASTM D1835–87, 91, 97, 03a, Standard Specification for Liquefied Petroleum (LP) Gases, IBR approved for §§60.41Da of subpart Da of this part, 60.41b of subpart Db of this part, and 60.41c of subpart Dc of this part.

(28) ASTM D1945–64, 76, 91, 96, Standard Method for Analysis of Natural Gas by Gas Chromatography, IBR approved for §60.45(f)(5)(i).

(29) ASTM D1946–77, 90 (Reapproved 1994), Standard Method for Analysis of Reformed Gas by Gas Chromatography, IBR approved for §§60.18(f)(3), 60.45(f)(5)(i), 60.564(f)(1), 60.614(e)(2)(ii), 60.614(e)(4), 60.664(e)(2)(ii), 60.664(e)(4), 60.704(d)(2)(ii), and 60.704(d)(4).

(30) ASTM D2013–72, 86, Standard Method of Preparing Coal Samples for Analysis, IBR approved for appendix A: Method 19, Section 12.5.2.1.3.

(31) ASTM D2015–77 (Reapproved 1978), 96, Standard Test Method for Gross Calorific Value of Solid Fuel by the Adiabatic Bomb Calorimeter, IBR approved for §60.45(f)(5)(ii), 60.46(c)(2), and appendix A: Method 19, Section 12.5.2.1.3.

(32) ASTM D2016–74, 83, Standard Test Methods for Moisture Content of Wood, IBR approved for appendix A: Method 28, Section 16.1.1.

(33) ASTM D2234–76, 96, 97b, 98, Standard Methods for Collection of a Gross Sample of Coal, IBR approved for appendix A: Method 19, Section 12.5.2.1.1.

(34) ASTM D2369–81, 87, 90, 92, 93, 95, Standard Test Method for Volatile Content of Coatings, IBR approved for appendix A: Method 24, Section 6.2.

(35) ASTM D2382–76, 88, Heat of Combustion of Hydrocarbon Fuels by Bomb Calorimeter (High-Precision Method), IBR approved for §§60.18(f)(3), 60.485(g)(6), 60.485a(g)(6), 60.564(f)(3), 60.614(e)(4), 60.664(e)(4), and 60.704(d)(4).

(36) ASTM D2504–67, 77, 88 (Reapproved 1993), Noncondensable Gases in C3 and Lighter Hydrocarbon Products by Gas Chromatography, IBR approved for §§60.485(g)(5) and 60.485a(g)(5).

(37) ASTM D2584–68 (Reapproved 1985), 94, Standard Test Method for Ignition Loss of Cured Reinforced Resins, IBR approved for §60.685(c)(3)(i).

(38) ASTM D2597–94 (Reapproved 1999), Standard Test Method for Analysis of Demethanized Hydrocarbon Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Gas Chromatography, IBR approved for §60.335(b)(9)(i).

(39) ASTM D2622–87, 94, 98, Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-Ray Fluorescence Spectrometry, IBR approved for §§60.106(j)(2) and 60.335(b)(10)(i).

(40) ASTM D2622–05, Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-Ray Fluorescence Spectrometry, IBR approved for §60.4415(a)(1)(i).

(41) ASTM D2879–83, 96, 97, Test Method for Vapor Pressure-Temperature Relationship and Initial Decomposition Temperature of Liquids by Isoteniscope, IBR approved for §§60.111b(f)(3), 60.116b(e)(3)(ii), 60.116b(f)(2)(i), 60.485(e)(1), and 60.485a(e)(1).

(42) ASTM D2880–78, 96, Standard Specification for Gas Turbine Fuel Oils, IBR approved for §§60.111(b), 60.111a(b), and 60.335(d).

(43) ASTM D2908–74, 91, Standard Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection Gas Chromatography, IBR approved for §60.564(j).

(44) ASTM D2986–71, 78, 95a, Standard Method for Evaluation of Air, Assay Media by the Monodisperse DOP (Diocetyl Phthalate) Smoke Test, IBR approved for appendix A: Method 5, Section 7.1.1; Method 12, Section 7.1.1; and Method 13A, Section 7.1.1.2.

(45) ASTM D3173–73, 87, Standard Test Method for Moisture in the Analysis Sample of Coal and Coke, IBR approved for appendix A: Method 19, Section 12.5.2.1.3.

(46) ASTM D3176–74, 89, Standard Method for Ultimate Analysis of Coal and Coke, IBR approved for §60.45(f)(5)(i) and appendix A: Method 19, Section 12.3.2.3.

- (47) ASTM D3177–75, 89, Standard Test Method for Total Sulfur in the Analysis Sample of Coal and Coke, IBR approved for appendix A: Method 19, Section 12.5.2.1.3.
- (48) ASTM D3178–73 (Reapproved 1979), 89, Standard Test Methods for Carbon and Hydrogen in the Analysis Sample of Coal and Coke, IBR approved for §60.45(f)(5)(i).
- (49) ASTM D3246–81, 92, 96, Standard Test Method for Sulfur in Petroleum Gas by Oxidative Microcoulometry, IBR approved for §60.335(b)(10)(ii).
- (50) ASTM D3246–05, Standard Test Method for Sulfur in Petroleum Gas by Oxidative Microcoulometry, IBR approved for §60.4415(a)(1)(ii).
- (51) ASTM D3270–73T, 80, 91, 95, Standard Test Methods for Analysis for Fluoride Content of the Atmosphere and Plant Tissues (Semiautomated Method), IBR approved for appendix A: Method 13A, Section 16.1.
- (52) ASTM D3286–85, 96, Standard Test Method for Gross Calorific Value of Coal and Coke by the Isoperibol Bomb Calorimeter, IBR approved for appendix A: Method 19, Section 12.5.2.1.3.
- (53) ASTM D3370–76, 95a, Standard Practices for Sampling Water, IBR approved for §60.564(j).
- (54) ASTM D3792–79, 91, Standard Test Method for Water Content of Water-Reducible Paints by Direct Injection into a Gas Chromatograph, IBR approved for appendix A: Method 24, Section 6.3.
- (55) ASTM D4017–81, 90, 96a, Standard Test Method for Water in Paints and Paint Materials by the Karl Fischer Titration Method, IBR approved for appendix A: Method 24, Section 6.4.
- (56) ASTM D4057–81, 95, Standard Practice for Manual Sampling of Petroleum and Petroleum Products, IBR approved for appendix A: Method 19, Section 12.5.2.2.3.
- (57) ASTM D4057–95 (Reapproved 2000), Standard Practice for Manual Sampling of Petroleum and Petroleum Products, IBR approved for §60.4415(a)(1).
- (58) ASTM D4084–82, 94, Standard Test Method for Analysis of Hydrogen Sulfide in Gaseous Fuels (Lead Acetate Reaction Rate Method), IBR approved for §60.334(h)(1).
- (59) ASTM D4084–05, Standard Test Method for Analysis of Hydrogen Sulfide in Gaseous Fuels (Lead Acetate Reaction Rate Method), IBR approved for §§60.4360 and 60.4415(a)(1)(ii).
- (60) ASTM D4177–95, Standard Practice for Automatic Sampling of Petroleum and Petroleum Products, IBR approved for appendix A: Method 19, Section 12.5.2.2.1.
- (61) ASTM D4177–95 (Reapproved 2000), Standard Practice for Automatic Sampling of Petroleum and Petroleum Products, IBR approved for §60.4415(a)(1).
- (62) ASTM D4239–85, 94, 97, Standard Test Methods for Sulfur in the Analysis Sample of Coal and Coke Using High Temperature Tube Furnace Combustion Methods, IBR approved for appendix A: Method 19, Section 12.5.2.1.3.
- (63) ASTM D4294–02, Standard Test Method for Sulfur in Petroleum and Petroleum Products by Energy-Dispersive X-Ray Fluorescence Spectrometry, IBR approved for §60.335(b)(10)(i).
- (64) ASTM D4294–03, Standard Test Method for Sulfur in Petroleum and Petroleum Products by Energy-Dispersive X-Ray Fluorescence Spectrometry, IBR approved for §60.4415(a)(1)(i).
- (65) ASTM D4442–84, 92, Standard Test Methods for Direct Moisture Content Measurement in Wood and Wood-base Materials, IBR approved for appendix A: Method 28, Section 16.1.1.
- (66) ASTM D4444–92, Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters, IBR approved for appendix A: Method 28, Section 16.1.1.
- (67) ASTM D4457–85 (Reapproved 1991), Test Method for Determination of Dichloromethane and 1, 1, 1-Trichloroethane in Paints and Coatings by Direct Injection into a Gas Chromatograph, IBR approved for appendix A: Method 24, Section 6.5.
- (68) ASTM D4468–85 (Reapproved 2000), Standard Test Method for Total Sulfur in Gaseous Fuels by Hydrogenolysis and Rateometric Colorimetry, IBR approved for §§60.335(b)(10)(ii) and 60.4415(a)(1)(ii).
- (69) ASTM D4629–02, Standard Test Method for Trace Nitrogen in Liquid Petroleum Hydrocarbons by

Syringe/Inlet Oxidative Combustion and Chemiluminescence Detection, IBR approved for §§60.49b(e) and 60.335(b)(9)(i).

(70) ASTM D4809–95, Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method), IBR approved for §§60.18(f)(3), 60.485(g)(6), 60.485a(g)(6), 60.564(f)(3), 60.614(d)(4), 60.664(e)(4), and 60.704(d)(4).

(71) ASTM D4810–88 (Reapproved 1999), Standard Test Method for Hydrogen Sulfide in Natural Gas Using Length of Stain Detector Tubes, IBR approved for §§60.4360 and 60.4415(a)(1)(ii).

(72) ASTM D5287–97 (Reapproved 2002), Standard Practice for Automatic Sampling of Gaseous Fuels, IBR approved for §60.4415(a)(1).

(73) ASTM D5403–93, Standard Test Methods for Volatile Content of Radiation Curable Materials, IBR approved for appendix A: Method 24, Section 6.6.

(74) ASTM D5453–00, Standard Test Method for Determination of Total Sulfur in Light Hydrocarbons, Motor Fuels and Oils by Ultraviolet Fluorescence, IBR approved for §60.335(b)(10)(i).

(75) ASTM D5453–05, Standard Test Method for Determination of Total Sulfur in Light Hydrocarbons, Motor Fuels and Oils by Ultraviolet Fluorescence, IBR approved for §60.4415(a)(1)(i).

(76) ASTM D5504–01, Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence, IBR approved for §§60.334(h)(1) and 60.4360.

(77) ASTM D5762–02, Standard Test Method for Nitrogen in Petroleum and Petroleum Products by Boat-Inlet Chemiluminescence, IBR approved for §60.335(b)(9)(i).

(78) ASTM D5865–98, Standard Test Method for Gross Calorific Value of Coal and Coke, IBR approved for §60.45(f)(5)(ii), 60.46(c)(2), and appendix A: Method 19, Section 12.5.2.1.3.

(79) ASTM D6216–98, Standard Practice for Opacity Monitor Manufacturers to Certify Conformance with Design and Performance Specifications, IBR approved for appendix B, Performance Specification 1.

(80) ASTM D6228–98, Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Flame Photometric Detection, IBR approved for §60.334(h)(1).

(81) ASTM D6228–98 (Reapproved 2003), Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Flame Photometric Detection, IBR approved for §§60.4360 and 60.4415.

(82) ASTM D6348–03, Standard Test Method for Determination of Gaseous Compounds by Extractive Direct Interface Fourier Transform Infrared (FTIR) Spectroscopy, IBR approved for table 7 of subpart IIII of this part and table 2 of subpart JJJJ of this part.

(83) ASTM D6366–99, Standard Test Method for Total Trace Nitrogen and Its Derivatives in Liquid Aromatic Hydrocarbons by Oxidative Combustion and Electrochemical Detection, IBR approved for §60.335(b)(9)(i).

(84) ASTM D6420–99 (Reapproved 2004) Standard Test Method for Determination of Gaseous Organic Compounds by Direct Interface Gas Chromatography-Mass Spectrometry, IBR approved for table 2 of subpart JJJJ of this part.

(85) ASTM D6522–00, Standard Test Method for Determination of Nitrogen Oxides, Carbon Monoxide, and Oxygen Concentrations in Emissions from Natural Gas-Fired Reciprocating Engines, Combustion Turbines, Boilers, and Process Heaters Using Portable Analyzers, IBR approved for §60.335(a).

(86) ASTM D6522–00 (Reapproved 2005), Standard Test Method for Determination of Nitrogen Oxides, Carbon Monoxide, and Oxygen Concentrations in Emissions from Natural Gas-Fired Reciprocating Engines, Combustion Turbines, Boilers, and Process Heaters Using Portable Analyzers, IBR approved for table 2 of subpart JJJJ of this part.

(87) ASTM D6667–01, Standard Test Method for Determination of Total Volatile Sulfur in Gaseous Hydrocarbons and Liquefied Petroleum Gases by Ultraviolet Fluorescence, IBR approved for §60.335(b)(10)(ii).

(88) ASTM D6667–04, Standard Test Method for Determination of Total Volatile Sulfur in Gaseous Hydrocarbons and Liquefied Petroleum Gases by Ultraviolet Fluorescence, IBR approved for §60.4415(a)(1)(ii).

(89) ASTM D6784–02, Standard Test Method for Elemental, Oxidized, Particle-Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method), IBR approved for appendix B to part 60, Performance Specification 12A, Section 8.6.2.

(90) ASTM D6784–02, Standard Test Method for Elemental, Oxidized, Particle-Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method), IBR approved for Appendix B to part 60, Performance Specification 12A, Section 8.6.2 and §60.56c(b)(13) of subpart Ec of this part.

(91) ASTM E169–63, 77, 93, General Techniques of Ultraviolet Quantitative Analysis, IBR approved for §§60.485a(d)(1), 60.593(b)(2), 60.593a(b)(2), and 60.632(f).

(92) ASTM E260–73, 91, 96, General Gas Chromatography Procedures, IBR approved for §§60.485a(d)(1), 60.593(b)(2), 60.593a(b)(2), and 60.632(f).

(b) The following material is available for purchase from the Association of Official Analytical Chemists, 1111 North 19th Street, Suite 210, Arlington, VA 22209.

(1) AOAC Method 9, Official Methods of Analysis of the Association of Official Analytical Chemists, 11th edition, 1970, pp. 11–12, IBR approved January 27, 1983 for §§60.204(b)(3), 60.214(b)(3), 60.224(b)(3), 60.234(b)(3).

(c) The following material is available for purchase from the American Petroleum Institute, 1220 L Street NW., Washington, DC 20005.

(1) API Publication 2517, Evaporation Loss from External Floating Roof Tanks, Second Edition, February 1980, IBR approved January 27, 1983, for §§60.111(i), 60.111a(f), 60.111a(f)(1) and 60.116b(e)(2)(i).

(d) The following material is available for purchase from the Technical Association of the Pulp and Paper Industry (TAPPI), Dunwoody Park, Atlanta, GA 30341.

(1) TAPPI Method T624 os–68, IBR approved January 27, 1983 for §60.285(d)(3).

(e) The following material is available for purchase from the Water Pollution Control Federation (WPCF), 2626 Pennsylvania Avenue NW., Washington, DC 20037.

(1) Method 209A, Total Residue Dried at 103–105 °C, in Standard Methods for the Examination of Water and Wastewater, 15th Edition, 1980, IBR approved February 25, 1985 for §60.683(b).

(f) The following material is available for purchase from the following address: Underwriter's Laboratories, Inc. (UL), 333 Pfingsten Road, Northbrook, IL 60062.

(1) UL 103, Sixth Edition revised as of September 3, 1986, Standard for Chimneys, Factory-built, Residential Type and Building Heating Appliance.

(g) The following material is available for purchase from the following address: West Coast Lumber Inspection Bureau, 6980 SW. Barnes Road, Portland, OR 97223.

(1) West Coast Lumber Standard Grading Rules No. 16, pages 5–21 and 90 and 91, September 3, 1970, revised 1984.

(h) The following material is available for purchase from the American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016–5990.

(1) ASME QRO–1–1994, Standard for the Qualification and Certification of Resource Recovery Facility Operators, IBR approved for §§60.56a, 60.54b(a), 60.54b(b), 60.1185(a), 60.1185(c)(2), 60.1675(a), and 60.1675(c)(2).

(2) ASME PTC 4.1–1964 (Reaffirmed 1991), Power Test Codes: Test Code for Steam Generating Units (with 1968 and 1969 Addenda), IBR approved for §§60.46b of subpart Db of this part, 60.58a(h)(6)(ii), 60.58b(i)(6)(ii), 60.1320(a)(3) and 60.1810(a)(3).

(3) ASME Interim Supplement 19.5 on Instruments and Apparatus: Application, Part II of Fluid Meters, 6th Edition (1971), IBR approved for §§60.58a(h)(6)(ii), 60.58b(i)(6)(ii), 60.1320(a)(4), and 60.1810(a)(4).

(4) ANSI/ASME PTC 19.10–1981, Flue and Exhaust Gas Analyses [Part 10, Instruments and Apparatus], IBR approved for §60.56c(b)(4) of subpart Ec, §60.63(f)(2) and (f)(4) of subpart F, §60.106 (e)(2) of subpart J, §§60.104a(d)(3), (d)(5), (d)(6), (h)(3), (h)(4), (h)(5), (i)(3), (i)(4), (i)(5), (j)(3), and (j)(4), 60.105a(d)(4), (f)(2), (f)(4), (g)(2), and (g)(4), 60.106a(a)(1)(iii), (a)(2)(iii), (a)(2)(v), (a)(2)(viii), (a)(3)(ii),

and (a)(3)(v), and 60.107a(a)(1)(ii), (a)(1)(iv), (a)(2)(ii), (c)(2), (c)(4), and (d)(2) of subpart Ja, tables 1 and 3 of subpart EEEE, tables 2 and 4 of subpart FFFF, table 2 of subpart JJJJ, and §60.4415(a)(2) and (a)(3) of subpart KKKK of this part.

(j) "Standard Methods for the Examination of Water and Wastewater," 16th edition, 1985. Method 303F: "Determination of Mercury by the Cold Vapor Technique." This document may be obtained from the American Public Health Association, 1015 18th Street, NW., Washington, DC 20036, and is incorporated by reference for appendix A to part 60, Method 29, Sections 9.2.3; 10.3; and 11.1.3.

(k) This material is available for purchase from the American Hospital Association (AHA) Service, Inc., Post Office Box 92683, Chicago, Illinois 60675-2683. You may inspect a copy at EPA's Air and Radiation Docket and Information Center (Docket A-91-61, Item IV-J-124), Room M-1500, 1200 Pennsylvania Ave., NW., Washington, DC.

(1) An Ounce of Prevention: Waste Reduction Strategies for Health Care Facilities. American Society for Health Care Environmental Services of the American Hospital Association. Chicago, Illinois. 1993. AHA Catalog No. 057007. ISBN 0-87258-673-5. IBR approved for §60.35e and §60.55c.

(l) This material is available for purchase from the National Technical Information Services, 5285 Port Royal Road, Springfield, Virginia 22161. You may inspect a copy at EPA's Air and Radiation Docket and Information Center (Docket A-91-61, Item IV-J-125), Room M-1500, 1200 Pennsylvania Ave., NW., Washington, DC.

(1) OMB Bulletin No. 93-17: Revised Statistical Definitions for Metropolitan Areas. Office of Management and Budget, June 30, 1993. NTIS No. PB 93-192-664. IBR approved for §60.31e.

(2) [Reserved]

(m) This material is available for purchase from at least one of the following addresses: The Gas Processors Association, 6526 East 60th Street, Tulsa, OK, 74145; or Information Handling Services, 15 Inverness Way East, PO Box 1154, Englewood, CO 80150-1154. You may inspect a copy at EPA's Air and Radiation Docket and Information Center, Room B108, 1301 Constitution Ave., NW., Washington, DC 20460. You may inspect a copy at EPA's Air and Radiation Docket and Information Center, Room 3334, 1301 Constitution Ave., NW., Washington, DC 20460.

(1) Gas Processors Association Standard 2377-86, Test for Hydrogen Sulfide and Carbon Dioxide in Natural Gas Using Length of Stain Tubes, 1986 Revision, IBR approved for §§60.105(b)(1)(iv), 60.107a(b)(1)(iv), 60.334(h)(1), 60.4360, and 60.4415(a)(1)(ii).

(2) [Reserved]

(n) This material is available for purchase from IHS Inc., 15 Inverness Way East, Englewood, CO 80112.

(1) International Organization for Standards 8178-4: 1996(E), Reciprocating Internal Combustion Engines—Exhaust Emission Measurement—part 4: Test Cycles for Different Engine Applications, IBR approved for §60.4241(b).

(2) [Reserved]

[48 FR 3735, Jan. 27, 1983]

**Editorial Note:** For Federal Register citations affecting §60.17, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

## § 60.18 General control device and work practice requirements.

(a) *Introduction.* (1) This section contains requirements for control devices used to comply with applicable subparts of 40 CFR parts 60 and 61. The requirements are placed here for administrative convenience and apply only to facilities covered by subparts referring to this section.

(2) This section also contains requirements for an alternative work practice used to identify leaking equipment. This alternative work practice is placed here for administrative convenience and is available to all subparts in 40 CFR parts 60, 61, 63, and 65 that require monitoring of equipment with a 40 CFR part 60, Appendix A-7, Method 21 monitor.

(b) *Flares.* Paragraphs (c) through (f) apply to flares.

(c)(1) Flares shall be designed for and operated with no visible emissions as determined by the methods specified in paragraph (f), except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

(2) Flares shall be operated with a flame present at all times, as determined by the methods specified in paragraph (f).

(3) An owner/operator has the choice of adhering to either the heat content specifications in paragraph (c)(3)(ii) of this section and the maximum tip velocity specifications in paragraph (c)(4) of this section, or adhering to the requirements in paragraph (c)(3)(i) of this section.

(i)(A) Flares shall be used that have a diameter of 3 inches or greater, are nonassisted, have a hydrogen content of 8.0 percent (by volume), or greater, and are designed for and operated with an exit velocity less than 37.2 m/sec (122 ft/sec) and less than the velocity,  $V_{max}$ , as determined by the following equation:

$$V_{max} = (X_{H_2} - K_1) * K_2$$

Where:

$V_{max}$  = Maximum permitted velocity, m/sec.

$K_1$  = Constant, 6.0 volume-percent hydrogen.

$K_2$  = Constant, 3.9(m/sec)/volume-percent hydrogen.

$X_{H_2}$  = The volume-percent of hydrogen, on a wet basis, as calculated by using the American Society for Testing and Materials (ASTM) Method D1946-77. (Incorporated by reference as specified in §60.17).

(B) The actual exit velocity of a flare shall be determined by the method specified in paragraph (f)(4) of this section.

(ii) Flares shall be used only with the net heating value of the gas being combusted being 11.2 MJ/scm (300 Btu/scf) or greater if the flare is steam-assisted or air-assisted; or with the net heating value of the gas being combusted being 7.45 MJ/scm (200 Btu/scf) or greater if the flare is nonassisted. The net heating value of the gas being combusted shall be determined by the methods specified in paragraph (f)(3) of this section.

(4)(i) Steam-assisted and nonassisted flares shall be designed for and operated with an exit velocity, as determined by the methods specified in paragraph (f)(4) of this section, less than 18.3 m/sec (60 ft/sec), except as provided in paragraphs (c)(4) (ii) and (iii) of this section.

(ii) Steam-assisted and nonassisted flares designed for and operated with an exit velocity, as determined by the methods specified in paragraph (f)(4), equal to or greater than 18.3 m/sec (60 ft/sec) but less than 122 m/sec (400 ft/sec) are allowed if the net heating value of the gas being combusted is greater than 37.3 MJ/scm (1,000 Btu/scf).

(iii) Steam-assisted and nonassisted flares designed for and operated with an exit velocity, as determined by the methods specified in paragraph (f)(4), less than the velocity,  $V_{max}$ , as determined by the method specified in paragraph (f)(5), and less than 122 m/sec (400 ft/sec) are allowed.

(5) Air-assisted flares shall be designed and operated with an exit velocity less than the velocity,  $V_{max}$ , as determined by the method specified in paragraph (f)(6).

(6) Flares used to comply with this section shall be steam-assisted, air-assisted, or nonassisted.

(d) Owners or operators of flares used to comply with the provisions of this subpart shall monitor these control devices to ensure that they are operated and maintained in conformance with their designs. Applicable subparts will provide provisions stating how owners or operators of flares shall monitor these control devices.

(e) Flares used to comply with provisions of this subpart shall be operated at all times when emissions may be vented to them.

(f)(1) Method 22 of appendix A to this part shall be used to determine the compliance of flares with the visible emission provisions of this subpart. The observation period is 2 hours and shall be used according to Method 22.

(2) The presence of a flare pilot flame shall be monitored using a thermocouple or any other equivalent device to detect the presence of a flame.

(3) The net heating value of the gas being combusted in a flare shall be calculated using the following equation:

$$H_T = K \sum_{i=1}^n C_i H_i$$

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where:

$H_T$ =Net heating value of the sample, MJ/scm; where the net enthalpy per mole of offgas is based on combustion at 25 °C and 760 mm Hg, but the standard temperature for determining the volume corresponding to one mole is 20 °C;

$$K = \text{Constant}, \frac{1}{1.740 \times 10^{-7}} \left( \frac{1}{\text{ppm}} \right) \left( \frac{\text{g mole}}{\text{scm}} \right) \left( \frac{\text{MJ}}{\text{kcal}} \right)$$

where the standard temperature for  $\left( \frac{\text{g mole}}{\text{scm}} \right)$  is 20°C;

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$C_i$ =Concentration of sample component  $i$  in ppm on a wet basis, as measured for organics by Reference Method 18 and measured for hydrogen and carbon monoxide by ASTM D1946–77 or 90 (Reapproved 1994) (Incorporated by reference as specified in §60.17); and

$H_i$ =Net heat of combustion of sample component  $i$ , kcal/g mole at 25 °C and 760 mm Hg. The heats of combustion may be determined using ASTM D2382–76 or 88 or D4809–95 (incorporated by reference as specified in §60.17) if published values are not available or cannot be calculated.

(4) The actual exit velocity of a flare shall be determined by dividing the volumetric flowrate (in units of standard temperature and pressure), as determined by Reference Methods 2, 2A, 2C, or 2D as appropriate; by the unobstructed (free) cross sectional area of the flare tip.

(5) The maximum permitted velocity,  $V_{\max}$ , for flares complying with paragraph (c)(4)(iii) shall be determined by the following equation.

$$\text{Log}_{10}(V_{\max}) = (H_T + 28.8) / 31.7$$

$V_{\max}$ =Maximum permitted velocity, M/sec

28.8=Constant

31.7=Constant

$H_T$ =The net heating value as determined in paragraph (f)(3).

(6) The maximum permitted velocity,  $V_{\max}$ , for air-assisted flares shall be determined by the following equation.

$$V_{\max} = 8.706 + 0.7084 (H_T)$$

$V_{\max}$ =Maximum permitted velocity, m/sec

8.706=Constant

0.7084=Constant

$H_T$ =The net heating value as determined in paragraph (f)(3).

(g) *Alternative work practice for monitoring equipment for leaks.* Paragraphs (g), (h), and (i) of this section apply to all equipment for which the applicable subpart requires monitoring with a 40 CFR part

60, Appendix A-7, Method 21 monitor, except for closed vent systems, equipment designated as leakless, and equipment identified in the applicable subpart as having no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background. An owner or operator may use an optical gas imaging instrument instead of a 40 CFR part 60, Appendix A-7, Method 21 monitor. Requirements in the existing subparts that are specific to the Method 21 instrument do not apply under this section. All other requirements in the applicable subpart that are not addressed in paragraphs (g), (h), and (i) of this section apply to this standard. For example, equipment specification requirements, and non-Method 21 instrument recordkeeping and reporting requirements in the applicable subpart continue to apply. The terms defined in paragraphs (g)(1) through (5) of this section have meanings that are specific to the alternative work practice standard in paragraphs (g), (h), and (i) of this section.

(1) *Applicable subpart* means the subpart in 40 CFR parts 60, 61, 63, or 65 that requires monitoring of equipment with a 40 CFR part 60, Appendix A-7, Method 21 monitor.

(2) *Equipment* means pumps, valves, pressure relief valves, compressors, open-ended lines, flanges, connectors, and other equipment covered by the applicable subpart that require monitoring with a 40 CFR part 60, Appendix A-7, Method 21 monitor.

(3) *Imaging* means making visible emissions that may otherwise be invisible to the naked eye.

(4) *Optical gas imaging instrument* means an instrument that makes visible emissions that may otherwise be invisible to the naked eye.

(5) *Repair* means that equipment is adjusted, or otherwise altered, in order to eliminate a leak.

(6) *Leak* means:

(i) Any emissions imaged by the optical gas instrument;

(ii) Indications of liquids dripping;

(iii) Indications by a sensor that a seal or barrier fluid system has failed; or

(iv) Screening results using a 40 CFR part 60, Appendix A-7, Method 21 monitor that exceed the leak definition in the applicable subpart to which the equipment is subject.

(h) The alternative work practice standard for monitoring equipment for leaks is available to all subparts in 40 CFR parts 60, 61, 63, and 65 that require monitoring of equipment with a 40 CFR part 60, Appendix A-7, Method 21 monitor.

(1) An owner or operator of an affected source subject to CFR parts 60, 61, 63, or 65 can choose to comply with the alternative work practice requirements in paragraph (i) of this section instead of using the 40 CFR part 60, Appendix A-7, Method 21 monitor to identify leaking equipment. The owner or operator must document the equipment, process units, and facilities for which the alternative work practice will be used to identify leaks.

(2) Any leak detected when following the leak survey procedure in paragraph (i)(3) of this section must be identified for repair as required in the applicable subpart.

(3) If the alternative work practice is used to identify leaks, re-screening after an attempted repair of leaking equipment must be conducted using either the alternative work practice or the 40 CFR part 60, Appendix A-7, Method 21 monitor at the leak definition required in the applicable subpart to which the equipment is subject.

(4) The schedule for repair is as required in the applicable subpart.

(5) When this alternative work practice is used for detecting leaking equipment, choose one of the monitoring frequencies listed in Table 1 to subpart A of this part in lieu of the monitoring frequency specified for regulated equipment in the applicable subpart. Reduced monitoring frequencies for good performance are not applicable when using the alternative work practice.

(6) When this alternative work practice is used for detecting leaking equipment the following are not applicable for the equipment being monitored:

(i) Skip period leak detection and repair;

(ii) Quality improvement plans; or

(iii) Complying with standards for allowable percentage of valves and pumps to leak.

(7) When the alternative work practice is used to detect leaking equipment, the regulated equipment in paragraph (h)(1)(i) of this section must also be monitored annually using a 40 CFR part 60, Appendix A-7, Method 21 monitor at the leak definition required in the applicable subpart. The owner or operator may choose the specific monitoring period (for example, first quarter) to conduct the annual monitoring. Subsequent monitoring must be conducted every 12 months from the initial period. Owners or operators must keep records of the annual Method 21 screening results, as specified in paragraph (i)(4)(vii) of this section.

(i) An owner or operator of an affected source who chooses to use the alternative work practice must comply with the requirements of paragraphs (i)(1) through (i)(5) of this section.

(1) Instrument Specifications. The optical gas imaging instrument must comply with the requirements in (i)(1)(i) and (i)(1)(ii) of this section.

(i) Provide the operator with an image of the potential leak points for each piece of equipment at both the detection sensitivity level and within the distance used in the daily instrument check described in paragraph (i)(2) of this section. The detection sensitivity level depends upon the frequency at which leak monitoring is to be performed.

(ii) Provide a date and time stamp for video records of every monitoring event.

(2) Daily Instrument Check. On a daily basis, and prior to beginning any leak monitoring work, test the optical gas imaging instrument at the mass flow rate determined in paragraph (i)(2)(i) of this section in accordance with the procedure specified in paragraphs (i)(2)(ii) through (i)(2)(iv) of this section for each camera configuration used during monitoring (for example, different lenses used), unless an alternative method to demonstrate daily instrument checks has been approved in accordance with paragraph (i)(2)(v) of this section.

(i) Calculate the mass flow rate to be used in the daily instrument check by following the procedures in paragraphs (i)(2)(i)(A) and (i)(2)(i)(B) of this section.

(A) For a specified population of equipment to be imaged by the instrument, determine the piece of equipment in contact with the lowest mass fraction of chemicals that are detectable, within the distance to be used in paragraph (i)(2)(iv)(B) of this section, at or below the standard detection sensitivity level.

(B) Multiply the standard detection sensitivity level, corresponding to the selected monitoring frequency in Table 1 of subpart A of this part, by the mass fraction of detectable chemicals from the stream identified in paragraph (i)(2)(i)(A) of this section to determine the mass flow rate to be used in the daily instrument check, using the following equation.

$$E_{dic} = (E_{sds}) \sum_{i=1}^k x_i$$

Where:

$E_{dic}$  = Mass flow rate for the daily instrument check, grams per hour

$x_i$  = Mass fraction of detectable chemical(s)  $i$  seen by the optical gas imaging instrument, within the distance to be used in paragraph (i)(2)(iv)(B) of this section, at or below the standard detection sensitivity level,  $E_{sds}$ .

$E_{sds}$  = Standard detection sensitivity level from Table 1 to subpart A, grams per hour

$k$  = Total number of detectable chemicals emitted from the leaking equipment and seen by the optical gas imaging instrument.

(ii) Start the optical gas imaging instrument according to the manufacturer's instructions, ensuring that all appropriate settings conform to the manufacturer's instructions.

(iii) Use any gas chosen by the user that can be viewed by the optical gas imaging instrument and that has a purity of no less than 98 percent.

(iv) Establish a mass flow rate by using the following procedures:

(A) Provide a source of gas where it will be in the field of view of the optical gas imaging instrument.

(B) Set up the optical gas imaging instrument at a recorded distance from the outlet or leak orifice of the flow meter that will not be exceeded in the actual performance of the leak survey. Do not exceed the

operating parameters of the flow meter.

(C) Open the valve on the flow meter to set a flow rate that will create a mass emission rate equal to the mass rate specified in paragraph (i)(2)(i) of this section while observing the gas flow through the optical gas imaging instrument viewfinder. When an image of the gas emission is seen through the viewfinder at the required emission rate, make a record of the reading on the flow meter.

(v) Repeat the procedures specified in paragraphs (i)(2)(ii) through (i)(2)(iv) of this section for each configuration of the optical gas imaging instrument used during the leak survey.

(vi) To use an alternative method to demonstrate daily instrument checks, apply to the Administrator for approval of the alternative under §60.13(i).

(3) Leak Survey Procedure. Operate the optical gas imaging instrument to image every regulated piece of equipment selected for this work practice in accordance with the instrument manufacturer's operating parameters. All emissions imaged by the optical gas imaging instrument are considered to be leaks and are subject to repair. All emissions visible to the naked eye are also considered to be leaks and are subject to repair.

(4) Recordkeeping. You must keep the records described in paragraphs (i)(4)(i) through (i)(4)(vii) of this section:

(i) The equipment, processes, and facilities for which the owner or operator chooses to use the alternative work practice.

(ii) The detection sensitivity level selected from Table 1 to subpart A of this part for the optical gas imaging instrument.

(iii) The analysis to determine the piece of equipment in contact with the lowest mass fraction of chemicals that are detectable, as specified in paragraph (i)(2)(i)(A) of this section.

(iv) The technical basis for the mass fraction of detectable chemicals used in the equation in paragraph (i)(2)(i)(B) of this section.

(v) The daily instrument check. Record the distance, per paragraph (i)(2)(iv)(B) of this section, and the flow meter reading, per paragraph (i)(2)(iv)(C) of this section, at which the leak was imaged. Keep a video record of the daily instrument check for each configuration of the optical gas imaging instrument used during the leak survey (for example, the daily instrument check must be conducted for each lens used). The video record must include a time and date stamp for each daily instrument check. The video record must be kept for 5 years.

(vi) Recordkeeping requirements in the applicable subpart. A video record must be used to document the leak survey results. The video record must include a time and date stamp for each monitoring event. A video record can be used to meet the recordkeeping requirements of the applicable subparts if each piece of regulated equipment selected for this work practice can be identified in the video record. The video record must be kept for 5 years.

(vii) The results of the annual Method 21 screening required in paragraph (h)(7) of this section. Records must be kept for all regulated equipment specified in paragraph (h)(1) of this section. Records must identify the equipment screened, the screening value measured by Method 21, the time and date of the screening, and calibration information required in the existing applicable subpart.

(5) Reporting. Submit the reports required in the applicable subpart. Submit the records of the annual Method 21 screening required in paragraph (h)(7) of this section to the Administrator via e-mail to CCG-AWP@EPA.GOV.

[51 FR 2701, Jan. 21, 1986, as amended at 63 FR 24444, May 4, 1998; 65 FR 61752, Oct. 17, 2000; 73 FR 78209, Dec. 22, 2008]

### § 60.19 General notification and reporting requirements.

(a) For the purposes of this part, time periods specified in days shall be measured in calendar days, even if the word "calendar" is absent, unless otherwise specified in an applicable requirement.

(b) For the purposes of this part, if an explicit postmark deadline is not specified in an applicable requirement for the submittal of a notification, application, report, or other written communication to the Administrator, the owner or operator shall postmark the submittal on or before the number of days specified in the applicable requirement. For example, if a notification must be submitted 15 days before a particular event is scheduled to take place, the notification shall be postmarked on or before 15 days preceding the event; likewise, if a notification must be submitted 15 days after a particular event takes place, the notification shall be delivered or postmarked on or before 15 days following the end of the

event. The use of reliable non-Government mail carriers that provide indications of verifiable delivery of information required to be submitted to the Administrator, similar to the postmark provided by the U.S. Postal Service, or alternative means of delivery, including the use of electronic media, agreed to by the permitting authority, is acceptable.

(c) Notwithstanding time periods or postmark deadlines specified in this part for the submittal of information to the Administrator by an owner or operator, or the review of such information by the Administrator, such time periods or deadlines may be changed by mutual agreement between the owner or operator and the Administrator. Procedures governing the implementation of this provision are specified in paragraph (f) of this section.

(d) If an owner or operator of an affected facility in a State with delegated authority is required to submit periodic reports under this part to the State, and if the State has an established timeline for the submission of periodic reports that is consistent with the reporting frequency(ies) specified for such facility under this part, the owner or operator may change the dates by which periodic reports under this part shall be submitted (without changing the frequency of reporting) to be consistent with the State's schedule by mutual agreement between the owner or operator and the State. The allowance in the previous sentence applies in each State beginning 1 year after the affected facility is required to be in compliance with the applicable subpart in this part. Procedures governing the implementation of this provision are specified in paragraph (f) of this section.

(e) If an owner or operator supervises one or more stationary sources affected by standards set under this part and standards set under part 61, part 63, or both such parts of this chapter, he/she may arrange by mutual agreement between the owner or operator and the Administrator (or the State with an approved permit program) a common schedule on which periodic reports required by each applicable standard shall be submitted throughout the year. The allowance in the previous sentence applies in each State beginning 1 year after the stationary source is required to be in compliance with the applicable subpart in this part, or 1 year after the stationary source is required to be in compliance with the applicable 40 CFR part 61 or part 63 of this chapter standard, whichever is latest. Procedures governing the implementation of this provision are specified in paragraph (f) of this section.

(f)(1)(i) Until an adjustment of a time period or postmark deadline has been approved by the Administrator under paragraphs (f)(2) and (f)(3) of this section, the owner or operator of an affected facility remains strictly subject to the requirements of this part.

(ii) An owner or operator shall request the adjustment provided for in paragraphs (f)(2) and (f)(3) of this section each time he or she wishes to change an applicable time period or postmark deadline specified in this part.

(2) Notwithstanding time periods or postmark deadlines specified in this part for the submittal of information to the Administrator by an owner or operator, or the review of such information by the Administrator, such time periods or deadlines may be changed by mutual agreement between the owner or operator and the Administrator. An owner or operator who wishes to request a change in a time period or postmark deadline for a particular requirement shall request the adjustment in writing as soon as practicable before the subject activity is required to take place. The owner or operator shall include in the request whatever information he or she considers useful to convince the Administrator that an adjustment is warranted.

(3) If, in the Administrator's judgment, an owner or operator's request for an adjustment to a particular time period or postmark deadline is warranted, the Administrator will approve the adjustment. The Administrator will notify the owner or operator in writing of approval or disapproval of the request for an adjustment within 15 calendar days of receiving sufficient information to evaluate the request.

(4) If the Administrator is unable to meet a specified deadline, he or she will notify the owner or operator of any significant delay and inform the owner or operator of the amended schedule.

[59 FR 12428, Mar. 16, 1994, as amended at 64 FR 7463, Feb. 12, 1998]

**Table 1 to Subpart A to Part 60—Detection Sensitivity Levels (grams per hour)**

<b>Monitoring frequency per subpart<sup>a</sup></b>	<b>Detection sensitivity level</b>
Bi-Monthly	60
Semi-Quarterly	85
Monthly	100

<sup>a</sup>When this alternative work practice is used to identify leaking equipment, the owner or operator must choose one of the monitoring frequencies listed in this table in lieu of the monitoring frequency specified in the applicable subpart. Bi-monthly means every other month. Semi-quarterly means twice per quarter. Monthly means once per month.

[73 FR 78211, Dec. 22, 2008]

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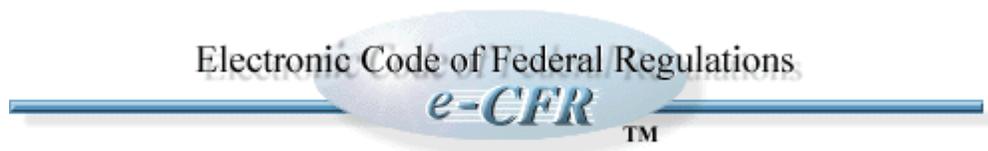
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## **Title 40: Protection of Environment**

[PART 60—STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES \(CONTINUED\)](#)

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### **Appendix B to Part 60—Performance Specifications**

Performance Specification 1—Specifications and test procedures for continuous opacity monitoring systems in stationary sources

Performance Specification 2—Specifications and Test Procedures for SO<sub>2</sub> and NO<sub>x</sub> Continuous Emission Monitoring Systems in Stationary Sources

Performance Specification 3—Specifications and Test Procedures for O<sub>2</sub> and CO<sub>2</sub> Continuous Emission Monitoring Systems in Stationary Sources

Performance Specification 4—Specifications and Test Procedures for Carbon Monoxide Continuous Emission Monitoring Systems in Stationary Sources

Performance Specification 4A—Specifications and Test Procedures for Carbon Monoxide Continuous Emission Monitoring Systems in Stationary Sources

Performance Specification 4B—Specifications and Test Procedures for Carbon Monoxide and Oxygen Continuous Monitoring Systems in Stationary Sources

Performance Specification 5—Specifications and Test Procedures for TRS Continuous Emission Monitoring Systems in Stationary Sources

Performance Specification 6—Specifications and Test Procedures for Continuous Emission Rate Monitoring Systems in Stationary Sources

Performance Specification 7—Specifications and Test Procedures for Hydrogen Sulfide Continuous Emission Monitoring Systems in Stationary Sources

Performance Specification 8—Performance Specifications for Volatile Organic Compound Continuous Emission Monitoring Systems in Stationary Sources

Performance Specification 8A—Specifications and Test Procedures for Total Hydrocarbon Continuous Monitoring Systems in Stationary Sources

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Performance Specification 11—Specifications and Test Procedures for Particulate Matter Continuous Emission Monitoring Systems at Stationary Sources

Performance Specification 12A—Specifications and Text Procedures for Total Vapor Phase Mercury Continuous Emission Monitoring Systems in Stationary Sources

Performance Specification 15—Performance Specification for Extractive FTIR Continuous Emissions Monitor Systems in Stationary Sources

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 February 6, 2001; or
- (2) Your COMS is replaced, relocated, or substantially refurbished (in the opinion of the regulatory authority) after February 6, 2001; or
- (3) Your COMS was installed before February 6, 2001 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	<10°.
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  $\pm 0.5$  percent of the NIST SRM values. No difference can be greater than  $\pm 1.0$  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  $\pm 0.25$  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  $\pm 2$  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:

<b>If your measurement location is in a:</b>	<b>And is:</b>	<b>Then use a light beam path that is:</b>
1. 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).
2. 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).
3. Straight vertical section of stack or duct	Less than 4 equivalent diameters downstream and is also less than 1 diameter upstream from a bend	In the plane defined by the upstream bend (see figure 1-3).
4. Horizontal section of stack or duct	At least 4 equivalent diameters downstream from a vertical bend	In the horizontal plane that is between 1/3 and 1/2 the distance up the vertical axis from the bottom of the duct (see figure 1-4).
5. Horizontal section of duct	Less than 4 equivalent diameters downstream from a vertical bend	In the horizontal plane that is between 1/2 and 2/3 the distance up the vertical axis from the bottom of the duct for upward flow in the vertical section, and is between 1/3 and 1/2 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  $\pm 10$  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:

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

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 follows:

$$LT = \frac{\sum_{i=300_{nm}}^{i=800_{nm}} T_i}{100,000} \quad Eq. 1-2$$

Where:

LT=Luminous transmittance

$T_i$ =Weighted tested filter transmittance.

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

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i \quad Eq. 1-3$$

Where:

$\bar{x}$  = Arithmetic mean

n=Number of data points

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

$x_i$ .

12.4 Standard Deviation. Calculate the standard deviation as follows:

$$S_d = \sqrt{\frac{\sum_{i=1}^n x_i^2 - \frac{\left(\sum_{i=1}^n x_i\right)^2}{n}}{n-1}} \quad Eq. 1-4$$

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:

$$CC = \frac{t_{0.975} S_d}{\sqrt{n}} \quad Eq. 1-5$$

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 follows:

$$Er = |\bar{x}| + |CC| \quad \text{Eq. 1-6}$$

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

$$\log (1-Op_2) = \frac{L_2}{L_1} \log (1-Op_1) \quad \text{Eq. 1-7}$$

$$OD_2 = \frac{L_2}{L_1} \times OD_1 \quad \text{Eq. 1-8}$$

Where:

Op<sub>1</sub>=Opacity of the effluent based upon L<sub>1</sub>.

Op<sub>2</sub>=Opacity of the effluent based upon L<sub>2</sub>.

L<sub>1</sub>=Monitor pathlength.

L<sub>2</sub>=Emission outlet pathlength.

OD<sub>1</sub>=Optical density of the effluent based upon L<sub>1</sub>.

OD<sub>2</sub>=Optical density of the effluent based upon L<sub>2</sub>.

12.8 Mean Response Wavelength. Calculate the mean of the effective spectral response curve from the individual responses at the specified wavelength values as follows:

$$L = \frac{\sum_{i=1}^n L_i g_i}{\sum_{i=1}^n g_i} \quad \text{Eq. 1-9}$$

Where:

L=mean of the effective spectral response curve

L<sub>i</sub>=The specified wavelength at which the response g<sub>i</sub> is calculated at 20 nm intervals.

g<sub>i</sub>=The individual response value at L<sub>i</sub>.

### 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  $\leq 3$  percent opacity for each of the three calibration attenuators.

(3) System Response Time. The COMS upscale and downscale response times must be  $\leq 10$  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  $\pm 2$  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 <sup>a</sup>	Wavelength nanometers	Weighting factor <sup>a</sup>
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		

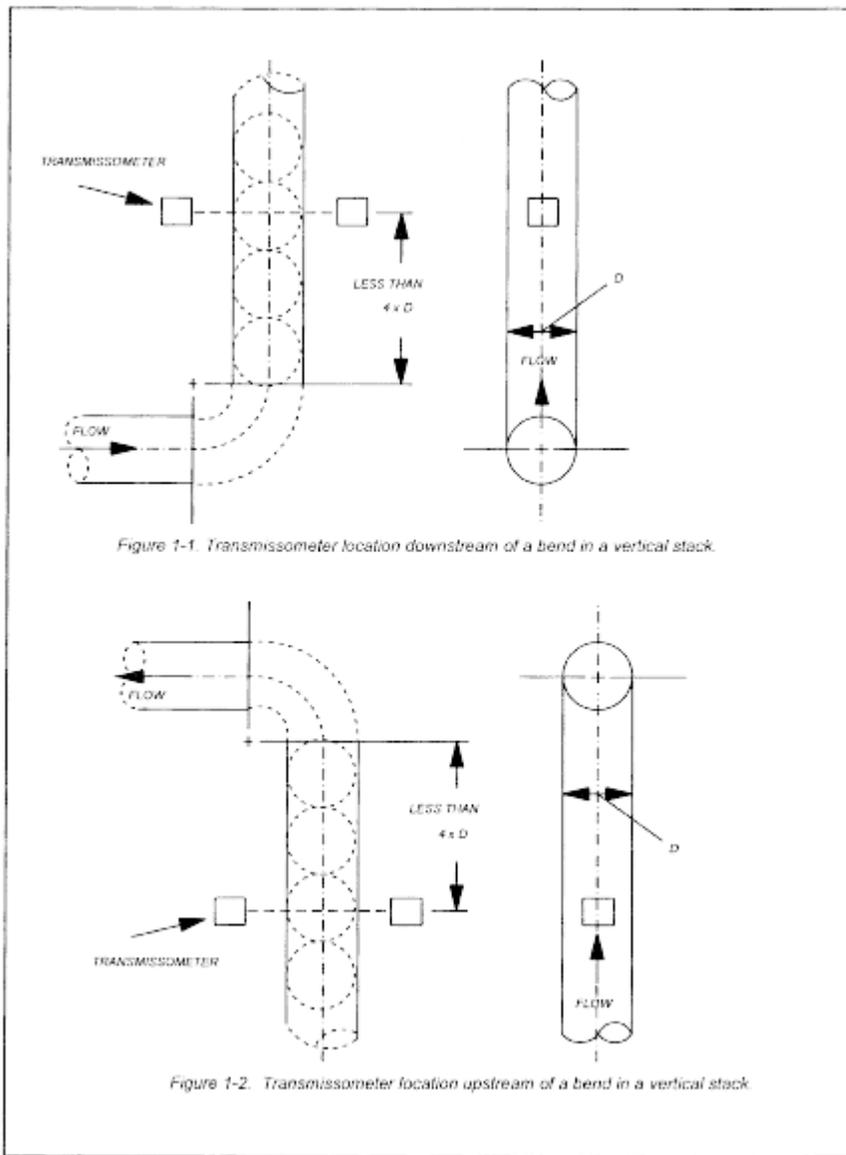
<sup>1</sup>Total of weighting factors=100,000.

Table 1-2<sup>T</sup> Values

n <sup>a</sup>	t <sub>0.975</sub>	n <sup>a</sup>	t <sub>0.975</sub>	n <sup>a</sup>	t <sub>0.975</sub>
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

<sup>a</sup>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.



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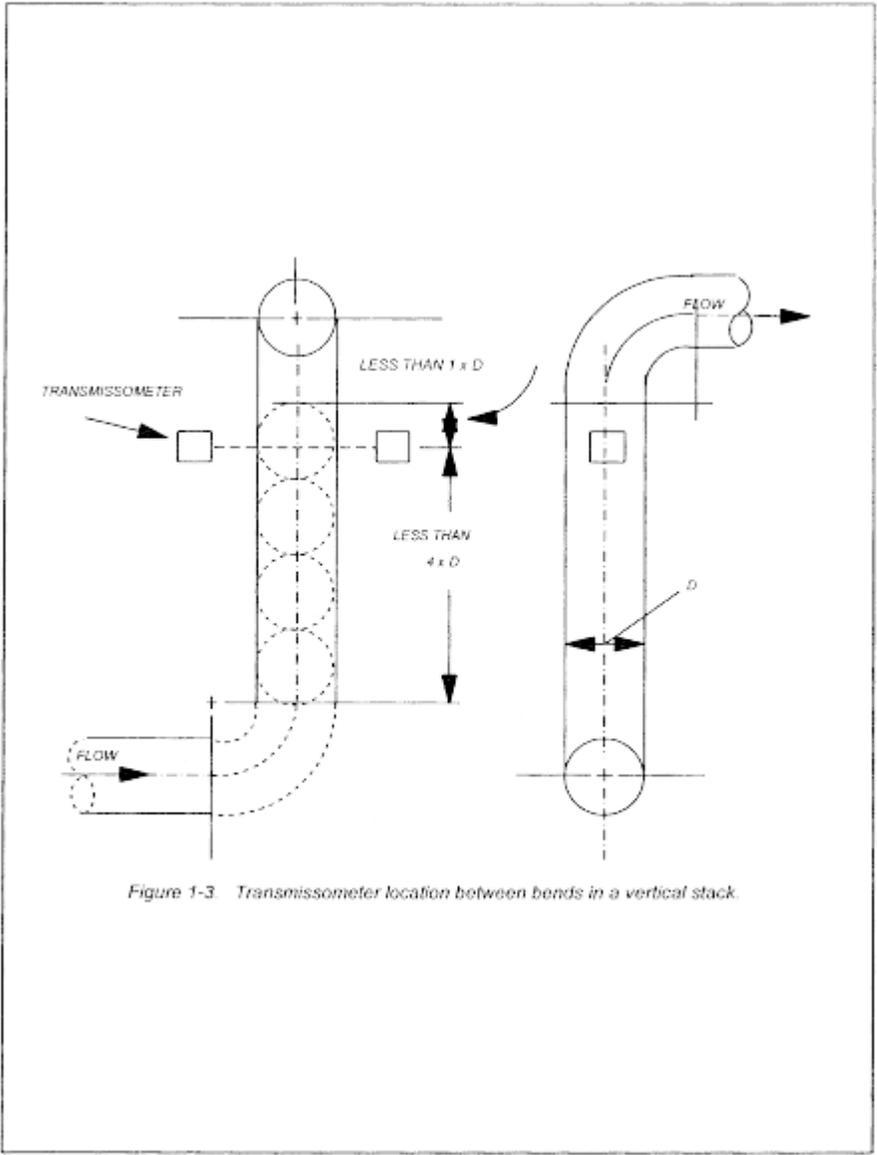


Figure 1-3. Transmissometer location between bends in a vertical stack.

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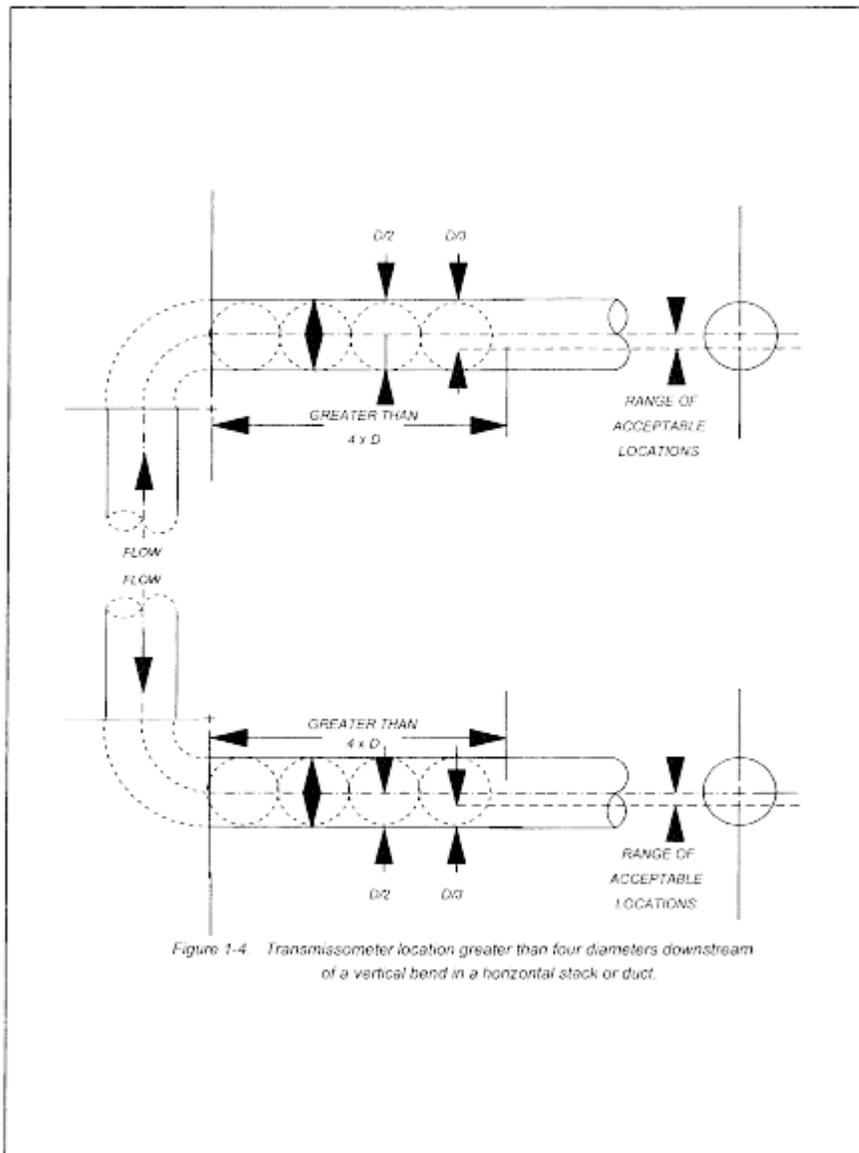
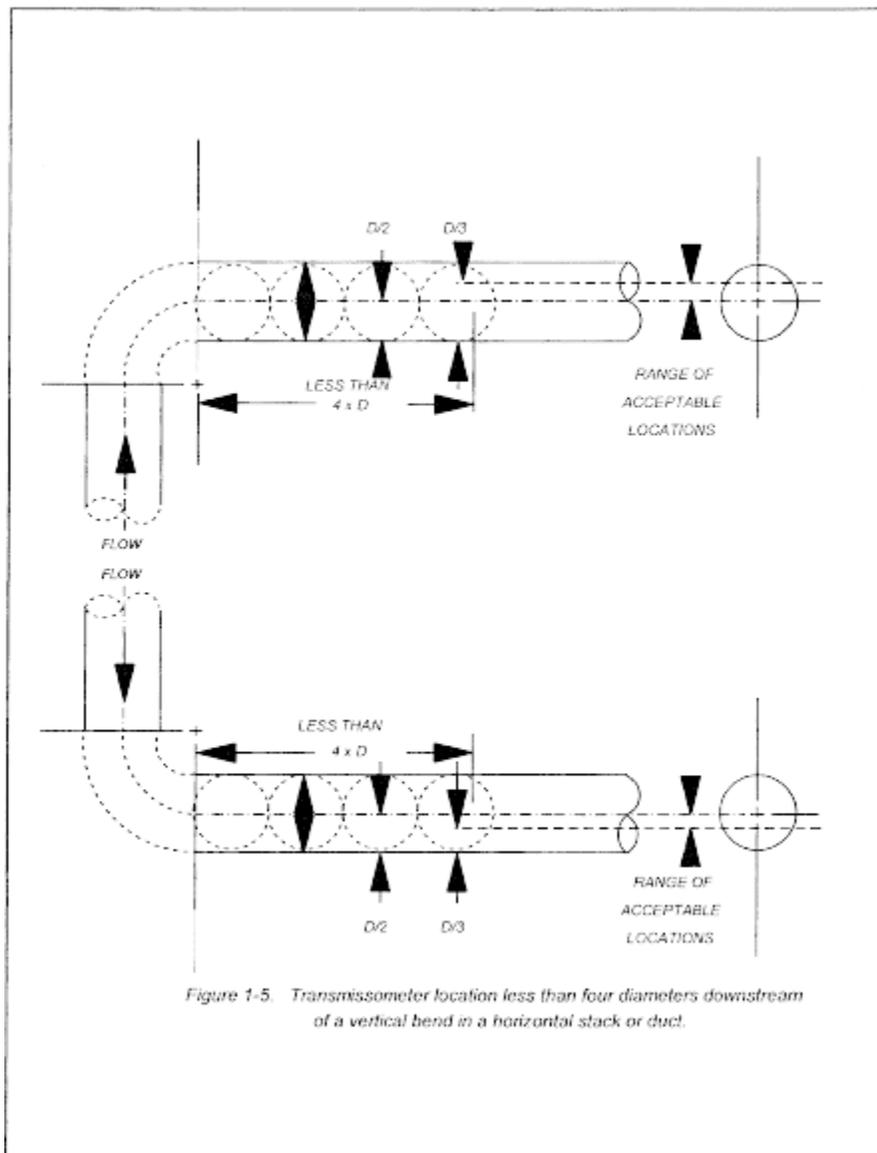


Figure 1-4. Transmissometer location greater than four diameters downstream of a vertical bend in a horizontal stack or duct.

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Performance Specification 2—Specifications and Test Procedures for SO<sub>2</sub> and NO<sub>x</sub> Continuous Emission Monitoring Systems in Stationary Sources

### 1.0 Scope and Application

#### 1.1 Analytes

Analyte	CAS Nos.
Sulfur Dioxide (SO <sub>2</sub> )	7449-09-5
Nitrogen Oxides (NO <sub>x</sub> )	10102-44-0 (NO <sub>2</sub> ), 10024-97-2 (NO)

#### 1.2 Applicability.

1.2.1 This specification is for evaluating the acceptability of SO<sub>2</sub> and NO<sub>x</sub> continuous emission monitoring systems (CEMS) at the time of installation or soon after and whenever specified in the regulations. The CEMS may include, for certain stationary sources, a diluent (O<sub>2</sub> or CO<sub>2</sub>) monitor.

1.2.2 This specification is not designed to evaluate the installed CEMS performance over an extended

period of time nor does it identify specific calibration techniques and other auxiliary procedures to assess the CEMS performance. The source owner or operator is responsible to calibrate, maintain, and operate the CEMS properly. The Administrator may require, under Section 114 of the Act, the operator to conduct CEMS performance evaluations at other times besides the initial test to evaluate the CEMS performance. See 40 CFR Part 60, §60.13(c).

## 2.0 Summary of Performance Specification

Procedures for measuring CEMS relative accuracy and calibration drift are outlined. CEMS installation and measurement location specifications, equipment specifications, performance specifications, and data reduction procedures are included. Conformance of the CEMS with the Performance Specification is determined.

## 3.0 Definitions

3.1 *Calibration Drift (CD)* means the difference in the CEMS output readings from the established reference value after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

3.2 *Centroidal Area* means 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 *Continuous Emission Monitoring System* means the total equipment required for the determination of a gas concentration or emission rate. The sample interface, pollutant analyzer, diluent analyzer, and data recorder are the major subsystems of the CEMS.

3.4 *Data Recorder* means that portion of the CEMS that provides a permanent record of the analyzer output. The data recorder may include automatic data reduction capabilities.

3.5 *Diluent Analyzer* means that portion of the CEMS that senses the diluent gas ( *i.e.*, CO<sub>2</sub> or O<sub>2</sub>) and generates an output proportional to the gas concentration.

3.6 *Path CEMS* means a CEMS that measures the gas concentration along a path greater than 10 percent of the equivalent diameter of the stack or duct cross section.

3.7 *Point CEMS* means a CEMS that measures the gas concentration either at a single point or along a path equal to or less than 10 percent of the equivalent diameter of the stack or duct cross section.

3.8 *Pollutant Analyzer* means that portion of the CEMS that senses the pollutant gas and generates an output proportional to the gas concentration.

3.9 *Relative Accuracy (RA)* means the absolute mean difference between the gas concentration or emission rate determined by the CEMS and the value determined by the reference method (RM), plus the 2.5 percent error confidence coefficient of a series of tests, divided by the mean of the RM tests or the applicable emission limit.

3.10 *Sample Interface* means that portion of the CEMS used for one or more of the following: sample acquisition, sample delivery, sample conditioning, or protection of the monitor from the effects of the stack effluent.

3.11 *Span Value* means the concentration specified for the affected source category in an applicable subpart of the regulations that is used to set the calibration gas concentration and in determining calibration drift.

## 4.0 Interferences[Reserved]

## 5.0 Safety

The procedures required under this performance specification may involve hazardous materials, operations, and equipment. This performance specification may not address all of the safety problems associated with these procedures. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicable regulatory limitations prior to performing these procedures. The CEMS user's manual and materials recommended by the reference method should be consulted for specific precautions to be taken.

## 6.0 Equipment and Supplies

### 6.1 CEMS Equipment Specifications.

6.1.1 Data Recorder Scale. The CEMS data recorder output range must include zero and a high-level value. The high-level value is chosen by the source owner or operator and is defined as follows:

6.1.1.1 For a CEMS intended to measure an uncontrolled emission ( e.g., SO<sub>2</sub> measurements at the inlet of a flue gas desulfurization unit), the high-level value should be between 1.25 and 2 times the maximum potential emission level over the appropriate averaging time, unless otherwise specified in an applicable subpart of the regulations.

6.1.1.2 For a CEMS installed to measure controlled emissions or emissions that are in compliance with an applicable regulation, the high-level value between 1.5 times the pollutant concentration corresponding to the emission standard level and the span value given in the applicable regulations is adequate.

6.1.1.3 Alternative high-level values may be used, provided the source can measure emissions which exceed the full-scale limit in accordance with the requirements of applicable regulations.

6.1.1.4 If an analog data recorder is used, the data recorder output must be established so that the high-level value would read between 90 and 100 percent of the data recorder full scale. (This scale requirement may not be applicable to digital data recorders.) The zero and high level calibration gas, optical filter, or cell values should be used to establish the data recorder scale.

6.1.2 The CEMS design should also allow the determination of calibration drift at the zero and high-level values. If this is not possible or practical, the design must allow these determinations to be conducted at a low-level value (zero to 20 percent of the high-level value) and at a value between 50 and 100 percent of the high-level value. In special cases, the Administrator may approve a single-point calibration-drift determination.

6.2 Other equipment and supplies, as needed by the applicable reference method(s) (see Section 8.4.2 of this Performance Specification), may be required.

## 7.0 Reagents and Standards

7.1 Reference Gases, Gas Cells, or Optical Filters. As specified by the CEMS manufacturer for calibration of the CEMS (these need not be certified).

7.2 Reagents and Standards. May be required as needed by the applicable reference method(s) (see Section 8.4.2 of this Performance Specification).

## 8.0 Performance Specification Test Procedure

### 8.1 Installation and Measurement Location Specifications.

8.1.1 CEMS Installation. Install the CEMS at an accessible location where the pollutant concentration or emission rate measurements are directly representative or can be corrected so as to be representative of the total emissions from the affected facility or at the measurement location cross section. Then select representative measurement points or paths for monitoring in locations that the CEMS will pass the RA test (see Section 8.4). If the cause of failure to meet the RA test is determined to be the measurement location and a satisfactory correction technique cannot be established, the Administrator may require the CEMS to be relocated. Suggested measurement locations and points or paths that are most likely to provide data that will meet the RA requirements are listed below.

8.1.2 CEMS Measurement Location. It is suggested that the measurement location be (1) at least two equivalent diameters downstream from the nearest control device, the point of pollutant generation, or other point at which a change in the pollutant concentration or emission rate may occur and (2) at least a half equivalent diameter upstream from the effluent exhaust or control device.

8.1.2.1 Point CEMS. It is suggested that the measurement point be (1) no less than 1.0 meter (3.3 ft) from the stack or duct wall or (2) within or centrally located over the centroidal area of the stack or duct cross section.

8.1.2.2 Path CEMS. It is suggested that the effective measurement path (1) be totally within the inner

area bounded by a line 1.0 meter (3.3 ft) from the stack or duct wall, or (2) have at least 70 percent of the path within the inner 50 percent of the stack or duct cross-sectional area, or (3) be centrally located over any part of the centroidal area.

### 8.1.3 Reference Method Measurement Location and Traverse Points.

8.1.3.1 Select, as appropriate, an accessible RM measurement point at least two equivalent diameters downstream from the nearest control device, the point of pollutant generation, or other point at which a change in the pollutant concentration or emission rate may occur, and at least a half equivalent diameter upstream from the effluent exhaust or control device. When pollutant concentration changes are due solely to diluent leakage ( e.g., air heater leakages) and pollutants and diluents are simultaneously measured at the same location, a half diameter may be used in lieu of two equivalent diameters. The CEMS and RM locations need not be the same.

8.1.3.2 Select traverse points that assure acquisition of representative samples over the stack or duct cross section. The minimum requirements are as follows: Establish a "measurement line" that passes through the centroidal area and in the direction of any expected stratification. If this line interferes with the CEMS measurements, displace the line up to 30 cm (12 in.) (or 5 percent of the equivalent diameter of the cross section, whichever is less) from the centroidal area. Locate three traverse points at 16.7, 50.0, and 83.3 percent of the measurement line. If the measurement line is longer than 2.4 meters (7.8 ft) and pollutant stratification is not expected, the three traverse points may be located on the line at 0.4, 1.2, and 2.0 meters from the stack or duct wall. This option must not be used after wet scrubbers or at points where two streams with different pollutant concentrations are combined. If stratification is suspected, the following procedure is suggested. For rectangular ducts, locate at least nine sample points in the cross section such that sample points are the centroids of similarly-shaped, equal area divisions of the cross section. Measure the pollutant concentration, and, if applicable, the diluent concentration at each point using appropriate reference methods or other appropriate instrument methods that give responses relative to pollutant concentrations. Then calculate the mean value for all sample points. For circular ducts, conduct a 12-point traverse ( i.e., six points on each of the two perpendicular diameters) locating the sample points as described in 40 CFR 60, Appendix A, Method 1. Perform the measurements and calculations as described above. Determine if the mean pollutant concentration is more than 10% different from any single point. If so, the cross section is considered to be stratified, and the tester may not use the alternative traverse point locations (...0.4, 1.2, and 2.0 meters from the stack or duct wall.) but must use the three traverse points at 16.7, 50.0, and 83.3 percent of the entire measurement line. Other traverse points may be selected, provided that they can be shown to the satisfaction of the Administrator to provide a representative sample over the stack or duct cross section. Conduct all necessary RM tests within 3 cm (1.2 in.) of the traverse points, but no closer than 3 cm (1.2 in.) to the stack or duct wall.

8.2 Pretest Preparation. Install the CEMS, prepare the RM test site according to the specifications in Section 8.1, and prepare the CEMS for operation according to the manufacturer's written instructions.

### 8.3 Calibration Drift Test Procedure.

8.3.1 *CD Test Period.* While the affected facility is operating, determine the magnitude of the CD once each day (at 24-hour intervals) for 7 consecutive calendar days according to the procedure given in Sections 8.3.2 through 8.3.4. Alternatively, the CD test may be conducted over 7 consecutive unit operating days.

8.3.2 The purpose of the CD measurement is to verify the ability of the CEMS to conform to the established CEMS calibration used for determining the emission concentration or emission rate. Therefore, if periodic automatic or manual adjustments are made to the CEMS zero and calibration settings, conduct the CD test immediately before these adjustments, or conduct it in such a way that the CD can be determined.

8.3.3 Conduct the CD test at the two points specified in Section 6.1.2. Introduce to the CEMS the reference gases, gas cells, or optical filters (these need not be certified). Record the CEMS response and subtract this value from the reference value (see example data sheet in Figure 2-1).

### 8.4 Relative Accuracy Test Procedure.

8.4.1 *RA Test Period.* Conduct the RA test according to the procedure given in Sections 8.4.2 through 8.4.6 while the affected facility is operating at more than 50 percent of normal load, or as specified in an applicable subpart. The RA test may be conducted during the CD test period.

8.4.2 *Reference Methods.* Unless otherwise specified in an applicable subpart of the regulations, Methods 3B, 4, 6, and 7, or their approved alternatives, are the reference methods for diluent (O<sub>2</sub> and

CO<sub>2</sub>), moisture, SO<sub>2</sub>, and NO<sub>x</sub>, respectively.

8.4.3 Sampling Strategy for RM Tests. Conduct the RM tests in such a way that they will yield results representative of the emissions from the source and can be correlated to the CEMS data. It is preferable to conduct the diluent (if applicable), moisture (if needed), and pollutant measurements simultaneously. However, diluent and moisture measurements that are taken within an hour of the pollutant measurements may be used to calculate dry pollutant concentration and emission rates. In order to correlate the CEMS and RM data properly, note the beginning and end of each RM test period of each run (including the exact time of day) on the CEMS chart recordings or other permanent record of output. Use the following strategies for the RM tests:

8.4.3.1 For integrated samples ( e.g., Methods 6 and Method 4), make a sample traverse of at least 21 minutes, sampling for an equal time at each traverse point (see Section 8.1.3.2 for discussion of traverse points).

8.4.3.2 For grab samples ( e.g., Method 7), take one sample at each traverse point, scheduling the grab samples so that they are taken simultaneously (within a 3-minute period) or at an equal interval of time apart over the span of time the CEM pollutant is measured. A test run for grab samples must be made up of at least three separate measurements.

Note: At times, CEMS RA tests are conducted during new source performance standards performance tests. In these cases, RM results obtained during CEMS RA tests may be used to determine compliance as long as the source and test conditions are consistent with the applicable regulations.

8.4.4 Number of RM Tests. Conduct a minimum of nine sets of all necessary RM test runs.

Note: More than nine sets of RM tests may be performed. If this option is chosen, a maximum of three sets of the test results may be rejected so long as the total number of test results used to determine the RA is greater than or equal to nine. However, all data must be reported, including the rejected data.

8.4.5 Correlation of RM and CEMS Data. Correlate the CEMS and the RM test data as to the time and duration by first determining from the CEMS final output (the one used for reporting) the integrated average pollutant concentration or emission rate for each pollutant RM test period. Consider system response time, if important, and confirm that the pair of results are on a consistent moisture, temperature, and diluent concentration basis. Then, compare each integrated CEMS value against the corresponding average RM value. Use the following guidelines to make these comparisons.

8.4.5.1 If the RM has an integrated sampling technique, make a direct comparison of the RM results and CEMS integrated average value.

8.4.5.2 If the RM has a grab sampling technique, first average the results from all grab samples taken during the test run, and then compare this average value against the integrated value obtained from the CEMS chart recording or output during the run. If the pollutant concentration is varying with time over the run, the arithmetic average of the CEMS value recorded at the time of each grab sample may be used.

8.4.6 Calculate the mean difference between the RM and CEMS values in the units of the emission standard, the standard deviation, the confidence coefficient, and the relative accuracy according to the procedures in Section 12.0.

8.5 Reporting. At a minimum (check with the appropriate regional office, State, or Local agency for additional requirements, if any), summarize in tabular form the results of the CD tests and the RA tests or alternative RA procedure, as appropriate. Include all data sheets, calculations, charts (records of CEMS responses), cylinder gas concentration certifications, and calibration cell response certifications (if applicable) necessary to confirm that the performance of the CEMS met the performance specifications.

9.0 *Quality Control*[Reserved]

10.0 *Calibration and Standardization*[Reserved]

11.0 *Analytical Procedure*

Sample collection and analysis are concurrent for this Performance Specification (see Section 8.0).

Refer to the RM for specific analytical procedures.

## 12.0 Calculations and Data Analysis

Summarize the results on a data sheet similar to that shown in Figure 2–2 (in Section 18.0).

12.1 All data from the RM and CEMS must be on a consistent dry basis and, as applicable, on a consistent diluent basis and in the units of the emission standard. Correct the RM and CEMS data for moisture and diluent as follows:

12.1.1 Moisture Correction (as applicable). Correct each wet RM run for moisture with the corresponding Method 4 data; correct each wet CEMS run using the corresponding CEMS moisture monitor data using Equation 2–1.

$$\text{Concentration}_{(\text{dry})} = \frac{\text{Concentration}_{\text{wet}}}{(1 - B_{ws})} \quad \text{Eq. 2-1}$$

12.1.2 Correction to Units of Standard (as applicable). Correct each dry RM run to the units of the emission standard with the corresponding Method 3B data; correct each dry CEMS run using the corresponding CEMS diluent monitor data as follows:

12.1.2.1 Correct to Diluent Basis. The following is an example of concentration (ppm) correction to 7% oxygen.

$$\text{ppm}_{(\text{corr})} = \text{ppm}_{(\text{uncorr})} \left[ \frac{20.9 - 7.0}{20.9 - \%O_2(\text{dry})} \right] \quad \text{Eq. 2-2}$$

The following is an example of mass/gross calorific value (lbs/million Btu) correction.

$$\text{lbs/MMBtu} = \text{Conc}(\text{dry})(\text{F-factor}) (20.9/20.9 - \%O_2)$$

12.2 Arithmetic Mean. Calculate the arithmetic mean of the difference,  $d$ , of a data set as follows:

$$\bar{d} = \frac{1}{n} \sum_{i=1}^n d_i \quad \text{Eq. 2-3}$$

Where:

$n$ =Number of data points.

$$\sum_{i=1}^n d_i = \text{Algebraic summation of the individual differences } d_i.$$

12.3 Standard Deviation. Calculate the standard deviation,  $S_d$ , as follows:

$$S_d = \left[ \frac{\sum_{i=1}^n d_i^2 - \frac{\left[ \sum_{i=1}^n d_i \right]^2}{n}}{n - 1} \right]^{\frac{1}{2}} \quad \text{Eq. 2-4}$$

12.4 Confidence Coefficient. Calculate the 2.5 percent error confidence coefficient (one-tailed),  $CC$ , as

follows:

$$CC = t_{0.975} \frac{S_d}{\sqrt{n}} \quad \text{Eq. 2-5}$$

Where:

$t_{0.975}$ =t-value (see Table 2–1).

12.5 Relative Accuracy. Calculate the RA of a set of data as follows:

$$RA = \frac{[|\bar{d}| + |CC|]}{\overline{RM}} \times 100 \quad \text{Eq. 2-6}$$

Where:

$\bar{d}$ =Absolute value of the mean differences (from Equation 2–3).

$CC$ =Absolute value of the confidence coefficient (from Equation 2–3).

$RM$ =Average RM value. In cases where the average emissions for the test are less than 50 percent of the applicable standard, substitute the emission standard value in the denominator of Eq. 2–6 in place of  $RM$ . In all other cases, use  $RM$ .

### 13.0 Method Performance

13.1 Calibration Drift Performance Specification. The CEMS calibration must not drift or deviate from the reference value of the gas cylinder, gas cell, or optical filter by more than 2.5 percent of the span value. If the CEMS includes pollutant and diluent monitors, the CD must be determined separately for each in terms of concentrations (See Performance Specification 3 for the diluent specifications), and none of the CDs may exceed the specification.

13.2 Relative Accuracy Performance Specification. The RA of the CEMS must be no greater than 20 percent when  $RM$  is used in the denominator of Eq. 2–6 (average emissions during test are greater than 50 percent of the emission standard) or 10 percent when the applicable emission standard is used in the denominator of Eq. 2–6 (average emissions during test are less than 50 percent of the emission standard). For  $SO_2$  emission standards of 130 to and including 86 ng/J (0.30 and 0.20 lb/million Btu), inclusive, use 15 percent of the applicable standard; below 86 ng/J (0.20 lb/million Btu), use 20 percent of the emission standard.

13.3 For instruments that use common components to measure more than one effluent gas constituent, all channels must simultaneously pass the RA requirement, unless it can be demonstrated that any adjustments made to one channel did not affect the others.

### 14.0 Pollution Prevention[Reserved]

### 15.0 Waste Management[Reserved]

### 16.0 Alternative Procedures

Paragraphs 60.13(j)(1) and (2) of 40 CFR part 60 contain criteria for which the reference method procedure for determining relative accuracy (see Section 8.4 of this Performance Specification) may be waived and the following procedure substituted.

16.1 Conduct a complete CEMS status check following the manufacturer's written instructions. The check should include operation of the light source, signal receiver, timing mechanism functions, data acquisition and data reduction functions, data recorders, mechanically operated functions (mirror movements, zero pipe operation, calibration gas valve operations, etc.), sample filters, sample line heaters, moisture traps, and other related functions of the CEMS, as applicable. All parts of the CEMS shall be functioning properly before proceeding to the alternative RA procedure.

## 16.2 Alternative RA Procedure.

16.2.1 Challenge each monitor (both pollutant and diluent, if applicable) with cylinder gases of known concentrations or calibration cells that produce known responses at two measurement points within the ranges shown in Table 2–2 (Section 18).

16.2.2 Use a separate cylinder gas (for point CEMS only) or calibration cell (for path CEMS or where compressed gas cylinders can not be used) for measurement points 1 and 2. Challenge the CEMS and record the responses three times at each measurement point. The Administrator may allow dilution of cylinder gas using the performance criteria in Test Method 205, 40 CFR Part 51, Appendix M. Use the average of the three responses in determining relative accuracy.

16.2.3 Operate each monitor in its normal sampling mode as nearly as possible. When using cylinder gases, pass the cylinder gas through all filters, scrubbers, conditioners, and other monitor components used during normal sampling and as much of the sampling probe as practical. When using calibration cells, the CEMS components used in the normal sampling mode should not be by-passed during the RA determination. These include light sources, lenses, detectors, and reference cells. The CEMS should be challenged at each measurement point for a sufficient period of time to assure adsorption-desorption reactions on the CEMS surfaces have stabilized.

16.2.4 Use cylinder gases that have been certified by comparison to National Institute of Standards and Technology (NIST) gaseous standard reference material (SRM) or NIST/EPA approved gas manufacturer's certified reference material (CRM) (See Reference 2 in Section 17.0) following EPA Traceability Protocol Number 1 (See Reference 3 in Section 17.0). As an alternative to Protocol Number 1 gases, CRM's may be used directly as alternative RA cylinder gases. A list of gas manufacturers that have prepared approved CRM's is available from EPA at the address shown in Reference 2. Procedures for preparation of CRM's are described in Reference 2.

16.2.5 Use calibration cells certified by the manufacturer to produce a known response in the CEMS. The cell certification procedure shall include determination of CEMS response produced by the calibration cell in direct comparison with measurement of gases of known concentration. This can be accomplished using SRM or CRM gases in a laboratory source simulator or through extended tests using reference methods at the CEMS location in the exhaust stack. These procedures are discussed in Reference 4 in Section 17.0. The calibration cell certification procedure is subject to approval of the Administrator.

16.3 The differences between the known concentrations of the cylinder gases and the concentrations indicated by the CEMS are used to assess the accuracy of the CEMS. The calculations and limits of acceptable relative accuracy are as follows:

16.3.1 For pollutant CEMS:

$$RA = \left| \left( \frac{\bar{d}}{AC} \right) 100 \right| \leq 15 \text{ percent} \quad \text{Eq. 2-7}$$

Where:

d=Average difference between responses and the concentration/responses (see Section 16.2.2).

AC=The known concentration/response of the cylinder gas or calibration cell.

16.3.2 For diluent CEMS:

RA= $\bar{d}$   $\leq$  0.7 percent O<sub>2</sub> or CO<sub>2</sub>, as applicable.

Note: Waiver of the relative accuracy test in favor of the alternative RA procedure does not preclude the requirements to complete the CD tests nor any other requirements specified in an applicable subpart for reporting CEMS data and performing CEMS drift checks or audits.

## 17.0 References

1. Department of Commerce. Experimental Statistics. Handbook 91. Washington, D.C. p. 3–31, paragraphs 3–3.1.4.

2. "A Procedure for Establishing Traceability of Gas Mixtures to Certain National Bureau of Standards Standard Reference Materials." Joint publication by NBS and EPA. EPA 600/7-81-010. Available from U.S. Environmental Protection Agency, Quality Assurance Division (MD-77), Research Triangle Park, North Carolina 27711.

3. "Traceability Protocol for Establishing True Concentrations of Gases Used for Calibration and Audits of Continuous Source Emission Monitors. (Protocol Number 1)." June 1978. Protocol Number 1 is included in the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods. EPA-600/4-77-027b. August 1977.

4. "Gaseous Continuous Emission Monitoring Systems—Performance Specification Guidelines for SO<sub>2</sub>, NO<sub>x</sub>, CO<sub>2</sub>, O<sub>2</sub>, and TRS." EPA-450/3-82-026. Available from the U.S. EPA, Emission Measurement Center, Emission Monitoring and Data Analysis Division (MD-19), Research Triangle Park, North Carolina 27711.

18.0 Tables, Diagrams, Flowcharts, and Validation Data

Figure 2-1. Calibration Drift Determination

Table 2-1—t-Values

n <sup>a</sup>	t <sub>0.975</sub>	n <sup>a</sup>	t <sub>0.975</sub>	n <sup>a</sup>	t <sub>0.975</sub>
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

<sup>a</sup>The values in this table are already corrected for n-1 degrees of freedom. Use n equal to the number of individual values.

Table 2-2—Measurement Range

Measurement point	Pollutant monitor	Diluent monitor for	
		CO <sub>2</sub>	O <sub>2</sub>
1	20–30% of span value	5–8% by volume	4–6% by volume.
2	50–60% of span value	10–14% by volume	8–12% by volume.

	Day	Date and time	Calibration value (C)	Monitor value (M)	Difference (C-M)	Percent of span value (C-M)/span value × 100
Low-level						

High-level						

Figure 2–2. Relative Accuracy Determination.

Run No.	Date and time	SO <sub>2</sub>			NO <sub>x</sub> <sup>b</sup>			CO <sub>2</sub> or O <sub>2</sub> <sup>a</sup>		SO <sub>2</sub> <sup>a</sup>			NO <sub>x</sub> <sup>a</sup>		
		RM	CEMS	Diff	RM	CEMS	Diff	RM	CEMS	RM	CEMS	Diff	RM	CEMS	Diff
		ppm <sup>c</sup>			ppm <sup>c</sup>			% <sup>c</sup>	% <sup>c</sup>	mass/GCV			mass/GCV		
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
Average															
Confidence Interval															
Accuracy															

<sup>a</sup>For steam generators.

<sup>b</sup>Average of three samples.

<sup>c</sup>Make sure that RM and CEMS data are on a consistent basis, either wet or dry.

Performance Specification 3—Specifications and Test Procedures for O<sub>2</sub> and CO<sub>2</sub> Continuous Emission Monitoring Systems in Stationary Sources

1.0 Scope and Application

1.1 Analytes.

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Analytes	CAS No.
Carbon Dioxide (CO <sub>2</sub> )	124-38-9
Oxygen (O <sub>2</sub> )	7782-44-7

## 1.2 Applicability.

1.2.1 This specification is for evaluating acceptability of O<sub>2</sub> and CO<sub>2</sub> continuous emission monitoring systems (CEMS) at the time of installation or soon after and whenever specified in an applicable subpart of the regulations. This specification applies to O<sub>2</sub> or CO<sub>2</sub> monitors that are not included under Performance Specification 2 (PS 2).

1.2.2 This specification is not designed to evaluate the installed CEMS performance over an extended period of time, nor does it identify specific calibration techniques and other auxiliary procedures to assess the CEMS performance. The source owner or operator, is responsible to calibrate, maintain, and operate the CEMS properly. The Administrator may require, under Section 114 of the Act, the operator to conduct CEMS performance evaluations at other times besides the initial test to evaluate the CEMS performance. See 40 CFR part 60, Section 60.13(c).

1.2.3 The definitions, installation and measurement location specifications, calculations and data analysis, and references are the same as in PS 2, Sections 3, 8.1, 12, and 17, respectively, and also apply to O<sub>2</sub> and CO<sub>2</sub> CEMS under this specification. The performance and equipment specifications and the relative accuracy (RA) test procedures for O<sub>2</sub> and CO<sub>2</sub> CEMS do not differ from those for SO<sub>2</sub> and NO<sub>x</sub> CEMS (see PS 2), except as noted below.

## 2.0 Summary of Performance Specification

The RA and calibration drift (CD) tests are conducted to determine conformance of the CEMS to the specification.

### 3.0 Definitions

Same as in Section 3.0 of PS 2.

### 4.0 Interferences [Reserved]

### 5.0 Safety

This performance specification may involve hazardous materials, operations, and equipment. This performance specification may not address all of the safety problems associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicable regulatory limitations prior to performing this performance specification. The CEMS users manual should be consulted for specific precautions to be taken with regard to the analytical procedures.

### 6.0 Equipment and Supplies

Same as Section 6.0 of PS2.

### 7.0 Reagents and Standards

Same as Section 7.0 of PS2.

### 8.0 Sample Collection, Preservation, Storage, and Transport

8.1 Relative Accuracy Test Procedure. Sampling Strategy for reference method (RM) Tests, Correlation of RM and CEMS Data, and Number of RM Tests. Same as PS 2, Sections 8.4.3, 8.4.5, and 8.4.4, respectively.

8.2 Reference Method. Unless otherwise specified in an applicable subpart of the regulations, Method 3B or other approved alternative is the RM for O<sub>2</sub> or CO<sub>2</sub>.

*9.0 Quality Control[Reserved]**10.0 Calibration and Standardization[Reserved]**11.0 Analytical Procedure*

Sample collection and analyses are concurrent for this performance specification (see Section 8). Refer to the RM for specific analytical procedures.

*12.0 Calculations and Data Analysis*

Summarize the results on a data sheet similar to that shown in Figure 2.2 of PS2. Calculate the arithmetic difference between the RM and the CEMS output for each run. The average difference of the nine (or more) data sets constitute the RA.

*13.0 Method Performance*

13.1 Calibration Drift Performance Specification. The CEMS calibration must not drift by more than 0.5 percent O<sub>2</sub> or CO<sub>2</sub> from the reference value of the gas, gas cell, or optical filter.

13.2 CEMS Relative Accuracy Performance Specification. The RA of the CEMS must be no greater than 1.0 percent O<sub>2</sub> or CO<sub>2</sub>.

*14.0 Pollution Prevention[Reserved]**15.0 Waste Management[Reserved]**16.0 References*

Same as in Section 17.0 of PS 2.

*17.0 Tables, Diagrams, Flowcharts, and Validation Data[Reserved]*

Performance Specification 4—Specifications and Test Procedures for Carbon Monoxide Continuous Emission Monitoring Systems in Stationary Sources

*1.0 Scope and Application*

## 1.1 Analytes.

Analyte	CAS No.
Carbon Monoxide (CO)	630-08-0

## 1.2 Applicability.

1.2.1 This specification is for evaluating the acceptability of carbon monoxide (CO) continuous emission monitoring systems (CEMS) at the time of installation or soon after and whenever specified in an applicable subpart of the regulations. This specification was developed primarily for CEMS having span values of 1,000 ppmv CO.

1.2.2 This specification is not designed to evaluate the installed CEMS performance over an extended period of time nor does it identify specific calibration techniques and other auxiliary procedures to assess CEMS performance. The source owner or operator, is responsible to calibrate, maintain, and operate the CEMS. The Administrator may require, under Section 114 of the Act, the source owner or operator to conduct CEMS performance evaluations at other times besides the initial test to evaluate the CEMS performance. See 40 CFR part 60, Section 60.13(c).

1.2.3 The definitions, performance specification test procedures, calculations, and data analysis procedures for determining calibration drift (CD) and relative accuracy (RA) of Performance Specification 2 (PS 2), Sections 3, 8.0, and 12, respectively, apply to this specification.

## 2.0 Summary of Performance Specification

The CD and RA tests are conducted to determine conformance of the CEMS to the specification.

## 3.0 Definitions

Same as in Section 3.0 of PS 2.

## 4.0 Interferences[Reserved]

## 5.0 Safety

This performance specification may involve hazardous materials, operations, and equipment. This performance specification may not address all of the safety problems associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicable regulatory limitations prior to performing this performance specification. The CEMS users manual should be consulted for specific precautions to be taken with regard to the analytical procedures.

## 6.0 Equipment and Supplies

Same as Section 6.0 of PS 2.

## 7.0 Reagents and Standards

Same as Section 7.0 of PS 2.

## 8.0 Sample Collection, Preservation, Storage, and Transport

8.1 Relative Accuracy Test Procedure. Sampling Strategy for reference method (RM) Tests, Number of RM Tests, and Correlation of RM and CEMS Data are the same as PS 2, Sections 8.4.3, 8.4.4, and 8.4.5, respectively.

8.2 Reference Methods. Unless otherwise specified in an applicable subpart of the regulation, Method 10, 10A, 10B or other approved alternative are the RM for this PS. When evaluating nondispersive infrared CEMS using Method 10 as the RM, the alternative interference trap specified in Section 16.0 of Method 10 shall be used.

## 9.0 Quality Control[Reserved]

## 10.0 Calibration and Standardization[Reserved]

## 11.0 Analytical Procedure

Sample collection and analysis are concurrent for this performance specification (see Section 8.0). Refer to the RM for specific analytical procedures.

## 12.0 Calculations and Data Analysis

Same as Section 12.0 of PS 2.

## 13.0 Method Performance

13.1 Calibration Drift. The CEMS calibration must not drift or deviate from the reference value of the calibration gas, gas cell, or optical filter by more than 5 percent of the established span value for 6 out of 7 test days ( e.g., the established span value is 1000 ppm for Subpart J affected facilities).

13.2 Relative Accuracy. The RA of the CEMS must be no greater than 10 percent when the average RM value is used to calculate RA or 5 percent when the applicable emission standard is used to calculate RA.

## 14.0 Pollution Prevention[Reserved]

*15.0 Waste Management[Reserved]**16.0 Alternative Procedures[Reserved]**17.0 References*

1. Ferguson, B.B., R.E. Lester, and W.J. Mitchell. Field Evaluation of Carbon Monoxide and Hydrogen Sulfide Continuous Emission Monitors at an Oil Refinery. U.S. Environmental Protection Agency. Research Triangle Park, N.C. Publication No. EPA-600/4-82-054. August 1982. 100 p.
2. "Gaseous Continuous Emission Monitoring Systems—Performance Specification Guidelines for SO<sub>2</sub>, NO<sub>x</sub>, CO<sub>2</sub>, O<sub>2</sub>, and TRS." EPA-450/3-82-026. U.S. Environmental Protection Agency, Technical Support Division (MD-19), Research Triangle Park, NC 27711.
3. Repp, M. Evaluation of Continuous Monitors for Carbon Monoxide in Stationary Sources. U.S. Environmental Protection Agency. Research Triangle Park, N.C. Publication No. EPA-600/2-77-063. March 1977. 155 p.
4. Smith, F., D.E. Wagoner, and R.P. Donovan. Guidelines for Development of a Quality Assurance Program: Volume VIII—Determination of CO Emissions from Stationary Sources by NDIR Spectrometry. U.S. Environmental Protection Agency. Research Triangle Park, N.C. Publication No. EPA-650/4-74-005-h. February 1975. 96 p.

*18.0 Tables, Diagrams, Flowcharts, and Validation Data*

Same as Section 18.0 of PS 2.

Performance Specification 4A—Specifications and Test Procedures for Carbon Monoxide Continuous Emission Monitoring Systems in Stationary Sources

*1.0 Scope and Application**1.1 Analytes.*

Analyte	CAS No.
Carbon Monoxide (CO)	630-80-0

*1.2 Applicability.*

1.2.1 This specification is for evaluating the acceptability of carbon monoxide (CO) continuous emission monitoring systems (CEMS) at the time of installation or soon after and whenever specified in an applicable subpart of the regulations. This specification was developed primarily for CEMS that comply with low emission standards (less than 200 ppmv).

1.2.2 This specification is not designed to evaluate the installed CEMS performance over an extended period of time nor does it identify specific calibration techniques and other auxiliary procedures to assess CEMS performance. The source owner or operator is responsible to calibrate, maintain, and operate the CEMS. The Administrator may require, under Section 114 of the Act, the source owner or operator to conduct CEMS performance evaluations at other times besides the initial test to evaluate CEMS performance. See 40 CFR Part 60, Section 60.13(c).

1.2.3 The definitions, performance specification, test procedures, calculations and data analysis procedures for determining calibration drifts (CD) and relative accuracy (RA), of Performance Specification 2 (PS 2), Sections 3, 8.0, and 12, respectively, apply to this specification.

*2.0 Summary of Performance Specification*

The CD and RA tests are conducted to determine conformance of the CEMS to the specification.

*3.0 Definitions*

Same as in Section 3.0 of PS 2.

#### 4.0 *Interferences*[Reserved]

#### 5.0 *Safety*

This performance specification may involve hazardous materials, operations, and equipment. This performance specification may not address all of the safety problems associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicable regulatory limitations prior to performing this performance specification. The CEMS users manual should be consulted for specific precautions to be taken with regard to the analytical procedures.

#### 6.0 *Equipment and Supplies*

Same as Section 6.0 of PS 2 with the following additions.

##### 6.1 *Data Recorder Scale.*

6.1.1 This specification is the same as Section 6.1 of PS 2. The CEMS shall be capable of measuring emission levels under normal conditions and under periods of short-duration peaks of high concentrations. This dual-range capability may be met using two separate analyzers (one for each range) or by using dual-range units which have the capability of measuring both levels with a single unit. In the latter case, when the reading goes above the full-scale measurement value of the lower range, the higher-range operation shall be started automatically. The CEMS recorder range must include zero and a high-level value. Under applications of consistent low emissions, a single-range analyzer is allowed provided normal and spike emissions can be quantified. In this case, set an appropriate high-level value to include all emissions.

6.1.2 For the low-range scale of dual-range units, the high-level value shall be between 1.5 times the pollutant concentration corresponding to the emission standard level and the span value. For the high-range scale, the high-level value shall be set at 2000 ppm, as a minimum, and the range shall include the level of the span value. There shall be no concentration gap between the low-and high-range scales.

#### 7.0 *Reagents and Standards*

Same as Section 7.0 of PS 2.

#### 8.0 *Sample Collection, Preservation, Storage, and Transport*

8.1 *Relative Accuracy Test Procedure. Sampling Strategy for reference method (RM) Tests, Number of RM Tests, and Correlation of RM and CEMS Data* are the same as PS 2, Sections 8.4.3, 8.4.4, and 8.4.5, respectively.

8.2 *Reference Methods.* Unless otherwise specified in an applicable subpart of the regulation, Methods 10, 10A, 10B, or other approved alternative is the RM for this PS. When evaluating nondispersive infrared CEMS using Method 10 as the RM, the alternative interference trap specified in Section 16.0 of Method 10 shall be used.

8.3 *Response Time Test Procedure.* The response time test applies to all types of CEMS, but will generally have significance only for extractive systems.

8.3.1 Introduce zero gas into the analyzer. When the system output has stabilized (no change greater than 1 percent of full scale for 30 sec), introduce an upscale calibration gas and wait for a stable value. Record the time (upscale response time) required to reach 95 percent of the final stable value. Next, reintroduce the zero gas and wait for a stable reading before recording the response time (downscale response time). Repeat the entire procedure three times and determine the mean upscale and downscale response times. The slower or longer of the two means is the system response time.

8.4 *Interference Check.* The CEMS must be shown to be free from the effects of any interferences.

#### 9.0 *Quality Control*[Reserved]

#### 10.0 *Calibration and Standardization*[Reserved]

### 11.0 Analytical Procedure

Sample collection and analysis are concurrent for this performance specification (see Section 8.0). Refer to the RM for specific analytical procedures.

### 12.0 Calculations and Data Analysis. Same as Section 12.0 of PS 2

### 13.0 Method Performance

13.1 Calibration Drift. The CEMS calibration must not drift or deviate from the reference value of the calibration gas, gas cell, or optical filter by more than 5 percent of the established span value for 6 out of 7 test days.

13.2 Relative Accuracy. The RA of the CEMS must be no greater than 10 percent when the average RM value is used to calculate RA, 5 percent when the applicable emission standard is used to calculate RA, or within 5 ppmv when the RA is calculated as the absolute average difference between the RM and CEMS plus the 2.5 percent confidence coefficient.

13.3 Response Time. The CEMS response time shall not exceed 1.5 min to achieve 95 percent of the final stable value.

### 14.0 Pollution Prevention[Reserved]

### 15.0 Waste Management[Reserved]

### 16.0 Alternative Procedures

16.1 Under conditions where the average CO emissions are less than 10 percent of the standard and this is verified by Method 10, a cylinder gas audit may be performed in place of the RA test to determine compliance with these limits. In this case, the cylinder gas shall contain CO in 12 percent carbon dioxide as an interference check. If this option is exercised, Method 10 must be used to verify that emission levels are less than 10 percent of the standard.

### 17.0 References

Same as Section 17 of PS 4.

### 18.0 Tables, Diagrams, Flowcharts, and Validation Data

Same as Section 18.0 of PS 2.

Performance Specification 4B—Specifications and Test Procedures for Carbon Monoxide and Oxygen Continuous Monitoring Systems in Stationary Sources

#### a. Applicability and Principle

1.1 Applicability. a. This specification is to be used for evaluating the acceptability of carbon monoxide (CO) and oxygen (O<sub>2</sub>) continuous emission monitoring systems (CEMS) at the time of or soon after installation and whenever specified in the regulations. The CEMS may include, for certain stationary sources, (a) flow monitoring equipment to allow measurement of the dry volume of stack effluent sampled, and (b) an automatic sampling system.

b. This specification is not designed to evaluate the installed CEMS' performance over an extended period of time nor does it identify specific calibration techniques and auxiliary procedures to assess the CEMS' performance. The source owner or operator, however, is responsible to properly calibrate, maintain, and operate the CEMS. To evaluate the CEMS' performance, the Administrator may require, under section 114 of the Act, the operator to conduct CEMS performance evaluations at times other than the initial test.

c. The definitions, installation and measurement location specifications, test procedures, data reduction procedures, reporting requirements, and bibliography are the same as in PS 3 (for O<sub>2</sub>) and PS 4A (for CO) except as otherwise noted below.

1.2 Principle. Installation and measurement location specifications, performance specifications, test procedures, and data reduction procedures are included in this specification. Reference method tests, calibration error tests, calibration drift tests, and interferant tests are conducted to determine conformance of the CEMS with the specification.

*b. Definitions*

2.1 *Continuous Emission Monitoring System (CEMS)*. This definition is the same as PS 2 Section 2.1 with the following addition. A continuous monitor is one in which the sample to be analyzed passes the measurement section of the analyzer without interruption.

2.2 *Response Time*. The time interval between the start of a step change in the system input and when the pollutant analyzer output reaches 95 percent of the final value.

2.3 *Calibration Error (CE)*. The difference between the concentration indicated by the CEMS and the known concentration generated by a calibration source when the entire CEMS, including the sampling interface is challenged. A CE test procedure is performed to document the accuracy and linearity of the CEMS over the entire measurement range.

*3. Installation and Measurement Location Specifications*

3.1 *The CEMS Installation and Measurement Location*. This specification is the same as PS 2 Section 3.1 with the following additions. Both the CO and O<sub>2</sub> monitors should be installed at the same general location. If this is not possible, they may be installed at different locations if the effluent gases at both sample locations are not stratified and there is no in-leakage of air between sampling locations.

3.1.1 *Measurement Location*. Same as PS 2 Section 3.1.1.

3.1.2 *Point CEMS*. The measurement point should be within or centrally located over the centroidal area of the stack or duct cross section.

3.1.3 *Path CEMS*. The effective measurement path should: (1) Have at least 70 percent of the path within the inner 50 percent of the stack or duct cross sectional area, or (2) be centrally located over any part of the centroidal area.

3.2 *Reference Method (RM) Measurement Location and Traverse Points*. This specification is the same as PS 2 Section 3.2 with the following additions. When pollutant concentration changes are due solely to diluent leakage and CO and O<sub>2</sub> are simultaneously measured at the same location, one half diameter may be used in place of two equivalent diameters.

3.3 *Stratification Test Procedure*. Stratification is defined as the difference in excess of 10 percent between the average concentration in the duct or stack and the concentration at any point more than 1.0 meter from the duct or stack wall. To determine whether effluent stratification exists, a dual probe system should be used to determine the average effluent concentration while measurements at each traverse point are being made. One probe, located at the stack or duct centroid, is used as a stationary reference point to indicate change in the effluent concentration over time. The second probe is used for sampling at the traverse points specified in Method 1 (40 CFR part 60 appendix A). The monitoring system samples sequentially at the reference and traverse points throughout the testing period for five minutes at each point.

*d. Performance and Equipment Specifications*

4.1 *Data Recorder Scale*. For O<sub>2</sub>, same as specified in PS 3, except that the span must be 25 percent. The span of the O<sub>2</sub> may be higher if the O<sub>2</sub> concentration at the sampling point can be greater than 25 percent. For CO, same as specified in PS 4A, except that the low-range span must be 200 ppm and the high range span must be 3000 ppm. In addition, the scale for both CEMS must record all readings within a measurement range with a resolution of 0.5 percent.

4.2 *Calibration Drift*. For O<sub>2</sub>, same as specified in PS 3. For CO, the same as specified in PS 4A except that the CEMS calibration must not drift from the reference value of the calibration standard by more than 3 percent of the span value on either the high or low range.

4.3 *Relative Accuracy (RA)*. For O<sub>2</sub>, same as specified in PS 3. For CO, the same as specified in PS 4A.

4.4 *Calibration Error (CE)*. The mean difference between the CEMS and reference values at all three test points (see Table I) must be no greater than 5 percent of span value for CO monitors and 0.5 percent for O<sub>2</sub> monitors.

4.5 *Response Time*. The response time for the CO or O<sub>2</sub> monitor must not exceed 2 minutes.

*e. Performance Specification Test Procedure*

5.1 *Calibration Error Test and Response Time Test Periods*. Conduct the CE and response time tests during the CD test period.

*F. The CEMS Calibration Drift and Response Time Test Procedures*

The response time test procedure is given in PS 4A, and must be carried out for both the CO and O<sub>2</sub> monitors.

7. Relative Accuracy and Calibration Error Test Procedures

7.1 *Calibration Error Test Procedure*. Challenge each monitor (both low and high range CO and O<sub>2</sub>) with zero gas and EPA Protocol 1 cylinder gases at three measurement points within the ranges specified in Table I.

**Table I. Calibration Error Concentration Ranges**

Measurement point	CO Low range (ppm)	CO High range (ppm)	O <sub>2</sub> (%)
1	0–40	0–600	0–2
2	60–80	900–1200	8–10
3	140–160	2100–2400	14–16

Operate each monitor in its normal sampling mode as nearly as possible. The calibration gas must be injected into the sample system as close to the sampling probe outlet as practical and should pass through all CEMS components used during normal sampling. Challenge the CEMS three non-consecutive times at each measurement point and record the responses. The duration of each gas injection should be sufficient to ensure that the CEMS surfaces are conditioned.

7.1.1 *Calculations*. Summarize the results on a data sheet. Average the differences between the instrument response and the certified cylinder gas value for each gas. Calculate the CE results according to:

$$CE = |d / FS| \times 100 \quad (1)$$

where *d* is the mean difference between the CEMS response and the known reference concentration and *FS* is the span value.

7.2 *Relative Accuracy Test Procedure*. Follow the RA test procedures in PS 3 (for O<sub>2</sub>) section 3 and PS 4A (for CO) section 4.

7.3 *Alternative RA Procedure*. Under some operating conditions, it may not be possible to obtain meaningful results using the RA test procedure. This includes conditions where consistent, very low CO emission or low CO emissions interrupted periodically by short duration, high level spikes are observed. It may be appropriate in these circumstances to waive the RA test and substitute the following procedure.

Conduct a complete CEMS status check following the manufacturer's written instructions. The check should include operation of the light source, signal receiver, timing mechanism functions, data acquisition and data reduction functions, data recorders, mechanically operated functions, sample filters, sample line heaters, moisture traps, and other related functions of the CEMS, as applicable. All parts of the CEMS must be functioning properly before the RA requirement can be waived. The instrument must also successfully passed the CE and CD specifications. Substitution of the alternate procedure requires

approval of the Regional Administrator.

## 8. Bibliography

1. 40 CFR Part 266, Appendix IX, Section 2, "Performance Specifications for Continuous Emission Monitoring Systems."

Performance Specification 5—Specifications and Test Procedures for TRS Continuous Emission Monitoring Systems in Stationary Sources

### 1.0 Scope and Application

#### 1.1 Analytes.

Analyte	CAS No.
Total Reduced Sulfur (TRS)	NA

1.2 Applicability. This specification is for evaluating the applicability of TRS continuous emission monitoring systems (CEMS) at the time of installation or soon after and whenever specified in an applicable subpart of the regulations. The CEMS may include oxygen monitors which are subject to Performance Specification 3 (PS 3).

1.3 The definitions, performance specification, test procedures, calculations and data analysis procedures for determining calibration drifts (CD) and relative accuracy (RA) of PS 2, Sections 3.0, 8.0, and 12.0, respectively, apply to this specification.

### 2.0 Summary of Performance Specification

The CD and RA tests are conducted to determine conformance of the CEMS to the specification.

### 3.0 Definitions

Same as in Section 3.0 of PS 2.

### 4.0 Interferences[Reserved]

### 5.0 Safety

This performance specification may involve hazardous materials, operations, and equipment. This performance specification may not address all of the safety problems associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicable regulatory limitations prior to performing this performance specification. The CEMS users manual should be consulted for specific precautions to be taken with regard to the analytical procedures.

### 6.0 Equipment and Supplies

Same as Section 6.0 of PS 2.

### 7.0 Reagents and Standards

Same as Section 7.0 of PS 2.

### 8.0 Sample Collection, Preservation, Storage, and Transport

8.1 Relative Accuracy Test Procedure. Sampling Strategy for reference method (RM) Tests, Number of RM Tests, and Correlation of RM and CEMS Data are the same as PS 2, Sections 8.4.3, 8.4.4, and 8.4.5, respectively.

Note: For Method 16, a sample is made up of at least three separate injects equally space over time. For Method 16A, a sample is collected for at least 1 hour.

8.2 Reference Methods. Unless otherwise specified in the applicable subpart of the regulations, Method 16, Method 16A, 16B or other approved alternative is the RM for TRS.

*9.0 Quality Control[Reserved]*

*10.0 Calibration and Standardization[Reserved]*

*11.0 Analytical Procedure*

Sample collection and analysis are concurrent for this performance specification (see Section 8.0). Refer to the reference method for specific analytical procedures.

*12.0 Calculations and Data Analysis*

Same as Section 12.0 of PS 2.

*13.0 Method Performance*

13.1 Calibration Drift. The CEMS detector calibration must not drift or deviate from the reference value of the calibration gas by more than 5 percent of the established span value for 6 out of 7 test days. This corresponds to 1.5 ppm drift for Subpart BB sources where the span value is 30 ppm. If the CEMS includes pollutant and diluent monitors, the CD must be determined separately for each in terms of concentrations (see PS 3 for the diluent specifications).

13.2 Relative Accuracy. The RA of the CEMS must be no greater than 20 percent when the average RM value is used to calculate RA or 10 percent when the applicable emission standard is used to calculate RA.

*14.0 Pollution Prevention[Reserved]*

*15.0 Waste Management[Reserved]*

*16.0 Alternative Procedures[Reserved]*

*17.0 References*

1. Department of Commerce. Experimental Statistics, National Bureau of Standards, Handbook 91. 1963. Paragraphs 3–3.1.4, p. 3–31.

2. A Guide to the Design, Maintenance and Operation of TRS Monitoring Systems. National Council for Air and Stream Improvement Technical Bulletin No. 89. September 1977.

3. Observation of Field Performance of TRS Monitors on a Kraft Recovery Furnace. National Council for Air and Stream Improvement Technical Bulletin No. 91. January 1978.

*18.0 Tables, Diagrams, Flowcharts, and Validation Data*

Same as Section 18.0 of PS 2.

Performance Specification 6—Specifications and Test Procedures for Continuous Emission Rate Monitoring Systems in Stationary Sources

*1.0 Scope and Application*

1.1 Applicability. This specification is used for evaluating the acceptability of continuous emission rate monitoring systems (CERMSs).

1.2 The installation and measurement location specifications, performance specification test procedure, calculations, and data analysis procedures, of Performance Specifications (PS 2), Sections 8.0 and 12, respectively, apply to this specification.

*2.0 Summary of Performance Specification*

The calibration drift (CD) and relative accuracy (RA) tests are conducted to determine conformance of the CERMS to the specification.

### 3.0 Definitions

The definitions are the same as in Section 3 of PS 2, except this specification refers to the continuous emission rate monitoring system rather than the continuous emission monitoring system. The following definitions are added:

3.1 *Continuous Emission Rate Monitoring System (CERMS)*. The total equipment required for the determining and recording the pollutant mass emission rate (in terms of mass per unit of time).

3.2 *Flow Rate Sensor*. That portion of the CERMS that senses the volumetric flow rate and generates an output proportional to that flow rate. The flow rate sensor shall have provisions to check the CD for each flow rate parameter that it measures individually ( e.g., velocity, pressure).

### 4.0 Interferences[Reserved]

### 5.0 Safety

This performance specification may involve hazardous materials, operations, and equipment. This performance specification may not address all of the safety problems associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicable regulatory limitations prior to performing this performance specification. The CERMS users manual should be consulted for specific precautions to be taken with regard to the analytical procedures.

### 6.0 Equipment and Supplies

Same as Section 6.0 of PS 2.

### 7.0 Reagents and Standards

Same as Section 7.0 of PS 2.

### 8.0 Sample Collection, Preservation, Storage, and Transport

#### 8.1 Calibration Drift Test Procedure.

8.1.1 The CD measurements are to verify the ability of the CERMS to conform to the established CERMS calibrations used for determining the emission rate. Therefore, if periodic automatic or manual adjustments are made to the CERMS zero and calibration settings, conduct the CD tests immediately before these adjustments, or conduct them in such a way that CD can be determined.

8.1.2 Conduct the CD tests for pollutant concentration at the two values specified in Section 6.1.2 of PS 2. For other parameters that are selectively measured by the CERMS ( e.g., velocity, pressure, flow rate), use two analogous values ( e.g., Low: 0–20% of full scale, High: 50–100% of full scale). Introduce to the CERMS the reference signals (these need not be certified). Record the CERMS response to each and subtract this value from the respective reference value (see example data sheet in Figure 6–1).

#### 8.2 Relative Accuracy Test Procedure.

8.2.1 Sampling Strategy for reference method (RM) Tests, Correlation of RM and CERMS Data, and Number of RM Tests are the same as PS 2, Sections 8.4.3, 8.4.5, and 8.4.4, respectively. Summarize the results on a data sheet. An example is shown in Figure 6–1. The RA test may be conducted during the CD test period.

8.2.2 Reference Methods. Unless otherwise specified in the applicable subpart of the regulations, the RM for the pollutant gas is the Appendix A method that is cited for compliance test purposes, or its approved alternatives. Methods 2, 2A, 2B, 2C, or 2D, as applicable, are the RMs for the determination of volumetric flow rate.

### 9.0 Quality Control[Reserved]

### 10.0 Calibration and Standardization[Reserved]

*11.0 Analytical Procedure*

Same as Section 11.0 of PS 2.

*12.0 Calculations and Data Analysis*

Same as Section 12.0 of PS 2.

*13.0 Method Performance*

13.1 Calibration Drift. Since the CERMS includes analyzers for several measurements, the CD shall be determined separately for each analyzer in terms of its specific measurement. The calibration for each analyzer associated with the measurement of flow rate shall not drift or deviate from each reference value of flow rate by more than 3 percent of the respective high-level value. The CD specification for each analyzer for which other PSs have been established ( e.g., PS 2 for SO<sub>2</sub> and NO<sub>x</sub>), shall be the same as in the applicable PS.

13.2 CERMS Relative Accuracy. The RA of the CERMS shall be no greater than 20 percent of the mean value of the RM's test data in terms of the units of the emission standard, or 10 percent of the applicable standard, whichever is greater.

*14.0 Pollution Prevention[Reserved]**15.0 Waste Management[Reserved]**16.0 Alternative Procedures*

Same as in Section 16.0 of PS 2.

*17.0 References*

1. Brooks, E.F., E.C. Beder, C.A. Flegal, D.J. Luciani, and R. Williams. Continuous Measurement of Total Gas Flow Rate from Stationary Sources. U.S. Environmental Protection Agency. Research Triangle Park, North Carolina. Publication No. EPA-650/2-75-020. February 1975. 248 p.

*18.0 Tables, Diagrams, Flowcharts, and Validation Data*

Run No.	Date and time	Emission rate (kg/hr) <sup>a</sup>		
		CERMS	RMs	Difference (RMs-CERMS)
1				
2				
3				
4				
5				
6				
7				
8				
9				

<sup>a</sup>The RMs and CERMS data as corrected to a consistent basis ( i.e., moisture, temperature, and pressure conditions).

Figure 6-1—Emission Rate Determinations

Performance Specification 7—Specifications and Test Procedures for Hydrogen Sulfide Continuous Emission Monitoring Systems in Stationary Sources

## 1.0 Scope and Application

### 1.1 Analytes.

Analyte	CAS No.
Hydrogen Sulfide	7783-06-4

### 1.2 Applicability.

1.2.1 This specification is to be used for evaluating the acceptability of hydrogen sulfide (H<sub>2</sub>S) continuous emission monitoring systems (CEMS) at the time of or soon after installation and whenever specified in an applicable subpart of the regulations.

1.2.2 This specification is not designed to evaluate the installed CEMS performance over an extended period of time nor does it identify specific calibration techniques and other auxiliary procedures to assess CEMS performance. The source owner or operator, however, is responsible to calibrate, maintain, and operate the CEMS. To evaluate CEMS performance, the Administrator may require, under Section 114 of the Act, the source owner or operator to conduct CEMS performance evaluations at other times besides the initial test. See Section 60.13(c).

## 2.0 Summary

Calibration drift (CD) and relative accuracy (RA) tests are conducted to determine that the CEMS conforms to the specification.

## 3.0 Definitions

Same as Section 3.0 of PS 2.

## 4.0 Interferences[Reserved]

## 5.0 Safety

The procedures required under this performance specification may involve hazardous materials, operations, and equipment. This performance specification may not address all of the safety problems associated with these procedures. It is the responsibility of the user to establish appropriate safety problems associated with these procedures. It is the responsibility of the user to establish appropriate safety and health practices and determine the application regulatory limitations prior to performing these procedures. The CEMS user's manual and materials recommended by the reference method should be consulted for specific precautions to be taken.

## 6.0 Equipment and Supplies

6.1 Instrument Zero and Span. This specification is the same as Section 6.1 of PS 2.

6.2 Calibration Drift. The CEMS calibration must not drift or deviate from the reference value of the calibration gas or reference source by more than 5 percent of the established span value for 6 out of 7 test days (e.g., the established span value is 300 ppm for Subpart J fuel gas combustion devices).

6.3 Relative Accuracy. The RA of the CEMS must be no greater than 20 percent when the average reference method (RM) value is used to calculate RA or 10 percent when the applicable emission standard is used to calculate RA.

## 7.0 Reagents and Standards

Same as Section 7.0 of PS 2.

## 8.0 Sample Collection, Preservation, Storage, and Transport.

8.1 Installation and Measurement Location Specification. Same as Section 8.1 of PS 2.

8.2 Pretest Preparation. Same as Section 8.2 of PS 2.

8.3 Calibration Drift Test Procedure. Same as Section 8.3 of PS 2.

8.4 Relative Accuracy Test Procedure.

8.4.1 Sampling Strategy for RM Tests, Correlation of RM and CEMS Data, and Number of RM Tests. These are the same as that in PS 2, Sections 8.4.3, 8.4.5, and 8.4.4, respectively.

8.4.2 Reference Methods. Unless otherwise specified in an applicable subpart of the regulation, Method 11 is the RM for this PS.

8.5 Reporting. Same as Section 8.5 of PS 2.

9.0 *Quality Control*[Reserved]

10.0 *Calibration and Standardizations*[Reserved]

11.0 *Analytical Procedures*

Sample Collection and analysis are concurrent for this PS (see Section 8.0). Refer to the RM for specific analytical procedures.

12.0 *Data Analysis and Calculations*

Same as Section 12.0 of PS 2.

13.0 *Method Performance*[Reserved]

14.0 *Pollution Prevention*[Reserved]

15.0 *Waste Management*[Reserved]

16.0 *References*

1. U.S. Environmental Protection Agency. Standards of Performance for New Stationary Sources; Appendix B; Performance Specifications 2 and 3 for SO<sub>2</sub>, NO<sub>x</sub>, CO<sub>2</sub>, and O<sub>2</sub> Continuous Emission Monitoring Systems; Final Rule. 48 CFR 23608. Washington, D.C. U.S. Government Printing Office. May 25, 1983.

2. U.S. Government Printing Office. Gaseous Continuous Emission Monitoring Systems—Performance Specification Guidelines for SO<sub>2</sub>, NO<sub>x</sub>, CO<sub>2</sub>, O<sub>2</sub>, and TRS. U.S. Environmental Protection Agency. Washington, D.C. EPA-450/3-82-026. October 1982. 26 p.

3. Maines, G.D., W.C. Kelly (Scott Environmental Technology, Inc.), and J.B. Homolya. Evaluation of Monitors for Measuring H<sub>2</sub>S in Refinery Gas. Prepared for the U.S. Environmental Protection Agency. Research Triangle Park, N.C. Contract No. 68-02-2707. 1978. 60 p.

4. Ferguson, B.B., R.E. Lester (Harmon Engineering and Testing), and W.J. Mitchell. Field Evaluation of Carbon Monoxide and Hydrogen Sulfide Continuous Emission Monitors at an Oil Refinery. Prepared for the U.S. Environmental Protection Agency. Research Triangle Park, N.C. Publication No. EPA-600/4-82-054. August 1982. 100 p.

17.0 *Tables, Diagrams, Flowcharts, and Validation Data*

Same as Section 18.0 of PS 2.

Performance Specification 8—Performance Specifications for Volatile Organic Compound Continuous Emission Monitoring Systems in Stationary Sources

1.0 *Scope and Application*

## 1.1 Analytes. Volatile Organic Compounds (VOCs).

### 1.2 Applicability.

1.2.1 This specification is to be used for evaluating a continuous emission monitoring system (CEMS) that measures a mixture of VOC's and generates a single combined response value. The VOC detection principle may be flame ionization (FI), photoionization (PI), non-dispersive infrared absorption (NDIR), or any other detection principle that is appropriate for the VOC species present in the emission gases and that meets this performance specification. The performance specification includes procedures to evaluate the acceptability of the CEMS at the time of or soon after its installation and whenever specified in emission regulations or permits. This specification is not designed to evaluate the installed CEMS performance over an extended period of time, nor does it identify specific calibration techniques and other auxiliary procedures to assess the CEMS performance. The source owner or operator, however, is responsible to calibrate, maintain, and operate the CEMS properly. To evaluate the CEMS performance, the Administrator may require, under Section 114 of the Act, the operator to conduct CEMS performance evaluations in addition to the initial test. See Section 60.13(c).

1.2.2 In most emission circumstances, most VOC monitors can provide only a relative measure of the total mass or volume concentration of a mixture of organic gases, rather than an accurate quantification. This problem is removed when an emission standard is based on a total VOC measurement as obtained with a particular detection principle. In those situations where a true mass or volume VOC concentration is needed, the problem can be mitigated by using the VOC CEMS as a relative indicator of total VOC concentration if statistical analysis indicates that a sufficient margin of compliance exists for this approach to be acceptable. Otherwise, consideration can be given to calibrating the CEMS with a mixture of the same VOC's in the same proportions as they actually occur in the measured source. In those circumstances where only one organic species is present in the source, or where equal incremental amounts of each of the organic species present generate equal CEMS responses, the latter choice can be more easily achieved.

### 2.0 *Summary of Performance Specification*

2.1 Calibration drift and relative accuracy tests are conducted to determine adherence of the CEMS with specifications given for those items. The performance specifications include criteria for installation and measurement location, equipment and performance, and procedures for testing and data reduction.

### 3.0 *Definitions.*

Same as Section 3.0 of PS 2.

### 4.0 *Interferences[Reserved]*

### 5.0 *Safety*

The procedures required under this performance specification may involve hazardous materials, operations, and equipment. This performance specification may not address all of the safety problems associated with these procedures. It is the responsibility of the user to establish appropriate safety problems associated with these procedures. It is the responsibility of the user to establish appropriate safety and health practices and determine the application regulatory limitations prior to performing these procedures. The CEMS user's manual and materials recommended by the reference method should be consulted for specific precautions to be taken.

### 6.0 *Equipment and Supplies*

6.1 VOC CEMS Selection. When possible, select a VOC CEMS with the detection principle of the reference method specified in the regulation or permit (usually either FI, NDIR, or PI). Otherwise, use knowledge of the source process chemistry, previous emission studies, or gas chromatographic analysis of the source gas to select an appropriate VOC CEMS. Exercise extreme caution in choosing and installing any CEMS in an area with explosive hazard potential.

6.2 Data Recorder Scale. Same as Section 6.1 of PS 2.

### 7.0 *Reagents and Standards[Reserved]*

### 8.0 *Sample Collection, Preservation, Storage, and Transport*

8.1 Installation and Measurement Location Specifications. Same as Section 8.1 of PS 2.

8.2 Pretest Preparation. Same as Section 8.2 of PS 2.

8.3 Reference Method (RM). Use the method specified in the applicable regulation or permit, or any approved alternative, as the RM.

8.4 Sampling Strategy for RM Tests, Correlation of RM and CEMS Data, and Number of RM Tests. Follow PS 2, Sections 8.4.3, 8.4.5, and 8.4.4, respectively.

8.5 Reporting. Same as Section 8.5 of PS 2.

9.0 *Quality Control*[Reserved]

10.0 *Calibration and Standardization*[Reserved]

11.0 *Analytical Procedure*

Sample collection and analysis are concurrent for this PS (see Section 8.0). Refer to the RM for specific analytical procedures.

12.0 *Calculations and Data Analysis*

Same as Section 12.0 of PS 2.

13.0 *Method Performance*

13.1 Calibration Drift. The CEMS calibration must not drift by more than 2.5 percent of the span value.

13.2 CEMS Relative Accuracy. Unless stated otherwise in the regulation or permit, the RA of the CEMS must not be greater than 20 percent of the mean value of the RM test data in terms of the units of the emission standard, or 10 percent of the applicable standard, whichever is greater.

14.0 *Pollution Prevention*[Reserved]

15.0 *Waste Management*[Reserved]

16.0 *References*

Same as Section 17.0 of PS 2.

17.0 *Tables, Diagrams, Flowcharts, and Validation Data*[Reserved]

Performance Specification 8A—Specifications and Test Procedures for Total Hydrocarbon Continuous Monitoring Systems in Stationary Sources

1. *Applicability and Principle*

1.1 *Applicability*. These performance specifications apply to hydrocarbon (HC) continuous emission monitoring systems (CEMS) installed on stationary sources. The specifications include procedures which are intended to be used to evaluate the acceptability of the CEMS at the time of its installation or whenever specified in regulations or permits. The procedures are not designed to evaluate CEMS performance over an extended period of time. The source owner or operator is responsible for the proper calibration, maintenance, and operation of the CEMS at all times.

1.2 *Principle*. A gas sample is extracted from the source through a heated sample line and heated filter to a flame ionization detector (FID). Results are reported as volume concentration equivalents of propane. Installation and measurement location specifications, performance and equipment specifications, test and data reduction procedures, and brief quality assurance guidelines are included in the specifications. Calibration drift, calibration error, and response time tests are conducted to determine conformance of the CEMS with the specifications.

2. *Definitions*

2.1 *Continuous Emission Monitoring System (CEMS)*. The total equipment used to acquire data, which includes sample extraction and transport hardware, analyzer, data recording and processing hardware, and software. The system consists of the following major subsystems:

2.1.1 *Sample Interface*. That portion of the system that is used for one or more of the following: Sample acquisition, sample transportation, sample conditioning, or protection of the analyzer from the effects of the stack effluent.

2.1.2 *Organic Analyzer*. That portion of the system that senses organic concentration and generates an output proportional to the gas concentration.

2.1.3 *Data Recorder*. That portion of the system that records a permanent record of the measurement values. The data recorder may include automatic data reduction capabilities.

2.2 *Instrument Measurement Range*. The difference between the minimum and maximum concentration that can be measured by a specific instrument. The minimum is often stated or assumed to be zero and the range expressed only as the maximum.

2.3 *Span or Span Value*. Full scale instrument measurement range. The span value must be documented by the CEMS manufacturer with laboratory data.

2.4 *Calibration Gas*. A known concentration of a gas in an appropriate diluent gas.

2.5 *Calibration Drift (CD)*. The difference in the CEMS output readings from the established reference value after a stated period of operation during which no unscheduled maintenance, repair, or adjustment takes place. A CD test is performed to demonstrate the stability of the CEMS calibration over time.

2.6 *Response Time*. The time interval between the start of a step change in the system input (e.g., change of calibration gas) and the time when the data recorder displays 95 percent of the final value.

2.7 *Accuracy*. A measurement of agreement between a measured value and an accepted or true value, expressed as the percentage difference between the true and measured values relative to the true value. For these performance specifications, accuracy is checked by conducting a calibration error (CE) test.

2.8 *Calibration Error (CE)*. The difference between the concentration indicated by the CEMS and the known concentration of the cylinder gas. A CE test procedure is performed to document the accuracy and linearity of the monitoring equipment over the entire measurement range.

2.9 *Performance Specification Test (PST) Period*. The period during which CD, CE, and response time tests are conducted.

2.10 *Centroidal 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. *Installation and Measurement Location Specifications*

3.1 *CEMS Installation and Measurement Locations*. The CEMS must be installed in a location in which measurements representative of the source's emissions can be obtained. The optimum location of the sample interface for the CEMS is determined by a number of factors, including ease of access for calibration and maintenance, the degree to which sample conditioning will be required, the degree to which it represents total emissions, and the degree to which it represents the combustion situation in the firebox (where applicable). The location should be as free from in-leakage influences as possible and reasonably free from severe flow disturbances. The sample location should be at least two equivalent duct diameters downstream from the nearest control device, point of pollutant generation, or other point at which a change in the pollutant concentration or emission rate occurs and at least 0.5 diameter upstream from the exhaust or control device. The equivalent duct diameter is calculated as per 40 CFR part 60, appendix A, method 1, section 2.1. If these criteria are not achievable or if the location is otherwise less than optimum, the possibility of stratification should be investigated as described in section 3.2. The measurement point must be within the centroidal area of the stack or duct cross section.

3.2 *Stratification Test Procedure*. Stratification is defined as a difference in excess of 10 percent between the average concentration in the duct or stack and the concentration at any point more than 1.0 meter from the duct or stack wall. To determine whether effluent stratification exists, a dual probe system should be used to determine the average effluent concentration while measurements at each

traverse point are being made. One probe, located at the stack or duct centroid, is used as a stationary reference point to indicate the change in effluent concentration over time. The second probe is used for sampling at the traverse points specified in 40 CFR part 60 appendix A, method 1. The monitoring system samples sequentially at the reference and traverse points throughout the testing period for five minutes at each point.

#### 4. CEMS Performance and Equipment Specifications

If this method is applied in highly explosive areas, caution and care must be exercised in choice of equipment and installation.

4.1 *Flame Ionization Detector (FID) Analyzer.* A heated FID analyzer capable of meeting or exceeding the requirements of these specifications. Heated systems must maintain the temperature of the sample gas between 150 °C (300 °F) and 175 °C (350 °F) throughout the system. This requires all system components such as the probe, calibration valve, filter, sample lines, pump, and the FID to be kept heated at all times such that no moisture is condensed out of the system. The essential components of the measurement system are described below:

4.1.1 *Sample Probe.* Stainless steel, or equivalent, to collect a gas sample from the centroidal area of the stack cross-section.

4.1.2 *Sample Line.* Stainless steel or Teflon tubing to transport the sample to the analyzer.

Note: Mention of trade names or specific products does not constitute endorsement by the Environmental Protection Agency.

4.1.3 *Calibration Valve Assembly.* A heated three-way valve assembly to direct the zero and calibration gases to the analyzer is recommended. Other methods, such as quick-connect lines, to route calibration gas to the analyzers are applicable.

4.1.4 *Particulate Filter.* An in-stack or out-of-stack sintered stainless steel filter is recommended if exhaust gas particulate loading is significant. An out-of-stack filter must be heated.

4.1.5 *Fuel.* The fuel specified by the manufacturer (e.g., 40 percent hydrogen/60 percent helium, 40 percent hydrogen/60 percent nitrogen gas mixtures, or pure hydrogen) should be used.

4.1.6 *Zero Gas.* High purity air with less than 0.1 parts per million by volume (ppm) HC as methane or carbon equivalent or less than 0.1 percent of the span value, whichever is greater.

4.1.7 *Calibration Gases.* Appropriate concentrations of propane gas (in air or nitrogen). Preparation of the calibration gases should be done according to the procedures in EPA Protocol 1. In addition, the manufacturer of the cylinder gas should provide a recommended shelf life for each calibration gas cylinder over which the concentration does not change by more than  $\pm 2$  percent from the certified value.

4.2 *CEMS Span Value.* 100 ppm propane. The span value must be documented by the CEMS manufacturer with laboratory data.

4.3 *Daily Calibration Gas Values.* The owner or operator must choose calibration gas concentrations that include zero and high-level calibration values.

4.3.1 The zero level may be between zero and 0.1 ppm (zero and 0.1 percent of the span value).

4.3.2 The high-level concentration must be between 50 and 90 ppm (50 and 90 percent of the span value).

4.4 *Data Recorder Scale.* The strip chart recorder, computer, or digital recorder must be capable of recording all readings within the CEMS' measurement range and must have a resolution of 0.5 ppm (0.5 percent of span value).

4.5 *Response Time.* The response time for the CEMS must not exceed 2 minutes to achieve 95 percent of the final stable value.

4.6 *Calibration Drift.* The CEMS must allow the determination of CD at the zero and high-level values. The CEMS calibration response must not differ by more than  $\pm 3$  ppm ( $\pm 3$  percent of the span value) after each 24-hour period of the 7-day test at both zero and high levels.

4.7 *Calibration Error.* The mean difference between the CEMS and reference values at all three test points listed below must be no greater than 5 ppm ( $\pm 5$  percent of the span value).

4.7.1 *Zero Level.* Zero to 0.1 ppm (0 to 0.1 percent of span value).

4.7.2 *Mid-Level.* 30 to 40 ppm (30 to 40 percent of span value).

4.7.3 *High-Level.* 70 to 80 ppm (70 to 80 percent of span value).

4.8 *Measurement and Recording Frequency.* The sample to be analyzed must pass through the measurement section of the analyzer without interruption. The detector must measure the sample concentration at least once every 15 seconds. An average emission rate must be computed and recorded at least once every 60 seconds.

4.9 *Hourly Rolling Average Calculation.* The CEMS must calculate every minute an hourly rolling average, which is the arithmetic mean of the 60 most recent 1-minute average values.

4.10 *Retest.* If the CEMS produces results within the specified criteria, the test is successful. If the CEMS does not meet one or more of the criteria, necessary corrections must be made and the performance tests repeated.

## 5. Performance Specification Test (PST) Periods

5.1 *Pretest Preparation Period.* Install the CEMS, prepare the PTM test site according to the specifications in section 3, and prepare the CEMS for operation and calibration according to the manufacturer's written instructions. A pretest conditioning period similar to that of the 7-day CD test is recommended to verify the operational status of the CEMS.

5.2 *Calibration Drift Test Period.* While the facility is operating under normal conditions, determine the magnitude of the CD at 24-hour intervals for seven consecutive days according to the procedure given in section 6.1. All CD determinations must be made following a 24-hour period during which no unscheduled maintenance, repair, or adjustment takes place. If the combustion unit is taken out of service during the test period, record the onset and duration of the downtime and continue the CD test when the unit resumes operation.

5.3 *Calibration Error Test and Response Time Test Periods.* Conduct the CE and response time tests during the CD test period.

## 6. Performance Specification Test Procedures

6.1 *Relative Accuracy Test Audit (RATA) and Absolute Calibration Audits (ACA).* The test procedures described in this section are in lieu of a RATA and ACA.

### 6.2 Calibration Drift Test.

6.2.1 *Sampling Strategy.* Conduct the CD test at 24-hour intervals for seven consecutive days using calibration gases at the two daily concentration levels specified in section 4.3. Introduce the two calibration gases into the sampling system as close to the sampling probe outlet as practical. The gas must pass through all CEM components used during normal sampling. If periodic automatic or manual adjustments are made to the CEMS zero and calibration settings, conduct the CD test immediately before these adjustments, or conduct it in such a way that the CD can be determined. Record the CEMS response and subtract this value from the reference (calibration gas) value. To meet the specification, none of the differences may exceed 3 percent of the span of the CEM.

6.2.2 *Calculations.* Summarize the results on a data sheet. An example is shown in Figure 1. Calculate the differences between the CEMS responses and the reference values.

6.3 *Response Time.* The entire system including sample extraction and transport, sample conditioning, gas analyses, and the data recording is checked with this procedure.

6.3.1 Introduce the calibration gases at the probe as near to the sample location as possible. Introduce the zero gas into the system. When the system output has stabilized (no change greater than 1 percent of full scale for 30 sec), switch to monitor stack effluent and wait for a stable value. Record the time (upscale response time) required to reach 95 percent of the final stable value.

6.3.2 Next, introduce a high-level calibration gas and repeat the above procedure. Repeat the entire procedure three times and determine the mean upscale and downscale response times. The longer of the two means is the system response time.

6.4 *Calibration Error Test Procedure.*

6.4.1 *Sampling Strategy.* Challenge the CEMS with zero gas and EPA Protocol 1 cylinder gases at measurement points within the ranges specified in section 4.7.

6.4.1.1 The daily calibration gases, if Protocol 1, may be used for this test.

SOURCE:	DATE:
MONITOR:	LOCATION:
SERIAL NUMBER:	SPAN:

	DAY	DATE	TIME	CALIBRATION VALUE	MONITOR RESPONSE	DIFFERENCE	PERCENT OF SPAN <sup>1</sup>
ZERO/LOW LEVEL	1						
	2						
	3						
	4						
	5						
	6						
	7						
HIGH LEVEL	1						
	2						
	3						
	4						
	5						
	6						
	7						

<sup>1</sup>/ = Acceptance Criteria: ≤ 3% of span each day for seven days.

FIGURE 1: Calibration Drift Determination

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6.4.1.2 Operate the CEMS as nearly as possible in its normal sampling mode. The calibration gas should be injected into the sampling system as close to the sampling probe outlet as practical and must pass through all filters, scrubbers, conditioners, and other monitor components used during normal sampling. Challenge the CEMS three non-consecutive times at each measurement point and record the responses. The duration of each gas injection should be for a sufficient period of time to ensure that the CEMS surfaces are conditioned.

6.4.2 *Calculations.* Summarize the results on a data sheet. An example data sheet is shown in Figure

2. Average the differences between the instrument response and the certified cylinder gas value for each gas. Calculate three CE results according to Equation 1. No confidence coefficient is used in CE calculations.

7. Equations

Calibration Error. Calculate CE using Equation 1.

$$CE = |d / FS| \times 100 \quad (\text{Eq. 1})$$

Where:

$d$  = Mean difference between CEMS response and the known reference concentration, determined using Equation 2.

$$d = \frac{1}{n} \sum_{i=1}^n d_i \quad (\text{Eq. 2})$$

Where:

$d_i$  = Individual difference between CEMS response and the known reference concentration.

8. Reporting

At a minimum, summarize in tabular form the results of the CD, response time, and CE test, as appropriate. Include all data sheets, calculations, CEMS data records, and cylinder gas or reference material certifications.

SOURCE:	DATE:
MONITOR:	LOCATION:
SERIAL NUMBER:	SPAN:

RUN NUMBER	CALIBRATION VALUE	MONITOR RESPONSE	DIFFERENCE		
			Zero/Low	Mid	High
1 - Zero					
2 - Mid					
3 - High					
4 - Mid					
5 - Zero					
6 - High					
7 - Zero					
8 - Mid					
9 - High					
Mean Difference =					
Calibration Error =			%	%	%

FIGURE 2: Calibration Error Determination

[View or download PDF](#)

## 9. References

1. Measurement of Volatile Organic Compounds-Guideline Series. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, 27711, EPA-450/2-78-041, June 1978.
2. Traceability Protocol for Establishing True Concentrations of Gases Used for Calibration and Audits of Continuous Source Emission Monitors (Protocol No. 1). U.S. Environmental Protection Agency ORD/EMSL, Research Triangle Park, North Carolina, 27711, June 1978.
3. Gasoline Vapor Emission Laboratory Evaluation-Part 2. U.S. Environmental Protection Agency, OAQPS, Research Triangle Park, North Carolina, 27711, EMB Report No. 76-GAS-6, August 1975.

Performance Specification 9—Specifications and Test Procedures for Gas Chromatographic Continuous Emission Monitoring Systems in Stationary Sources

### 1.0 Scope and Application

1.1 Applicability. These requirements apply to continuous emission monitoring systems (CEMSs) that use gas chromatography (GC) to measure gaseous organic compound emissions. The requirements include procedures intended to evaluate the acceptability of the CEMS at the time of its installation and whenever specified in regulations or permits. Quality assurance procedures for calibrating, maintaining, and operating the CEMS properly at all times are also given in this procedure.

### 2.0 Summary of Performance Specification

2.1 Calibration precision, calibration error, and performance audit tests are conducted to determine conformance of the CEMS with these specifications. Daily calibration and maintenance requirements are also specified.

### 3.0 Definitions

3.1 Gas Chromatograph (GC). That portion of the system that separates and detects organic analytes and generates an output proportional to the gas concentration. The GC must be temperature controlled.

Note: The term temperature controlled refers to the ability to maintain a certain temperature around the column. Temperature-programmable GC is not required for this performance specification, as long as all other requirements for precision, linearity and accuracy listed in this performance specification are met. It should be noted that temperature programming a GC will speed up peak elution, thus allowing increased sampling frequency.

3.1.1 Column. Analytical column capable of separating the analytes of interest.

3.1.2 Detector. A detection system capable of detecting and quantifying all analytes of interest.

3.1.3 Integrator. That portion of the system that quantifies the area under a particular sample peak generated by the GC.

3.1.4 Data Recorder. A strip chart recorder, computer, or digital recorder capable of recording all readings within the instrument's calibration range.

3.2 Calibration Precision. The error between triplicate injections of each calibration standard.

### 4.0 Interferences[Reserved]

### 5.0 Safety

The procedures required under this performance specification may involve hazardous materials, operations, and equipment. This performance specification does not purport to address all of the safety problems associated with these procedures. It is the responsibility of the user to establish appropriate safety and health practices and determine the application regulatory limitations prior to performing these procedures. The CEMS user's manual and materials recommended by the reference method should be consulted for specific precautions to be taken.

## 6.0 *Equipment and Supplies*

6.1 **Presurvey Sample Analysis and GC Selection.** Determine the pollutants to be monitored from the applicable regulation or permit and determine the approximate concentration of each pollutant (this information can be based on past compliance test results). Select an appropriate GC configuration to measure the organic compounds. The GC components should include a heated sample injection loop (or other sample introduction systems), separatory column, temperature-controlled oven, and detector. If the source chooses dual column and/or dual detector configurations, each column/detector is considered a separate instrument for the purpose of this performance specification and thus the procedures in this performance specification shall be carried out on each system. If this method is applied in highly explosive areas, caution should be exercised in selecting the equipment and method of installation.

6.2 **Sampling System.** The sampling system shall be heat traced and maintained at a minimum of 120 ° C with no cold spots. All system components shall be heated, including the probe, calibration valve, sample lines, sampling loop (or sample introduction system), GC oven, and the detector block (when appropriate for the type of detector being utilized, e.g., flame ionization detector).

## 7.0 *Reagents and Standards*

7.1 **Calibration Gases.** Obtain three concentrations of calibration gases certified by the manufacturer to be accurate to within 2 percent of the value on the label. A gas dilution system may be used to prepare the calibration gases from a high concentration certified standard if the gas dilution system meets the requirements specified in Test Method 205, 40 CFR Part 51, Appendix M. The performance test specified in Test Method 205 shall be repeated quarterly, and the results of the Method 205 test shall be included in the report. The calibration gas concentration of each target analyte shall be as follows (measured concentration is based on the presurvey concentration determined in Section 6.1).

**Note:** If the low level calibration gas concentration falls at or below the limit of detection for the instrument for any target pollutant, a calibration gas with a concentration at 4 to 5 times the limit of detection for the instrument may be substituted for the low-level calibration gas listed in Section 7.1.1.

7.1.1 **Low-level.** 40–60 percent of measured concentration.

7.1.2 **Mid-level.** 90–110 percent of measured concentration.

7.1.3 **High-level.** 140–160 percent of measured concentration, or select highest expected concentration.

7.2 **Performance Audit Gas.** A certified EPA audit gas shall be used, when possible. A gas mixture containing all the target compounds within the calibration range and certified by EPA's Traceability Protocol for Assay and Certification of Gaseous Calibration Standards may be used when EPA performance audit materials are not available. The instrument relative error shall be ≤ 10 percent of the certified value of the audit gas.

## 8.0 *Sample Collection, Preservation, Storage, and Transport*

8.1 **Installation and Measurement Location Specifications.** Install the CEMs in a location where the measurements are representative of the source emissions. Consider other factors, such as ease of access for calibration and maintenance purposes. The location should not be close to air in-leakages. The sampling location should be at least two equivalent duct diameters downstream from the nearest control device, point of pollutant generation, or other point at which a change in the pollutant concentration or emission rate occurs. The location should be at least 0.5 diameter upstream from the exhaust or control device. To calculate equivalent duct diameter, see Section 12.2 of Method 1 (40 CFR Part 60, Appendix A). Sampling locations not conforming to the requirements in this section may be used if necessary upon approval of the Administrator.

8.2 **Pretest Preparation Period.** Using the procedures described in Method 18

(40 CFR Part 60, Appendix A), perform initial tests to determine GC conditions that provide good resolution and minimum analysis time for compounds of interest. Resolution interferences that may occur can be eliminated by appropriate GC column and detector choice or by shifting the retention times through changes in the column flow rate and the use of temperature programming.

8.3 **7-Day Calibration Error (CE) Test Period.** At the beginning of each 24-hour period, set the initial instrument setpoints by conducting a multi-point calibration for each compound. The multi-point

calibration shall meet the requirements in Section 13.3. Throughout the 24-hour period, sample and analyze the stack gas at the sampling intervals prescribed in the regulation or permit. At the end of the 24 hour period, inject the three calibration gases for each compound in triplicate and determine the average instrument response. Determine the CE for each pollutant at each level using the equation in Section 9–2.

Each CE shall be  $\leq 10$  percent. Repeat this procedure six more times for a total of 7 consecutive days.

8.4 Performance Audit Test Periods. Conduct the performance audit once during the initial 7-day CE test and quarterly thereafter. Sample and analyze the EPA audit gas(es) (or the gas mixture prepared by EPA's traceability protocol if an EPA audit gas is not available) three times. Calculate the average instrument response. Report the audit results as part of the reporting requirements in the appropriate regulation or permit (if using a gas mixture, report the certified cylinder concentration of each pollutant).

8.5 Reporting. Follow the reporting requirements of the applicable regulation or permit. If the reporting requirements include the results of this performance specification, summarize in tabular form the results of the CE tests. Include all data sheets, calculations, CEMS data records, performance audit results, and calibration gas concentrations and certifications.

#### 9.0 Quality Control[Reserved]

#### 10.0 Calibration and Standardization

10.1 Initial Multi-Point Calibration. After initial startup of the GC, after routine maintenance or repair, or at least once per month, conduct a multi-point calibration of the GC for each target analyte. The multi-point calibration for each analyte shall meet the requirements in Section 13.3.

10.2 Daily Calibration. Once every 24 hours, analyze the mid-level calibration standard for each analyte in triplicate. Calculate the average instrument response for each analyte. The average instrument response shall not vary more than 10 percent from the certified concentration value of the cylinder for each analyte. If the difference between the analyzer response and the cylinder concentration for any target compound is greater than 10 percent, immediately inspect the instrument making any necessary adjustments, and conduct an initial multi-point calibration as described in Section 10.1.

#### 11.0 Analytical Procedure. Sample Collection and Analysis Are Concurrent for This Performance Specification (See Section 8.0)

#### 12.0 Calculations and Data Analysis

##### 12.1 Nomenclature.

$C_m$ =average instrument response, ppm.

$C_a$ =cylinder gas value, ppm.

F=Flow rate of stack gas through sampling system, in Liters/min.

n=Number of measurement points.

$r^2$  =Coefficient of determination.

V=Sample system volume, in Liters, which is the volume inside the sample probe and tubing leading from the stack to the sampling loop.

x=CEMS response.

y=Actual value of calibration standard.

12.2 Coefficient of Determination. Calculate  $r^2$  using linear regression analysis and the average concentrations obtained at three calibration points as shown in Equation 9–1.

$$r^2 = \left( \frac{n \sum x_i y_i - (\sum x_i)(\sum y_i)}{\sqrt{(n \sum y_i^2 - \sum y_i \sum y_i)(n \sum x_i^2 - \sum x_i \sum x_i)}} \right)^2 \quad \text{Eq. 9-1}$$

12.3 Calibration Error Determination. Determine the percent calibration error (CE) at each concentration for each pollutant using the following equation.

$$CE = \frac{C_m - C_a}{C_a} \times 100 \quad \text{Eq. 9-2}$$

12.4 Sampling System Time Constant (T).

$$T = \frac{F}{V} \quad \text{Eq. 9-3}$$

### 13.0 Method Performance

13.1 Calibration Error (CE). The CEMS must allow the determination of CE at all three calibration levels. The average CEMS calibration response must not differ by more than 10 percent of calibration gas value at each level after each 24-hour period of the initial test.

13.2 Calibration Precision and Linearity. For each triplicate injection at each concentration level for each target analyte, any one injection shall not deviate more than 5 percent from the average concentration measured at that level. The linear regression curve for each organic compound at all three levels shall have an  $r^2 \geq 0.995$  (using Equation 9–1).

13.3 Measurement Frequency. The sample to be analyzed shall flow continuously through the sampling system. The sampling system time constant shall be  $\leq 5$  minutes or the sampling frequency specified in the applicable regulation, whichever is less. Use Equation 9–3 to determine T. The analytical system shall be capable of measuring the effluent stream at the frequency specified in the appropriate regulation or permit.

### 14.0 Pollution Prevention[Reserved]

### 15.0 Waste Management[Reserved]

### 16.0 References[Reserved]

### 17.0 Tables, Diagrams, Flowcharts, and Validation Data[Reserved]

## Performance Specification 11—Specifications and Test Procedures for Particulate Matter Continuous Emission Monitoring Systems at Stationary Sources

### 1.0 What Are the Purpose and Applicability of Performance Specification 11?

The purpose of Performance Specification 11 (PS–11) is to establish the initial installation and performance procedures that are required for evaluating the acceptability of a particulate matter (PM) continuous emission monitoring system (CEMS); it is not to evaluate the ongoing performance of your PM CEMS over an extended period of time, nor to identify specific calibration techniques and auxiliary procedures to assess CEMS performance. You will find procedures for evaluating the ongoing performance of a PM CEMS in Procedure 2 of Appendix F—Quality Assurance Requirements for Particulate Matter Continuous Emission Monitoring Systems Used at Stationary Sources.

1.1 Under what conditions does PS–11 apply to my PM CEMS? The PS–11 applies to your PM CEMS if you are required by any provision of Title 40 of the Code of Federal Regulations (CFR) to install and operate PM CEMS.

1.2 When must I comply with PS–11? You must comply with PS–11 when directed by the applicable rule that requires you to install and operate a PM CEMS.

1.3 What other monitoring must I perform? To report your PM emissions in units of the emission standard, you may need to monitor additional parameters to correct the PM concentration reported by your PM CEMS. Your CEMS may include the components listed in paragraphs (1) through (3) of this section:

- (1) A diluent monitor ( *i.e.*, O<sub>2</sub>, CO<sub>2</sub>, or other CEMS specified in the applicable regulation), which must meet its own performance specifications (also found in this appendix),
- (2) Auxiliary monitoring equipment to allow measurement, determination, or input of the flue gas temperature, pressure, moisture content, and/or dry volume of stack effluent sampled, and
- (3) An automatic sampling system. The performance of your PM CEMS and the establishment of its correlation to manual reference method measurements must be determined in units of mass concentration as measured by your PM CEMS ( *e.g.*, milligrams per actual cubic meter (mg/acm) or milligrams per dry standard cubic meter (mg/dscm)).

## 2.0 What Are the Basic Requirements of PS-11?

The PS-11 requires you to perform initial installation and calibration procedures that confirm the acceptability of your CEMS when it is installed and placed into operation. You must develop a site-specific correlation of your PM CEMS response against manual gravimetric reference method measurements (including those made using EPA Methods 5, 5l, or 17).

2.1 What types of PM CEMS technologies are covered? Several different types of PM CEMS technologies ( *e.g.*, light scattering, Beta attenuation, etc.) can be designed with in-situ or extractive sample gas handling systems. Each PM CEMS technology and sample gas handling technology has certain site-specific advantages. You should select and install a PM CEMS that is appropriate for the flue gas conditions at your source.

2.2 How is PS-11 different from other performance specifications? The PS-11 is based on a technique of correlating PM CEMS responses relative to emission concentrations determined by the reference method. This technique is called "the correlation." This differs from CEMS used to measure gaseous pollutants that have available calibration gases of known concentration. Because the type and characteristics of PM vary from source to source, a single PM correlation, applicable to all sources, is not possible.

2.3 How are the correlation data handled? You must carefully review your manual reference method data and your PM CEMS responses to include only valid, high-quality data. For the correlation, you must convert the manual reference method data to measurement conditions ( *e.g.*, wet or dry basis) that are consistent with your PM CEMS. Then, you must correlate the manual method and PM CEMS data in terms of the output as received from the monitor ( *e.g.*, milliamps). At the appropriate PM CEMS response specified in section 13.2 of this performance specification, you must calculate the confidence interval half range and tolerance interval half range as a percentage of the applicable PM concentration emission limit and compare the confidence interval and tolerance interval percentages with the performance criteria. Also, you must calculate the correlation coefficient and compare the correlation coefficient with the applicable performance criterion specified in section 13.2 of this performance specification.

Situations may arise where you will need two or more correlations. If you need multiple correlations, you must collect sufficient data for each correlation, and each correlation must satisfy the performance criteria specified in section 13.2 of this performance specification.

2.4 How do I design my PM CEMS correlation program? When planning your PM CEMS correlation effort, you must address each of the items in paragraphs (1) through (7) of this section to enhance the probability of success. You will find each of these elements further described in this performance specification or in the applicable reference method procedure.

(1) What type of PM CEMS should I select? You should select a PM CEMS that is appropriate for your source with technical consideration for potential factors such as interferences, site-specific configurations, installation location, flue gas conditions, PM concentration range, and other PM characteristics. You can find guidance on which technology is best suited for specific situations in our report "Current Knowledge of Particulate Matter (PM) Continuous Emission Monitoring" (PM CEMS Knowledge Document, see section 16.5).

(2) Where should I install my PM CEMS? Your PM CEMS must be installed in a location that is most representative of PM emissions, as determined by the reference method, such that the correlation between PM CEMS response and emissions determined by the reference method will meet these

performance specifications. Care must be taken in selecting a location and measurement point to minimize problems due to flow disturbances, cyclonic flow, and varying PM stratification.

(3) How should I record my CEMS data? You need to ensure that your PM CEMS and data logger are set up to collect and record all normal emission levels and excursions. You must ensure that your data logger and PM CEMS have been properly programmed to accept and transfer status signals of valid monitor operation ( e.g., flags for internal calibration, suspect data, or maintenance periods).

(4) What CEMS data should I review? You must review drift data daily to document proper operation. You must also ensure that any audit material is appropriate for the typical operating range of your PM CEMS.

(5) How long should I operate my PM CEMS before conducting the initial correlation test? You should allow sufficient time for your PM CEMS to operate for you to become familiar with your PM CEMS.

(i) You should observe PM CEMS response over time during normal and varying process conditions. This will ensure that your PM CEMS has been properly set up to operate at a range that is compatible with the concentrations and characteristics of PM emissions for your source. You should use this information to establish the range of operating conditions necessary to determine the correlations of PM CEMS data to manual reference method measurements over a wide operating range.

(ii) You must determine the types of process changes that will influence, on a definable and repeatable basis, flue gas PM concentrations and the resulting PM CEMS responses. You may find this period useful to make adjustments to your planned approach for operating your PM CEMS at your source. For instance, you may change the measurement range or batch sampling period to something other than those you initially planned to use.

(6) How do I conduct the initial correlation test? When conducting the initial correlation test of your PM CEMS response to PM emissions determined by the reference method, you must pay close attention to accuracy and details. Your PM CEMS must be operating properly. You must perform the manual reference method testing accurately, with attention to eliminating site-specific systemic errors. You must coordinate the timing of the manual reference method testing with the sampling cycle of your PM CEMS. You must complete a minimum of 15 manual reference method tests. You must perform the manual reference method testing over the full range of PM CEMS responses that correspond to normal operating conditions for your source and control device and will result in the widest range of emission concentrations.

(7) How should I perform the manual reference method testing? You must perform the manual reference method testing in accordance with specific rule requirements, coordinated closely with PM CEMS and process operations. It is highly recommended that you use paired trains for the manual reference method testing. You must perform the manual reference method testing over a suitable PM concentration range that corresponds to the full range of normal process and control device operating conditions. Because the manual reference method testing for this correlation test is not for compliance reporting purposes, you may conduct the reference method test runs for less than the typical minimum test run duration of 1 hour.

(8) What do I do with the manual reference method data and PM CEMS data? You must complete each of the activities in paragraphs (8)(i) through (v) of this section.

(i) Screen the manual reference method data for validity ( e.g., isokinetics, leak checks), quality assurance, and quality control ( e.g., outlier identification).

(ii) Screen your PM CEMS data for validity ( e.g., daily drift check requirements) and quality assurance ( e.g., flagged data).

(iii) Convert the manual reference method test data into measurement units ( e.g., mg/acm) consistent with the measurement conditions of your PM CEMS.

(iv) Calculate the correlation equation(s) as specified in section 12.3.

(v) Calculate the correlation coefficient, confidence interval half range, and tolerance interval half range for the complete set of PM CEMS and reference method correlation data for comparison with the correlation performance criteria specified in section 13.2.

2.5 What other procedures must I perform? Before conducting the initial correlation test, you must successfully complete a 7-day drift test (See section 8.5).

### 3.0 What Special Definitions Apply to PS-11?

3.1 "Appropriate Measurement Range of your PM CEMS" means a measurement range that is capable of recording readings over the complete range of your source's PM emission concentrations during routine operations. The appropriate range is determined during the pretest preparations as specified in section 8.4.

3.2 "Appropriate Data Range for PM CEMS Correlation" means the data range that reflects the full range of your source's PM emission concentrations recorded by your PM CEMS during the correlation test planning period or other normal operations as defined in the applicable regulations.

3.3 "Batch Sampling" means that gas is sampled on an intermittent basis and concentrated on a collection medium before intermittent analysis and follow-up reporting. Beta gauge PM CEMS are an example of batch sampling devices.

3.4 "Confidence Interval Half Range (CI)" is a statistical term and means one-half of the width of the 95 percent confidence interval around the predicted mean PM concentration (y value) calculated at the PM CEMS response value (x value) where the confidence interval is narrowest. Procedures for calculating CI are specified in section 12.3. The CI as a percent of the emission limit value (CI%) is calculated at the appropriate PM CEMS response value and must satisfy the criteria specified in Section 13.2 (2).

3.5 "Continuous Emission Monitoring System (CEMS)" means all of the equipment required for determination of PM mass concentration in units of the emission standard. The sample interface, pollutant monitor, diluent monitor, other auxiliary data monitor(s), and data recorder are the major subsystems of your CEMS.

3.6 "Correlation" means the primary mathematical relationship for correlating the output from your PM CEMS to a PM concentration, as determined by the PM reference method. The correlation is expressed in the measurement units that are consistent with the measurement conditions ( e.g., mg/dscm, mg/acm) of your PM CEMS.

3.7 "Correlation Coefficient (r)" means a quantitative measure of the association between your PM CEMS outputs and the reference method measurements. Equations for calculating the r value are provided in section 12.3(1)(iv) for linear correlations and in section 12.3(2)(iv) for polynomial correlations.

3.8 "Cycle Time" means the time required to complete one sampling, measurement, and reporting cycle. For a batch sampling PM CEMS, the cycle time would start when sample gas is first extracted from the stack/duct and end when the measurement of that batch sample is complete and a new result for that batch sample is produced on the data recorder.

3.9 "Data Recorder" means the portion of your CEMS that provides a permanent record of the monitor output in terms of response and status (flags). The data recorder may also provide automatic data reduction and CEMS control capabilities (see section 6.6).

3.10 "Diluent Monitor and Other Auxiliary Data Monitor(s) (if applicable)" means the portion of your CEMS that provides the diluent gas concentration (such as O<sub>2</sub> or CO<sub>2</sub>, as specified by the applicable regulations), temperature, pressure, and/or moisture content, and generates an output proportional to the diluent gas concentration or gas property.

3.11 "Drift Check" means a check of the difference between your PM CEMS output readings and the established reference value of a reference standard or procedure after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place. The procedures used to determine drift are specific to the operating principles of your specific PM CEMS. A drift check includes both a zero drift check and an upscale drift check.

3.12 "Exponential Correlation" means an exponential equation used to define the relationship between your PM CEMS output and the reference method PM concentration, as indicated by Equation 11-37.

3.13 "Flagged Data" means data marked by your CEMS indicating that the response value(s) from one or more CEMS subsystems is suspect or invalid or that your PM CEMS is not in source-measurement operating mode.

3.14 "Linear Correlation" means a first-order mathematical relationship between your PM CEMS output and the reference method PM concentration that is linear in form, as indicated by Equation 11-3.

- 3.15 “Logarithmic Correlation” means a first-order mathematical relationship between the natural logarithm of your PM CEMS output and the reference method PM concentration that is linear in form, as indicated by Equation 11–34.
- 3.16 “Low-Emitting Source” means a source that operated at no more than 50 percent of the emission limit during the most recent performance test, and, based on the PM CEMS correlation, the daily average emissions for the source, measured in the units of the applicable emission limit, have not exceeded 50 percent of the emission limit for any day since the most recent performance test.
- 3.17 “Paired Trains” means two reference method trains that are used to conduct simultaneous measurements of PM concentrations. Guidance on the use of paired sampling trains can be found in the PM CEMS Knowledge Document (see section 16.5).
- 3.18 “Polynomial Correlation” means a second-order equation used to define the relationship between your PM CEMS output and reference method PM concentration, as indicated by Equation 11–16.
- 3.19 “Power Correlation” means an equation used to define a power function relationship between your PM CEMS output and the reference method concentration, as indicated by Equation 11–42.
- 3.20 “Reference Method” means the method defined in the applicable regulations, but commonly refers to those methods collectively known as EPA Methods 5, 5I, and 17 (for particulate matter), found in Appendix A of 40 CFR 60. Only the front half and dry filter catch portions of the reference method can be correlated to your PM CEMS output.
- 3.21 “Reference Standard” means a reference material or procedure that produces a known and unchanging response when presented to the pollutant monitor portion of your CEMS. You must use these standards to evaluate the overall operation of your PM CEMS, but not to develop a PM CEMS correlation.
- 3.22 “Response Time” means the time interval between the start of a step change in the system input and the time when the pollutant monitor output reaches 95 percent of the final value (see sections 6.5 and 13.3 for procedures and acceptance criteria).
- 3.23 “Sample Interface” means the portion of your CEMS used for one or more of the following: sample acquisition, sample delivery, sample conditioning, or protection of the monitor from the effects of the stack effluent.
- 3.24 “Sample Volume Check” means a check of the difference between your PM CEMS sample volume reading and the sample volume reference value.
- 3.25 “Tolerance Interval half range (TI)” means one-half of the width of the tolerance interval with upper and lower limits, within which a specified percentage of the future data population is contained with a given level of confidence, as defined by the respective tolerance interval half range equations in section 12.3(1)(iii) for linear correlations and in section 12.3(2)(iii) for polynomial correlations. The TI as a percent of the emission limit value (TI%) is calculated at the appropriate PM CEMS response value specified in Section 13.2(3).
- 3.26 “Upscale Check Value” means the expected response to a reference standard or procedure used to check the upscale response of your PM CEMS.
- 3.27 “Upscale Drift (UD) Check” means a check of the difference between your PM CEMS output reading and the upscale check value.
- 3.28 “Zero Check Value” means the expected response to a reference standard or procedure used to check the response of your PM CEMS to particulate-free or low-particulate concentration conditions.
- 3.29 “Zero Drift (ZD) Check” means a check of the difference between your PM CEMS output reading and the zero check value.
- 3.30 “Zero Point Correlation Value” means a value added to PM CEMS correlation data to represent low or near zero PM concentration data (see section 8.6 for rationale and procedures).

#### 4.0 *Are There Any Potential Interferences for My PM CEMS?*

Yes, condensible water droplets or condensible acid gas aerosols ( *i.e.*, those with condensation

temperatures above those specified by the reference method) at the measurement location can be interferences for your PM CEMS if the necessary precautions are not met.

4.1 Where are interferences likely to occur? Interferences may develop if your CEMS is installed downstream of a wet air pollution control system or any other conditions that produce flue gases, which, at your PM CEMS measurement point, normally or occasionally contain entrained water droplets or condensable salts before release to the atmosphere.

4.2 How do I deal with interferences? We recommend that you use a PM CEMS that extracts and heats representative samples of the flue gas for measurement to simulate results produced by the reference method for conditions such as those described in section 4.1. Independent of your PM CEMS measurement technology and extractive technique, you should have a configuration simulating the reference method to ensure that:

- (1) No formation of new PM or deposition of PM occurs in sample delivery from the stack or duct; and
- (2) No condensate accumulates in the sample flow measurement apparatus.

4.3 What PM CEMS measurement technologies should I use? You should use a PM CEMS measurement technology that is free of interferences from any condensable constituent in the flue gas.

#### *5.0 What Do I Need To Know To Ensure the Safety of Persons Using PS-11?*

People using the procedures required under PS-11 may be exposed to hazardous materials, operations, site conditions, and equipment. This performance specification does not purport to address all of the safety issues associated with its use. It is your responsibility to establish appropriate safety and health practices and determine the applicable regulatory limitations before performing these procedures. You must consult your CEMS user's manual and other reference materials recommended by the reference method for specific precautions to be taken.

#### *6.0 What Equipment and Supplies Do I Need?*

Different types of PM CEMS use different operating principles. You should select an appropriate PM CEMS based on your site-specific configurations, flue gas conditions, and PM characteristics.

- (1) Your PM CEMS must sample the stack effluent continuously or, for batch sampling PM CEMS, intermittently.
- (2) You must ensure that the averaging time, the number of measurements in an average, the minimum data availability, and the averaging procedure for your CEMS conform with those specified in the applicable emission regulation.
- (3) Your PM CEMS must include, as a minimum, the equipment described in sections 6.1 through 6.7.

6.1 What equipment is needed for my PM CEMS's sample interface? Your PM CEMS's sample interface must be capable of delivering a representative sample of the flue gas to your PM CEMS. This subsystem may be required to heat the sample gas to avoid PM deposition or moisture condensation, provide dilution air, perform other gas conditioning to prepare the sample for analysis, or measure the sample volume or flow rate.

- (1) If your PM CEMS is installed downstream of a wet air pollution control system such that the flue gases normally or occasionally contain entrained water droplets, we recommend that you select a sampling system that includes equipment to extract and heat a representative sample of the flue gas for measurement so that the pollutant monitor portion of your CEMS measures only dry PM. Heating should be sufficient to raise the temperature of the extracted flue gas above the water condensation temperature and should be maintained at all times and at all points in the sample line from where the flue gas is extracted, including the pollutant monitor and any sample flow measurement devices.
- (2) You must consider the measured conditions of the sample gas stream to ensure that manual reference method test data are converted to units of PM concentration that are appropriate for the correlation calculations. Additionally, you must identify what, if any, additional auxiliary data from other monitoring and handling systems are necessary to convert your PM CEMS response into the units of the PM standard.
- (3) If your PM CEMS is an extractive type and your source's flue gas volumetric flow rate varies by more

than 10 percent from nominal, your PM CEMS should maintain an isokinetic sampling rate (within 10 percent of true isokinetic). If your extractive-type PM CEMS does not maintain an isokinetic sampling rate, you must use actual site-specific data or data from a similar installation to prove to us, the State, and/or local enforcement agency that isokinetic sampling is not necessary.

6.2 What type of equipment is needed for my PM CEMS? Your PM CEMS must be capable of providing an electronic output that can be correlated to the PM concentration.

(1) Your PM CEMS must be able to perform zero and upscale drift checks. You may perform these checks manually, but performing these checks automatically is preferred.

(2) We recommend that you select a PM CEMS that is capable of performing automatic diagnostic checks and sending instrument status signals (flags) to the data recorder.

(3) If your PM CEMS is an extractive type that measures the sample volume and uses the measured sample volume as part of calculating the output value, your PM CEMS must be able to perform a check of the sample volume to verify the accuracy of the sample volume measuring equipment. The sample volume check must be conducted daily and at the normal sampling rate of your PM CEMS.

6.3 What is the appropriate measurement range for my PM CEMS? Initially, your PM CEMS must be set up to measure over the expected range of your source's PM emission concentrations during routine operations. You may change the measurement range to a more appropriate range prior to correlation testing.

6.4 What if my PM CEMS does automatic range switching? Your PM CEMS may be equipped to perform automatic range switching so that it is operating in a range most sensitive to the detected concentrations. If your PM CEMS does automatic range switching, you must configure the data recorder to handle the recording of data values in multiple ranges during range-switching intervals.

6.5 What averaging time and sample intervals should be used? Your CEMS must sample the stack effluent such that the averaging time, the number of measurements in an average, the minimum sampling time, and the averaging procedure for reporting and determining compliance conform with those specified in the applicable regulation. Your PM CEMS must be designed to meet the specified response time and cycle time established in this performance specification (see section 13.3).

6.6 What type of equipment is needed for my data recorder? Your CEMS data recorder must be able to accept and record electronic signals from all the monitors associated with your PM CEMS.

(1) Your data recorder must record the signals from your PM CEMS that can be correlated to PM mass concentrations. If your PM CEMS uses multiple ranges, your data recorder must identify what range the measurement was made in and provide range-adjusted results.

(2) Your data recorder must accept and record monitor status signals (flagged data).

(3) Your data recorder must accept signals from auxiliary data monitors, as appropriate.

6.7 What other equipment and supplies might I need? You may need other supporting equipment as defined by the applicable reference method(s) (see section 7) or as specified by your CEMS manufacturer.

#### 7.0 *What Reagents and Standards Do I Need?*

You will need reference standards or procedures to perform the zero drift check, the upscale drift check, and the sample volume check.

7.1 What is the reference standard value for the zero drift check? You must use a zero check value that is no greater than 20 percent of the PM CEMS's response range. You must obtain documentation on the zero check value from your PM CEMS manufacturer.

7.2 What is the reference standard value for the upscale drift check? You must use an upscale check value that produces a response between 50 and 100 percent of the PM CEMS's response range. For a PM CEMS that produces output over a range of 4 mA to 20 mA, the upscale check value must produce a response in the range of 12 mA to 20 mA. You must obtain documentation on the upscale check value from your PM CEMS manufacturer.

7.3 What is the reference standard value for the sample volume check? You must use a reference standard value or procedure that produces a sample volume value equivalent to the normal sampling rate. You must obtain documentation on the sample volume value from your PM CEMS manufacturer.

#### 8.0 What Performance Specification Test Procedure Do I Follow?

You must complete each of the activities in sections 8.1 through 8.8 for your performance specification test.

8.1 How should I select and set up my equipment? You should select a PM CEMS that is appropriate for your source, giving consideration to potential factors such as flue gas conditions, interferences, site-specific configuration, installation location, PM concentration range, and other PM characteristics. Your PM CEMS must meet the equipment specifications in sections 6.1 and 6.2.

(1) You should select a PM CEMS that is appropriate for the flue gas conditions at your source. If your source's flue gas contains entrained water droplets, we recommend that your PM CEMS include a sample delivery and conditioning system that is capable of extracting and heating a representative sample.

(i) Your PM CEMS must maintain the sample at a temperature sufficient to prevent moisture condensation in the sample line before analysis of PM.

(ii) If condensible PM is an issue, we recommend that you operate your PM CEMS to maintain the sample gas temperature at the same temperature as the reference method filter.

(iii) Your PM CEMS must avoid condensation in the sample flow rate measurement lines.

(2) Some PM CEMS do not have a wide measurement range capability. Therefore, you must select a PM CEMS that is capable of measuring the full range of PM concentrations expected from your source from normal levels through the emission limit concentration.

(3) Some PM CEMS are sensitive to particle size changes, water droplets in the gas stream, particle charge, stack gas velocity changes, or other factors. Therefore, you should select a PM CEMS appropriate for the emission characteristics of your source.

(4) We recommend that you consult your PM CEMS vendor to obtain basic recommendations on the instrument capabilities and setup configuration. You are ultimately responsible for setup and operation of your PM CEMS.

8.2 Where do I install my PM CEMS? You must install your PM CEMS at an accessible location downstream of all pollution control equipment. You must perform your PM CEMS concentration measurements from a location considered representative or be able to provide data that can be corrected to be representative of the total PM emissions as determined by the manual reference method.

(1) You must select a measurement location that minimizes problems due to flow disturbances, cyclonic flow, and varying PM stratification (refer to Method 1 for guidance).

(2) If you plan to achieve higher emissions for correlation test purposes by adjusting the performance of the air pollution control device (per section 8.6(4)(i)), you must locate your PM CEMS and reference method sampling points well downstream of the control device ( e.g., downstream of the induced draft fan), in order to minimize PM stratification that may be created in these cases.

8.3 How do I select the reference method measurement location and traverse points? You must follow EPA Method 1 for identifying manual reference method traverse points. Ideally, you should perform your manual reference method measurements at locations that satisfy the measurement site selection criteria specified in EPA Method 1 of at least eight duct diameters downstream and at least two duct diameters upstream of any flow disturbance. Where necessary, you may conduct testing at a location that is two diameters downstream and 0.5 diameters upstream of flow disturbances. If your location does not meet the minimum downstream and upstream requirements, you must obtain approval from us to test at your location.

8.4 What are my pretest preparation steps? You must install your CEMS and prepare the reference method test site according to the specifications in sections 8.2 and 8.3.

- (1) After completing the initial field installation, we recommend that you operate your PM CEMS according to the manufacturer's instructions to familiarize yourself with its operation before you begin correlation testing.
- (i) During this initial period of operation, we recommend that you conduct daily checks (zero and upscale drift and sample volume, as appropriate), and, when any check exceeds the daily specification (see section 13.1), make adjustments and perform any necessary maintenance to ensure reliable operation.
- (2) When you are confident that your PM CEMS is operating properly, we recommend that you operate your CEMS over a correlation test planning period of sufficient duration to identify the full range of operating conditions and PM emissions to be used in your PM CEMS correlation test.
- (i) During the correlation test planning period, you should operate the process and air pollution control equipment over the normal range of operating conditions, except when you attempt to produce higher emissions.
- (ii) Your data recorder should record PM CEMS response during the full range of routine process operating conditions.
- (iii) You should try to establish the relationships between operating conditions and PM CEMS response, especially those conditions that produce the highest PM CEMS response over 15-minute averaging periods, and the lowest PM CEMS response as well. The objective is to be able to reproduce the conditions for purposes of the actual correlation testing discussed in section 8.6.
- (3) You must set the response range of your PM CEMS such that the instrument measures the full range of responses that correspond to the range of source operating conditions that you will implement during correlation testing.
- (4) We recommend that you perform preliminary reference method testing after the correlation test planning period. During this preliminary testing, you should measure the PM emission concentration corresponding to the highest PM CEMS response observed during the full range of normal operation, when perturbing the control equipment, or as the result of PM spiking.
- (5) Before performing correlation testing, you must perform a 7-day zero and upscale drift test (see section 8.5).
- (6) You must not change the response range of the monitor once the response range has been set and the drift test successfully completed.

8.5 How do I perform the 7-day drift test? You must check the zero (or low-level value between 0 and 20 percent of the response range of the instrument) and upscale (between 50 and 100 percent of the instrument's response range) drift. You must perform this check at least once daily over 7 consecutive days. Your PM CEMS must quantify and record the zero and upscale measurements and the time of the measurements. If you make automatic or manual adjustments to your PM CEMS zero and upscale settings, you must conduct the drift test immediately before these adjustments, or conduct it in such a way that you can determine the amount of drift. You will find the calculation procedures for drift in section 12.1 and the acceptance criteria for allowable drift in section 13.1.

- (1) What is the purpose of 7-day drift tests? The purpose of the 7-day drift test is to demonstrate that your system is capable of operating in a stable manner and maintaining its calibration for at least a 7-day period.
- (2) How do I conduct the 7-day drift test? To conduct the 7-day drift test, you must determine the magnitude of the drift once each day, at 24-hour intervals, for 7 consecutive days while your source is operating normally.
- (i) You must conduct the 7-day drift test at the two points specified in section 8.5. You may perform the 7-day drift tests automatically or manually by introducing to your PM CEMS suitable reference standards (these need not be certified) or by using other appropriate procedures.
- (ii) You must record your PM CEMS zero and upscale response and evaluate them against the zero check value and upscale check value.
- (3) When must I conduct the 7-day drift test? You must complete a valid 7-day drift test before attempting the correlation test.

8.6 How do I conduct my PM CEMS correlation test? You must conduct the correlation test according to the procedure given in paragraphs (1) through (5) of this section. If you need multiple correlations, you must conduct testing and collect at least 15 sets of reference method and PM CEMS data for calculating each separate correlation.

(1) You must use the reference method for PM (usually EPA Methods 5, 5I, or 17) that is prescribed by the applicable regulations. You may need to perform other reference methods or performance specifications ( e.g., Method 3 for oxygen, Method 4 for moisture, etc.) depending on the units in which your PM CEMS reports PM concentration.

(i) We recommend that you use paired reference method trains when collecting manual PM data to identify and screen the reference method data for imprecision and bias. Procedures for checking reference method data for bias and precision can be found in the PM CEMS Knowledge Document (see section 16.5).

(ii) You may use test runs that are shorter than 60 minutes in duration ( e.g., 20 or 30 minutes). You may perform your PM CEMS correlation tests during new source performance standards performance tests or other compliance tests subject to the Clean Air Act or other statutes, such as the Resource Conservation and Recovery Act. In these cases, your reference method results obtained during the PM CEMS correlation test may be used to determine compliance so long as your source and the test conditions and procedures ( e.g., reference method sample run durations) are consistent with the applicable regulations and the reference method.

(iii) You must convert the reference method results to units consistent with the conditions of your PM CEMS measurements. For example, if your PM CEMS measures and reports PM emissions in the units of mass per actual volume of stack gas, you must convert your reference method results to those units ( e.g., mg/acm). If your PM CEMS extracts and heats the sample gas to eliminate water droplets, then measures and reports PM emissions under those actual conditions, you must convert your reference method results to those same conditions ( e.g., mg/acm at 160 °C).

(2) During each test run, you must coordinate process operations, reference method sampling, and PM CEMS operations. For example, you must ensure that the process is operating at the targeted conditions, both reference method trains are sampling simultaneously (if paired sampling trains are being used), and your PM CEMS and data logger are operating properly.

(i) You must coordinate the start and stop times of each run between the reference method sampling and PM CEMS operation. For a batch sampling PM CEMS, you must start the reference method at the same time as your PM CEMS sampling.

(ii) You must note the times for port changes (and other periods when the reference method sampling may be suspended) on the data sheets so that you can adjust your PM CEMS data accordingly, if necessary.

(iii) You must properly align the time periods for your PM CEMS and your reference method measurements to account for your PM CEMS response time.

(3) You must conduct a minimum of 15 valid runs each consisting of simultaneous PM CEMS and reference method measurement sets.

(i) You may conduct more than 15 sets of CEMS and reference method measurements. If you choose this option, you may reject certain test results so long as the total number of valid test results you use to determine the correlation is greater than or equal to 15.

(ii) You must report all data, including the rejected data.

(iii) You may reject the results of up to five test runs without explanation.

(iv) If you reject the results of more than five test runs, the basis for rejecting the results of the additional test runs must be explicitly stated in the reference method, this performance specification, Procedure 2 of appendix F, or your quality assurance plan.

(4) Simultaneous PM CEMS and reference method measurements must be performed in a manner to ensure that the range of data that will be used to establish the correlation for your PM CEMS is maximized. You must first attempt to maximize your correlation range by following the procedures described in paragraphs (4)(i) through (iv) of this section. If you cannot obtain the three levels as described in paragraphs (i) through (iv), then you must use the procedure described in section 8.6(5).

- (i) You must attempt to obtain the three different levels of PM mass concentration by varying process operating conditions, varying PM control device conditions, or by means of PM spiking.
- (ii) The three PM concentration levels you use in the correlation tests must be distributed over the complete operating range experienced by your source.
- (iii) At least 20 percent of the minimum 15 measured data points you use should be contained in each of the following levels:
- Level 1: From no PM (zero concentration) emissions to 50 percent of the maximum PM concentration;
  - Level 2: 25 to 75 percent of the maximum PM concentration; and
  - Level 3: 50 to 100 percent of the maximum PM concentration.
- (iv) Although the above levels overlap, you may only apply individual run data to one level.
- (5) If you cannot obtain three distinct levels of PM concentration as described, you must perform correlation testing over the maximum range of PM concentrations that is practical for your PM CEMS. To ensure that the range of data used to establish the correlation for your PM CEMS is maximized, you must follow one or more of the steps in paragraphs (5)(i) through (iv) of this section.
- (i) Zero point data for *in-situ* instruments should be obtained, to the extent possible, by removing the instrument from the stack and monitoring ambient air on a test bench.
- (ii) Zero point data for extractive instruments should be obtained by removing the extractive probe from the stack and drawing in clean ambient air.
- (iii) Zero point data also can be obtained by performing manual reference method measurements when the flue gas is free of PM emissions or contains very low PM concentrations ( e.g., when your process is not operating, but the fans are operating or your source is combusting only natural gas).
- (iv) If none of the steps in paragraphs (5)(i) through (iii) of this section are possible, you must estimate the monitor response when no PM is in the flue gas ( e.g., 4 mA = 0 mg/acm).

8.7 What do I do with the initial correlation test data for my PM CEMS? You must calculate and report the results of the correlation testing, including the correlation coefficient, confidence interval, and tolerance interval for the PM CEMS response and reference method correlation data that are used to establish the correlation, as specified in section 12. You must include all data sheets, calculations, charts (records of PM CEMS responses), process data records including PM control equipment operating parameters, and reference media certifications necessary to confirm that your PM CEMS met the requirements of this performance specification. In addition, you must:

- (1) Determine the integrated (arithmetic average) PM CEMS output over each reference method test period;
- (2) Adjust your PM CEMS outputs and reference method test data to the same clock time (considering response time of your PM CEMS);
- (3) Confirm that the reference method results are consistent with your PM CEMS response in terms of, where applicable, moisture, temperature, pressure, and diluent concentrations; and
- (4) Determine whether any of the reference method test results do not meet the test method criteria.

8.8 What is the limitation on the range of my PM CEMS correlation? Although the data you collect during the correlation testing should be representative of the full range of normal operating conditions at your source, you must conduct additional correlation testing if either of the conditions specified in paragraphs (1) and (2) of this section occurs.

(1) If your source is a low-emitting source, as defined in section 3.16 of this specification, you must conduct additional correlation testing if either of the events specified in paragraphs (1)(i) or (ii) of this section occurs while your source is operating under normal conditions.

- (i) Your source generates 24 consecutive hourly average PM CEMS responses that are greater than 125

percent of the highest PM CEMS response ( e.g., mA reading) used for the correlation curve or are greater than the PM CEMS response that corresponds to 50 percent of the emission limit, whichever is greater, or

(ii) The cumulative hourly average PM CEMS responses generated by your source are greater than 125 percent of the highest PM CEMS response used for the correlation curve or are greater than the PM CEMS response that corresponds to 50 percent of the emission limit, whichever is greater, for more than 5 percent of your PM CEMS operating hours for the previous 30-day period.

(2) If your source is not a low-emitting source, as defined in section 3.16 of this specification, you must conduct additional correlation testing if either of the events specified in paragraph (i) or (ii) of this section occurs while your source is operating under normal conditions.

(i) Your source generates 24 consecutive hourly average PM CEMS responses that are greater than 125 percent of the highest PM CEMS response ( e.g., mA reading) used for the correlation curve, or

(ii) The cumulative hourly average PM CEMS responses generated by your source are greater than 125 percent of the highest PM CEMS response used for the correlation curve for more than 5 percent of your PM CEMS operating hours for the previous 30-day period.

(3) If additional correlation testing is required, you must conduct at least three additional test runs under the conditions that caused the higher PM CEMS response.

(i) You must complete the additional testing and use the resulting new data along with the previous data to calculate a revised correlation equation within 60 days after the occurrence of the event that requires additional testing, as specified in paragraphs 8.8(1) and (2).

(4) If your source generates consecutive PM CEMS hourly responses that are greater than 125 percent of the highest PM CEMS response used to develop the correlation curve for 24 hours or for a cumulative period that amounts to more than 5 percent of the PM CEMS operating hours for the previous 30-day period, you must report the reason for the higher PM CEMS responses.

#### 9.0 What Quality Control Measures Are Required?

Quality control measures for PM CEMS are specified in 40 CFR 60, Appendix F, Procedure 2.

#### 10.0 What Calibration and Standardization Procedures Must I Perform?[Reserved]

#### 11.0 What Analytical Procedures Apply to This Procedure?

Specific analytical procedures are outlined in the applicable reference method(s).

#### 12.0 What Calculations and Data Analyses Are Needed?

You must determine the primary relationship for correlating the output from your PM CEMS to a PM concentration, typically in units of mg/acm or mg/dscm of flue gas, using the calculations and data analysis process in sections 12.2 and 12.3. You develop the correlation by performing an appropriate regression analysis between your PM CEMS response and your reference method data.

12.1 How do I calculate upscale drift and zero drift? You must determine the difference in your PM CEMS output readings from the established reference values (zero and upscale check values) after a stated period of operation during which you performed no unscheduled maintenance, repair, or adjustment.

(1) Calculate the upscale drift (UD) using Equation 11-1:

$$UD = \frac{|R_{CEM} - R_U|}{R_U} \times 100 \quad (\text{Eq. 11-1})$$

Where:

UD = The upscale (high-level) drift of your PM CEMS in percent,

$R_{CEM}$  = The measured PM CEMS response to the upscale reference standard, and

$R_U$  = The preestablished numerical value of the upscale reference standard.

(2) Calculate the zero drift (ZD) using Equation 11-2:

$$ZD = \frac{|R_{CEM} - R_L|}{R_U} \times 100 \quad (\text{Eq. 11-2})$$

Where:

ZD = The zero (low-level) drift of your PM CEMS in percent,

$R_{CEM}$  = The measured PM CEMS response to the zero reference standard,

$R_L$  = The preestablished numerical value of the zero reference standard, and

$R_U$  = The preestablished numerical value of the upscale reference standard.

(3) Summarize the results on a data sheet similar to that shown in Table 2 (see section 17).

12.2 How do I perform the regression analysis? You must couple each reference method PM concentration measurement,  $y$ , in the appropriate units, with an average PM CEMS response,  $x$ , over corresponding time periods. You must complete your PM CEMS correlation calculations using data deemed acceptable by quality control procedures identified in 40 CFR 60, Appendix F, Procedure 2.

(1) You must evaluate all flagged or suspect data produced during measurement periods and determine whether they should be excluded from your PM CEMS's average.

(2) You must assure that the reference method and PM CEMS results are on a consistent moisture, temperature, and diluent basis. You must convert the reference method PM concentration measurements (dry standard conditions) to the units of your PM CEMS measurement conditions. The conditions of your PM CEMS measurement are monitor-specific. You must obtain from your PM CEMS vendor or instrument manufacturer the conditions and units of measurement for your PM CEMS.

(i) If your sample gas contains entrained water droplets and your PM CEMS is an extractive system that measures at actual conditions ( *i.e.*, wet basis), you must use the measured moisture content determined from the impinger analysis when converting your reference method PM data to PM CEMS conditions; do not use the moisture content calculated from a psychrometric chart based on saturated conditions.

12.3 How do I determine my PM CEMS correlation? To predict PM concentrations from PM CEMS responses, you must use the calculation method of least squares presented in paragraphs (1) through (5) of this section. When performing the calculations, each reference method PM concentration measurement must be treated as a discrete data point; if using paired sampling trains, do not average reference method data pairs for any test run.

This performance specification describes procedures for evaluating five types of correlation models: linear, polynomial, logarithmic, exponential, and power. Procedures for selecting the most appropriate correlation model are presented in section 12.4 of this specification.

(1) How do I evaluate a linear correlation for my correlation test data? To evaluate a linear correlation, follow the procedures described in paragraphs (1)(i) through (iv) of this section.

(i) Calculate the linear correlation equation, which gives the predicted PM concentration ( $\hat{y}$ ) as a function of the PM CEMS response ( $x$ ), as indicated by Equation 11-3:

$$\hat{y} = b_0 + b_1x \quad (\text{Eq. 11-3})$$

Where:

$y$  = the predicted PM concentration,

$b_0$  = the intercept for the correlation curve, as calculated using Equation 11-4,

$b_1$  = the slope of the correlation curve, as calculated using Equation 11-6, and

$x$  = the PM CEMS response value.

Calculate the  $y$  intercept ( $b_0$ ) of the correlation curve using Equation 11-4:

$$b_0 = \bar{y} - b_1 \cdot \bar{x} \quad (\text{Eq. 11-4})$$

Where:

$\bar{x}$  = the mean value of the PM CEMS response data, as calculated using Equation 11-5, and

$\bar{y}$  = the mean value of the PM concentration data, as calculated using Equation 11-5:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i, \bar{y} = \frac{1}{n} \sum_{i=1}^n y_i \quad (\text{Eq. 11-5})$$

Where:

$x_i$  = the PM CEMS response value for run  $i$ ,

$y_i$  = the PM concentration value for run  $i$ , and

$n$  = the number of data points.

Calculate the slope ( $b_1$ ) of the correlation curve using Equation 11-6:

$$b_1 = \frac{S_{xy}}{S_{xx}} \quad (\text{Eq. 11-6})$$

Where:

$S_{xx}$ ,  $S_{xy}$  = as calculated using Equation 11-7:

$$S_{xx} = \sum_{i=1}^n (x_i - \bar{x})^2, S_{xy} = \sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y}) \quad (\text{Eq. 11-7})$$

(ii) Calculate the half range of the 95 percent confidence interval (CI) for the predicted PM concentration () at the mean value of  $x$ , using Equation 11-8:

$$CI = t_{df, 1-\alpha/2} \cdot S_L \sqrt{\frac{1}{n}} \quad (\text{Eq. 11-8})$$

Where:

CI = the half range of the 95 percent confidence interval for the predicted PM concentration at the mean  $x$  value,

$t_{df, 1-\alpha/2}$  = the value for the  $t$  statistic provided in Table 1 for  $df = (n - 2)$ , and

$S_L$  = the scatter or deviation of values about the correlation curve, which is determined using Equation 11-9:

$$S_L = \sqrt{\frac{1}{n-2} \sum_{i=1}^n (\hat{y}_i - y_i)^2} \quad (\text{Eq. 11-9})$$

Calculate the confidence interval half range for the predicted PM concentration ( ) at the mean x value as a percentage of the emission limit (CI%) using Equation 11-10:

$$\text{CI}\% = \frac{\text{CI}}{\text{EL}} \cdot 100\% \quad (\text{Eq. 11-10})$$

Where:

CI = the half range of the 95 percent confidence interval for the predicted PM concentration at the mean x value, and

EL = PM emission limit, as described in section 13.2.

(iii) Calculate the half range of the tolerance interval (TI) for the predicted PM concentration ( ) at the mean x value using Equation 11-11:

$$\text{TI} = k_T \cdot S_L \quad (\text{Eq. 11-11})$$

Where:

TI = the half range of the tolerance interval for the predicted PM concentration ( ) at the mean x value,

$k_T$  = as calculated using Equation 11-12, and

$S_L$  = as calculated using Equation 11-9:

$$k_T = u_{n'} \cdot v_{df} \quad (\text{Eq. 11-12})$$

Where:

$n'$  = the number of test runs (n),

$u_{n'}$  = the tolerance factor for 75 percent coverage at 95 percent confidence provided in Table 1 for  $df = (n-2)$ , and

$v_{df}$  = the value from Table 1 for  $df = (n-2)$ .

Calculate the half range of the tolerance interval for the predicted PM concentration ( ) at the mean x value as a percentage of the emission limit (TI%) using Equation 11-13:

$$\text{TI}\% = \frac{\text{TI}}{\text{EL}} \cdot 100\% \quad (\text{Eq. 11-13})$$

Where:

TI = the half range of the tolerance interval for the predicted PM concentration ( ) at the mean x value, and

EL = PM emission limit, as described in section 13.2.

(iv) Calculate the linear correlation coefficient (r) using Equation 11-14:

$$r = \sqrt{1 - \frac{S_L^2}{S_y^2}} \quad (\text{Eq. 11-14})$$

Where:

$S_L$  = as calculated using Equation 11–9, and

$S_y$  = as calculated using Equation 11–15:

$$S_y = \sqrt{\frac{\sum_{i=1}^n (y_i - \bar{y})^2}{n - 1}} \quad (\text{Eq. 11-15})$$

(2) How do I evaluate a polynomial correlation for my correlation test data? To evaluate a polynomial correlation, follow the procedures described in paragraphs (2)(i) through (iv) of this section.

(i) Calculate the polynomial correlation equation, which is indicated by Equation 11–16, using Equations 11–17 through 11–22:

$$\hat{y} = b_0 + b_1x + b_2x^2 \quad (\text{Eq. 11-16})$$

Where:

$\hat{y}$  = the PM CEMS concentration predicted by the polynomial correlation equation, and

$b_0, b_1, b_2$  = the coefficients determined from the solution to the matrix equation  $Ab=B$

Where:

$$A = \begin{bmatrix} n & S_1 & S_2 \\ S_1 & S_2 & S_3 \\ S_2 & S_3 & S_4 \end{bmatrix}, \quad b = \begin{bmatrix} b_0 \\ b_1 \\ b_2 \end{bmatrix}, \quad B = \begin{bmatrix} S_5 \\ S_6 \\ S_7 \end{bmatrix}$$

$$S_1 = \sum_{i=1}^n (x_i), S_2 = \sum_{i=1}^n (x_i^2), S_3 = \sum_{i=1}^n (x_i^3), S_4 = \sum_{i=1}^n (x_i^4) \quad (\text{Eq. 11-17})$$

$$S_5 = \sum_{i=1}^n (y_i), S_6 = \sum_{i=1}^n (x_i y_i), S_7 = \sum_{i=1}^n (x_i^2 y_i). \quad (\text{Eq. 11-18})$$

Where:

$X_i$  = the PM CEMS response for run  $i$ ,

$Y_i$  = the reference method PM concentration for run  $i$ , and

$n$  = the number of test runs.

Calculate the polynomial correlation curve coefficients ( $b_0, b_1$ , and  $b_2$ ) using Equations 11–19 through 11–21, respectively:

$$b_0 = \frac{(S_3 \cdot S_2 \cdot S_4 + S_1 \cdot S_3 \cdot S_7 + S_2 \cdot S_4 \cdot S_3 - S_7 \cdot S_2 \cdot S_2 - S_3 \cdot S_3 \cdot S_3 - S_4 \cdot S_4 \cdot S_1)}{\det A} \quad (\text{Eq. 11-19})$$

$$b_1 = \frac{(n \cdot S_4 \cdot S_4 + S_3 \cdot S_3 \cdot S_2 + S_2 \cdot S_1 \cdot S_7 - S_2 \cdot S_4 \cdot S_2 - S_7 \cdot S_3 \cdot n - S_4 \cdot S_1 \cdot S_3)}{\det A} \quad (\text{Eq. 11-20})$$

$$b_2 = \frac{(n \cdot S_2 \cdot S_7 + S_1 \cdot S_4 \cdot S_2 + S_3 \cdot S_1 \cdot S_3 - S_2 \cdot S_2 \cdot S_3 - S_3 \cdot S_4 \cdot n - S_7 \cdot S_1 \cdot S_1)}{\det A} \quad (\text{Eq. 11-21})$$

Where:

$$\det A = n \cdot S_2 \cdot S_4 - S_2 \cdot S_2 \cdot S_2 + S_1 \cdot S_3 \cdot S_2 - S_3 \cdot S_3 \cdot n + S_2 \cdot S_1 \cdot S_3 - S_4 \cdot S_1 \cdot S_1 \quad (\text{Eq. 11-22})$$

(ii) Calculate the 95 percent confidence interval half range (CI) by first calculating the C coefficients (Coto C5) using Equations 11-23 and 11-24:

$$C_0 = \frac{(S_2 \cdot S_4 - S_3^2)}{D}, \quad C_1 = \frac{(S_3 \cdot S_2 - S_1 \cdot S_4)}{D}, \quad C_2 = \frac{(S_1 \cdot S_3 - S_2^2)}{D},$$

$$C_3 = \frac{(nS_4 - S_2^2)}{D}, \quad C_4 = \frac{(S_1 \cdot S_2 - nS_3)}{D}, \quad C_5 = \frac{(nS_2 - S_1^2)}{D} \quad (\text{Eq. 11-23})$$

Where:

$$D = n(S_2 \cdot S_4 - S_3^2) + S_1(S_3 \cdot S_2 - S_1 \cdot S_4) + S_2(S_1 \cdot S_3 - S_2^2) \quad (\text{Eq. 11-24})$$

Calculate  $\Delta$  using Equation 11-25 for each x value:

$$\Delta = C_0 + 2C_1x + (2C_2 + C_3)x^2 + 2C_4x^3 + C_5x^4 \quad (\text{Eq. 11-25})$$

Determine the x value that corresponds to the minimum value of  $\Delta$  ( $\Delta_{\min}$ ). Determine the scatter or deviation of values about the polynomial correlation curve ( $S_p$ ) using Equation 11-26:

$$S_p = \sqrt{\frac{1}{n-3} \sum_{i=1}^n (\hat{y}_i - y_i)^2} \quad (\text{Eq. 11-26})$$

Calculate the half range of the 95 percent confidence interval (CI) for the predicted PM concentration ( $\hat{y}$ ) at the x value that corresponds to  $\Delta_{\min}$  using Equation 11-27:

$$CI = t_{df} \cdot S_p \sqrt{\Delta_{\min}} \quad (\text{Eq. 11-27})$$

Where:

df = (n-3), and

t<sub>df</sub> = as listed in Table 1 (see section 17).

Calculate the half range of the 95 percent confidence interval for the predicted PM concentration at the x value that corresponds to  $\Delta_{\min}$  as a percentage of the emission limit (CI%) using Equation 11-28:

$$CI\% = \frac{CI}{EL} \cdot 100\% \quad (\text{Eq. 11-28})$$

Where:

CI = the half range of the 95 percent confidence interval for the predicted PM concentration at the x value that corresponds to  $\Delta_{\min}$ , and

EL = PM emission limit, as described in section 13.2.

(iii) Calculate the tolerance interval half range (TI) for the predicted PM concentration at the x value that corresponds to  $\Delta_{\min}$ , as indicated in Equation 11-29 for the polynomial correlation, using Equations 11-30 and 11-31:

$$TI = k_T \cdot S_p \quad (\text{Eq. 11-29})$$

Where:

$$k_T = u_n \cdot v_{df} \quad (\text{Eq. 11-30})$$

$$n' = \frac{1}{\Delta} \quad (\text{Eq. 11-31})$$

$u_n$  = the value indicated in Table 1 for  $df = (n'-3)$ , and

$v_{df}$  = the value indicated in Table 1 for  $df = (n'-3)$ .

Calculate the tolerance interval half range for the predicted PM concentration at the x value that corresponds to  $\Delta_{\min}$  as a percentage of the emission limit (TI%) using Equation 11-32:

$$TI\% = \frac{TI}{EL} \cdot 100 \quad (\text{Eq. 11-32})$$

Where:

TI = the tolerance interval half range for the predicted PM concentration at the x value that corresponds to  $\Delta_{\min}$ , and

EL = PM emission limit, as described in section 13.2.

(iv) Calculate the polynomial correlation coefficient (r) using Equation 11-33:

$$r = \sqrt{1 - \frac{S_p^2}{S_y^2}} \quad (\text{Eq. 11-33})$$

Where:

$S_p$  = as calculated using Equation 11-26, and

$S_y$  = as calculated using Equation 11-15.

(3) How do I evaluate a logarithmic correlation for my correlation test data? To evaluate a logarithmic correlation, which has the form indicated by Equation 11-34, follow the procedures described in paragraphs (3)(i) through (iii) of this section.

$$\hat{y} = b_0 + b_1 \ln(x) \quad (\text{Eq. 11-34})$$

(i) Perform a logarithmic transformation of each PM CEMS response value (x values) using Equation

11-35:

$$x_i' = \text{Ln}(x_i) \quad (\text{Eq. 11-35})$$

Where:

$x_i'$  = is the transformed value of  $x_i$ , and

$\text{Ln}(x_i)$  = the natural logarithm of the PM CEMS response for run i.

(ii) Using the values for  $x_i'$  in place of the values for  $x_i$ , perform the same procedures used to develop the linear correlation equation described in paragraph (1)(i) of this section. The resulting equation has the form indicated by Equation 11-36:

$$\hat{y} = b_0 + b_1 x' \quad (\text{Eq. 11-36})$$

Where:

$x'$  = the natural logarithm of the PM CEMS response, and the variables  $b_0$ , and  $b_1$  are as defined in paragraph (1)(i) of this section.

(iii) Using the values for  $x_i'$  in place of the values for  $x_i$ , calculate the confidence interval half range at the mean  $x'$  value as a percentage of the emission limit (CI%), the tolerance interval half range at the mean  $x'$  value as a percentage of the emission limit (TI%), and the correlation coefficient ( $r$ ) using the procedures described in paragraphs (1)(ii) through (iv) of this section.

(4) How do I evaluate an exponential correlation for my correlation test data? To evaluate an exponential correlation, which has the form indicated by Equation 11-37, follow the procedures described in paragraphs (4)(i) through (v) of this section:

$$\hat{y} = b_0 e^{b_1 x} \quad (\text{Eq. 11-37})$$

(i) Perform a logarithmic transformation of each PM concentration measurement ( $y$  values) using Equation 11-38:

$$y_i' = \text{Ln}(y_i) \quad (\text{Eq. 11-38})$$

Where:

$y_i'$  = is the transformed value of  $y_i$ , and

$\text{Ln}(y_i)$  = the natural logarithm of the PM concentration measurement for run i.

(ii) Using the values for  $y_i'$  in place of the values for  $y_i$ , perform the same procedures used to develop the linear correlation equation described in paragraph (1)(i) of this section. The resulting equation will have the form indicated by Equation 11-39.

$$\hat{Y}' = b_0' + b_1 x \quad (\text{Eq. 11-39})$$

Where:

$\hat{Y}'$  = the predicted log PM concentration value,

$b_0'$  = the natural logarithm of  $b_0$ , and the variables  $b_0$ ,  $b_1$ , and  $x$  are as defined in paragraph (1)(i) of this section.

(iii) Using the values for  $y_i'$  in place of the values for  $y_i$ , calculate the half range of the 95 percent confidence interval (CI'), as described in paragraph (1)(ii) of this section for CI. Note that CI' is on the log

scale. Next, calculate the upper and lower 95 percent confidence limits for the mean value  $y'$  using Equations 11-40 and 11-41:

$$LCL' = \bar{y}' - CI' \quad (\text{Eq. 11-40}) \quad UCL' = \bar{y}' + CI' \quad (\text{Eq. 11-41})$$

Where:

LCL' = the lower 95 percent confidence limit for the mean value  $y'$ ,

UCL' = the upper 95 percent confidence limit for the mean value  $y'$ ,

$\bar{y}'$  = the mean value of the log-transformed PM concentrations, and

CI' = the half range of the 95 percent confidence interval for the predicted PM concentration ( $\bar{y}'$ ), as calculated in Equation 11-8.

Calculate the half range of the 95 percent confidence interval (CI) on the original PM concentration scale using Equation 11-42:

$$CI = \frac{e^{UCL'} - e^{LCL'}}{2} \quad (\text{Eq. 11-42})$$

Where:

CI = the half range of the 95 percent confidence interval on the original PM concentration scale, and UCL' and LCL' are as defined previously.

Calculate the half range of the 95 percent confidence interval for the predicted PM concentration corresponding to the mean value of  $x$  as a percentage of the emission limit (CI%) using Equation 11-10.

(iv) Using the values for  $y'$  in place of the values for  $y$ , calculate the half range tolerance interval (TI'), as described in paragraph (1)(iii) of this section for TI. Note that TI' is on the log scale. Next, calculate the half range tolerance limits for the mean value  $y'$  using Equations 11-43 and 11-44:

$$LTL' = \bar{y}' - TI' \quad (\text{Eq. 11-43}) \quad UTL' = \bar{y}' + TI' \quad (\text{Eq. 11-44})$$

Where:

LTL' = the lower 95 percent tolerance limit for the mean value  $y'$ ,

UTL' = the upper 95 percent tolerance limit for the mean value  $y'$ ,

$\bar{y}'$  = the mean value of the log-transformed PM concentrations, and

TI' = the half range of the 95 percent tolerance interval for the predicted PM concentration ( $\bar{y}'$ ), as calculated in Equation 11-11.

Calculate the half range tolerance interval (TI) on the original PM concentration scale using Equation 11-45:

$$TI = \frac{e^{UTL'} - e^{LTL'}}{2} \quad (\text{Eq. 11-45})$$

TI = the half range of the 95 percent tolerance interval on the original PM scale, and UTL' and LTL' are as defined previously.

Calculate the tolerance interval half range for the predicted PM concentration corresponding to the mean value of  $x$  as a percentage of the emission limit (TI%) using Equation 11-13.

(v) Using the values for  $y'$  in place of the values for  $y_i$ , calculate the correlation coefficient ( $r$ ) using the procedure described in paragraph (1)(iv) of this section.

(5) How do I evaluate a power correlation for my correlation test data? To evaluate a power correlation, which has the form indicated by Equation 11–46, follow the procedures described in paragraphs (5)(i) through (v) of this section.

$$\hat{y} = b_0 x^h \quad (\text{Eq. 11-46})$$

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(i) Perform logarithmic transformations of each PM CEMS response ( $x$  values) and each PM concentration measurement ( $y$  values) using Equations 11–35 and 11–38, respectively.

(ii) Using the values for  $x'$  in place of the values for  $x_i$ , and the values for  $y'$  in place of the values for  $y_i$ , perform the same procedures used to develop the linear correlation equation described in paragraph (1)(i) of this section. The resulting equation will have the form indicated by Equation 11–47:

$$\hat{Y}' = b'_0 + b_1 x' \quad (\text{Eq. 11-47})$$

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Where:

$\hat{y}$  = the predicted log PM concentration value, and

$x'$  = the natural logarithm of the PM CEMS response values,

$b'_0$  = the natural logarithm of  $b_0$ , and the variables  $b_0$ ,  $b_1$ , and  $x$  are as defined in paragraph (1)(i) of this section.

(iii) Using the same procedure described for exponential models in paragraph (4)(iii) of this section, calculate the half range of the 95 percent confidence interval for the predicted PM concentration corresponding to the mean value of  $x'$  as a percentage of the emission limit.

(iv) Using the same procedure described for exponential models in paragraph (4)(iv) of this section, calculate the tolerance interval half range for the predicted PM concentration corresponding to the mean value of  $x'$  as a percentage of the emission limit.

(v) Using the values for  $y'$  in place of the values for  $y_i$ , calculate the correlation coefficient ( $r$ ) using the procedure described in paragraph (1)(iv) of this section.

*Note:* PS–11 does not address the application of correlation equations to calculate PM emission concentrations using PM CEMS response data during normal operations of a PM CEMS. However, we will provide guidance on the use of specific correlation models (i.e., logarithmic, exponential, and power models) to calculate PM concentrations in an operating PM CEMS in situations when the PM CEMS response values are equal to or less than zero, and the correlation model is undefined.

12.4 Which correlation model should I use? Follow the procedures described in paragraphs (1) through (4) of this section to determine which correlation model you should use.

(1) For each correlation model that you develop using the procedures described in section 12.3 of this specification, compare the confidence interval half range percentage, tolerance interval half range percentage, and correlation coefficient to the performance criteria specified in section 13.2 of this specification. You can use the linear, logarithmic, exponential, or power correlation model if the model satisfies all of the performance criteria specified in section 13.2 of this specification. However, to use the polynomial model you first must check that the polynomial correlation curve satisfies the criteria for minimum and maximum values specified in paragraph (3) of this section.

(2) If you develop more than one correlation curve that satisfy the performance criteria specified in section 13.2 of this specification, you should use the correlation curve with the greatest correlation coefficient. If the polynomial model has the greatest correlation coefficient, you first must check that the polynomial correlation curve satisfies the criteria for minimum and maximum values specified in paragraph (3) of this section.

(3) You can use the polynomial model that you develop using the procedures described in section 12.3 (2) if the model satisfies the performance criteria specified in section 13.2 of this specification, and the minimum or maximum value of the polynomial correlation curve does not occur within the expanded data range. The minimum or maximum value of the polynomial correlation curve is the point where the slope of the curve equals zero. To determine if the minimum or maximum value occurs within the expanded data range, follow the procedure described in paragraphs (3)(i) through (iv) of this section.

(i) Determine if your polynomial correlation curve has a minimum or maximum point by comparing the polynomial coefficient  $b_2$  to zero. If  $b_2$  is less than zero, the curve has a maximum value. If  $b_2$  is greater than zero, the curve has a minimum value. (Note: If  $b_2$  equals zero, the correlation curve is linear.)

(ii) Calculate the minimum value using Equation 11-48.

$$\text{min or max} = -\frac{b_1}{2b_2} \quad (\text{Eq. 11-48})$$

(iii) If your polynomial correlation curve has a minimum point, you must compare the minimum value to the minimum PM CEMS response used to develop the correlation curve. If the correlation curve minimum value is less than or equal to the minimum PM CEMS response value, you can use the polynomial correlation curve, provided the correlation curve also satisfies all of the performance criteria specified in section 13.2 of this specification. If the correlation curve minimum value is greater than the minimum PM CEMS response value, you cannot use the polynomial correlation curve to predict PM concentrations.

(iv) If your polynomial correlation curve has a maximum, the maximum value must be greater than the allowable extrapolation limit. If your source is not a low-emitting source, as defined in section 3.16 of this specification, the allowable extrapolation limit is 125 percent of the highest PM CEMS response used to develop the correlation curve. If your source is a low-emitting source, the allowable extrapolation limit is 125 percent of the highest PM CEMS response used to develop the correlation curve or the PM CEMS response that corresponds to 50 percent of the emission limit, whichever is greater. If the polynomial correlation curve maximum value is greater than the extrapolation limit, and the correlation curve satisfies all of the performance criteria specified in section 13.2 of this specification, you can use the polynomial correlation curve to predict PM concentrations. If the correlation curve maximum value is less than the extrapolation limit, you cannot use the polynomial correlation curve to predict PM concentrations.

(4) You may petition the Administrator for alternative solutions or sampling recommendations if the correlation models described in section 12.3 of this specification do not satisfy the performance criteria specified in section 13.2 of this specification.

### 13.0 What Are the Performance Criteria for My PM CEMS?

You must evaluate your PM CEMS based on the 7-day drift check, the accuracy of the correlation, and the sampling periods and cycle/response time.

13.1 What is the 7-day drift check performance specification? Your daily PM CEMS internal drift checks must demonstrate that the average daily drift of your PM CEMS does not deviate from the value of the reference light, optical filter, Beta attenuation signal, or other technology-suitable reference standard by more than 2 percent of the upscale value. If your CEMS includes diluent and/or auxiliary monitors (for temperature, pressure, and/or moisture) that are employed as a necessary part of this performance specification, you must determine the calibration drift separately for each ancillary monitor in terms of its respective output (see the appropriate performance specification for the diluent CEMS specification). None of the calibration drifts may exceed their individual specification.

13.2 What performance criteria must my PM CEMS correlation satisfy? Your PM CEMS correlation must meet each of the minimum specifications in paragraphs (1), (2), and (3) of this section. Before confidence and tolerance interval half range percentage calculations are made, you must convert the emission limit to the appropriate units of your PM CEMS measurement conditions using the average of emissions gas property values ( e.g., diluent concentration, temperature, pressure, and moisture) measured during the correlation test.

(1) The correlation coefficient must satisfy the criterion specified in paragraph (1)(i) or (ii), whichever applies.

(i) If your source is not a low-emitting source, as defined in section 3.16 of this specification, the

correlation coefficient (r) must be greater than or equal to 0.85.

(ii) If your source is a low-emitting source, as defined in section 3.16 of this specification, the correlation coefficient (r) must be greater than or equal to 0.75.

(2) The confidence interval half range must satisfy the applicable criterion specified in paragraph (2)(i), (ii), or (iii) of this section, based on the type of correlation model.

(i) For linear or logarithmic correlations, the 95 percent confidence interval half range at the mean PM CEMS response value from the correlation test must be within 10 percent of the PM emission limit value specified in the applicable regulation. Therefore, the CI% calculated using Equation 11–10 must be less than or equal to 10 percent.

(ii) For polynomial correlations, the 95 percent confidence interval half range at the PM CEMS response value from the correlation test that corresponds to the minimum value for  $\Delta$  must be within 10 percent of the PM emission limit value specified in the applicable regulation. Therefore, the CI% calculated using Equation 11–28 must be less than or equal to 10 percent.

(iii) For exponential or power correlations, the 95 percent confidence interval half range at the mean of the logarithm of the PM CEMS response values from the correlation test must be within 10 percent of the PM emission limit value specified in the applicable regulation. Therefore, the CI% calculated using Equation 11–10 must be less than or equal to 10 percent.

(3) The tolerance interval half range must satisfy the applicable criterion specified in paragraph (3)(i), (ii), or (iii) of this section, based on the type of correlation model.

(i) For linear or logarithmic correlations, the half range tolerance interval with 95 percent confidence and 75 percent coverage at the mean PM CEMS response value from the correlation test must be within 25 percent of the PM emission limit value specified in the applicable regulation. Therefore, the TI% calculated using Equation 11–13 must be less than or equal to 25 percent.

(ii) For polynomial correlations, the half range tolerance interval with 95 percent confidence and 75 percent coverage at the PM CEMS response value from the correlation test that corresponds to the minimum value for  $\Delta$  must be within 25 percent of the PM emission limit value specified in the applicable regulation. Therefore, the TI% calculated using Equation 11–32 must be less than or equal to 25 percent.

(iii) For exponential or power correlations, the half range tolerance interval with 95 percent confidence and 75 percent coverage at the mean of the logarithm of the PM CEMS response values from the correlation test must be within 25 percent of the PM emission limit value specified in the applicable regulation. Therefore, the TI% calculated using Equation 11–13 must be less than or equal to 25 percent.

13.3 What are the sampling periods and cycle/response time? You must document and maintain the response time and any changes in the response time following installation.

(1) If you have a batch sampling PM CEMS, you must evaluate the limits presented in paragraphs (1)(i) and (ii) of this section.

(i) The response time of your PM CEMS, which is equivalent to the cycle time, must be no longer than 15 minutes. In addition, the delay between the end of the sampling time and reporting of the sample analysis must be no greater than 3 minutes. You must document any changes in the response time following installation.

(ii) The sampling time of your PM CEMS must be no less than 30 percent of the cycle time. If you have a batch sampling PM CEMS, sampling must be continuous except during pauses when the collected pollutant on the capture media is being analyzed and the next capture medium starts collecting a new sample.

13.4 What PM compliance monitoring must I do? You must report your CEMS measurements in the units of the standard expressed in the regulations ( e.g., mg/dscm @ 7 percent oxygen, pounds per million Btu (lb/mmBtu), etc.). You may need to install auxiliary data monitoring equipment to convert the units reported by your PM CEMS into units of the PM emission standard.

14.0 *Pollution Prevention*[Reserved]

## 15.0 Waste Management[Reserved]

## 16.0 Which References Are Relevant to This Performance Specification?

16.1 Technical Guidance Document: Compliance Assurance Monitoring. U.S. Environmental Protection Agency Office of Air Quality Planning and Standards Emission Measurement Center. August 1998.

16.2 40 CFR 60, Appendix B, "Performance Specification 2—Specifications and Test Procedures for SO<sub>2</sub>, and NO<sub>x</sub>, Continuous Emission Monitoring Systems in Stationary Sources."

16.3 40 CFR 60, Appendix B, "Performance Specification 1—Specification and Test Procedures for Opacity Continuous Emission Monitoring Systems in Stationary Sources."

16.4 40 CFR 60, Appendix A, "Method 1—Sample and Velocity Traverses for Stationary Sources."

16.5 "Current Knowledge of Particulate Matter (PM) Continuous Emission Monitoring." EPA-454/R-00-039. U.S. Environmental Protection Agency, Research Triangle Park, NC. September 2000.

16.6 40 CFR 266, Appendix IX, Section 2, "Performance Specifications for Continuous Emission Monitoring Systems."

16.7 ISO 10155, "Stationary Source Emissions—Automated Monitoring of Mass Concentrations of Particles: Performance Characteristics, Test Procedures, and Specifications." American National Standards Institute, New York City. 1995.

16.8 Snedecor, George W. and Cochran, William G. (1989), Statistical Methods, Eighth Edition, Iowa State University Press.

16.9 Wallis, W. A. (1951) "Tolerance Intervals for Linear Regression," in Second Berkeley Symposium on Mathematical Statistics and Probability, ed. J. Neyman, Berkeley: University of California Press, pp. 43-51.

## 17.0 What Reference Tables and Validation Data Are Relevant to PS-11?

Use the information in Table 1 for determining the confidence and tolerance interval half ranges. Use Table 2 to record your 7-day drift test data.

**Table 1—Factors for Calculation of Confidence and Tolerance Interval Half Ranges**

df	Student's t, t <sub>df</sub>	Tolerance interval with 75% coverage and 95% confidence level		
		v <sub>df</sub> (95%)	u <sub>n</sub> (75%)	k <sub>T</sub>
3	3.182	2.920	1.266	3.697
4	2.776	2.372	1.247	2.958
5	2.571	2.089	1.233	2.576
6	2.447	1.915	1.223	2.342
7	2.365	1.797	1.214	2.183
8	2.306	1.711	1.208	2.067
9	2.262	1.645	1.203	1.979
10	2.228	1.593	1.198	1.909
11	2.201	1.551	1.195	1.853
12	2.179	1.515	1.192	1.806
13	2.160	1.485	1.189	1.766
14	2.145	1.460	1.186	1.732
15	2.131	1.437	1.184	1.702

16	2.120	1.418	1.182	1.676
17	2.110	1.400	1.181	1.653
18	2.101	1.384	1.179	1.633
19	2.093	1.370	1.178	1.614
20	2.086	1.358	1.177	1.597
21	2.080	1.346	1.175	1.582
22	2.074	1.335	1.174	1.568
23	2.069	1.326	1.173	1.555
24	2.064	1.316	1.172	1.544
25	2.060	1.308	1.172	1.533
26	2.056	1.300	1.171	1.522
27	2.052	1.293	1.170	1.513
28	2.048	1.286	1.170	1.504
29	2.045	1.280	1.169	1.496
30	2.042	1.274	1.168	1.488
31	2.040	1.268	1.168	1.481
32	2.037	1.263	1.167	1.474
33	2.035	1.258	1.167	1.467
34	2.032	1.253	1.166	1.461
35	2.030	1.248	1.166	1.455
36	2.028	1.244	1.165	1.450
37	2.026	1.240	1.165	1.444
38	2.024	1.236	1.165	1.439
39	2.023	1.232	1.164	1.435
40	2.021	1.228	1.164	1.430
41	2.020	1.225	1.164	1.425
42	2.018	1.222	1.163	1.421
43	2.017	1.218	1.163	1.417
44	2.015	1.215	1.163	1.413
45	2.014	1.212	1.163	1.410
46	2.013	1.210	1.162	1.406
47	2.012	1.207	1.162	1.403
48	2.011	1.204	1.162	1.399
49	2.010	1.202	1.162	1.396
50	2.009	1.199	1.161	1.393
51	2.008	1.197	1.161	1.390
52	2.007	1.195	1.161	1.387
53	2.006	1.192	1.161	1.384
54	2.005	1.190	1.161	1.381
55	2.004	1.188	1.160	1.379
56	2.003	1.186	1.160	1.376
57	2.002	1.184	1.160	1.374
58	2.002	1.182	1.160	1.371
59	2.001	1.180	1.160	1.369

	2.000	1.179	1.160	1.367
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References 16.8 (t values) and 16.9 ( $v_{df}$  and  $u_n$  values).

Table 2—7-Day Drift Test Data

Zero drift day #	Date and time	Zero check value ( $R_L$ )	PM CEMS response ( $R_{CEMS}$ )	Difference ( $R_{CEMS}-R_L$ )	Zero drift $((R_{CEMS}-R_L)/R_U) \times 100$
1					
2					
3					
4					
5					
6					
7					

**PM**

Upscale drift day #	Date and time	Upscale check value ( $R_U$ )	CEMS response ( $R_{CEMS}$ )	Difference ( $R_{CEMS}-R_U$ )	Upscale drift $((R_{CEMS}-R_U)/R_U) \times 100\%$
1					
2					
3					
4					
5					
6					
7					

Performance Specification 12A—Specifications and Test Procedures for Total Vapor Phase Mercury Continuous Emission Monitoring Systems in Stationary Sources

### 1.0 Scope and Application

1.1 Analyte. The analyte measured by these procedures and specifications is total vapor phase mercury (Hg) in the flue gas, which represents the sum of elemental Hg ( $Hg^0$ , CAS Number 7439-97-6) and oxidized forms of gaseous Hg ( $Hg+2$ ), in concentration units of micrograms per cubic meter ( $\mu g/m^3$ ).

### 1.2 Applicability.

1.2.1 This specification is for evaluating the acceptability of total vapor phase Hg continuous emission monitoring systems (CEMS) installed at stationary sources at the time of or soon after installation and whenever specified in the regulations. The Hg CEMS must be capable of measuring the total concentration in  $\mu g/m^3$  of vapor phase Hg, regardless of speciation, and recording that concentration at standard conditions on a wet or dry basis. These specifications do not address measurement of particle bound Hg.

1.2.2 This specification is not designed to evaluate an installed CEMS's performance over an extended period of time nor does it identify specific calibration techniques and auxiliary procedures to assess the CEMS's performance. The source owner or operator, however, is responsible to calibrate, maintain, and operate the CEMS properly. The Administrator may require, under section 114 of the Clean Air Act, the operator to conduct CEMS performance evaluations at other times besides the initial performance

evaluation test. See §§60.13(c) and 63.8(e)(1).

1.2.3 Mercury monitoring approaches not entirely suited to these specifications may be approvable under the alternative monitoring or alternative test method provisions of §60.13(i) and §63.8(f) or §60.8(b)(3) and §63.7(f), respectively.

## 2.0 Summary of Performance Specification

Procedures for determining CEMS relative accuracy, linearity, and calibration drift are outlined. CEMS installation and measurement location specifications, data reduction procedures, and performance criteria are included.

## 3.0 Definitions

3.1 *Continuous Emission Monitoring System (CEMS)* means the total equipment required to measure a pollutant concentration. The system generally consists of the following three major subsystems:

3.2 *Sample Interface* means that portion of the CEMS used for one or more of the following: sample acquisition, sample transport, sample conditioning, and protection of the monitor from the effects of the stack effluent.

3.3 *Hg Analyzer* means that portion of the Hg CEMS that measures the total vapor phase Hg mass concentration and generates a proportional output.

3.4 *Data Recorder* means that portion of the CEMS that provides a permanent electronic record of the analyzer output. The data recorder may provide automatic data reduction and CEMS control capabilities.

3.5 *Span Value* means the measurement range as specified in the applicable regulation or other requirement. If the span is not specified in the applicable regulation or other requirement, then it must be a value approximately equivalent to two times the emission standard. Unless otherwise specified, the span value may be rounded up to the nearest multiple of 10.

3.6 *Measurement Error Test* means a test procedure in which the accuracy of the concentrations measured by a CEMS at three or more points over its measurement range is evaluated using reference gases. For Hg CEMS, elemental and oxidized Hg ( $\text{Hg}^0$  and mercuric chloride,  $\text{HgCl}_2$ ) gas standards of known concentration are used for this procedure.

3.7 *Measurement Error (ME)* means the absolute value of the difference between the concentration indicated by the CEMS and the known concentration of a reference gas, expressed as a percentage of the span value, when the entire CEMS, including the sampling interface, is challenged.

3.8 *Calibration Drift (CD)* means the absolute value of the difference between the CEMS output response and either an upscale Hg reference gas or a zero-level Hg reference gas, expressed as a percentage of the span value, when the entire CEMS, including the sampling interface, is challenged after a stated period of operation during which no unscheduled maintenance or repair took place.

3.9 *Relative Accuracy Test Procedure* means a test procedure consisting of at least nine test runs, in which the accuracy of the concentrations measured by a CEMS is evaluated by comparison against concurrent measurements made with a reference method (RM). Relative accuracy tests repeated on a regular, on-going basis are referred to as relative accuracy test audits or RATAs.

3.10 *Relative Accuracy (RA)* means the absolute mean difference between the pollutant concentrations determined by the CEMS and the values determined by the RM plus the 2.5 percent error confidence coefficient of a series of tests divided by the mean of the RM tests. Alternatively, for sources with an average RM concentration less than 5.0 micrograms per standard cubic meter ( $\mu\text{g}/\text{scm}$ ), the RA may be expressed as the absolute value of the difference between the mean CEMS and RM values.

## 4.0 Interferences [Reserved]

## 5.0 Safety

The procedures required under this performance specification may involve hazardous materials, operations, and equipment. This performance specification may not address all of the safety problems associated with these procedures. It is the responsibility of the user to establish appropriate safety and

health practices and determine the applicable regulatory limitations prior to performing these procedures. The CEMS user's manual and materials recommended by the RM should be consulted for specific precautions to be taken.

## 6.0 *Equipment and Supplies*

### 6.1 CEMS Equipment Specifications.

6.1.1 Data Recorder Scale. The Hg CEMS data recorder output range must include the full range of expected Hg concentration values in the gas stream to be sampled including zero and the span value.

6.1.2 The Hg CEMS design should also provide for the determination of CD and ME at a zero value (zero to 20 percent of the span value) and at upscale values (between 50 and 100 percent of the span value). The Hg CEMS must be constructed to permit the introduction of known concentrations of Hg and HgCl<sub>2</sub> separately into the sampling system of the CEMS immediately preceding the sample extraction filtration system such that the entire CEMS can be challenged.

6.2 Reference Gas Delivery System. The reference gas delivery system must be designed so that the flowrate exceeds the sampling system flow requirements of the CEMS and that the gas is delivered to the CEMS at atmospheric pressure.

6.3 Other equipment and supplies, as needed by the reference method used for the Relative Accuracy Test Procedure. See Section 8.6.2.

## 7.0 *Reagents and Standards*

7.1 Reference Gases. Reference gas standards are required for both elemental and oxidized Hg (Hg and mercuric chloride, HgCl<sub>2</sub>). The use of National Institute of Standards and Technology (NIST)-traceable standards and reagents is required. The following gas concentrations are required.

7.1.1 Zero-level. 0 to 20 percent of the span value.

7.1.2 Mid-level. 50 to 60 percent of the span value.

7.1.3 High-level. 80 to 100 percent of the span value.

7.2 Reference gas standards may also be required for the reference methods. See Section 8.6.2.

## 8.0 *Performance Specification Test Procedure*

### 8.1 Installation and Measurement Location Specifications.

8.1.1 CEMS Installation. Install the CEMS at an accessible location downstream of all pollution control equipment. Place the probe outlet or other sampling interface at a point or location in the stack (or vent) representative of the stack gas concentration of Hg. Since the Hg CEMS sample system normally extracts gas from a single point in the stack, a location that has been shown to be free of stratification for Hg or, alternatively, SO<sub>2</sub> is recommended. If the cause of failure to meet the RA test requirement is determined to be the measurement location and a satisfactory correction technique cannot be established, the Administrator may require the CEMS to be relocated. Measurement locations and points or paths that are most likely to provide data that will meet the RA requirements are described in Sections 8.1.2 and 8.1.3 below.

8.1.2 Measurement Location. The measurement location should be (1) at least two equivalent diameters downstream of the nearest control device, point of pollutant generation or other point at which a change of pollutant concentration may occur, and (2) at least half an equivalent diameter upstream from the effluent exhaust. The equivalent duct diameter is calculated according to Method 1 in appendix A-1 to this part.

8.1.3 Hg CEMS Sample Extraction Point. Use a sample extraction point either (1) no less than 1.0 meter from the stack or duct wall, or (2) within the centroidal velocity traverse area of the stack or duct cross section. This does not apply to cross-stack, in-situ measurement systems.

8.2 Measurement Error (ME) Test Procedure. Sequentially inject each of at least three elemental Hg reference gases (zero, mid-level, and high level, as defined in Section 7.1), three times each for a total

of nine injections. Inject the gases in such a manner that the entire CEMS is challenged. Do not inject the same gas concentration twice in succession. At each reference gas concentration, determine the average of the three CEMS responses and subtract the average response from the reference gas value. Calculate the measurement error (ME) using Equation 12–1 by expressing the absolute value of the difference between the average CEMS response (A) and the reference gas value (R) as a percentage of the span ( see example data sheet in Figure 12A–1). For each elemental Hg reference gas, the absolute value of the difference between the CEMS response and the reference value must not exceed 5 percent of the span value. If this specification is not met, identify and correct the problem before proceeding. Repeat the measurement error test procedure using oxidized Hg reference gases. For each oxidized Hg reference gas, the absolute value of the difference between the CEMS response and the reference value shall not exceed 10 percent of the span value. If this specification is not met, identify and correct the problem before proceeding.

$$ME = \frac{|R - A|}{Span} \times 100 \quad (\text{Equation 12A-1})$$

### 8.3 Seven-Day Calibration Drift (CD) Test Procedure.

8.3.1 CD Test Period. While the affected facility is operating normally, or as specified in an applicable regulation, determine the magnitude of the CD once each day (at 24-hour intervals, to the extent practicable) for 7 consecutive unit operating days according to the procedures in Sections 8.3.2 and 8.3.3. The 7 consecutive unit operating days need not be 7 consecutive calendar days. Use either Hg<sup>0</sup> or HgCl<sub>2</sub> standards for this test.

8.3.2 The purpose of the CD measurement is to verify the ability of the CEMS to conform to the established CEMS response used for determining emission concentrations or emission rates. Therefore, if periodic automatic or manual adjustments are made to the CEMS zero and upscale response settings, conduct the CD test immediately before these adjustments, or conduct it in such a way that the CD can be determined.

8.3.3 Conduct the CD test using the zero gas specified and either the mid-level or high-level gas as specified in Section 7.1. Sequentially introduce the reference gases to the CEMS at the sampling system of the CEMS immediately preceding the sample extraction filtration system. Record the CEMS response (A) for each reference gas and, using Equation 12A–2, subtract the corresponding reference value (R) from the CEMS value, and express the absolute value of the difference as a percentage of the span value ( see also example data sheet in Figure 12A–2). For each reference gas, the absolute value of the difference between the CEMS response and the reference value must not exceed 5 percent of the span value. If these specifications are not met, identify and correct the problem before proceeding.

$$CD = \frac{|R - A|}{Span} \times 100 \quad (\text{Equation 12A-2})$$

### 8.4 Relative Accuracy (RA) Test Procedure.

8.4.1 RA Test Period. Conduct the RA test according to the procedure given in Sections 8.4.2 through 8.4.6 while the affected facility is operating normally, or as specified in an applicable subpart. The RA test may be conducted during the CD test period.

8.4.2 Reference Methods (RM). Unless otherwise specified in an applicable subpart of the regulations, use Method 29, Method 30A, or Method 30B in appendix A–8 to this part or American Society of Testing and Materials (ASTM) Method D6784–02 (incorporated by reference, see §60.17) as the RM for Hg concentration. For Method 29 and ASTM Method D6784–02 only, the filterable portion of the sample need not be included when making comparisons to the CEMS results. When Method 29, Method 30B, or ASTM D6784–02 is used, conduct the RM test runs with paired or duplicate sampling systems and use the average of the vapor phase Hg concentrations measured by the two trains. When Method 30A is used, paired sampling systems are not required. If the RM and CEMS measure on a different moisture basis, data derived with Method 4 in appendix A–3 to this part must also be obtained during the RA test.

8.4.3 Sampling Strategy for RM Tests. Conduct the RM tests in such a way that they will yield results representative of the emissions from the source and can be compared to the CEMS data. The RM and CEMS locations need not be immediately adjacent. Locate the RM measurement points in accordance with section 8.1.3 of Performance Specification 2 (PS 2) in this appendix. It is preferable to conduct moisture measurements (if needed) and Hg measurements simultaneously, although moisture measurements that are taken within an hour of the Hg measurements may be used to adjust the Hg concentrations to a consistent moisture basis. In order to correlate the CEMS and RM data properly,

note the beginning and end of each RM test period for each paired RM run (including the exact time of day) on the CEMS chart recordings or other permanent record of output.

8.4.4 Number and Length of RM Test Runs. Conduct a minimum of nine RM test runs. When Method 29, Method 30B, or ASTM D6784–02 is used, only test runs for which the paired RM trains meet the relative deviation criteria (RD) of this PS must be used in the RA calculations. In addition, for Method 29 and ASTM D6784–02, use a minimum sample time of 2 hours and for Methods 30A and 30B use a minimum sample time of 30 minutes.

Note: More than nine sets of RM test runs may be performed. If this option is chosen, RM test run results may be excluded so long as the total number of RM test run results used to determine the CEMS RA is greater than or equal to nine. However, all data must be reported including the excluded test run data.

8.4.5 Correlation of RM and CEMS Data. Correlate the CEMS and the RM test data as to the time and duration by first determining from the CEMS final output (the one used for reporting) the integrated average pollutant concentration for each RM test period. Consider system response time, if important, and confirm that the results are on a consistent moisture basis with the RM test. Then, compare each integrated CEMS value against the corresponding RM value. When Method 29, Method 30B, or ASTM D6784–02 is used, compare each CEMS value against the corresponding average of the paired RM values.

8.4.6 Paired RM Outliers.

8.4.6.1 When Method 29, Method 30B, or ASTM D6784–02 is used, outliers are identified through the determination of relative deviation (RD) of the paired RM tests. Data that do not meet the RD criteria must be flagged as a data quality problem and may not be used in the calculation of RA. The primary reason for performing paired RM sampling is to ensure the quality of the RM data. The percent RD of paired data is the parameter used to quantify data quality. Determine RD for paired data points as follows:

$$RD = \frac{|C_a - C_b|}{C_a + C_b} \times 100 \quad (\text{Equation 12A-3})$$

Where:

$C_a$  and  $C_b$  are the Hg concentration values determined from the paired samples.

8.4.6.2 The minimum performance criteria for RM Hg data is that RD for any data pair must be  $\leq 10$  percent as long as the mean Hg concentration is greater than  $1.0 \mu\text{g}/\text{m}^3$ . If the mean Hg concentration is less than or equal to  $1.0 \mu\text{g}/\text{m}^3$ , the RD must be  $\leq 20$  percent or  $\leq 0.2 \mu\text{g}/\text{m}^3$  absolute difference. Pairs of RM data exceeding these RD criteria should be eliminated from the data set used to develop a Hg CEMS correlation or to assess CEMS RA.

8.4.7 Calculate the mean difference between the RM and CEMS values in the units of micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ), the standard deviation, the confidence coefficient, and the RA according to the procedures in Section 12.0.

8.5 Reporting. At a minimum (check with the appropriate EPA Regional Office, State or local Agency for additional requirements, if any), summarize in tabular form the results of the CD tests, the linearity tests, and the RA test or alternative RA procedure, as appropriate. Include all data sheets, calculations, charts (records of CEMS responses), reference gas concentration certifications, and any other information necessary to confirm that the CEMS meets the performance criteria.

9.0 *Quality Control [Reserved]*

10.0 *Calibration and Standardization [Reserved]*

11.0 *Analytical Procedure*

For Method 30A, sample collection and analysis are concurrent. For the other RM, post-run sample analyses are performed. Refer to the RM employed for specific analytical procedures.

## 12.0 Calculations and Data Analysis

Calculate and summarize the RA test results on a data sheet similar to Figure 12A–3.

12.1 Consistent Basis. All data from the RM and CEMS must be compared in units of micrograms per standard cubic meter ( $\mu\text{g}/\text{scm}$ ), on a consistent and identified moisture basis. The values must be standardized to 20 °C, 760 mm Hg.

12.1.1 Moisture Correction (as applicable). If the RM and CEMS measure Hg on a different moisture basis, they will need to be corrected to a consistent basis. Use Equation 12A–4a to correct data from a wet basis to a dry basis.

$$\text{Concentration}_{(\text{dry})} = \frac{\text{Concentration}_{(\text{wet})}}{(1 - B_{\text{ws}})} \quad (\text{Equation 12A-4a})$$

Use Equation 12A–4b to correct data from a dry basis to a wet basis.

$$\text{Concentration}_{(\text{wet})} = \text{Concentration}_{(\text{dry})} \times (1 - B_{\text{ws}}) \quad (\text{Equation 12A-4b})$$

Where:

$B_{\text{ws}}$  is the moisture content of the flue gas from Method 4, expressed as a decimal fraction (e.g., for 8.0 percent  $\text{H}_2\text{O}$ ,  $B_{\text{ws}} = 0.08$ ).

12.2 Arithmetic Mean. Calculate the arithmetic mean of the differences ( $d_i$ ) of a data set as follows:

$$\bar{d} = \frac{1}{n} \sum_{i=1}^n d_i \quad (\text{Equation 12A-5})$$

Where:

$n$  = Number of data points.

12.3 Standard Deviation. Calculate the standard deviation,  $S_d$ , as follows:

$$S_d = \left[ \frac{\sum_{i=1}^n d_i^2 - \frac{\left[ \sum_{i=1}^n d_i \right]^2}{n}}{n - 1} \right]^{\frac{1}{2}} \quad (\text{Equation 12A-6})$$

Where:

$\sum_{i=1}^n d_i$  = Algebraic sum of the individual differences  $d_i$ .

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

$$CC = t_{0.975} \frac{S_d}{\sqrt{n}} \quad (\text{Equation 12A-7})$$

12.4 Relative Accuracy. Calculate the RA of a set of data as follows:

$$RA = \frac{|\bar{d}| + |CC|}{RM} \times 100 \quad (\text{Equation 12A-8})$$

Where:

$\bar{d}$  = Absolute value of the mean of the differences (from Equation 12A-5)

$CC$  = Absolute value of the confidence coefficient (from Equation 12A-7)

RM = Average reference method value

13.0 Method Performance

13.1 Measurement Error (ME). For Hg<sup>0</sup>, the ME must not exceed 5 percent of the span value at the zero-, mid-, and high-level reference gas concentrations. For HgCl<sub>2</sub>, the ME must not exceed 10 percent of the span value at the zero-, mid-, and high-level reference gas concentrations.

13.2 Calibration Drift (CD). The CD must not exceed 5 percent of the span value on any of the 7 days of the CD test.

13.3 Relative Accuracy (RA). The RA of the CEMS must be no greater than 20 percent of the mean value of the RM test data in terms of units of µg/scm. Alternatively, if the mean RM is less than 5.0 µg/scm, the results are acceptable if the absolute value of the difference between the mean RM and CEMS values does not exceed 1.0 µg/scm.

14.0 Pollution Prevention [Reserved]

15.0 Waste Management [Reserved]

16.0 Alternative Procedures [Reserved]

17.0 Bibliography

17.1 40 CFR part 60, appendix B, "Performance Specification 2—Specifications and Test Procedures for SO<sub>2</sub> and NO<sub>x</sub> Continuous Emission Monitoring Systems in Stationary Sources."

17.2 40 CFR part 60, appendix A, "Method 29—Determination of Metals Emissions from Stationary Sources."

17.3 40 CFR part 60, appendix A, "Method 30A—Determination of Total Vapor Phase Mercury Emissions From Stationary Sources (Instrumental Analyzer Procedure)."

17.4 40 CFR part 60, appendix A, "Method 30B—Determination of Total Vapor Phase Mercury Emissions From Coal-Fired Combustion Sources Using Carbon Sorbent Traps."

17.5 ASTM Method D6784-02, "Standard Test Method for Elemental, Oxidized, Particle-Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method)."

18.0 Tables and Figures

Table 12A-1—T-Values

n <sup>a</sup>	t <sub>0.975</sub>	n <sup>a</sup>	t <sub>0.975</sub>	n <sup>a</sup>	t <sub>0.975</sub>
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
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<sup>a</sup>The values in this table are already corrected for n-1 degrees of freedom. Use n equal to the number of individual values.

Figure 12A-1—ME Determination

	Date	Time	Reference gas value (µg/m <sup>3</sup> )	CEMS measured value (µg/m <sup>3</sup> )	Absolute difference (µg/m <sup>3</sup> )	ME (% of span value)
Zero level						
	Average					
Mid level						
	Average					
High level						
	Average					

Figure 12A-2—7-Day Calibration Drift Determination

	Date	Time	Reference gas value (µg/m <sup>3</sup> )	CEMS measured value (µg/m <sup>3</sup> )	Absolute difference (µg/m <sup>3</sup> )	CD (% of span value)
Zero level						
Upscale (Mid or High)						


Figure 12A-3—Relative Accuracy Test Data

Run No.	Date	Begin time	End time	RM value (µg/m <sup>3</sup> )	CEMS value (µg/m <sup>3</sup> )	Difference (µg/m <sup>3</sup> )	Run used? (Yes/No)	RD <sup>1</sup>
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
Average Values								
Arithmetic Mean Difference:								
Standard Deviation:								
Confidence Coefficient:								
T-Value:								
% Relative Accuracy:								
$\frac{(RM)_{avg} - (CEMS)_{avg}}{(RM)_{avg}} \times 100$								

<sup>1</sup>Calculate the RD only if paired samples are taken using RM 30B, RM 29, or ASTM 6784-08. Express RD as a percentage or, for very low RM concentrations ( $\leq 1.0 \mu\text{g}/\text{m}^3$ ), as the absolute difference between  $C_a$  and  $C_b$ .

Performance Specification 12B—Specifications and Test Procedures for Monitoring Total Vapor Phase Mercury Emissions From Stationary Sources Using a Sorbent Trap Monitoring System

1.0 Scope and Application

The purpose of Performance Specification 12B (PS 12B) is to establish performance benchmarks for, and to evaluate the acceptability of, sorbent trap monitoring systems used to monitor total vapor-phase mercury (Hg) emissions in stationary source flue gas streams. These monitoring systems involve continuous repetitive in-stack sampling using paired sorbent media traps with periodic analysis of the time-integrated samples. Persons using PS 12B should have a thorough working knowledge of Methods 1, 2, 3, 4, 5 and 30B in appendices A-1 through A-3 and A-8 to this part.

1.1 Analyte. The analyte measured by these procedures and specifications is total vapor phase Hg in the flue gas, which represents the sum of elemental Hg ( $\text{Hg}^0$ , CAS Number 7439-97-6) and gaseous

forms of oxidized Hg ( *i.e.*, Hg<sup>+2</sup> ) in mass concentration units of micrograms per dry standard cubic meter ( $\mu\text{g}/\text{dscm}$ ).

## 1.2 Applicability

1.2.1 These procedures are only intended for use under relatively low particulate conditions (e.g., monitoring after all pollution control devices). This specification is for evaluating the acceptability of total vapor phase Hg sorbent trap monitoring systems installed at stationary sources at the time of, or soon after, installation and whenever specified in the regulations. The Hg monitoring system must be capable of measuring the total concentration of vapor phase Hg (regardless of speciation), in units of  $\mu\text{g}/\text{dscm}$ .

1.2.2 This specification contains routine procedures and specifications designed to evaluate an installed sorbent trap monitoring system's performance over time; Procedure 5 of appendix F to this part contains additional procedures and specifications which may be required for long term operation. In addition, the source owner or operator is responsible to calibrate, maintain, and operate the monitoring system properly. The Administrator may require the owner or operator, under section 114 of the Clean Air Act, to conduct performance evaluations at other times besides the initial test to evaluate the CEMS performance. See §60.13(c) and 63.8(e)(1).

## 2.0 Principle

Known volumes of flue gas are continuously extracted from a stack or duct through paired, in-stack, pre-spiked sorbent media traps at appropriate nominal flow rates. The sorbent traps in the sampling system are periodically exchanged with new ones, prepared for analysis as needed, and analyzed by any technique that can meet the performance criteria. For quality-assurance purposes, a section of each sorbent trap is spiked with Hg<sup>0</sup> prior to sampling. Following sampling, this section is analyzed separately and a specified minimum percentage of the spike must be recovered. Paired train sampling is required to determine method precision.

## 3.0 Definitions

3.1 *Sorbent Trap Monitoring System* means the total equipment required for the collection of gaseous Hg samples using paired three-partition sorbent traps.

3.2 *Relative Accuracy Test Procedure* means a test procedure consisting of at least nine runs, in which the accuracy of the total vapor phase Hg concentrations measured by the sorbent trap monitoring system is evaluated by comparison against concurrent measurements made with a reference method (RM). Relative accuracy tests repeated on a regular, on-going basis are referred to as relative accuracy test audits or RATAs.

3.3 *Relative Accuracy (RA)* means the absolute mean difference between the pollutant (Hg) concentrations determined by the sorbent trap monitoring system and the values determined by the reference method (RM) plus the 2.5 percent error confidence coefficient of a series of tests divided by the mean of the RM tests. Alternatively, for low concentration sources, the RA may be expressed as the absolute value of the difference between the mean sorbent trap monitoring system and RM values.

3.4 *Relative Deviation (RD)* means the absolute difference of the Hg concentration values obtained with a pair of sorbent traps divided by the sum of those concentrations, expressed as a percentage. RD is used to assess the precision of the sorbent trap monitoring system.

3.5 *Spike Recovery* means the mass of Hg recovered from the spiked trap section, expressed as a percentage of the amount spiked. Spike recovery is used to assess sample matrix interference.

## 4.0 Interferences [Reserved]

## 5.0 Safety

The procedures required under this performance specification may involve hazardous materials, operations, and equipment. This performance specification may not address all of the safety problems associated with these procedures. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicable regulatory limitations prior to performing these procedures.

## 6.0 Equipment and Supplies

## 6.1 Sorbent Trap Monitoring System Equipment Specifications.

6.1.1 Monitoring System. The equipment described in Method 30B in appendix A–8 to this part must be used to continuously sample for Hg emissions, with the substitution of three-section traps in place of two-section traps, as described below. A typical sorbent trap monitoring system is shown in Figure 12B–1.

6.1.2 Three-Section Sorbent Traps. The sorbent media used to collect Hg must be configured in traps with three distinct and identical segments or sections, connected in series, to be separately analyzed. Section 1 is designated for primary capture of gaseous Hg. Section 2 is designated as a backup section for determination of vapor-phase Hg breakthrough. Section 3 is designated for quality assurance/quality control (QA/QC) purposes. Section 3 must be spiked with a known amount of gaseous Hg<sup>0</sup> prior to sampling and later analyzed to determine the spike (and hence sample) recovery efficiency.



6.1.3 Gaseous Hg<sup>0</sup> Sorbent Trap Spiking System. A known mass of gaseous Hg<sup>0</sup> must be spiked onto section 3 of each sorbent trap prior to sampling. Any approach capable of quantitatively delivering known masses of Hg<sup>0</sup> onto sorbent traps is acceptable. Several technologies or devices are available to meet this objective. Their practicality is a function of Hg mass spike levels. For low levels, NIST-certified or NIST-traceable gas generators or tanks may be suitable, but will likely require long preparation times. A more practical, alternative system, capable of delivering almost any mass required, employs NIST-certified or NIST-traceable Hg salt solutions (e.g., Hg(NO<sub>3</sub>)<sub>2</sub>). With this system, an aliquot of known volume and concentration is added to a reaction vessel containing a reducing agent (e.g., stannous chloride); the Hg salt solution is reduced to Hg<sup>0</sup> and purged onto section 3 of the sorbent trap by using an impinger sparging system.

6.1.4 Sample Analysis Equipment. Any analytical system capable of quantitatively recovering and quantifying total gaseous Hg from sorbent media is acceptable provided that the analysis can meet the performance criteria in Table 12B–1 in Section 9 of this performance specification. Candidate recovery techniques include leaching, digestion, and thermal desorption. Candidate analytical techniques include ultraviolet atomic fluorescence (UV AF); ultraviolet atomic absorption (UV AA), with and without gold trapping; and in-situ X-ray fluorescence (XRF).

## 7.0 Reagents and Standards

Only NIST-certified or NIST-traceable calibration gas standards and reagents must be used for the tests and procedures required under this performance specification. The sorbent media may be any collection material (e.g., carbon, chemically treated filter, *etc.*) capable of quantitatively capturing and recovering for subsequent analysis, all gaseous forms of Hg in the emissions from the intended application. Selection of the sorbent media must be based on the material's ability to achieve the performance criteria contained in this method as well as the sorbent's vapor phase Hg capture efficiency for the emissions matrix and the expected sampling duration at the test site.

## 8.0 Performance Specification Test Procedure

### 8.1 Installation and Measurement Location Specifications.

8.1.1 Selection of Monitoring Site. Sampling site information should be obtained in accordance with Method 1 in appendix A–1 to this part. Place the probe inlet at a point or location in the stack (or vent) downstream of all pollution control equipment and representative of the stack gas concentration of Hg. A location that has been shown to be free of stratification for Hg or, alternatively, SO<sub>2</sub> is recommended. An estimation of the expected stack Hg concentration is required to establish a target sample flow rate, total gas sample volume, and the mass of Hg<sup>0</sup> to be spiked onto section 3 of each sorbent trap.

8.1.2 Pre-sampling Spiking of Sorbent Traps. Based on the estimated Hg concentration in the stack, the target sample rate and the target sampling duration, calculate the expected mass loading for section 1 of each sorbent trap (see Section 12.1 of this performance specification). The pre-sampling spike to be added to section 3 of each sorbent trap must be within ± 50 percent of the expected section 1 mass loading. Spike section 3 of each sorbent trap at this level, as described in Section 6.1.3 of this performance specification. For each sorbent trap, keep a record of the mass of Hg<sup>0</sup> added to section 3. This record must include, at a minimum, the identification number of the trap, the date and time of the spike, the name of the analyst performing the procedure, the method of spiking, the mass of Hg<sup>0</sup> added to section 3 of the trap (µg), and the supporting calculations.

8.1.3 Pre-monitoring Leak Check. Perform a leak check with the sorbent traps in place in the sampling system. Draw a vacuum in each sample train. Adjust the vacuum in each sample train to ~15" Hg. Use the gas flow meter to determine leak rate. The leakage rate must not exceed 4 percent of the target sampling rate. Once the leak check passes this criterion, carefully release the vacuum in the sample train, then seal the sorbent trap inlet until the probe is ready for insertion into the stack or duct.

8.1.4 Determination of Flue Gas Characteristics. Determine or measure the flue gas measurement environment characteristics (gas temperature, static pressure, gas velocity, stack moisture, *etc.*) in order to determine ancillary requirements such as probe heating requirements (if any), sampling rate, proportional sampling conditions, moisture management, *etc.*

## 8.2 Monitoring.

8.2.1 System Preparation and Initial Data Recording. Remove the plug from the end of each sorbent trap and store each plug in a clean sorbent trap storage container. Remove the stack or duct port cap and insert the probe(s) with the inlet(s) aligned perpendicular to the stack gas flow. Secure the probe(s) and ensure that no leakage occurs between the duct and environment. Record initial data including the sorbent trap ID, start time, starting gas flow meter readings, initial temperatures, set points, and any other appropriate information.

8.2.2 Flow Rate Control. Set the initial sample flow rate at the target value from section 8.1.1 of this performance specification. Then, for every operating hour during the sampling period, record the date and time, the sample flow rate, the gas flow meter reading, the stack temperature (if needed), the flow meter temperatures (if needed), temperatures of heated equipment such as the vacuum lines and the probes (if heated), and the sampling system vacuum readings. Also, record the stack gas flow rate and the ratio of the stack gas flow rate to the sample flow rate. Adjust the sampling flow rate to maintain proportional sampling, *i.e.*, keep the ratio of the stack gas flow rate to sample flow rate within  $\pm 25$  percent of the reference ratio from the first hour of the data collection period ( see section 12.2 of this performance specification). The sample flow rate through a sorbent trap monitoring system during any hour (or portion of an hour) that the unit is not operating must be zero.

8.2.3 Stack Gas Moisture Determination. If data from the sorbent trap monitoring system will be used to calculate Hg mass emissions, determine the stack gas moisture content using a continuous moisture monitoring system or other means acceptable to the Administrator, such as the ones described in §75.11(b) of this chapter. Alternatively, for combustion of coal, wood, or natural gas in boilers only, a default moisture percentage from §75.11(b) of this chapter may be used.

8.2.4 Essential Operating Data. Obtain and record any essential operating data for the facility during the test period, e.g., the barometric pressure for correcting the sample volume measured by a dry gas meter to standard conditions. At the end of the data collection period, record the final gas flow meter reading and the final values of all other essential parameters.

8.2.5 Post-monitoring Leak Check. When the monitoring period is completed, turn off the sample pump, remove the probe/sorbent trap from the port and carefully re-plug the end of each sorbent trap. Perform a leak check with the sorbent traps in place, at the maximum vacuum reached during the monitoring period. Use the same general approach described in section 8.1.3 of this performance specification. Record the leakage rate and vacuum. The leakage rate must not exceed 4 percent of the average sampling rate for the monitoring period. Following the leak check, carefully release the vacuum in the sample train.

8.2.6 Sample Recovery. Recover each sampled sorbent trap by removing it from the probe and seal both ends. Wipe any deposited material from the outside of the sorbent trap. Place the sorbent trap into an appropriate sample storage container and store/preserve it in an appropriate manner.

8.2.7 Sample Preservation, Storage, and Transport. While the performance criteria of this approach provide for verification of appropriate sample handling, it is still important that the user consider, determine, and plan for suitable sample preservation, storage, transport, and holding times for these measurements. Therefore, procedures in recognized voluntary consensus standards such as those in ASTM D6911-03 "Standard Guide for Packaging and Shipping Environmental Samples for Laboratory Analysis" should be followed for all samples.

8.2.8 Sample Custody. Proper procedures and documentation for sample chain of custody are critical to ensuring data integrity. Chain of custody procedures in recognized voluntary consensus standards such as those in ASTM D4840-99 "Standard Guide for Sample Chain-of-Custody Procedures" should be followed for all samples (including field samples and blanks).

## 8.3 Relative Accuracy (RA) Test Procedure

8.3.1 For the initial certification of a sorbent trap monitoring system, a RA Test is required. Follow the basic RA test procedures and calculation methodology described in Sections 8.4.1 through 8.4.7 and 12.4 of PS 12A in this appendix, replacing the term “CEMS” with “sorbent trap monitoring system”.

8.3.2 Special Considerations. The type of sorbent material used in the traps must be the same as that used for daily operation of the monitoring system; however, the size of the traps used for the RA test may be smaller than the traps used for daily operation of the system. Spike the third section of each sorbent trap with elemental Hg, as described in section 8.1.2 of this performance specification. Install a new pair of sorbent traps prior to each test run. For each run, the sorbent trap data must be validated according to the quality assurance criteria in Table 12B–1 in Section 9.0, below.

8.3.3 Acceptance Criteria. The RA of the sorbent trap monitoring system must be no greater than 20 percent of the mean value of the RM test data in terms of units of  $\mu\text{g}/\text{scm}$ . Alternatively, if the RM concentration is less than or equal to  $5.0 \mu\text{g}/\text{scm}$ , then the RA results are acceptable if the absolute difference between the means of the RM and sorbent trap monitoring system values does not exceed  $1.0 \mu\text{g}/\text{scm}$ .

#### 9.0 Quality Assurance and Quality Control (QA/QC)

Table 12B–1 summarizes the QA/QC performance criteria that are used to validate the Hg emissions data from a sorbent trap monitoring system. Failure to achieve these performance criteria will result in invalidation of Hg emissions data, except where otherwise noted.

**Table 12B–1—Qa/QC Criteria for Sorbent Trap Monitoring System Operation and Certification**

<b>QA/QC test or specification</b>	<b>Acceptance criteria</b>	<b>Frequency</b>	<b>Consequences if not met</b>
Pre-monitoring leak check	$\leq 4\%$ of target sampling rate	Prior to monitoring	Monitoring must not commence until the leak check is passed.
Post-monitoring leak check	$\leq 4\%$ of average sampling rate	After monitoring	Invalidate the data from the paired traps or, if certain conditions are met, report adjusted data from a single trap (see Section 12.7.1.3).
Ratio of stack gas flow rate to sample flow rate	Hourly ratio may not deviate from the reference ratio by more than $\pm 25\%$ .	Every hour throughout monitoring period	Invalidate the data from the paired traps or, if certain conditions are met, report adjusted data from a single trap ( see Section 12.7.1.3).
Sorbent trap section 2 breakthrough	$\leq 5\%$ of Section 1 Hg mass	Every sample	Invalidate the data from the paired traps or, if certain conditions are met, report adjusted data from a single trap ( see Section 12.7.1.3).
Paired sorbent	$\leq 10\%$ Relative	Every sample	Either invalidate the

trap agreement	Deviation (RD) if the average concentration is $> 1.0 \mu\text{g}/\text{m}^3$ $\leq 20\%$ RD if the average concentration is $\leq 1.0 \mu\text{g}/\text{m}^3$		data from the paired traps or report the results from the trap with the higher Hg concentration.
	Results also acceptable if absolute difference between concentrations from paired traps is $\leq 0.03 \mu\text{g}/\text{m}^3$		
Spike Recovery Study	Average recovery between 85% and 115% for each of the 3 spike concentration levels	Prior to analyzing field samples and prior to use of new sorbent media	Field samples must not be analyzed until the percent recovery criteria has been met.
Multipoint analyzer calibration	Each analyzer reading within $\pm 10\%$ of true value and $r^2 \geq 0.99$	On the day of analysis, before analyzing any samples	Recalibrate until successful
Analysis of independent calibration standard.	Within $\pm 10\%$ of true value	Following daily calibration, prior to analyzing field samples	Recalibrate and repeat independent standard analysis until successful.
Spike recovery from section 3 of both sorbent traps	75–125% of spike amount	Every sample	Invalidate the data from the paired traps or, if certain conditions are met, report adjusted data from a single trap ( see Section 12.7.1.3).
Relative Accuracy	RA $\leq 20.0\%$ of RM mean value; or if RM mean value $\leq 5.0 \mu\text{g}/\text{scm}$ , absolute difference between RM and sorbent trap monitoring system mean values $\leq 1.0 \mu\text{g}/\text{scm}$	RA specification must be met for initial certification	Data from the system are invalid until a RA test is passed.
Gas flow meter calibration	An initial calibration factor (Y) has been determined at 3 settings; for mass flow meters, initial calibration with stack gas has been performed. For	At 3 settings prior to initial use and at least quarterly at one setting thereafter	Recalibrate meter at 3 settings to determine a new value of Y.

	subsequent calibrations, Y within $\pm 5\%$ of average value from the most recent 3-point calibration		
Temperature sensor calibration	Absolute temperature measured by sensor within $\pm 1.5\%$ of a reference sensor	Prior to initial use and at least quarterly thereafter	Recalibrate; sensor may not be used until specification is met.
Barometer calibration	Absolute pressure measured by instrument within $\pm 10$ mm Hg of reading with a NIST-traceable barometer	Prior to initial use and at least quarterly thereafter	Recalibrate; instrument may not be used until specification is met.

### 10.0 Calibration and Standardization

10.1 Gaseous and Liquid Standards. Only NIST certified or NIST-traceable calibration standards ( *i.e.*, calibration gases, solutions, *etc.* ) must be used for the spiking and analytical procedures in this performance specification.

10.2 Gas Flow Meter Calibration. The manufacturer or supplier of the gas flow meter should perform all necessary set-up, testing, programming, *etc.*, and should provide the end user with any necessary instructions, to ensure that the meter will give an accurate readout of dry gas volume in standard cubic meters for the particular field application.

10.2.1 Initial Calibration. Prior to its initial use, a calibration of the flow meter must be performed. The initial calibration may be done by the manufacturer, by the equipment supplier, or by the end user. If the flow meter is volumetric in nature (e.g., a dry gas meter), the manufacturer, equipment supplier, or end user may perform a direct volumetric calibration using any gas. For a mass flow meter, the manufacturer, equipment supplier, or end user may calibrate the meter using a bottled gas mixture containing  $12 \pm 0.5\%$  CO<sub>2</sub>,  $7 \pm 0.5\%$  O<sub>2</sub>, and balance N<sub>2</sub>, or these same gases in proportions more representative of the expected stack gas composition. Mass flow meters may also be initially calibrated on-site, using actual stack gas.

10.2.1.1 Initial Calibration Procedures. Determine an average calibration factor (Y) for the gas flow meter, by calibrating it at three sample flow rate settings covering the range of sample flow rates at which the sorbent trap monitoring system typically operates. Either the procedures in section 10.3.1 of Method 5 in appendix A-3 to this part or the procedures in section 16 of Method 5 in appendix A-3 to this part may be followed. If a dry gas meter is being calibrated, use at least five revolutions of the meter at each flow rate.

10.2.1.2 Alternative Initial Calibration Procedures. Alternatively, the initial calibration of the gas flow meter may be performed using a reference gas flow meter (RGFM). The RGFM may be either: (1) A wet test meter calibrated according to section 10.3.1 of Method 5 in appendix A-3 to this part; (2) A gas flow metering device calibrated at multiple flow rates using the procedures in section 16 of Method 5 in appendix A-3 to this part; or (3) A NIST-traceable calibration device capable of measuring volumetric flow to an accuracy of 1 percent. To calibrate the gas flow meter using the RGFM, proceed as follows: While the sorbent trap monitoring system is sampling the actual stack gas or a compressed gas mixture that simulates the stack gas composition (as applicable), connect the RGFM to the discharge of the system. Care should be taken to minimize the dead volume between the sample flow meter being tested and the RGFM. Concurrently measure dry gas volume with the RGFM and the flow meter being calibrated for a minimum of 10 minutes at each of three flow rates covering the typical range of operation of the sorbent trap monitoring system. For each 10-minute (or longer) data collection period, record the total sample volume, in units of dry standard cubic meters (dscm), measured by the RGFM and the gas flow meter being tested.

10.2.1.3 Initial Calibration Factor. Calculate an individual calibration factor Y<sub>i</sub> at each tested flow rate from section 10.2.1.1 or 10.2.1.2 of this performance specification (as applicable), by taking the ratio of the reference sample volume to the sample volume recorded by the gas flow meter. Average the three Y<sub>i</sub> values, to determine Y, the calibration factor for the flow meter. Each of the three individual values of Y<sub>i</sub> must be within  $\pm 0.02$  of Y. Except as otherwise provided in sections 10.2.1.4 and 10.2.1.5 of this performance specification, use the average Y value from the three level calibration to adjust all

subsequent gas volume measurements made with the gas flow meter.

10.2.2 Initial On-Site Calibration Check. For a mass flow meter that was initially calibrated using a compressed gas mixture, an on-site calibration check must be performed before using the flow meter to provide data. While sampling stack gas, check the calibration of the flow meter at one intermediate flow rate typical of normal operation of the monitoring system. Follow the basic procedures in section 10.2.1.1 or 10.2.1.2 of this performance specification. If the onsite calibration check shows that the value of  $Y_i$ , the calibration factor at the tested flow rate, differs by more than 5 percent from the value of  $Y$  obtained in the initial calibration of the meter, repeat the full 3-level calibration of the meter using stack gas to determine a new value of  $Y$ , and apply the new  $Y$  value to all subsequent gas volume measurements made with the gas flow meter.

10.2.3 Ongoing Quality Control. Recalibrate the gas flow meter quarterly at one intermediate flow rate setting representative of normal operation of the monitoring system. Follow the basic procedures in section 10.2.1.1 or 10.2.1.2 of this performance specification. If a quarterly recalibration shows that the value of  $Y_i$ , the calibration factor at the tested flow rate, differs from the current value of  $Y$  by more than 5 percent, repeat the full 3-level calibration of the meter to determine a new value of  $Y$ , and apply the new  $Y$  value to all subsequent gas volume measurements made with the gas flow meter.

10.3 Calibration of Thermocouples and Other Temperature Sensors. Use the procedures and criteria in section 10.3 of Method 2 in appendix A-1 to this part to calibrate in-stack temperature sensors and thermocouples. Calibrations must be performed prior to initial use and at least quarterly thereafter. At each calibration point, the absolute temperature measured by the temperature sensor must agree to within  $\pm 1.5$  percent of the temperature measured with the reference sensor, otherwise the sensor may not continue to be used.

10.4 Barometer Calibration. Calibrate the barometer against another barometer that has a NIST-traceable calibration. This calibration must be performed prior to initial use and at least quarterly thereafter. At each calibration point, the absolute pressure measured by the barometer must agree to within  $\pm 10$  mm Hg of the pressure measured by the NIST-traceable barometer, otherwise the barometer may not continue to be used.

10.5 Calibration of Other Sensors and Gauges. Calibrate all other sensors and gauges according to the procedures specified by the instrument manufacturer(s).

10.6 Analytical System Calibration. See section 11.1 of this performance specification.

### 11.0 Analytical Procedures

The analysis of the Hg samples may be conducted using any instrument or technology capable of quantifying total Hg from the sorbent media and meeting the performance criteria in section 9 of this performance specification.

11.1 Analyzer System Calibration. Perform a multipoint calibration of the analyzer at three or more upscale points over the desired quantitative range (multiple calibration ranges must be calibrated, if necessary). The field samples analyzed must fall within a calibrated, quantitative range and meet the necessary performance criteria. For samples that are suitable for aliquotting, a series of dilutions may be needed to ensure that the samples fall within a calibrated range. However, for sorbent media samples that are consumed during analysis (e.g., thermal desorption techniques), extra care must be taken to ensure that the analytical system is appropriately calibrated prior to sample analysis. The calibration curve range(s) should be determined based on the anticipated level of Hg mass on the sorbent media. Knowledge of estimated stack Hg concentrations and total sample volume may be required prior to analysis. The calibration curve for use with the various analytical techniques (e.g., UV AA, UV AF, and XRF) can be generated by directly introducing standard solutions into the analyzer or by spiking the standards onto the sorbent media and then introducing into the analyzer after preparing the sorbent/standard according to the particular analytical technique. For each calibration curve, the value of the square of the linear correlation coefficient, *i.e.*,  $r^2$ , must be  $\geq 0.99$ , and the analyzer response must be within  $\pm 10$  percent of reference value at each upscale calibration point. Calibrations must be performed on the day of the analysis, before analyzing any of the samples. Following calibration, an independently prepared standard (not from same calibration stock solution) must be analyzed. The measured value of the independently prepared standard must be within  $\pm 10$  percent of the expected value.

11.2 Sample Preparation. Carefully separate the three sections of each sorbent trap. Combine for analysis all materials associated with each section, *i.e.*, any supporting substrate that the sample gas passes through prior to entering a media section (e.g., glass wool, polyurethane foam, *etc.*) must be analyzed with that segment.

11.3 Spike Recovery Study. Before analyzing any field samples, the laboratory must demonstrate the ability to recover and quantify Hg from the sorbent media by performing the following spike recovery study for sorbent media traps spiked with elemental mercury. Using the procedures described in sections 6.2 and 12.1 of this performance specification, spike the third section of nine sorbent traps with gaseous  $\text{Hg}^0$ , *i.e.*, three traps at each of three different mass loadings, representing the range of masses anticipated in the field samples. This will yield a  $3 \times 3$  sample matrix. Prepare and analyze the third section of each spiked trap, using the techniques that will be used to prepare and analyze the field samples. The average recovery for each spike concentration must be between 85 and 115 percent. If multiple types of sorbent media are to be analyzed, a separate spike recovery study is required for each sorbent material. If multiple ranges are calibrated, a separate spike recovery study is required for each range.

11.4 Field Sample Analyses. Analyze the sorbent trap samples following the same procedures that were used for conducting the spike recovery study. The three sections of each sorbent trap must be analyzed separately (*i.e.*, section 1, then section 2, then section 3). Quantify the total mass of Hg for each section based on analytical system response and the calibration curve from section 11.1 of this performance specification. Determine the spike recovery from sorbent trap section 3. The spike recovery must be no less than 75 percent and no greater than 125 percent. To report the final Hg mass for each trap, add together the Hg masses collected in trap sections 1 and 2.

#### 12.0 Calculations, Data Reduction, and Data Analysis

12.1 Calculation of Pre-Sampling Spiking Level. Determine sorbent trap section 3 spiking level using estimates of the stack Hg concentration, the target sample flow rate, and the expected monitoring period. Calculate  $M_{\text{exp}}$ , the expected Hg mass that will be collected in section 1 of the trap, using Equation 12B-1. The pre-sampling spike must be within  $\pm 50$  percent of this mass.

$$M_{\text{exp}} = [Q_s t_s C_{\text{est}}] \times 10^{-3} \quad (\text{Equation 12B-1})$$

Where:

$M_{\text{exp}}$  = Expected sample mass ( $\mu\text{g}$ )

$Q_s$  = Sample flow rate (L/min)

$t_s$  = Expected monitoring period (min)

$C_{\text{est}}$  = Estimated Hg concentration in stack gas ( $\mu\text{g}/\text{m}^3$ )

$10^{-3}$  = Conversion factor ( $\text{m}^3/\text{L}$ )

*Example calculation:* For an estimated stack Hg concentration of  $5 \mu\text{g}/\text{m}^3$ , a target sample rate of 0.30 L/min, and a monitoring period of 5 days:

$$M_{\text{exp}} = (0.30 \text{ L/min})(1440 \text{ min/day})(5 \text{ days})(10^{-3} \text{ m}^3/\text{L})(5 \mu\text{g}/\text{m}^3) = 10.8 \mu\text{g}$$

A pre-sampling spike of  $10.8 \mu\text{g} \pm 50$  percent is, therefore, appropriate.

12.2 Calculations for Flow-Proportional Sampling. For the first hour of the data collection period, determine the reference ratio of the stack gas volumetric flow rate to the sample flow rate, as follows:

$$R_{\text{ref}} = \frac{KQ_{\text{ref}}}{R_{\text{ref}}} \quad (\text{Equation 12B-2})$$

Where:

$R_{\text{ref}}$  = Reference ratio of hourly stack gas flow rate to hourly sample flow rate

$Q_{\text{ref}}$  = Average stack gas volumetric flow rate for first hour of collection period (scfh)

$F_{ref}$  = Average sample flow rate for first hour of the collection period, in appropriate units (e.g., liters/min, cc/min, dscm/min)

$K$  = Power of ten multiplier, to keep the value of  $R_{ref}$  between 1 and 100. The appropriate  $K$  value will depend on the selected units of measure for the sample flow rate.

Then, for each subsequent hour of the data collection period, calculate ratio of the stack gas flow rate to the sample flow rate using Equation 12B-3:

$$R_h = \frac{KQ_h}{F_h} \quad (\text{Equation 12B-3})$$

Where:

$R_h$  = Ratio of hourly stack gas flow rate to hourly sample flow rate

$Q_h$  = Average stack gas volumetric flow rate for the hour (scfh)

$F_h$  = Average sample flow rate for the hour, in appropriate units (e.g., liters/min, cc/min, dscm/min)

$K$  = Power of ten multiplier, to keep the value of  $R_h$  between 1 and 100. The appropriate  $K$  value will depend on the selected units of measure for the sample flow rate and the range of expected stack gas flow rates.

Maintain the value of  $R_h$  within  $\pm 25$  percent of  $R_{ref}$  throughout the data collection period.

12.3 Calculation of Spike Recovery. Calculate the percent recovery of each section 3 spike, as follows:

$$\%R = \frac{M_3}{M_s} \times 100 \quad (\text{Equation 12B-4})$$

Where:

$\%R$  = Percentage recovery of the pre-sampling spike

$M_3$  = Mass of Hg recovered from section 3 of the sorbent trap, ( $\mu\text{g}$ )

$M_s$  = Calculated Hg mass of the pre-sampling spike, from section 8.1.2 of this performance specification, ( $\mu\text{g}$ )

12.4 Calculation of Breakthrough. Calculate the percent breakthrough to the second section of the sorbent trap, as follows:

$$\%B = \frac{M_2}{M_1} \times 100 \quad (\text{Equation 12B-5})$$

Where:

$\%B$  = Percent breakthrough

$M_2$  = Mass of Hg recovered from section 2 of the sorbent trap, ( $\mu\text{g}$ )

$M_1$  = Mass of Hg recovered from section 1 of the sorbent trap, ( $\mu\text{g}$ )

12.5 Calculation of Hg Concentration. Calculate the Hg concentration for each sorbent trap, using the following equation:

$$C = \frac{M^*}{V_t} \quad (\text{Equation 12B-6})$$

Where:

C = Concentration of Hg for the collection period, ( $\mu\text{g}/\text{dscm}$ )

$M^*$  = Total mass of Hg recovered from sections 1 and 2 of the sorbent trap, ( $\mu\text{g}$ )

$V_t$  = Total volume of dry gas metered during the collection period, (dscm). For the purposes of this performance specification, standard temperature and pressure are defined as 20 °C and 760 mm Hg, respectively.

12.6 Calculation of Paired Trap Agreement. Calculate the relative deviation (RD) between the Hg concentrations measured with the paired sorbent traps:

$$RD = \frac{|C_a - C_b|}{C_a + C_b} \times 100 \quad (\text{Equation 12B-7})$$

Where:

RD = Relative deviation between the Hg concentrations from traps "a" and "b" (percent)

$C_a$  = Concentration of Hg for the collection period, for sorbent trap "a" ( $\mu\text{g}/\text{dscm}$ )

$C_b$  = Concentration of Hg for the collection period, for sorbent trap "b" ( $\mu\text{g}/\text{dscm}$ )

12.7 Calculation of Relative Accuracy. Calculate the relative accuracy as described in Section 12.4 of PS 12A in this appendix.

12.8 Data Reduction. Typical monitoring periods for normal, day-to-day operation of a sorbent trap monitoring system range from about 24 hours to 168 hours. For the required RA tests of the system, smaller sorbent traps are often used, and the "monitoring period" or time per run is considerably shorter (e.g., 1 hour or less). Generally speaking, to validate sorbent trap monitoring system data, the acceptance criteria for the following five QC specifications in Table 12B-1 above must be met for both traps: (a) the post-monitoring leak check; (b) the ratio of stack gas flow rate to sample flow rate; (c) section 2 breakthrough; (d) paired trap agreement; and (e) section 3 spike recovery.

12.8.1 For routine day-to-day operation of a sorbent trap monitoring system, when both traps meet the acceptance criteria for all five QC specifications, the two measured Hg concentrations must be averaged arithmetically and the average value must be applied to each hour of the data collection period.

12.8.2 To validate a RA test run, both traps must meet the acceptance criteria for all five QC specifications. However, as specified in Section 12.8.3 below, for routine day-to-day operation of the monitoring system, a monitoring period may, in certain instances, be validated based on the results from one trap.

12.8.3 For the routine, day-to-day operation of the monitoring system, when one of the two sorbent trap samples or sampling systems either: (a) Fails the post-monitoring leak check; or (b) has excessive section 2 breakthrough; or (c) fails to maintain the proper stack flow-to-sample flow ratio; or (d) fails to achieve the required section 3 spike recovery, provided that the other trap meets the acceptance criteria for all four of these QC specifications, the Hg concentration measured by the valid trap may be multiplied by a factor of 1.111 and then used for reporting purposes. Further, if both traps meet the acceptance criteria for all four of these QC specifications, but the acceptance criterion for paired trap agreement is not met, the owner or operator may report the higher of the two Hg concentrations measured by the traps, in lieu of invalidating the data from the paired traps.

12.8.4 Whenever the data from a pair of sorbent traps must be invalidated and no quality-assured data from a certified backup Hg monitoring system or Hg reference method are available to cover the hours in the data collection period, treat those hours in the manner specified in the applicable regulation (i.e., use missing data substitution procedures or count the hours as monitoring system down time, as appropriate).

### 13.0 Monitoring System Performance

These monitoring criteria and procedures have been successfully applied to coal-fired utility boilers (including units with post-combustion emission controls), having vapor-phase Hg concentrations ranging from 0.03 µg/dscm to approximately 100 µg/dscm.

### 14.0 Pollution Prevention [Reserved]

### 15.0 Waste Management [Reserved]

### 16.0 Alternative Procedures [Reserved]

### 17.0 Bibliography

17.1 40 CFR Part 60, Appendix B, "Performance Specification 2—Specifications and Test Procedures for SO<sub>2</sub> and NO<sub>x</sub> Continuous Emission Monitoring Systems in Stationary Sources."

17.2 40 CFR Part 60, Appendix B, "Performance Specification 12A—Specifications and Test Procedures for Total Vapor Phase Mercury Continuous Emission Monitoring Systems in Stationary Sources."

Performance Specification 15—Performance Specification for Extractive FTIR Continuous Emissions Monitor Systems in Stationary Sources

#### 1.0 Scope and Application

1.1 Analytes. This performance specification is applicable for measuring all hazardous air pollutants (HAPs) which absorb in the infrared region and can be quantified using Fourier Transform Infrared Spectroscopy (FTIR), as long as the performance criteria of this performance specification are met. This specification is to be used for evaluating FTIR continuous emission monitoring systems for measuring HAPs regulated under Title III of the 1990 Clean Air Act Amendments. This specification also applies to the use of FTIR CEMs for measuring other volatile organic or inorganic species.

1.2 Applicability. A source which can demonstrate that the extractive FTIR system meets the criteria of this performance specification for each regulated pollutant may use the FTIR system to continuously monitor for the regulated pollutants.

#### 2.0 Summary of Performance Specification

For compound-specific sampling requirements refer to FTIR sampling methods ( e.g., reference 1). For data reduction procedures and requirements refer to the EPA FTIR Protocol (reference 2), hereafter referred to as the "FTIR Protocol." This specification describes sampling and analytical procedures for quality assurance. The infrared spectrum of any absorbing compound provides a distinct signature. The infrared spectrum of a mixture contains the superimposed spectra of each mixture component. Thus, an FTIR CEM provides the capability to continuously measure multiple components in a sample using a single analyzer. The number of compounds that can be speciated in a single spectrum depends, in practice, on the specific compounds present and the test conditions.

#### 3.0 Definitions

For a list of definitions related to FTIR spectroscopy refer to Appendix A of the FTIR Protocol. Unless otherwise specified, spectroscopic terms, symbols and equations in this performance specification are taken from the FTIR Protocol or from documents cited in the Protocol. Additional definitions are given below.

##### 3.1 FTIR Continuous Emission Monitoring System (FTIR CEM).

3.1.1 *FTIR System*. Instrument to measure spectra in the mid-infrared spectral region (500 to 4000 cm<sup>-1</sup>). It contains an infrared source, interferometer, sample gas containment cell, infrared detector, and computer. The interferometer consists of a beam splitter that divides the beam into two paths, one path a fixed distance and the other a variable distance. The computer is equipped with software to run the interferometer and store the raw digitized signal from the detector (interferogram). The software performs the mathematical conversion (the Fourier transform) of the interferogram into a spectrum showing the frequency dependent sample absorbance. All spectral data can be stored on computer

media.

3.1.2 *Gas Cell* . A gas containment cell that can be evacuated. It contains the sample as the infrared beam passes from the interferometer, through the sample, and to the detector. The gas cell may have multi-pass mirrors depending on the required detection limit(s) for the application.

3.1.3 *Sampling System* . Equipment used to extract sample from the test location and transport the gas to the FTIR analyzer. Sampling system components include probe, heated line, heated non-reactive pump, gas distribution manifold and valves, flow measurement devices and any sample conditioning systems.

3.2 *Reference CEM* . An FTIR CEM, with sampling system, that can be used for comparison measurements.

3.3 *Infrared Band (also Absorbance Band or Band)* . Collection of lines arising from rotational transitions superimposed on a vibrational transition. An infrared absorbance band is analyzed to determine the analyte concentration.

3.4 *Sample Analysis* . Interpreting infrared band shapes, frequencies, and intensities to obtain sample component concentrations. This is usually performed by a software routine using a classical least squares (cls), partial least squares (pls), or K- or P- matrix method.

3.5 *(Target) Analyte* . A compound whose measurement is required, usually to some established limit of detection and analytical uncertainty.

3.6 *Interferant* . A compound in the sample matrix whose infrared spectrum overlaps at least part of an analyte spectrum complicating the analyte measurement. The interferant may not prevent the analyte measurement, but could increase the analytical uncertainty in the measured concentration. Reference spectra of interferants are used to distinguish the interferant bands from the analyte bands. An interferant for one analyte may not be an interferant for other analytes.

3.7 *Reference Spectrum* . Infrared spectra of an analyte, or interferant, prepared under controlled, documented, and reproducible laboratory conditions (see Section 4.6 of the FTIR Protocol). A suitable library of reference spectra can be used to measure target analytes in gas samples.

3.8 *Calibration Spectrum* . Infrared spectrum of a compound suitable for characterizing the FTIR instrument configuration (Section 4.5 in the FTIR Protocol).

3.9 *One hundred percent line* . A double beam transmittance spectrum obtained by combining two successive background single beam spectra. Ideally, this line is equal to 100 percent transmittance (or zero absorbance) at every point in the spectrum. The zero absorbance line is used to measure the RMS noise of the system.

3.10 *Background Deviation* . Any deviation (from 100 percent) in the one hundred percent line (or from zero absorbance). Deviations greater than  $\pm 5$  percent in any analytical region are unacceptable. Such deviations indicate a change in the instrument throughput relative to the single-beam background.

3.11 *Batch Sampling* . A gas cell is alternately filled and evacuated. A Spectrum of each filled cell (one discreet sample) is collected and saved.

3.12 *Continuous Sampling* . Sample is continuously flowing through a gas cell. Spectra of the flowing sample are collected at regular intervals.

3.13 *Continuous Operation* . In continuous operation an FTIR CEM system, without user intervention, samples flue gas, records spectra of samples, saves the spectra to a disk, analyzes the spectra for the target analytes, and prints concentrations of target analytes to a computer file. User intervention is permitted for initial set-up of sampling system, initial calibrations, and periodic maintenance.

3.14 *Sampling Time* . In batch sampling—the time required to fill the cell with flue gas. In continuous sampling—the time required to collect the infrared spectrum of the sample gas.

3.15 *PPM-Meters*. Sample concentration expressed as the concentration-path length product, ppm (molar) concentration multiplied by the path length of the FTIR gas cell. Expressing concentration in these units provides a way to directly compare measurements made using systems with different optical configurations. Another useful expression is (ppm-meters)/K, where K is the absolute temperature of the

sample in the gas cell.

3.16 *CEM Measurement Time Constant*. The Time Constant (TC, minutes for one cell volume to flow through the cell) determines the minimum interval for complete removal of an analyte from the FTIR cell. It depends on the sampling rate ( $R_s$  in Lpm), the FTIR cell volume ( $V_{\text{cell}}$  in L) and the chemical and physical properties of an analyte.

$$TC = \frac{V_{\text{cell}}}{R_s} \quad \text{Eq. 1}$$

For example, if the sample flow rate (through the FTIR cell) is 5 Lpm and the cell volume is 7 liters, then TC is equal to 1.4 minutes (0.71 cell volumes per minute). This performance specification defines  $5 * TC$  as the minimum interval between independent samples.

3.17 *Independent Measurement*. Two independent measurements are spectra of two independent samples. Two independent samples are separated by, at least 5 cell volumes. The interval between independent measurements depends on the cell volume and the sample flow rate (through the cell). There is no mixing of gas between two independent samples. Alternatively, estimate the analyte residence time empirically: (1) Fill cell to ambient pressure with a (known analyte concentration) gas standard, (2) measure the spectrum of the gas standard, (3) purge the cell with zero gas at the sampling rate and collect a spectrum every minute until the analyte standard is no longer detected spectroscopically. If the measured time corresponds to less than 5 cell volumes, use  $5 * TC$  as the minimum interval between independent measurements. If the measured time is greater than  $5 * TC$ , then use this time as the minimum interval between independent measurements.

3.18 *Test Condition*. A period of sampling where all process, and sampling conditions, and emissions remain constant and during which a single sampling technique and a single analytical program are used. One Run may include results for more than one test condition. Constant emissions means that the composition of the emissions remains approximately stable so that a single analytical program is suitable for analyzing all of the sample spectra. A greater than two-fold change in analyte or interferant concentrations or the appearance of additional compounds in the emissions, may constitute a new test condition and may require modification of the analytical program.

3.19 *Run*. A single Run consists of spectra (one spectrum each) of at least 10 independent samples over a minimum of one hour. The concentration results from the spectra can be averaged together to give a run average for each analyte measured in the test run.

#### 4.0 Interferences

Several compounds, including water, carbon monoxide, and carbon dioxide, are known interferences in the infrared region in which the FTIR instrument operates. Follow the procedures in the FTIR protocol for subtracting or otherwise dealing with these and other interferences.

#### 5.0 Safety

The procedures required under this performance specification may involve hazardous materials, operations, and equipment. This performance specification may not address all of the safety problems associated with these procedures. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicable regulatory limitations prior to performing these procedures. The CEMS users manual and materials recommended by this performance specification should be consulted for specific precautions to be taken.

#### 6.0 Equipment and Supplies

6.1 Installation of sampling equipment should follow requirements of FTIR test Methods such as references 1 and 3 and the EPA FTIR Protocol (reference 2). Select test points where the gas stream composition is representative of the process emissions. If comparing to a reference method, the probe tips for the FTIR CEM and the RM should be positioned close together using the same sample port if possible.

6.2 FTIR Specifications. The FTIR CEM must be equipped with reference spectra bracketing the range of path length-concentrations (absorbance intensities) to be measured for each analyte. The effective concentration range of the analyzer can be adjusted by changing the path length of the gas cell or by diluting the sample. The optical configuration of the FTIR system must be such that maximum absorbance of any target analyte is no greater than 1.0 and the minimum absorbance of any target

analyte is at least 10 times the RMSD noise in the analytical region. For example, if the measured RMSD in an analytical region is equal to  $10^{-3}$ , then the peak analyte absorbance is required to be at least 0.01. Adequate measurement of all of the target analytes may require changing path lengths during a run, conducting separate runs for different analytes, diluting the sample, or using more than one gas cell.

6.3 Data Storage Requirements. The system must have sufficient capacity to store all data collected in one week of routine sampling. Data must be stored to a write-protected medium, such as write-once-read-many (WORM) optical storage medium or to a password protected remote storage location. A back-up copy of all data can be temporarily saved to the computer hard drive. The following items must be stored during testing.

- At least one sample interferogram per sampling Run or one interferogram per hour, whichever is greater. This assumes that no sampling or analytical conditions have changed during the run.
- All sample absorbance spectra (about 12 per hr, 288 per day).
- All background spectra and interferograms (variable, but about 5 per day).
- All CTS spectra and interferograms (at least 2 each 24 hour period).
- Documentation showing a record of resolution, path length, apodization, sampling time, sampling conditions, and test conditions for all sample, CTS, calibration, and background spectra.

Using a resolution of  $0.5 \text{ cm}^{-1}$ , with analytical range of  $3500 \text{ cm}^{-1}$ , assuming about 65 Kbytes per spectrum and 130 Kb per interferogram, the storage requirement is about 164 Mb for one week of continuous sampling. Lower spectral resolution requires less storage capacity. All of the above data must be stored for at least two weeks. After two weeks, storage requirements include: (1) all analytical results (calculated concentrations), (2) at least 1 sample spectrum with corresponding background and sample interferograms for each test condition, (3) CTS and calibration spectra with at least one interferogram for CTS and all interferograms for calibrations, (4) a record of analytical input used to produce results, and (5) all other documentation. These data must be stored according to the requirements of the applicable regulation.

#### 7.0 Reagents and Standards[Reserved]

#### 8.0 Sample Collection, Preservation, Storage, and Transport[Reserved]

#### 9.0 Quality Control

These procedures shall be used for periodic quarterly or semiannual QA/QC checks on the operation of the FTIR CEM. Some procedures test only the analytical program and are not intended as a test of the sampling system.

9.1 Audit Sample. This can serve as a check on both the sampling system and the analytical program.

9.1.1 Sample Requirements. The audit sample can be a mixture or a single component. It must contain target analyte(s) at approximately the expected flue gas concentration(s). If possible, each mixture component concentration should be NIST traceable ( $\pm 2$  percent accuracy). If a cylinder mixture standard (s) cannot be obtained, then, alternatively, a gas phase standard can be generated from a condensed phase analyte sample. Audit sample contents and concentrations are not revealed to the FTIR CEM operator until after successful completion of procedures in 5.3.2.

9.1.2 Test Procedure. An audit sample is obtained from the Administrator. Spike the audit sample using the analyte spike procedure in Section 11. The audit sample is measured directly by the FTIR system (undiluted) and then spiked into the effluent at a known dilution ratio. Measure a series of spiked and unspiked samples using the same procedures as those used to analyze the stack gas. Analyze the results using Sections 12.1 and 12.2. The measured concentration of each analyte must be within  $\pm 5$  percent of the expected concentration (plus the uncertainty), *i.e.*, the calculated correction factor must be within 0.93 and 1.07 for an audit with an analyte uncertainty of  $\pm 2$  percent.

9.2 Audit Spectra. Audit spectra can be used to test the analytical program of the FTIR CEM, but provide no test of the sampling system.

9.2.1 Definition and Requirements. Audit spectra are absorbance spectra that; (1) have been well

characterized, and (2) contain absorbance bands of target analyte(s) and potential interferants at intensities equivalent to what is expected in the source effluent. Audit spectra are provided by the administrator without identifying information. Methods of preparing Audit spectra include; (1) mathematically adding sample spectra or adding reference and interferant spectra, (2) obtaining sample spectra of mixtures prepared in the laboratory, or (3) they may be sample spectra collected previously at a similar source. In the last case it must be demonstrated that the analytical results are correct and reproducible. A record associated with each Audit spectrum documents its method of preparation. The documentation must be sufficient to enable an independent analyst to reproduce the Audit spectra.

9.2.2 Test Procedure. Audit spectra concentrations are measured using the FTIR CEM analytical program. Analytical results must be within  $\pm 5$  percent of the certified audit concentration for each analyte (plus the uncertainty in the audit concentration). If the condition is not met, demonstrate how the audit spectra are unrepresentative of the sample spectra. If the audit spectra are representative, modify the FTIR CEM analytical program until the test requirement is met. Use the new analytical program in subsequent FTIR CEM analyses of effluent samples.

9.3 Submit Spectra For Independent Analysis. This procedure tests only the analytical program and not the FTIR CEM sampling system. The analyst can submit FTIR CEM spectra for independent analysis by EPA. Requirements for submission include; (1) three representative absorbance spectra (and stored interferograms) for each test period to be reviewed, (2) corresponding CTS spectra, (3) corresponding background spectra and interferograms, (4) spectra of associated spiked samples if applicable, and (5) analytical results for these sample spectra. The analyst will also submit documentation of process times and conditions, sampling conditions associated with each spectrum, file names and sampling times, method of analysis and reference spectra used, optical configuration of FTIR CEM including cell path length and temperature, spectral resolution and apodization used for every spectrum. Independent analysis can also be performed on site in conjunction with the FTIR CEM sampling and analysis. Sample spectra are stored on the independent analytical system as they are collected by the FTIR CEM system. The FTIR CEM and the independent analyses are then performed separately. The two analyses will agree to within  $\pm 120$  percent for each analyte using the procedure in Section 12.3. This assumes both analytical routines have properly accounted for differences in optical path length, resolution, and temperature between the sample spectra and the reference spectra.

#### *10.0 Calibration and Standardization*

10.1 Calibration Transfer Standards. For CTS requirements see Section 4.5 of the FTIR Protocol. A well characterized absorbance band in the CTS gas is used to measure the path length and line resolution of the instrument. The CTS measurements made at the beginning of every 24 hour period must agree to within  $\pm 5$  percent after correction for differences in pressure.

Verify that the frequency response of the instrument and CTS absorbance intensity are correct by comparing to other CTS spectra or by referring to the literature.

10.2 Analyte Calibration. If EPA library reference spectra are not available, use calibration standards to prepare reference spectra according to Section 6 of the FTIR Protocol. A suitable set of analyte reference data includes spectra of at least 2 independent samples at each of at least 2 different concentrations. The concentrations bracket a range that includes the expected analyte absorbance intensities. The linear fit of the reference analyte band areas must have a fractional calibration uncertainty (FCU in Appendix F of the FTIR Protocol) of no greater than 10 percent. For requirements of analyte standards refer to Section 4.6 of the FTIR Protocol.

10.3 System Calibration. The calibration standard is introduced at a point on the sampling probe. The sampling system is purged with the calibration standard to verify that the absorbance measured in this way is equal to the absorbance in the analyte calibration. Note that the system calibration gives no indication of the ability of the sampling system to transport the target analyte(s) under the test conditions.

10.4 Analyte Spike. The target analyte(s) is spiked at the outlet of the sampling probe, upstream of the particulate filter, and combined with effluent at a ratio of about 1 part spike to 9 parts effluent. The measured absorbance of the spike is compared to the expected absorbance of the spike plus the analyte concentration already in the effluent. This measures sampling system bias, if any, as distinguished from analyzer bias. It is important that spiked sample pass through all of the sampling system components before analysis.

10.5 Signal-to-Noise Ratio (S/N). The measure of S/N in this performance specification is the root-mean-square (RMS) noise level as given in Appendix C of the FTIR Protocol. The RMS noise level of a contiguous segment of a spectrum is defined as the RMS difference (RMSD) between the  $n$  contiguous absorbance values ( $A_i$ ) which form the segment and the mean value ( $A_M$ ) of that segment.

$$\text{RMSD} = \sqrt{\left(\frac{1}{n}\right) \sum_{i=1}^n (A_i - A_m)^2} \quad \text{Eq. 2}$$

A decrease in the S/N may indicate a loss in optical throughput, or detector or interferometer malfunction.

10.6 Background Deviation. The 100 percent baseline must be between 95 and 105 percent transmittance (absorbance of 0.02 to -0.02) in every analytical region. When background deviation exceeds this range, a new background spectrum must be collected using nitrogen or other zero gas.

10.7 Detector Linearity. Measure the background and CTS at three instrument aperture settings; one at the aperture setting to be used in the testing, and one each at settings one half and twice the test aperture setting. Compare the three CTS spectra. CTS band areas should agree to within the uncertainty of the cylinder standard. If test aperture is the maximum aperture, collect CTS spectrum at maximum aperture, then close the aperture to reduce the IR through-put by half. Collect a second background and CTS at the smaller aperture setting and compare the spectra as above. Instead of changing the aperture neutral density filters can be used to attenuate the infrared beam. Set up the FTIR system as it will be used in the test measurements. Collect a CTS spectrum. Use a neutral density filter to attenuate the infrared beam (either immediately after the source or the interferometer) to approximately 1/2 its original intensity. Collect a second CTS spectrum. Use another filter to attenuate the infrared beam to approximately 1/4 its original intensity. Collect a third background and CTS spectrum. Compare the CTS spectra as above. Another check on linearity is to observe the single beam background in frequency regions where the optical configuration is known to have a zero response. Verify that the detector response is "flat" and equal to zero in these regions. If detector response is not linear, decrease aperture, or attenuate the infrared beam. Repeat the linearity check until system passes the requirement.

#### 11.0 Analytical Procedure

11.1 Initial Certification. First, perform the evaluation procedures in Section 6.0 of the FTIR Protocol. The performance of an FTIR CEM can be certified upon installation using EPA Method 301 type validation (40 CFR, Part 63, Appendix A), or by comparison to a reference Method if one exists for the target analyte(s). Details of each procedure are given below. Validation testing is used for initial certification upon installation of a new system. Subsequent performance checks can be performed with more limited analyte spiking. Performance of the analytical program is checked initially, and periodically as required by EPA, by analyzing audit spectra or audit gases.

11.1.1 Validation. Use EPA Method 301 type sampling (reference 4, Section 5.3 of Method 301) to validate the FTIR CEM for measuring the target analytes. The analyte spike procedure is as follows: (1) a known concentration of analyte is mixed with a known concentration of a non-reactive tracer gas, (2) the undiluted spike gas is sent directly to the FTIR cell and a spectrum of this sample is collected, (3) pre-heat the spiked gas to at least the sample line temperature, (4) introduce spike gas at the back of the sample probe upstream of the particulate filter, (5) spiked effluent is carried through all sampling components downstream of the probe, (6) spike at a ratio of roughly 1 part spike to 9 parts flue gas (or more dilute), (7) the spike-to-flue gas ratio is estimated by comparing the spike flow to the total sample flow, and (8) the spike ratio is verified by comparing the tracer concentration in spiked flue gas to the tracer concentration in undiluted spike gas. The analyte flue gas concentration is unimportant as long as the spiked component can be measured and the sample matrix (including interferences) is similar to its composition under test conditions. Validation can be performed using a single FTIR CEM analyzing sample spectra collected sequentially. Since flue gas analyte (unspiked) concentrations can vary, it is recommended that two separate sampling lines (and pumps) are used; one line to carry unspiked flue gas and the other line to carry spiked flue gas. Even with two sampling lines the variation in unspiked concentration may be fast compared to the interval between consecutive measurements. Alternatively, two FTIR CEMs can be operated side-by-side, one measuring spiked sample, the other unspiked sample. In this arrangement spiked and unspiked measurements can be synchronized to minimize the affect of temporal variation in the unspiked analyte concentration. In either sampling arrangement, the interval between measured concentrations used in the statistical analysis should be, at least, 5 cell volumes ( $5 * TC$  in equation 1). A validation run consists of, at least, 24 independent analytical results, 12 spiked and 12 unspiked samples. See Section 3.17 for definition of an "independent" analytical result. The results are analyzed using Sections 12.1 and 12.2 to determine if the measurements passed the validation requirements. Several analytes can be spiked and measured in the same sampling run, but a separate statistical analysis is performed for each analyte. In lieu of 24 independent measurements, averaged results can be used in the statistical analysis. In this procedure, a series of consecutive spiked measurements are combined over a sampling period to give a single average result. The related unspiked measurements are averaged in the same way. The minimum 12 spiked and 12 unspiked result averages are obtained by averaging measurements over subsequent sampling periods of equal duration. The averaged results are grouped together and statistically analyzed using Section 12.2.

11.1.1.1 Validation with a Single Analyzer and Sampling Line. If one sampling line is used, connect the sampling system components and purge the entire sampling system and cell with at least 10 cell volumes of sample gas. Begin sampling by collecting spectra of 2 independent unspiked samples. Introduce the spike gas into the back of the probe, upstream of the particulate filter. Allow 10 cell volumes of spiked flue gas to purge the cell and sampling system. Collect spectra of 2 independent spiked samples. Turn off the spike flow and allow 10 cell volumes of unspiked flue gas to purge the FTIR cell and sampling system. Repeat this procedure 6 times until the 24 samples are collected. Spiked and unspiked samples can also be measured in groups of 4 instead of in pairs. Analyze the results using Sections 12.1 and 12.2. If the statistical analysis passes the validation criteria, then the validation is completed. If the results do not pass the validation, the cause may be that temporal variations in the analyte sample gas concentration are fast relative to the interval between measurements. The difficulty may be avoided by: (1) Averaging the measurements over long sampling periods and using the averaged results in the statistical analysis, (2) modifying the sampling system to reduce TC by, for example, using a smaller volume cell or increasing the sample flow rate, (3) using two sample lines (4) use two analyzers to perform synchronized measurements. This performance specification permits modifications in the sampling system to minimize TC if the other requirements of the validation sampling procedure are met.

11.1.1.2 Validation With a Single Analyzer and Two Sampling Lines. An alternative sampling procedure uses two separate sample lines, one carrying spiked flue gas, the other carrying unspiked gas. A valve in the gas distribution manifold allows the operator to choose either sample. A short heated line connects the FTIR cell to the 3-way valve in the manifold. Both sampling lines are continuously purged. Each sample line has a rotameter and a bypass vent line after the rotameter, immediately upstream of the valve, so that the spike and unspiked sample flows can each be continuously monitored. Begin sampling by collecting spectra of 2 independent unspiked samples. Turn the sampling valve to close off the unspiked gas flow and allow the spiked flue gas to enter the FTIR cell. Isolate and evacuate the cell and fill with the spiked sample to ambient pressure. (While the evacuated cell is filling, prevent air leaks into the cell by making sure that the spike sample rotameter always indicates that a portion of the flow is directed out the by-pass vent.) Open the cell outlet valve to allow spiked sample to continuously flow through the cell. Measure spectra of 2 independent spiked samples. Repeat this procedure until at least 24 samples are collected.

11.1.1.3 Synchronized Measurements With Two Analyzers. Use two FTIR analyzers, each with its own cell, to perform synchronized spiked and unspiked measurements. If possible, use a similar optical configuration for both systems. The optical configurations are compared by measuring the same CTS gas with both analyzers. Each FTIR system uses its own sampling system including a separate sampling probe and sampling line. A common gas distribution manifold can be used if the samples are never mixed. One sampling system and analyzer measures spiked effluent. The other sampling system and analyzer measures unspiked flue gas. The two systems are synchronized so that each measures spectra at approximately the same times. The sample flow rates are also synchronized so that both sampling rates are approximately the same ( $TC_1 \sim TC_2$  in equation 1). Start both systems at the same time. Collect spectra of at least 12 independent samples with each (spiked and unspiked) system to obtain the minimum 24 measurements. Analyze the analytical results using Sections 12.1 and 12.2. Run averages can be used in the statistical analysis instead of individual measurements.

11.1.1.4 Compare to a Reference Method (RM). Obtain EPA approval that the method qualifies as an RM for the analyte(s) and the source to be tested. Follow the published procedures for the RM in preparing and setting up equipment and sampling system, performing measurements, and reporting results. Since FTIR CEMS have multicomponent capability, it is possible to perform more than one RM simultaneously, one for each target analyte. Conduct at least 9 runs where the FTIR CEM and the RM are sampling simultaneously. Each Run is at least 30 minutes long and consists of spectra of at least 5 independent FTIR CEM samples and the corresponding RM measurements. If more than 9 runs are conducted, the analyst may eliminate up to 3 runs from the analysis if at least 9 runs are used.

11.1.1.4.1 RMs Using Integrated Sampling. Perform the RM and FTIR CEM sampling simultaneously. The FTIR CEM can measure spectra as frequently as the analyst chooses (and should obtain measurements as frequently as possible) provided that the measurements include spectra of at least 5 independent measurements every 30 minutes. Concentration results from all of the FTIR CEM spectra within a run may be averaged for use in the statistical comparison even if all of the measurements are not independent. When averaging the FTIR CEM concentrations within a run, it is permitted to exclude some measurements from the average provided the minimum of 5 independent measurements every 30 minutes are included: The Run average of the FTIR CEM measurements depends on both the sample flow rate and the measurement frequency (MF). The run average of the RM using the integrated sampling method depends primarily on its sampling rate. If the target analyte concentration fluctuates significantly, the contribution to the run average of a large fluctuation depends on the sampling rate and measurement frequency, and on the duration and magnitude of the fluctuation. It is, therefore, important to carefully select the sampling rate for both the FTIR CEM and the RM and the measurement frequency for the FTIR CEM. The minimum of 9 run averages can be compared according to the relative accuracy test procedure in Performance Specification 2 for SO<sub>2</sub> and NO<sub>x</sub> CEMs (40 CFR, Part 60, App. B).

11.1.1.4.2 RMs Using a Grab Sampling Technique. Synchronize the RM and FTIR CEM measurements as closely as possible. For a grab sampling RM record the volume collected and the exact sampling period for each sample. Synchronize the FTIR CEM so that the FTIR measures a spectrum of a similar cell volume at the same time as the RM grab sample was collected. Measure at least 5 independent samples with both the FTIR CEM and the RM for each of the minimum 9 Runs. Compare the Run concentration averages by using the relative accuracy analysis procedure in 40 CFR, Part 60, App. B.

11.1.1.4.3 Continuous Emission Monitors (CEMs) as RMs. If the RM is a CEM, synchronize the sampling flow rates of the RM and the FTIR CEM. Each run is at least 1-hour long and consists of at least 10 FTIR CEM measurements and the corresponding 10 RM measurements (or averages). For the statistical comparison use the relative accuracy analysis procedure in 40 CFR, Part 60, App. B. If the RM time constant is  $<1/2$  the FTIR CEM time constant, brief fluctuations in analyte concentrations which are not adequately measured with the slower FTIR CEM time constant can be excluded from the run average along with the corresponding RM measurements. However, the FTIR CEM run average must still include at least 10 measurements over a 1-hr period.

## 12.0 Calculations and Data Analysis

12.1 Spike Dilution Ratio, Expected Concentration. The Method 301 bias is calculated as follows.

$$B = S_m - M_m - CS \quad \text{Eq. 3}$$

Where:

B=Bias at the spike level

$S_m$ =Mean of the observed spiked sample concentrations

$M_m$ =Mean of the observed unspiked sample concentrations

CS=Expected value of the spiked concentration.

The CS is determined by comparing the SF<sub>6</sub> tracer concentration in undiluted spike gas to the SF<sub>6</sub> tracer concentrations in the spiked samples;

$$DF = \frac{[SF_6]_{direct}}{[SF_6]_{spiked}} \quad \text{Eq. 4}$$

The expected concentration (CS) is the measured concentration of the analyte in undiluted spike gas divided by the dilution factor

$$CS = \frac{[anal]_{dir}}{DF} \quad \text{Eq. 5}$$

Where:

$[anal]_{dir}$ =The analyte concentration in undiluted spike gas measured directly by filling the FTIR cell with the spike gas.

If the bias is statistically significant (Section 12.2), Method 301 requires that a correction factor, CF, be multiplied by the analytical results, and that  $0.7 \leq CF \leq 1.3$ .

$$CF = \frac{1}{1 + \frac{B}{CS}} \quad \text{Eq. 6}$$

12.2 Statistical Analysis of Validation Measurements. Arrange the independent measurements (or

measurement averages) as in Table 1. More than 12 pairs of measurements can be analyzed. The statistical analysis follows EPA Method 301, Section 6.3. Section 12.1 of this performance specification shows the calculations for the bias, expected spike concentration, and correction factor. This Section shows the determination of the statistical significance of the bias. Determine the statistical significance of the bias at the 95 percent confidence level by calculating the t-value for the set of measurements. First, calculate the differences,  $d_i$ , for each pair of spiked and each pair of unspiked measurements. Then calculate the standard deviation of the spiked pairs of measurements.

$$SD_s = \sqrt{\frac{\sum d_i^2}{2n}} \quad \text{Eq. 7}$$

Where:

$d_i$ =The differences between pairs of spiked measurements.

$SD_s$ =The standard deviation in the  $d_i$  values.

$n$ =The number of spiked pairs,  $2n=12$  for the minimum of 12 spiked and 12 unspiked measurements.

Calculate the relative standard deviation, RSD, using  $SD_s$  and the mean of the spiked concentrations,  $S_m$ . The RSD must be  $\leq 50\%$ .

$$RSD = \left( \frac{SD}{S_m} \right) \quad \text{Eq. 8}$$

Repeat the calculations in equations 7 and 8 to determine  $SD_u$  and RSD, respectively, for the unspiked samples. Calculate the standard deviation of the mean using  $SD_s$  and  $SD_u$  from equation 7.

$$SD = \sqrt{SD_s^2 + SD_u^2} \quad \text{Eq. 9}$$

The t-statistic is calculated as follows to test the bias for statistical significance;

$$t = \frac{|B|}{SDM} \quad \text{Eq. 10}$$

where the bias, B, and the correction factor, CF, are given in Section 12.1. For 11 degrees of freedom, and a one-tailed distribution, Method 301 requires that  $t \leq 2.201$ . If the t-statistic indicates the bias is statistically significant, then analytical measurements must be multiplied by the correction factor. There is no limitation on the number of measurements, but there must be at least 12 independent spiked and 12 independent unspiked measurements. Refer to the t-distribution (Table 2) at the 95 percent confidence level and appropriate degrees of freedom for the critical t-value.

## 16.0 References

1. Method 318, 40 CFR, Part 63, Appendix A (Draft), "Measurement of Gaseous Formaldehyde, Phenol and Methanol Emissions by FTIR Spectroscopy," EPA Contract No. 68D20163, Work Assignment 2-18, February, 1995.
2. "EPA Protocol for the Use of Extractive Fourier Transform Infrared (FTIR) Spectrometry in Analyses of Gaseous Emissions from Stationary Industrial Sources," February, 1995.
3. "Measurement of Gaseous Organic and Inorganic Emissions by Extractive FTIR Spectroscopy," EPA Contract No. 68-D2-0165, Work Assignment 3-08.
4. "Method 301—Field Validation of Pollutant Measurement Methods from Various Waste Media," 40 CFR 63, App A.

## 17.0 Tables, Diagrams, Flowcharts, and Validation Data

Table 1—Arrangement of Validation Measurements for Statistical Analysis

Measurement (or average)	Time	Spiked (ppm)	$d_i$ spiked	Unspiked (ppm)	$d_i$ unspiked
1		$S_1$		$U_1$	
2		$S_2$	$S_2-S_1$	$U_2$	$U_2-U_1$
3		$S_3$		$U_3$	
4		$S_4$	$S_4-S_3$	$U_4$	$U_4-U_3$
5		$S_5$		$U_5$	
6		$S_6$	$S_6-S_5$	$U_6$	$U_6-U_5$
7		$S_7$		$U_7$	
8		$S_8$	$S_8-S_7$	$U_8$	$U_8-U_7$
9		$S_9$		$U_9$	
10		$S_{10}$	$S_{10}-S_9$	$U_{10}$	$U_{10}-U_9$
11		$S_{11}$		$U_{11}$	
12		$S_{12}$	$S_{12}-S_{11}$	$U_{12}$	$U_{12}-U_{11}$
Average ->		$S_m$		$M_m$	

Table 2—t=Values

n-1 <sup>a</sup>	t-value						
11	2.201	17	2.110	23	2.069	29	2.045
12	2.179	18	2.101	24	2.064	30	2.042
13	2.160	19	2.093	25	2.060	40	2.021
14	2.145	20	2.086	26	2.056	60	2.000
15	2.131	21	2.080	27	2.052	120	1.980
16	2.120	22	2.074	28	2.048	8	1.960

<sup>(a)</sup>n is the number of independent pairs of measurements (a pair consists of one spiked and its corresponding unspiked measurement). Either discrete (independent) measurements in a single run, or run averages can be used.

#### Performance Specification 16—Specifications and Test Procedures for Predictive Emission Monitoring Systems in Stationary Sources

##### 1.0 Scope and Application

1.1 *Does this performance specification apply to me?* If you, the source owner or operator, intend to use (with any necessary approvals) a predictive emission monitoring system (PEMS) to show compliance with your emission limitation under 40 CFR 60, 61, or 63, you must use the procedures in this performance specification (PS) to determine whether your PEMS is acceptable for use in demonstrating compliance with applicable requirements. Use these procedures to certify your PEMS after initial installation and periodically thereafter to ensure the PEMS is operating properly. If your PEMS contains a diluent (O<sub>2</sub> or CO<sub>2</sub>) measuring component and your emissions limitation is in units that require a diluent measurement ( e.g. lbs/mm Btu), the diluent component must be tested as well. These

specifications apply to PEMS that are installed under 40 CFR 60, 61, and 63 after the effective date of this performance specification. These specifications do not apply to parametric monitoring systems, these are covered under PS-17.

**1.1.1 How do I certify my PEMS after it is installed?** PEMS must pass a relative accuracy (RA) test and accompanying statistical tests in the initial certification test to be acceptable for use in demonstrating compliance with applicable requirements. Ongoing quality assurance tests also must be conducted to ensure the PEMS is operating properly. An ongoing sensor evaluation procedure must be in place before the PEMS certification is complete. The amount of testing and data validation that is required depends upon the regulatory needs, *i.e.*, whether precise quantification of emissions will be needed or whether indication of exceedances of some regulatory threshold will suffice. Performance criteria are more rigorous for PEMS used in determining continual compliance with an emission limit than those used to measure excess emissions. You must perform the initial certification test on your PEMS before reporting any PEMS data as quality-assured.

**1.1.2 Is other testing required after certification?** After you initially certify your PEMS, you must pass additional periodic performance checks to ensure the long-term quality of data. These periodic checks are listed in the table in Section 9. You are always responsible for properly maintaining and operating your PEMS.

## 2.0 Summary of Performance Specification

The following performance tests are required in addition to other equipment and measurement location requirements.

### 2.1 Initial PEMS Certification.

**2.1.1 Excess Emissions PEMS.** For a PEMS that is used for excess emission reporting, the owner or operator must perform a minimum 9-run, 3-level (3 runs at each level) RA test (see Section 8.2).

**2.1.2 Compliance PEMS.** For a PEMS that is used for continual compliance standards, the owner or operator must perform a minimum 27-run, 3-level (9 runs at each level) RA test (see Section 8.2). Additionally, the data must be evaluated for bias and by F-test and correlation analysis.

**2.2 Periodic Quality Assurance (QA) Assessments.** Owners and operators of all PEMS are required to conduct quarterly relative accuracy audits (RAA) and yearly relative accuracy test audits (RATA) to assess ongoing PEMS operation. The frequency of these periodic assessments may be shortened by successful operation during a prior year.

### 3.0 Definitions

The following definitions apply:

**3.1 Centroidal Area** means that area in the center of the stack (or duct) comprising no more than 1 percent of the stack cross-sectional area and having the same geometric shape as the stack.

**3.2 Data Recorder** means the equipment that provides a permanent record of the PEMS output. The data recorder may include automatic data reduction capabilities and may include electronic data records, paper records, or a combination of electronic data and paper records.

**3.3 Defective sensor** means a sensor that is responsible for PEMS malfunction or that operates outside the approved operating envelope. A defective sensor may be functioning properly, but because it is operating outside the approved operating envelope, the resulting predicted emission is not validated.

**3.4 Diluent PEMS** means the total equipment required to predict a diluent gas concentration or emission rate.

**3.5 Operating envelope** means the defined range of a parameter input that is established during PEMS development. Emission data generated from parameter inputs that are beyond the operating envelope are not considered quality assured and are therefore unacceptable.

**3.6 PEMS** means all of the equipment required to predict an emission concentration or emission rate. The system may consist of any of the following major subsystems: sensors and sensor interfaces, emission model, algorithm, or equation that uses process data to generate an output that is proportional to the emission concentration or emission rate, diluent emission model, data recorder, and sensor

evaluation system. Systems that use fewer than 3 variables do not qualify as PEMS unless the system has been specifically approved by the Administrator for use as a PEMS. A PEMS may predict emissions data that are corrected for diluent if the relative accuracy and relevant QA tests are passed in the emission units corrected for diluent. Parametric monitoring systems that serve as indicators of compliance and have *parametric* limits but do not predict emissions to comply with an *emissions* limit are not included in this definition.

3.7 *PEMS training* means the process of developing or confirming the operation of the PEMS against a reference method under specified conditions.

3.8 *Quarter* means a quarter of a calendar year in which there are at least 168 unit operating hours.

3.9 *Reconciled Process Data* means substitute data that are generated by a sensor evaluation system to replace that of a failed sensor. Reconciled process data may not be used without approval from the Administrator.

3.10 *Relative Accuracy* means the accuracy of the PEMS when compared to a reference method (RM) at the source. The RA is the average difference between the pollutant PEMS and RM data for a specified number of comparison runs plus a 2.5 percent confidence coefficient, divided by the average of the RM tests. For a diluent PEMS, the RA may be expressed as a percentage of absolute difference between the PEMS and RM. Alternative specifications are given for units that have very low emissions.

3.11 *Relative Accuracy Audit* means a quarterly audit of the PEMS against a portable analyzer meeting the requirements of ASTM D6522–00 or a RM for a specified number of runs. A RM may be used in place of the portable analyzer for the RAA.

3.12 *Relative Accuracy Test Audit* means a RA test that is performed at least once every four calendar quarters after the initial certification test while the PEMS is operating at the normal operating level.

3.13 *Reference Value* means a PEMS baseline value that may be established by RM testing under conditions when all sensors are functioning properly. This reference value may then be used in the sensor evaluation system or in adjusting new sensors.

3.14 *Sensor Evaluation System* means the equipment or procedure used to periodically assess the quality of sensor input data. This system may be a sub-model that periodically cross-checks sensor inputs among themselves or any other procedure that checks sensor integrity at least daily (when operated for more than one hour in any calendar day).

3.15 *Sensors and Sensor Interface* means the equipment that measures the process input signals and transports them to the emission prediction system.

#### 4.0 *Interferences [Reserved]*

#### 5.0 *Safety [Reserved]*

#### 6.0 *Equipment and Supplies*

6.1 PEMS Design. You must detail the design of your PEMS and make this available in reports and for on-site inspection. You must also establish the following, as applicable:

6.1.1 Number of Input Parameters. An acceptable PEMS will normally use three or more input parameters. You must obtain the Administrator's permission on a case-by-case basis if you desire to use a PEMS having fewer than three input parameters.

6.1.2 Parameter Operating Envelopes. Before you evaluate your PEMS through the certification test, you must specify the input parameters your PEMS uses, define their range of minimum and maximum values (operating envelope), and demonstrate the integrity of the parameter operating envelope using graphs and data from the PEMS development process, vendor information, or engineering calculations, as appropriate. If you operate the PEMS beyond these envelopes at any time after the certification test, the data generated during this condition will not be acceptable for use in demonstrating compliance with applicable requirements. If these parameter operating envelopes are not clearly defined and supported by development data, the PEMS operation will be limited to the range of parameter inputs encountered during the certification test until the PEMS has a new operating envelope established.

6.1.3 Source-Specific Operating Conditions. Identify any source-specific operating conditions, such as

fuel type, that affect the output of your PEMS. You may only use the PEMS under the source-specific operating conditions it was certified for.

6.1.4 Ambient Conditions. You must explain whether and how ambient conditions and seasonal changes affect your PEMS. Some parameters such as absolute ambient humidity cannot be manipulated during a test. The effect of ambient conditions such as humidity on the pollutant concentration must be determined and this effect extrapolated to include future anticipated conditions. Seasonal changes and their effects on the PEMS must be evaluated unless you can show that such effects are negligible.

6.1.5 PEMS Principle of Operation. If your PEMS is developed on the basis of known physical principles, you must identify the specific physical assumptions or mathematical manipulations that support its operation. If your PEMS is developed on the basis of linear or nonlinear regression analysis, you must make available the paired data (preferably in graphic form) used to develop or train the model.

6.1.6 Data Recorder Scale. If you are not using a digital recorder, you must choose a recorder scale that accurately captures the desired range of potential emissions. The lower limit of your data recorder's range must be no greater than 20 percent of the applicable emission standard (if subject to an emission standard). The upper limit of your data recorder's range must be determined using the following table. If you obtain approval first, you may use other lower and upper recorder limits.

<b>If PEMS is measuring . . .</b>	<b>And if . . .</b>	<b>Then your upper limit. . .</b>
Uncontrolled emissions, such as NO <sub>x</sub> at the stack of a natural gas-fired boiler	No other regulation sets an upper limit for the data recorder's range	Must be 1.25 to 2 times the average potential emission level
Uncontrolled emissions, such as NO <sub>x</sub> at the stack of a natural gas-fired boiler	Another regulation sets an upper limit for the data recorder's range	Must follow the other regulation
Controlled emissions	Must be 1.5 to 2.0 times concentration of the emission standard that applies to your emission unit	
Continual compliance emissions for an applicable regulation	Must be 1.1 to 1.5 times the concentration of the emission standard that applies to your emission unit	

6.1.7 Sensor Location and Repair. We recommend you install sensors in an accessible location in order to perform repairs and replacements. Permanently installed platforms or ladders may not be needed. If you install sensors in an area that is not accessible, you may be required to shut down the emissions unit to repair or replace a sensor. Conduct a new RATA after replacing a sensor. All sensors must be calibrated as often as needed but at least as often as recommended by the manufacturers.

6.1.8 Sensor Evaluation System. Your PEMS must be designed to perform automatic or manual determination of defective sensors on at least a daily basis. This sensor evaluation system may consist of a sensor validation sub-model, a comparison of redundant sensors, a spot check of sensor input readings at a reference value, operation, or emission level, or other procedure that detects faulty or failed sensors. Some sensor evaluation systems generate substitute values (reconciled data) that are used when a sensor is perceived to have failed. You must obtain prior approval before using reconciled data.

6.1.9 Parameter Envelope Exceedances. Your PEMS must include a plan to detect and notify the operator of parameter envelope exceedances. Emission data collected outside the ranges of the sensor envelopes will not be considered quality assured.

6.2 Recordkeeping. All valid data recorded by the PEMS must be used to calculate the emission value.

## 7.0 Reagents and Standards [Reserved]

## 8.0 Sample Collection, Preservation, Storage, and Transport

8.1 Initial Certification. Use the following procedure to certify your PEMS. Complete all PEMS training before the certification begins.

### 8.2 Relative Accuracy Test.

8.2.1 Reference Methods. Unless otherwise specified in the applicable regulations, you must use the test methods in Appendix A of this part for the RM test. Conduct the RM tests at three operating levels of the key parameter that most affects emissions ( e.g. , load level). Conduct the specified number of RM tests at the low (minimum to 50 percent of maximum), mid (an intermediary level between the low and high levels), and high (80 percent to maximum) key parameter operating levels, as practicable. If these levels are not practicable, vary the key parameter range as much as possible over three levels.

8.2.2 Number of RM Tests for Excess Emission PEMS. For PEMS used for excess emission reporting, conduct at least the following number of RM tests at the following key parameter operating levels:

(1) Three at a low level.

(2) Three at a mid level.

(3) Three at a high level.

You may choose to perform more than nine total RM tests. If you perform more than nine tests, you may reject a maximum of three tests as long as the total number of test results used to determine the RA is nine or greater and each operating level has at least three tests. You must report all data, including the rejected data.

8.2.3 Number of RM Tests for Continual Compliance PEMS. For PEMS used to determine compliance, conduct at least the following number of RM tests at the following key parameter operating levels:

(1) Nine at a low level.

(2) Nine at a mid level.

(3) Nine at a high level.

You may choose to perform more than 9 RM runs at each operating level. If you perform more than 9 runs, you may reject a maximum of three runs per level as long as the total number of runs used to determine the RA at each operating level is 9 or greater.

8.2.4 Reference Method Measurement Location. Select an accessible measurement point for the RM that will ensure you measure emissions representatively. Ensure the location is at least two equivalent stack diameters downstream and half an equivalent diameter upstream from the nearest flow disturbance such as the control device, point of pollutant generation, or other place where the pollutant concentration or emission rate can change. You may use a half diameter downstream instead of the two diameters if you meet both of the following conditions:

(1) Changes in the pollutant concentration are caused solely by diluent leakage, such as leaks from air heaters.

(2) You measure pollutants and diluents simultaneously at the same locations.

8.2.5 Traverse Points. Select traverse points that ensure representative samples. Conduct all RM tests within 3 cm of each selected traverse point but no closer than 3 cm to the stack or duct wall. The minimum requirement for traverse points are as follows:

(1) Establish a measurement line across the stack that passes through the center and in the direction of any expected stratification.

(2) Locate a minimum of three traverse points on the line at 16.7, 50.0, and 83.3 percent of the stack inside diameter.

(3) Alternatively, if the stack inside diameter is greater than 2.4 meters, you may locate the three traverse points on the line at 0.4, 1.2, and 2.0 meters from the stack or duct wall. You may not use this alternative option after wet scrubbers or at points where two streams with different pollutant concentrations are combined. You may select different traverse points if you demonstrate and provide verification that it provides a representative sample. You may also use the traverse point specifications given the RM.

8.2.6 Relative Accuracy Procedure. Perform the number of RA tests at the levels required in Sections 8.2.2 and 8.2.3. For integrated samples ( e.g. , Method 3A or 7E), make a sample traverse of at least 21 minutes, sampling for 7 minutes at each traverse point. For grab samples ( e.g. , Method 3 or 7), take one sample at each traverse point, scheduling the grab samples so that they are taken simultaneously (within a 3-minute period) or at an equal interval of time apart over a 21-minute period. A test run for grab samples must be made up of at least three separate measurements. Where multiple fuels are used in the monitored unit and the fuel type affects the predicted emissions, determine a RA for each fuel unless the effects of the alternative fuel on predicted emissions or diluent were addressed in the model training process. The unit may only use fuels that have been evaluated this way.

8.2.7 Correlation of RM and PEMS Data. Mark the beginning and end of each RM test run (including the exact time of day) on the permanent record of PEMS output. Correlate the PEMS and the RM test data by the time and duration using the following steps:

- A. Determine the integrated pollutant concentration for the PEMS for each corresponding RM test period.
- B. Consider system response time, if important, and confirm that the pair of results is on a consistent moisture, temperature, and diluent concentration basis.
- C. Compare each average PEMS value to the corresponding average RM value. Use the following guidelines to make these comparisons.

<b>If . . .</b>	<b>Then . . .</b>	<b>And then . . .</b>
The RM has an instrumental or integrated non-instrumental sampling technique	Directly compare RM and PEMS results	
The RM has a grab sampling technique	Average the results from all grab samples taken during the test run. The test run must include $\geq 3$ separate grab measurements	Compare this average RM result with the PEMS result obtained during the run.

Use the paired PEMS and RM data and the equations in Section 12.2 to calculate the RA in the units of the applicable emission standard. For this 3-level RA test, calculate the RA at each operation level.

8.3 Statistical Tests for PEMS that are Used for Continual Compliance. In addition to the RA determination, evaluate the paired RA and PEMS data using the following statistical tests.

8.3.1 Bias Test. From the RA data taken at the mid-level, determine if a bias exists between the RM and PEMS. Use the equations in Section 12.3.1.

8.3.2 F-test. Perform a separate F-test for the RA paired data from each operating level to determine if the RM and PEMS variances differ by more than might be expected from chance. Use the equations in Section 12.3.2.

8.3.3 Correlation Analysis. Perform a correlation analysis using the RA paired data from all operating levels combined to determine how well the RM and PEMS correlate. Use the equations in Section 12.3.3. The correlation is waived if the process cannot be varied to produce a concentration change sufficient for a successful correlation test because of its technical design. In such cases, should a subsequent RATA identify a variation in the RM measured values by more than 30 percent, the waiver will not apply, and a correlation analysis test must be performed at the next RATA.

8.4 Reporting. Summarize in tabular form the results of the RA and statistical tests. Include all data sheets, calculations, and charts (records of PEMS responses) necessary to verify that your PEMS meets the performance specifications. Include in the report the documentation used to establish your PEMS parameter envelopes.

8.5 Reevaluating Your PEMS After a Failed Test, Change in Operations, or Change in Critical PEMS Parameter. After initial certification, if your PEMS fails to pass a quarterly RAA or yearly RATA, or if changes occur or are made that could result in a significant change in the emission rate ( e.g. , turbine aging, process modification, new process operating modes, or changes to emission controls), your PEMS must be recertified using the tests and procedures in Section 8.1. For example, if you initially developed your PEMS for the emissions unit operating at 80–100 percent of its range, you would have performed the initial test under these conditions. Later, if you wanted to operate the emission unit at 50–100 percent of its range, you must conduct another RA test and statistical tests, as applicable, to verify that the new conditions of 50–100 percent of range are functional. These tests must demonstrate that your PEMS provides acceptable data when operating in the new range or with the new critical PEMS parameter(s). The requirements of Section 8.1 must be completed by the earlier of 60 unit operating days or 180 calendar days after the failed RATA or after the change that caused a significant change in emission rate.

#### 9.0 Quality Control

You must incorporate a QA plan beyond the initial PEMS certification test to verify that your system is generating quality-assured data. The QA plan must include the components of this section.

9.1 QA/QC Summary. Conduct the applicable ongoing tests listed below.

#### Ongoing Quality Assurance Tests

Test	PEMS regulatory purpose	Acceptability	Frequency
Sensor Evaluation	All		Daily
RAA	Compliance	3-test average $\leq 10\%$ of simultaneous PEMS average	Each quarter except quarter when RATA performed
RATA	All	Same as for RA in Sec. 13.1	Yearly in quarter when RAA not performed
Bias Correction	All	If $d_{avg} \leq \text{cc}$	Bias test passed (no correction factor needed)
PEMS Training	All	If $F_{critical} \geq F$ , $r \geq 0.8$	Optional after initial and subsequent RATAs
Sensor Evaluation Alert Test (optional)	All	See Section 6.1.8	After each PEMS training

9.2 Daily Sensor Evaluation Check. Your sensor evaluation system must check the integrity of each PEMS input at least daily.

9.3 Quarterly Relative Accuracy Audits. In the first year of operation after the initial certification, perform a RAA consisting of at least three 30-minute portable analyzer or RM determinations each quarter a RATA is not performed. The average of the 3 portable analyzer or RM determinations must not differ from the simultaneous PEMS average value by more than 10 percent of the analyzer or RM value or the test is failed. If a PEMS passes all quarterly RAAs in the first year and also passes the subsequent yearly RATA in the second year, you may elect to perform a single mid-year RAA in the second year in

place of the quarterly RAAs. This option may be repeated, but only until the PEMS fails either a mid-year RAA or a yearly RATA. When such a failure occurs, you must resume quarterly RAAs in the quarter following the failure and continue conducting quarterly RAAs until the PEMS successfully passes both a year of quarterly RAAs and a subsequent RATA.

9.4 Yearly Relative Accuracy Test Audit. Perform a minimum 9-run RATA at the normal operating level on a yearly basis in the quarter that the RAA is not performed.

#### 10.0 Calibration and Standardization [Reserved]

#### 11.0 Analytical Procedure [Reserved]

#### 12.0 Calculations and Data Analysis

##### 12.1 Nomenclature

B = PEMS bias adjustment factor.

cc = Confidence coefficient.

$d_i$  = Difference between each RM and PEMS run.

d = Arithmetic mean of differences for all runs.

$e_i$  = Individual measurement provided by the PEMS or RM at a particular level.

$e_m$  = Mean of the PEMS or RM measurements at a particular level.

$e_p$  = Individual measurement provided by the PEMS.

$e_v$  = Individual measurement provided by the RM.

F = Calculated F-value.

n = Number of RM runs.

PEMS<sub>i</sub> = Individual measurement provided by the PEMS.

PEMS<sub>iAdjusted</sub> = Individual measurement provided by the PEMS adjusted for bias. PEMS = Mean of the values provided by the PEMS at the normal operating range during the bias test.

r = Coefficient of correlation.

RA = Relative accuracy.

RAA = Relative accuracy audit. RM = Average RM value (or in the case of the RAA, the average portable analyzer value). In cases where the average emissions for the test are less than 50 percent of the applicable standard, substitute the emission standard value here in place of the average RM value.

$S_d$  = Standard deviation of differences.

$S^2$  = Variance of your PEMS or RM.

$t_{0.025}$  = t-value for a one-sided, 97.5 percent confidence interval (see Table 16-1).

12.2 Relative Accuracy Calculations. Calculate the mean of the RM values. Calculate the differences between the pairs of observations for the RM and the PEMS output sets. Finally, calculate the mean of the differences, standard deviation, confidence coefficient, and PEMS RA, using Equations 16-1, 16-2, 16-3, and 16-4, respectively. For compliance PEMS, calculate the RA at each test level. The PEMS

must pass the RA criterion at each test level.

12.2.1 Arithmetic Mean. Calculate the arithmetic mean of the differences between paired RM and PEMS observations using Equation 16–1.

$$\bar{d} = \frac{1}{n} \sum_{i=1}^n d_i \quad \text{Eq. 16-1}$$

12.2.2 Standard Deviation. Calculate the standard deviation of the differences using Equation 16–2 (positive square root).

$$s_d = \sqrt{\frac{\sum_{i=1}^n d_i^2 - \frac{\left(\sum_{i=1}^n d_i\right)^2}{n}}{n-1}} \quad \text{Eq. 16-2}$$

12.2.3 Confidence Coefficient. Calculate the confidence coefficient using Equation 16–3 and Table 16–1.

$$cc = t_{0.025} \frac{s_d}{\sqrt{n}} \quad \text{Eq. 16-3}$$

12.2.4 Relative Accuracy. Calculate the RA of your data using Equation 16–4.

$$RA = \frac{|\bar{d}| + |cc|}{RM} \times 100 \quad \text{Eq. 16-4}$$

12.3 Compliance PEMS Statistical Tests. If your PEMS will be used for continual compliance purposes, conduct the following tests using the information obtained during the RA tests. For the pollutant measurements at any one test level, if the mean value of the RM is less than either 10 ppm or 5 percent of the emission standard, all statistical tests are waived at that specific test level. For diluent measurements at any one test level, if the mean value of the RM is less than 3 percent of span, all statistical tests are waived for that specific test level.

12.3.1 Bias Test. Conduct a bias test to determine if your PEMS is biased relative to the RM. Determine the PEMS bias by comparing the confidence coefficient obtained from Equation 16–3 to the arithmetic mean of the differences determined in Equation 16–1. If the arithmetic mean of the differences ( $d$ ) is greater than the absolute value of the confidence coefficient ( $cc$ ), your PEMS must incorporate a bias factor to adjust future PEMS values as in Equation 16–5.

$$PEMS_{\text{adjusted}} = PEMS_i \times B \quad \text{Eq. 16-5}$$

Where:

$$B = 1 + \frac{|\bar{d}|}{PEMS} \quad \text{Eq. 16-6 a}$$

12.3.2 F-test. Conduct an F-test for each of the three RA data sets collected at different test levels. Calculate the variances of the PEMS and the RM using Equation 16–6.

$$s^2 = \frac{\sum_{i=1}^n (e_i - e_m)^2}{n-1} \quad \text{Eq. 16-6}$$

Determine if the variance of the PEMS data is significantly different from that of the RM data at each level by calculating the F-value using Equation 16–7.

$$F = \frac{S^2_{PEMS}}{S^2_{RM}} \quad \text{Eq. 16-7}$$

Compare the calculated F-value with the critical value of F at the 95 percent confidence level with n-1 degrees of freedom. The critical value is obtained from Table 16-2 or a similar table for F-distribution. If the calculated F-value is greater than the critical value at any level, your proposed PEMS is unacceptable. For pollutant PEMS measurements, if the standard deviation of the RM is less than either 3 percent of the span or 5 ppm, use a RM standard deviation of either 5 ppm or 3 percent of span. For diluent PEMS measurements, if the standard deviation of the reference method is less than 3 percent of span, use a RM standard deviation of 3 percent of span.

12.3.3 Correlation Analysis. Calculate the correlation coefficient either manually using Eq. 16-8, on a graph, or by computer using all of the paired data points from all operating levels. Your PEMS correlation must be 0.8 or greater to be acceptable. If during the initial certification test, your PEMS data are determined to be auto-correlated according to the procedures in 40 CFR 75.41(b)(2), or if the signal-to-noise ratio of the data is less than 4, then the correlation analysis is permanently waived.

$$r = \frac{\sum ep ev - (\sum ep)(\sum ev)/n}{\sqrt{[(\sum ep^2 - (\sum ep)^2/n)(\sum ev^2 - (\sum ev)^2/n)]}} \quad \text{Eq. 16-8}$$

12.4 Relative Accuracy Audit. Calculate the quarterly RAA using Equation 16-4.

$$RAA = \frac{\overline{PEMS} - \overline{RM}}{\overline{RM}} \times 100 \quad \text{Eq. 16-9}$$

13.0 Method Performance

13.1 PEMS Relative Accuracy. The RA must not exceed 10 percent if the PEMS measurements are greater than 100 ppm or 0.2 lbs/mm Btu. The RA must not exceed 20 percent if the PEMS measurements are between 100 ppm (or 0.2 lb/mm Btu) and 10 ppm (or 0.05 lb/mm Btu). For measurements below 10 ppm, the absolute mean difference between the PEMS measurements and the RM measurements must not exceed 2 pppm. For diluent PEMS, an alternative criterion of ± 1 percent absolute difference between the PEMS and RM may be used if less stringent.

13.2 PEMS Bias. Your PEMS data is considered biased and must be adjusted if the arithmetic mean (d) is greater than the absolute value of the confidence coefficient (cc) in Equations 16.1 and 16.3. In such cases, a bias factor must be used to correct your PEMS data.

13.3 PEMS Variance. Your calculated F-value must not be greater than the critical F-value at the 95-percent confidence level for your PEMS to be acceptable.

13.4 PEMS Correlation. Your calculated r-value must be greater than or equal to 0.8 for your PEMS to be acceptable.

13.5 Relative Accuracy Audits. The average of the 3 portable analyzer or RM determinations must not differ from the simultaneous PEMS average value by more than 10 percent of the analyzer or RM value.

14.0 Pollution Prevention [Reserved]

15.0 Waste Management [Reserved]

16.0 References [Reserved]

17.0 Tables, Diagrams, Flowcharts, and Validation Data

**Table 16-1—t-Values for One-sided, 97.5 Percent Confidence Intervals for Selected Sample Sizes\***

n-1	t <sub>0.025</sub>	n-1	t <sub>0.025</sub>
-----	--------------------	-----	--------------------

2	12.706	16	2.131
3	4.303	17	2.120
4	3.182	18	2.110
5	2.776	19	2.101
6	2.571	20	2.093
7	2.447	21	2.086
8	2.365	22	2.080
9	2.306	23	2.074
10	2.262	24	2.069
11	2.228	25	2.064
12	2.201	26	2.060
13	2.179	27	2.056
14	2.160	28	2.052
15	2.145	> 29	t-Table

\*Use n equal to the number of data points (n-1 equals the degrees of freedom).

Table 16-2. F-Values for Critical Value of F at the 95 Percent Confidence Level

d.f. for $S^2_{MS}$	d.f. for $S^2_{Error}$											
	1	2	3	4	5	6	7	8	9	10	11	12
1	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5	241.8	243.0	243.9
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.50	19.40	19.41
3	10.13	9.52	9.27	9.17	9.14	9.04	8.94	8.84	8.82	8.77	8.76	8.74
4	7.70	6.94	6.59	6.38	6.26	6.16	6.06	6.00	5.99	5.96	5.95	5.92
5	6.60	5.78	5.44	5.19	5.07	4.97	4.87	4.84	4.77	4.74	4.73	4.68
6	5.98	5.14	4.79	4.54	4.42	4.32	4.22	4.17	4.10	4.07	4.06	4.00
7	5.59	4.74	4.39	4.14	4.02	3.92	3.82	3.77	3.69	3.66	3.65	3.58
8	5.31	4.46	4.11	3.86	3.74	3.64	3.54	3.49	3.41	3.38	3.37	3.30
9	5.11	4.26	3.91	3.66	3.54	3.44	3.34	3.29	3.21	3.18	3.17	3.10
10	4.94	4.09	3.74	3.49	3.37	3.27	3.17	3.12	3.04	2.99	2.98	2.90
11	4.84	3.99	3.64	3.39	3.27	3.17	3.07	3.02	2.94	2.89	2.88	2.80
12	4.77	3.92	3.57	3.32	3.20	3.10	3.00	2.95	2.87	2.82	2.81	2.73

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[48 FR 13327, Mar. 30, 1983 and 48 FR 23611, May 25, 1983, as amended at 48 FR 32986, July 20, 1983; 51 FR 31701, Aug. 5, 1985; 52 FR 17556, May 11, 1987; 52 FR 30675, Aug. 18, 1987; 52 FR 34650, Sept. 14, 1987; 53 FR 7515, Mar. 9, 1988; 53 FR 41335, Oct. 21, 1988; 55 FR 18876, May 7, 1990; 55 FR 40178, Oct. 2, 1990; 55 FR 47474, Nov. 14, 1990; 56 FR 5526, Feb. 11, 1991; 59 FR 64593, Dec. 15, 1994; 64 FR 53032, Sept. 30, 1999; 65 FR 62130, 62144, Oct. 17, 2000; 65 FR 48920, Aug. 10, 2000; 69 FR 1802, Jan. 12, 2004; 70 FR 28673, May 18, 2005; 71 FR 55127, Sept. 21, 2006; 72 FR 32767, June 13, 2007; 72 FR 51527, Sept. 7, 2007; 72 FR 55278, Sept. 28, 2007; 74 FR 12580, 12585, Mar. 25, 2009; 74 FR 18474, Apr. 23, 2009; 75 FR 55037, Sept. 9, 2010]

**Editorial Note:** At 72 FR 55279, Sept. 28, 2007, appendix B to part 60 was amended by correcting “Eq. 12A-1” to read “(Eq. 12A-1)” in section 8.6.6.1 of Performance Specification 12A; however, the amendment could not be incorporated because that figure is an illustration.

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## **Title 40: Protection of Environment**

### **PART 60—STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES (CONTINUED)**

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#### **Appendix F to Part 60—Quality Assurance Procedures**

Procedure 1. Quality Assurance Requirements for Gas Continuous Emission Monitoring Systems Used for Compliance Determination

##### *1. Applicability and Principle*

1.1 Applicability. Procedure 1 is used to evaluate the effectiveness of quality control (QC) and quality assurance (QA) procedures and the quality of data produced by any continuous emission monitoring system (CEMS) that is used for determining compliance with the emission standards on a continuous basis as specified in the applicable regulation. The CEMS may include pollutant (e.g., SO<sub>2</sub> and NO<sub>x</sub>) and diluent (e.g., O<sub>2</sub> or CO<sub>2</sub>) monitors.

This procedure specifies the minimum QA requirements necessary for the control and assessment of the quality of CEMS data submitted to the Environmental Protection Agency (EPA). Source owners and operators responsible for one or more CEMS's used for compliance monitoring must meet these minimum requirements and are encouraged to develop and implement a more extensive QA program or to continue such programs where they already exist.

Data collected as a result of QA and QC measures required in this procedure are to be submitted to the Agency. These data are to be used by both the Agency and the CEMS operator in assessing the effectiveness of the CEMS QC and QA procedures in the maintenance of acceptable CEMS operation and valid emission data.

Appendix F, Procedure 1 is applicable December 4, 1987. The first CEMS accuracy assessment shall be a relative accuracy test audit (RATA) (see section 5) and shall be completed by March 4, 1988 or the date of the initial performance test required by the applicable regulation, whichever is later.

1.2 Principle. The QA procedures consist of two distinct and equally important functions. One function is the assessment of the quality of the CEMS data by estimating accuracy. The other function is the control and improvement of the quality of the CEMS data by implementing QC policies and corrective actions. These two functions form a control loop: When the assessment function indicates that the data quality is inadequate, the control effort must be increased until the data quality is acceptable. In order to provide uniformity in the assessment and reporting of data quality, this procedure explicitly specifies the assessment methods for response drift and accuracy. The methods are based on procedures included in the applicable performance specifications (PS's) in appendix B of 40 CFR part 60. Procedure 1 also requires the analysis of the EPA audit samples concurrent with certain reference method (RM) analyses as specified in the applicable RM's.

Because the control and corrective action function encompasses a variety of policies, specifications, standards, and corrective measures, this procedure treats QC requirements in general terms to allow each source owner or operator to develop a QC system that is most effective and efficient for the circumstances.

##### *2. Definitions*

2.1 Continuous Emission Monitoring System. The total equipment required for the determination of a gas concentration or emission rate.

2.2 Diluent Gas. A major gaseous constituent in a gaseous pollutant mixture. For combustion sources, CO<sub>2</sub> and O<sub>2</sub> are the major gaseous constituents of interest.

2.3 Span Value. The upper limit of a gas concentration measurement range that is specified for affected source categories in the applicable subpart of the regulation.

2.4 Zero, Low-Level, and High-Level Values. The CEMS response values related to the source specific span value. Determination of zero, low-level, and high-level values is defined in the appropriate PS in appendix B of this part.

2.5 Calibration Drift (CD). The difference in the CEMS output reading from a reference value after a period of operation during which no unscheduled maintenance, repair or adjustment took place. The reference value may be supplied by a cylinder gas, gas cell, or optical filter and need not be certified.

2.6 Relative Accuracy (RA). The absolute mean difference between the gas concentration or emission rate determined by the CEMS and the value determined by the RM's plus the 2.5 percent error confidence coefficient of a series of tests divided by the mean of the RM tests or the applicable emission limit.

### 3. QC Requirements

Each source owner or operator must develop and implement a QC program. As a minimum, each QC program must include written procedures which should describe in detail, complete, step-by-step procedures and operations for each of the following activities:

1. Calibration of CEMS.
2. CD determination and adjustment of CEMS.
3. Preventive maintenance of CEMS (including spare parts inventory).
4. Data recording, calculations, and reporting.
5. Accuracy audit procedures including sampling and analysis methods.
6. Program of corrective action for malfunctioning CEMS.

As described in Section 5.2, whenever excessive inaccuracies occur for two consecutive quarters, the source owner or operator must revise the current written procedures or modify or replace the CEMS to correct the deficiency causing the excessive inaccuracies.

These written procedures must be kept on record and available for inspection by the enforcement agency.

### 4. CD Assessment

4.1 CD Requirement. As described in 40 CFR 60.13(d), source owners and operators of CEMS must check, record, and quantify the CD at two concentration values at least once daily (approximately 24 hours) in accordance with the method prescribed by the manufacturer. The CEMS calibration must, as minimum, be adjusted whenever the daily zero (or low-level) CD or the daily high-level CD exceeds two times the limits of the applicable PS's in appendix B of this regulation.

4.2 Recording Requirement for Automatic CD Adjusting Monitors. Monitors that automatically adjust the data to the corrected calibration values (e.g., microprocessor control) must be programmed to record the unadjusted concentration measured in the CD prior to resetting the calibration, if performed, or record the amount of adjustment.

4.3 Criteria for Excessive CD. If either the zero (or low-level) or high-level CD result exceeds twice the applicable drift specification in appendix B for five, consecutive, daily periods, the CEMS is out-of-control. If either the zero (or low-level) or high-level CD result exceeds four times the applicable drift specification in appendix B during any CD check, the CEMS is out-of-control. If the CEMS is out-of-

control, take necessary corrective action. Following corrective action, repeat the CD checks.

4.3.1 Out-Of-Control Period Definition. The beginning of the out-of-control period is the time corresponding to the completion of the fifth, consecutive, daily CD check with a CD in excess of two times the allowable limit, or the time corresponding to the completion of the daily CD check preceding the daily CD check that results in a CD in excess of four times the allowable limit. The end of the out-of-control period is the time corresponding to the completion of the CD check following corrective action that results in the CD's at both the zero (or low-level) and high-level measurement points being within the corresponding allowable CD limit (i.e., either two times or four times the allowable limit in appendix B).

4.3.2 CEMS Data Status During Out-of-Control Period. During the period the CEMS is out-of-control, the CEMS data may not be used in calculating emission compliance nor be counted towards meeting minimum data availability as required and described in the applicable subpart [e.g., §60.47a(f)].

4.4 Data Recording and Reporting. As required in §60.7(d) of this regulation (40 CFR part 60), all measurements from the CEMS must be retained on file by the source owner for at least 2 years. However, emission data obtained on each successive day while the CEMS is out-of-control may not be included as part of the minimum daily data requirement of the applicable subpart [e.g., §60.47a(f)] nor be used in the calculation of reported emissions for that period.

## 5. Data Accuracy Assessment

5.1 Auditing Requirements. Each CEMS must be audited at least once each calendar quarter. Successive quarterly audits shall occur no closer than 2 months. The audits shall be conducted as follows:

5.1.1 Relative Accuracy Test Audit (RATA). The RATA must be conducted at least once every four calendar quarters, except as otherwise noted in section 5.1.4 of this appendix. Conduct the RATA as described for the RA test procedure in the applicable PS in appendix B (e.g., PS 2 for SO<sub>2</sub> and NO<sub>x</sub>). In addition, analyze the appropriate performance audit samples received from EPA as described in the applicable sampling methods (e.g., Methods 6 and 7).

5.1.2 Cylinder Gas Audit (CGA). If applicable, a CGA may be conducted in three of four calendar quarters, but in no more than three quarters in succession.

To conduct a CGA: (1) Challenge the CEMS (both pollutant and diluent portions of the CEMS, if applicable) with an audit gas of known concentration at two points within the following ranges:

Audit point	Audit range		
	Pollutant monitors	Diluent monitors for—	
		CO <sub>2</sub>	O <sub>2</sub>
1	20 to 30% of span value	5 to 8% by volume	4 to 6% by volume.
2	50 to 60% of span value	10 to 14% by volume	8 to 12% by volume.

Challenge the CEMS three times at each audit point, and use the average of the three responses in determining accuracy.

Use of separate audit gas cylinder for audit points 1 and 2. Do not dilute gas from audit cylinder when challenging the CEMS.

The monitor should be challenged at each audit point for a sufficient period of time to assure adsorption-desorption of the CEMS sample transport surfaces has stabilized.

(2) Operate each monitor in its normal sampling mode, i.e., pass the audit gas through all filters, scrubbers, conditioners, and other monitor components used during normal sampling, and as much of the sampling probe as is practical. At a minimum, the audit gas should be introduced at the connection between the probe and the sample line.

(3) Use Certified Reference Materials (CRM's) (See Citation 1) audit gases that have been certified by comparison to National Institute of Standards and Technology (NIST) or EPA Traceability Protocol Materials (ETPM's) following the most recent edition of EPA's Traceability Protocol No. 1 (See Citation 2). Procedures for preparation of CRM's are described in Citation 1. Procedures for preparation of ETPM's are described in Citation 2. As an alternative to CRM's or ETPM gases, Method 205 (See Citation 3) may be used. The difference between the actual concentration of the audit gas and the concentration indicated by the monitor is used to assess the accuracy of the CEMS.

5.1.3 Relative Accuracy Audit (RAA). The RAA may be conducted three of four calendar quarters, but in no more than three quarters in succession. To conduct a RAA, follow the procedure described in the applicable PS in appendix B for the relative accuracy test, except that only three sets of measurement data are required. Analyses of EPA performance audit samples are also required.

The relative difference between the mean of the RM values and the mean of the CEMS responses will be used to assess the accuracy of the CEMS.

5.1.4 Other Alternative Audits. Other alternative audit procedures may be used as approved by the Administrator for three of four calendar quarters. One RATA is required at least every four calendar quarters, except in the case where the affected facility is off-line (does not operate) in the fourth calendar quarter since the quarter of the previous RATA. In that case, the RATA shall be performed in the quarter in which the unit recommences operation. Also, cylinder gas audits are not be required for calendar quarters in which the affected facility does not operate.

5.2 Excessive Audit Inaccuracy. If the RA, using the RATA, CGA, or RAA exceeds the criteria in section 5.2.3, the CEMS is out-of-control. If the CEMS is out-of-control, take necessary corrective action to eliminate the problem. Following corrective action, the source owner or operator must audit the CEMS with a RATA, CGA, or RAA to determine if the CEMS is operating within the specifications. A RATA must always be used following an out-of-control period resulting from a RATA. The audit following corrective action does not require analysis of EPA performance audit samples. If audit results show the CEMS to be out-of-control, the CEMS operator shall report both the audit showing the CEMS to be out-of-control and the results of the audit following corrective action showing the CEMS to be operating within specifications.

5.2.1 Out-Of-Control Period Definition. The beginning of the out-of-control period is the time corresponding to the completion of the sampling for the RATA, RAA, or CGA. The end of the out-of-control period is the time corresponding to the completion of the sampling of the subsequent successful audit.

5.2.2 CEMS Data Status During Out-Of-Control Period. During the period the monitor is out-of-control, the CEMS data may not be used in calculating emission compliance nor be counted towards meeting minimum data availability as required and described in the applicable subpart [e.g., §60.47a(f)].

5.2.3 Criteria for Excessive Audit Inaccuracy. Unless specified otherwise in the applicable subpart, the criteria for excessive inaccuracy are:

- (1) For the RATA, the allowable RA in the applicable PS in appendix B.
- (2) For the CGA,  $\pm 15$  percent of the average audit value or  $\pm 5$  ppm, whichever is greater.
- (3) For the RAA,  $\pm 15$  percent of the three run average or  $\pm 7.5$  percent of the applicable standard, whichever is greater.

5.3 Criteria for Acceptable QC Procedure. Repeated excessive inaccuracies (i.e., out-of-control conditions resulting from the quarterly audits) indicates the QC procedures are inadequate or that the CEMS is incapable of providing quality data. Therefore, whenever excessive inaccuracies occur for two consecutive quarters, the source owner or operator must revise the QC procedures (see Section 3) or modify or replace the CEMS.

## 6. Calculations for CEMS Data Accuracy

6.1 RATA RA Calculation. Follow the equations described in Section 8 of appendix B, PS 2 to calculate the RA for the RATA. The RATA must be calculated in units of the applicable emission standard (e.g., ng/J).

6.2 RAA Accuracy Calculation. Use Equation 1–1 to calculate the accuracy for the RAA. The RAA must be calculated in units of the applicable emission standard (e.g., ng/J).

6.3 CGA Accuracy Calculation. Use Equation 1–1 to calculate the accuracy for the CGA, which is calculated in units of the appropriate concentration (e.g., ppm SO<sub>2</sub> or percent O<sub>2</sub>). Each component of the CEMS must meet the acceptable accuracy requirement.

$$A = \frac{C_m - C_a}{C_a} \times 100 \quad \text{Eq. 1-1}$$

where:

A=Accuracy of the CEMS, percent.

C<sub>m</sub>=Average CEMS response during audit in units of applicable standard or appropriate concentration.

C<sub>a</sub>=Average audit value (CGA certified value or three-run average for RAA) in units of applicable standard or appropriate concentration.

6.4 Example Accuracy Calculations. Example calculations for the RATA, RAA, and CGA are available in Citation 3.

### 7. Reporting Requirements

At the reporting interval specified in the applicable regulation, report for each CEMS the accuracy results from Section 6 and the CD assessment results from Section 4. Report the drift and accuracy information as a Data Assessment Report (DAR), and include one copy of this DAR for each quarterly audit with the report of emissions required under the applicable subparts of this part.

As a minimum, the DAR must contain the following information:

1. Source owner or operator name and address.
2. Identification and location of monitors in the CEMS.
3. Manufacturer and model number of each monitor in the CEMS.
4. Assessment of CEMS data accuracy and date of assessment as determined by a RATA, RAA, or CGA described in Section 5 including the RA for the RATA, the A for the RAA or CGA, the RM results, the cylinder gases certified values, the CEMS responses, and the calculations results as defined in Section 6. If the accuracy audit results show the CEMS to be out-of-control, the CEMS operator shall report both the audit results showing the CEMS to be out-of-control and the results of the audit following corrective action showing the CEMS to be operating within specifications.
5. Results from EPA performance audit samples described in Section 5 and the applicable RM's.
6. Summary of all corrective actions taken when CEMS was determined out-of-control, as described in Sections 4 and 5.

An example of a DAR format is shown in Figure 1.

### 8. Bibliography

1. "A Procedure for Establishing Traceability of Gas Mixtures to Certain National Bureau of Standards Standard Reference Materials." Joint publication by NBS and EPA-600/7-81-010, Revised 1989. Available from the U.S. Environmental Protection Agency. Quality Assurance Division (MD-77). Research Triangle Park, NC 27711.
2. "EPA Traceability Protocol For Assay And Certification Of Gaseous Calibration Standards." EPA-600/R-97/121, September 1997. Available from EPA's Emission Measurement Center at <http://www.epa.gov/ttn/emc>.
3. Method 205, "Verification of Gas Dilution Systems for Field Instrument Calibrations," 40 CFR 51, appendix M.

Figure 1—Example Format for Data Assessment Report

Period ending date \_\_\_\_\_  
 Year \_\_\_\_\_  
 Company name \_\_\_\_\_  
 Plant name \_\_\_\_\_  
 Source unit no. \_\_\_\_\_  
 CEMS manufacturer \_\_\_\_\_  
 Model no. \_\_\_\_\_  
 CEMS serial no. \_\_\_\_\_  
 CEMS type (e.g., in situ) \_\_\_\_\_  
 CEMS sampling location (e.g., control device outlet) \_\_\_\_\_

CEMS span values as per the applicable regulation: \_\_\_\_\_ (e.g., SO<sub>2</sub> \_\_\_\_\_ ppm, NO<sub>x</sub> \_\_\_\_\_ ppm).  
 \_\_\_\_\_

I. Accuracy assessment results (Complete A, B, or C below for each CEMS or for each pollutant and diluent analyzer, as applicable.) If the quarterly audit results show the CEMS to be out-of-control, report the results of both the quarterly audit and the audit following corrective action showing the CEMS to be operating properly.

A. Relative accuracy test audit (RATA) for \_\_\_\_\_ (e.g., SO<sub>2</sub> in ng/J).

1. Date of audit \_\_\_\_\_.
2. Reference methods (RM's) used \_\_\_\_\_ (e.g., Methods 3 and 6).
3. Average RM value \_\_\_\_\_ (e.g., ng/J, mg/dsm<sup>3</sup>, or percent volume).
4. Average CEMS value \_\_\_\_\_.
5. Absolute value of mean difference [d] \_\_\_\_\_.
6. Confidence coefficient [CC] \_\_\_\_\_.
7. Percent relative accuracy (RA) \_\_\_\_\_ percent.
8. EPA performance audit results:
  - a. Audit lot number (1) \_\_\_\_\_ (2) \_\_\_\_\_
  - b. Audit sample number (1) \_\_\_\_\_ (2) \_\_\_\_\_
  - c. Results (mg/dsm<sup>3</sup>) (1) \_\_\_\_\_ (2) \_\_\_\_\_
  - d. Actual value (mg/dsm<sup>3</sup>)\* (1) \_\_\_\_\_ (2) \_\_\_\_\_
  - e. Relative error\* (1) \_\_\_\_\_ (2) \_\_\_\_\_

B. Cylinder gas audit (CGA) for \_\_\_\_\_ (e.g., SO<sub>2</sub> in ppm).

	<b>Audit point 1</b>	<b>Audit point 2</b>	
1. Date of audit			
2. Cylinder ID number			
3. Date of certification			
4. Type of certification			(e.g., EPA Protocol 1 or CRM).

5. Certified audit value			(e.g., ppm).
6. CEMS response value			(e.g., ppm).
7. Accuracy			percent.

C. Relative accuracy audit (RAA) for \_\_\_\_ (e.g., SO<sub>2</sub> in ng/J).

1. Date of audit \_\_\_\_.
2. Reference methods (RM's) used \_\_\_\_ (e.g., Methods 3 and 6).
3. Average RM value \_\_\_\_ (e.g., ng/J).
4. Average CEMS value \_\_\_\_.
5. Accuracy \_\_\_\_ percent.
6. EPA performance audit results:
  - a. Audit lot number (1) \_\_\_\_ (2) \_\_\_\_
  - b. Audit sample number (1) \_\_\_\_ (2) \_\_\_\_
  - c. Results (mg/dsm<sup>3</sup>) (1) \_\_\_\_ (2) \_\_\_\_
  - d. Actual value (mg/dsm<sup>3</sup>) \*(1) \_\_\_\_ (2) \_\_\_\_
  - e. Relative error\*(1) \_\_\_\_ (2) \_\_\_\_

\*To be completed by the Agency.

D. Corrective action for excessive inaccuracy.

1. Out-of-control periods.
  - a. Date(s) \_\_\_\_.
  - b. Number of days \_\_\_\_.
2. Corrective action taken \_\_\_\_\_
3. Results of audit following corrective action. (Use format of A, B, or C above, as applicable.)

II. Calibration drift assessment.

- A. Out-of-control periods.
  1. Date(s) \_\_\_\_.
  2. Number of days \_\_\_\_.
- B. Corrective action taken \_\_\_\_\_

Procedure 2—Quality Assurance Requirements for Particulate Matter Continuous Emission Monitoring Systems at Stationary Sources

1.0 What Are the Purpose and Applicability of Procedure 2?

The purpose of Procedure 2 is to establish the minimum requirements for evaluating the effectiveness of quality control (QC) and quality assurance (QA) procedures and the quality of data produced by your particulate matter (PM) continuous emission monitoring system (CEMS). Procedure 2 applies to PM CEMS used for continuously determining compliance with emission standards or operating permit limits as specified in an applicable regulation or permit. Other QC procedures may apply to diluent ( e.g., O<sub>2</sub>) monitors and other auxiliary monitoring equipment included with your CEMS to facilitate PM measurement or determination of PM concentration in units specified in an applicable regulation.

1.1 What measurement parameter does Procedure 2 address? Procedure 2 covers the instrumental measurement of PM as defined by your source's applicable reference method (no Chemical Abstract Service number assigned).

1.2 For what types of devices must I comply with Procedure 2? You must comply with Procedure 2 for the total equipment that:

(1) We require you to install and operate on a continuous basis under the applicable regulation, and

(2) You use to monitor the PM mass concentration associated with the operation of a process or emission control device.

1.3 What are the data quality objectives (DQOs) of Procedure 2? The overall DQO of Procedure 2 is the generation of valid, representative data that can be transferred into useful information for determining PM CEMS concentrations averaged over a prescribed interval. Procedure 2 is also closely associated with Performance Specification 11 (PS-11).

(1) Procedure 2 specifies the minimum requirements for controlling and assessing the quality of PM CEMS data submitted to us or the delegated permitting authority.

(2) You must meet these minimum requirements if you are responsible for one or more PM CEMS used for compliance monitoring. We encourage you to develop and implement a more extensive QA program or to continue such programs where they already exist.

1.4 What is the intent of the QA/QC procedures specified in Procedure 2? Procedure 2 is intended to establish the minimum QA/QC requirements for PM CEMS and is presented in general terms to allow you to develop a program that is most effective for your circumstances. You may adopt QA/QC procedures that go beyond these minimum requirements to ensure compliance with applicable regulations.

1.5 When must I comply with Procedure 2? You must comply with the basic requirements of Procedure 2 immediately following successful completion of the initial correlation test of PS-11.

## 2.0 *What Are the Basic Requirements of Procedure 2?*

Procedure 2 requires you to perform periodic evaluations of PM CEMS performance and to develop and implement QA/QC programs to ensure that PM CEMS data quality is maintained.

2.1 What are the basic functions of Procedure 2?

(1) Assessment of the quality of your PM CEMS data by estimating measurement accuracy;

(2) Control and improvement of the quality of your PM CEMS data by implementing QC requirements and corrective actions until the data quality is acceptable; and

(3) Specification of requirements for daily instrument zero and upscale drift checks and daily sample volume checks, as well as routine response correlation audits, absolute correlation audits, sample volume audits, and relative response audits.

## 3.0 *What Special Definitions Apply to Procedure 2?*

The definitions in Procedure 2 include those provided in PS-11 of Appendix B, with the following additions:

3.1 "Absolute Correlation Audit (ACA)" means an evaluation of your PM CEMS response to a series of reference standards covering the full measurement range of the instrument ( e.g., 4 mA to 20 mA).

3.2 “Correlation Range” means the range of PM CEMS responses used in the complete set of correlation test data.

3.3 “PM CEMS Correlation” means the site-specific relationship ( *i.e.*, a regression equation) between the output from your PM CEMS ( *e.g.*, mA) and the particulate concentration, as determined by the reference method. The PM CEMS correlation is expressed in the same units as the PM concentration measured by your PM CEMS ( *e.g.*, mg/acm). You must derive this relation from PM CEMS response data and manual reference method data that were gathered simultaneously. These data must be representative of the full range of source and control device operating conditions that you expect to occur. You must develop the correlation by performing the steps presented in sections 12.2 and 12.3 of PS-11.

3.4 “Reference Method Sampling Location” means the location in your source's exhaust duct from which you collect manual reference method data for developing your PM CEMS correlation and for performing relative response audits (RRAs) and response correlation audits (RCAs).

3.5 “Response Correlation Audit (RCA)” means the series of tests specified in section 10.3(8) of this procedure that you conduct to ensure the continued validity of your PM CEMS correlation.

3.6 “Relative Response Audit (RRA)” means the brief series of tests specified in section 10.3(6) of this procedure that you conduct between consecutive RCAs to ensure the continued validity of your PM CEMS correlation.

3.7 “Sample Volume Audit (SVA)” means an evaluation of your PM CEMS measurement of sample volume if your PM CEMS determines PM concentration based on a measure of PM mass in an extracted sample volume and an independent determination of sample volume.

#### 4.0 *Interferences[Reserved]*

#### 5.0 *What Do I Need To Know To Ensure the Safety of Persons Using Procedure 2?*

People using Procedure 2 may be exposed to hazardous materials, operations, and equipment. Procedure 2 does not purport to address all of the safety issues associated with its use. It is your responsibility to establish appropriate safety and health practices and determine the applicable regulatory limitations before performing this procedure. You must consult your CEMS user's manual for specific precautions to be taken with regard to your PM CEMS procedures.

#### 6.0 *What Equipment and Supplies Do I Need?[Reserved]*

#### 7.0 *What Reagents and Standards Do I Need?*

You will need reference standards or procedures to perform the zero drift check, the upscale drift check, and the sample volume check.

7.1 What is the reference standard value for the zero drift check? You must use a zero check value that is no greater than 20 percent of the PM CEMS's response range. You must obtain documentation on the zero check value from your PM CEMS manufacturer.

7.2 What is the reference standard value for the upscale drift check? You must use an upscale check value that produces a response between 50 and 100 percent of the PM CEMS's response range. For a PM CEMS that produces output over a range of 4 mA to 20 mA, the upscale check value must produce a response in the range of 12 mA to 20 mA. You must obtain documentation on the upscale check value from your PM CEMS manufacturer.

7.3 What is the reference standard value for the sample volume check? You must use a reference standard value or procedure that produces a sample volume value equivalent to the normal sampling rate. You must obtain documentation on the sample volume value from your PM CEMS manufacturer.

#### 8.0 *What Sample Collection, Preservation, Storage, and Transport Are Relevant to This Procedure? [Reserved]*

#### 9.0 *What Quality Control Measures Are Required by This Procedure for My PM CEMS?*

You must develop and implement a QC program for your PM CEMS. Your QC program must, at a minimum, include written procedures that describe, in detail, complete step-by-step procedures and

operations for the activities in paragraphs (1) through (8) of this section.

- (1) Procedures for performing drift checks, including both zero drift and upscale drift and the sample volume check (see sections 10.2(1), (2), and (5)).
- (2) Methods for adjustment of PM CEMS based on the results of drift checks, sample volume checks (if applicable), and the periodic audits specified in this procedure.
- (3) Preventative maintenance of PM CEMS (including spare parts inventory and sampling probe integrity).
- (4) Data recording, calculations, and reporting.
- (5) RCA and RRA procedures, including sampling and analysis methods, sampling strategy, and structuring test conditions over the prescribed range of PM concentrations.
- (6) Procedures for performing ACAs and SVAs and methods for adjusting your PM CEMS response based on ACA and SVA results.
- (7) Program of corrective action for malfunctioning PM CEMS, including flagged data periods.
- (8) For extractive PM CEMS, procedures for checking extractive system ducts for material accumulation.

9.1 What QA/QC documentation must I have? You are required to keep the written QA/QC procedures on record and available for inspection by us, the State, and/or local enforcement agency for the life of your CEMS or until you are no longer subject to the requirements of this procedure.

9.2 How do I know if I have acceptable QC procedures for my PM CEMS? Your QC procedures are inadequate or your PM CEMS is incapable of providing quality data if you fail two consecutive QC audits ( *i.e.*, out-of-control conditions resulting from the annual audits, quarterly audits, or daily checks). Therefore, if you fail the same two consecutive audits, you must revise your QC procedures or modify or replace your PM CEMS to correct the deficiencies causing the excessive inaccuracies (see section 10.4 for limits for excessive audit inaccuracy).

#### *10.0 What Calibration/Correlation and Standardization Procedures Must I Perform for My PM CEMS?*

You must generate a site-specific correlation for each of your PM CEMS installation(s) relating response from your PM CEMS to results from simultaneous PM reference method testing. The PS-11 defines procedures for developing the correlation and defines a series of statistical parameters for assessing acceptability of the correlation. However, a critical component of your PM CEMS correlation process is ensuring the accuracy and precision of reference method data. The activities listed in sections 10.1 through 10.10 assure the quality of the correlation.

10.1 When should I use paired trains for reference method testing? Although not required, we recommend that you should use paired-train reference method testing to generate data used to develop your PM CEMS correlation and for RCA testing. Guidance on the use of paired sampling trains can be found in the PM CEMS Knowledge Document (see section 16.5 of PS-11).

10.2 What routine system checks must I perform on my PM CEMS? You must perform routine checks to ensure proper operation of system electronics and optics, light and radiation sources and detectors, and electric or electro-mechanical systems. Necessary components of the routine system checks will depend on design details of your PM CEMS. As a minimum, you must verify the system operating parameters listed in paragraphs (1) through (5) of this section on a daily basis. Some PM CEMS may perform one or more of these functions automatically or as an integral portion of unit operations; for other PM CEMS, you must initiate or perform one or more of these functions manually.

- (1) You must check the zero drift to ensure stability of your PM CEMS response to the zero check value. You must determine system output on the most sensitive measurement range when the PM CEMS is challenged with a zero reference standard or procedure. You must, at a minimum, adjust your PM CEMS whenever the daily zero drift exceeds 4 percent.
- (2) You must check the upscale drift to ensure stability of your PM CEMS response to the upscale check value. You must determine system output when the PM CEMS is challenged with a reference standard or procedure corresponding to the upscale check value. You must, at a minimum, adjust your PM CEMS whenever the daily upscale drift check exceeds 4 percent.

(3) For light-scattering and extinction-type PM CEMS, you must check the system optics to ensure that system response has not been altered by the condition of optical components, such as fogging of lens and performance of light monitoring devices.

(4) You must record data from your automatic drift-adjusting PM CEMS before any adjustment is made. If your PM CEMS automatically adjusts its response to the corrected calibration values ( e.g., microprocessor control), you must program your PM CEMS to record the unadjusted concentration measured in the drift check before resetting the calibration. Alternately, you may program your PM CEMS to record the amount of adjustment.

(5) For extractive PM CEMS that measure the sample volume and use the measured sample volume as part of calculating the output value, you must check the sample volume on a daily basis to verify the accuracy of the sample volume measuring equipment. This sample volume check must be done at the normal sampling rate of your PM CEMS. You must adjust your PM CEMS sample volume measurement whenever the daily sample volume check error exceeds 10 percent.

10.3 What are the auditing requirements for my PM CEMS? You must subject your PM CEMS to an ACA and an SVA, as applicable, at least once each calendar quarter. Successive quarterly audits must occur no closer than 2 months apart. You must conduct an RCA and an RRA at the frequencies specified in the applicable regulation or facility operating permit. An RRA or RCA conducted during any calendar quarter can take the place of the ACA required for that calendar quarter. An RCA conducted during the period in which an RRA is required can take the place of the RRA for that period.

(1) When must I perform an ACA? You must perform an ACA each quarter unless you conduct an RRA or RCA during that same quarter.

(2) How do I perform an ACA? You perform an ACA according to the procedure specified in paragraphs (2)(i) through (v) of this section.

(i) You must challenge your PM CEMS with an audit standard or an equivalent audit reference to reproduce the PM CEMS's measurement at three points within the following ranges:

<b>Audit point</b>	<b>Audit range</b>
1	0 to 20 percent of measurement range
2	40 to 60 percent of measurement range
3	70 to 100 percent of measurement range

(ii) You must then challenge your PM CEMS three times at each audit point and use the average of the three responses in determining accuracy at each audit point. Use a separate audit standard for audit points 1, 2, and 3. Challenge the PM CEMS at each audit point for a sufficient period of time to ensure that your PM CEMS response has stabilized.

(iii) Operate your PM CEMS in the mode, manner, and range specified by the manufacturer.

(iv) Store, maintain, and use audit standards as recommended by the manufacturer.

(v) Use the difference between the actual known value of the audit standard and the response of your PM CEMS to assess the accuracy of your PM CEMS.

(3) When must I perform an SVA? You must perform an audit of the measured sample volume ( e.g., the sampling flow rate for a known time) once per quarter for applicable PM CEMS with an extractive sampling system. Also, you must perform and pass an SVA prior to initiation of any of the reference method data collection runs for an RCA or RRA.

(4) How do I perform an SVA? You perform an SVA according to the procedure specified in paragraphs (4)(i) through (iii) of this section.

(i) You perform an SVA by independently measuring the volume of sample gas extracted from the stack or duct over each batch cycle or time period with a calibrated device. You may make this measurement either at the inlet or outlet of your PM CEMS, so long as it measures the sample gas volume without including any dilution or recycle air. Compare the measured volume with the volume reported by your PM CEMS for the same cycle or time period to calculate sample volume accuracy.

- (ii) You must make measurements during three sampling cycles for batch extractive monitors ( e.g., Beta-gauge) or during three periods of at least 20 minutes for continuous extractive PM CEMS.
- (iii) You may need to condense, collect, and measure moisture from the sample gas prior to the calibrated measurement device ( e.g., dry gas meter) and correct the results for moisture content. In any case, the volumes measured by the calibrated device and your PM CEMS must be on a consistent temperature, pressure, and moisture basis.
- (5) How often must I perform an RRA? You must perform an RRA at the frequency specified in the applicable regulation or facility operating permit. You may conduct an RCA instead of an RRA during the period when the RRA is required.
- (6) How do I perform an RRA? You must perform the RRA according to the procedure specified in paragraphs (6)(i) and (ii) of this section.
- (i) You perform an RRA by collecting three simultaneous reference method PM concentration measurements and PM CEMS measurements at the as-found source operating conditions and PM concentration.
- (ii) We recommend that you use paired trains for reference method sampling. Guidance on the use of paired sampling trains can be found in the PM CEMS Knowledge Document (see section 16.5 of PS–11).
- (7) How often must I perform an RCA? You must perform an RCA at the frequency specified in the applicable regulation or facility operating permit.
- (8) How do I perform an RCA? You must perform the RCA according to the procedures for the PM CEMS correlation test described in PS–11, section 8.6, except that the minimum number of runs required is 12 in the RCA instead of 15 as specified in PS–11.
- (9) What other alternative audits can I use? You can use other alternative audit procedures as approved by us, the State, or local agency for the quarters when you would conduct ACAs.
- 10.4 What are my limits for excessive audit inaccuracy? Unless specified otherwise in the applicable subpart, the criteria for excessive audit inaccuracy are listed in paragraphs (1) through (6) of this section.
- (1) What are the criteria for excessive zero or upscale drift? Your PM CEMS is out of control if the zero drift check or upscale drift check either exceeds 4 percent for five consecutive daily periods or exceeds 8 percent for any one day.
- (2) What are the criteria for excessive sample volume measurement error? Your PM CEMS is out of control if sample volume check error exceeds 10 percent for five consecutive daily periods or exceeds 20 percent for any one day.
- (3) What are the criteria for excessive ACA error? Your PM CEMS is out of control if the results of any ACA exceed  $\pm 10$  percent of the average audit value, as calculated using Equation 2–1a, or 7.5 percent of the applicable standard, as calculated using Equation 2–1b, whichever is greater.
- (4) What is the criterion for excessive SVA error? Your PM CEMS is out of control if results exceed  $\pm 5$  percent of the average sample volume audit value.
- (5) What are the criteria for passing an RCA? To pass an RCA, you must meet the criteria specified in paragraphs (5)(i) through (iii) of this section. If your PM CEMS fails to meet these RCA criteria, it is out of control.
- (i) For all 12 data points, the PM CEMS response value can be no greater than the greatest PM CEMS response value used to develop your correlation curve.
- (ii) For 9 of the 12 data points, the PM CEMS response value must lie within the PM CEMS output range used to develop your correlation curve.
- (iii) At least 75 percent of a minimum number of 12 sets of PM CEMS and reference method measurements must fall within a specified area on a graph of the correlation regression line. The specified area on the graph of the correlation regression line is defined by two lines parallel to the correlation regression line, offset at a distance of  $\pm 25$  percent of the numerical emission limit value from

the correlation regression line.

(6) What are the criteria to pass an RRA? To pass an RRA, you must meet the criteria specified in paragraphs (6)(i) and (ii) of this section. If your PM CEMS fails to meet these RRA criteria, it is out of control.

(i) For all three data points, the PM CEMS response value can be no greater than the greatest PM CEMS response value used to develop your correlation curve.

(ii) For two of the three data points, the PM CEMS response value must lie within the PM CEMS output range used to develop your correlation curve.

(iii) At least two of the three sets of PM CEMS and reference method measurements must fall within the same specified area on a graph of the correlation regression line as required for the RCA and described in paragraph (5)(iii) of this section.

10.5 What do I do if my PM CEMS is out of control? If your PM CEMS is out of control, you must take the actions listed in paragraphs (1) and (2) of this section.

(1) You must take necessary corrective action to eliminate the problem and perform tests, as appropriate, to ensure that the corrective action was successful.

(i) Following corrective action, you must repeat the previously failed audit to confirm that your PM CEMS is operating within the specifications.

(ii) If your PM CEMS failed an RRA, you must take corrective action until your PM CEMS passes the RRA criteria. If the RRA criteria cannot be achieved, you must perform an RCA.

(iii) If your PM CEMS failed an RCA, you must follow procedures specified in section 10.6 of this procedure.

(2) You must report both the audit showing your PM CEMS to be out of control and the results of the audit following corrective action showing your PM CEMS to be operating within specifications.

10.6 What do I do if my PM CEMS fails an RCA? After an RCA failure, you must take all applicable actions listed in paragraphs (1) through (3) of this section.

(1) Combine RCA data with data from the active PM CEMS correlation and perform the mathematical evaluations defined in PS-11 for development of a PM CEMS correlation, including examination of alternate correlation models ( *i.e.*, linear, polynomial, logarithmic, exponential, and power). If the expanded data base and revised correlation meet PS-11 statistical criteria, use the revised correlation.

(2) If the criteria specified in paragraph (1) of this section are not achieved, you must develop a new PM CEMS correlation based on revised data. The revised data set must consist of the test results from only the RCA. The new data must meet all requirements of PS-11 to develop a revised PM CEMS correlation, except that the minimum number of sets of PM CEMS and reference method measurements is 12 instead of the minimum of 15 sets required by PS-11. Your PM CEMS is considered to be back in controlled status when the revised correlation meets all of the performance criteria specified in section 13.2 of PS-11.

(3) If the actions in paragraphs (1) and (2) of this section do not result in an acceptable correlation, you must evaluate the cause(s) and comply with the actions listed in paragraphs (3)(i) through (iv) of this section within 90 days after the completion of the failed RCA.

(i) Completely inspect your PM CEMS for mechanical or operational problems. If you find a mechanical or operational problem, repair your PM CEMS and repeat the RCA.

(ii) You may need to relocate your PM CEMS to a more appropriate measurement location. If you relocate your PM CEMS, you must perform a new correlation test according to the procedures specified in PS-11.

(iii) The characteristics of the PM or gas in your source's flue gas stream may have changed such that your PM CEMS measurement technology is no longer appropriate. If this is the case, you must install a PM CEMS with measurement technology that is appropriate for your source's flue gas characteristics. You must perform a new correlation test according to the procedures specified in PS-11.

(iv) If the corrective actions in paragraphs (3)(i) through (iii) of this section were not successful, you must petition us, the State, or local agency for approval of alternative criteria or an alternative for continuous PM monitoring.

10.7 When does the out-of-control period begin and end? The out-of-control period begins immediately after the last test run or check of an unsuccessful RCA, RRA, ACA, SVA, drift check, or sample volume check. The out-of-control period ends immediately after the last test run or check of the subsequent successful audit or drift check.

10.8 Can I use the data recorded by my PM CEMS during out-of-control periods? During any period when your PM CEMS is out of control, you may not use your PM CEMS data to calculate emission compliance or to meet minimum data availability requirements described in the applicable regulation.

10.9 What are the QA/QC reporting requirements for my PM CEMS? You must report the accuracy results for your PM CEMS, specified in section 10.4 of this procedure, at the interval specified in the applicable regulation. Report the drift and accuracy information as a Data Assessment Report (DAR), and include one copy of this DAR for each quarterly audit with the report of emissions required under the applicable regulation. An example DAR is provided in Procedure 1, Appendix F of this part.

10.10 What minimum information must I include in my DAR? As a minimum, you must include the information listed in paragraphs (1) through (5) of this section in the DAR:

(1) Your name and address.

(2) Identification and location of monitors in your CEMS.

(3) Manufacturer and model number of each monitor in your CEMS.

(4) Assessment of PM CEMS data accuracy/acceptability, and date of assessment, as determined by an RCA, RRA, ACA, or SVA described in section 10, including the acceptability determination for the RCA or RRA, the accuracy for the ACA or SVA, the reference method results, the audit standards, your PM CEMS responses, and the calculation results as defined in section 12. If the accuracy audit results show your PM CEMS to be out of control, you must report both the audit results showing your PM CEMS to be out of control and the results of the audit following corrective action showing your PM CEMS to be operating within specifications.

(5) Summary of all corrective actions you took when you determined your PM CEMS to be out of control, as described in section 10.5, or after failing on RCA, as described in section 10.6.

10.7 Where and how long must I retain the QA data that this procedure requires me to record for my PM CEMS? You must keep the records required by this procedure for your PM CEMS onsite and available for inspection by us, the State, and/or local enforcement agency for a period of 5 years.

#### 11.0 What Analytical Procedures Apply to This Procedure?

Sample collection and analysis are concurrent for this procedure. You must refer to the appropriate reference method for the specific analytical procedures.

#### 12.0 What Calculations and Data Analysis Must I Perform for my PM CEMS?

(1) How do I determine RCA and RRA acceptability? You must plot each of your PM CEMS and reference method data sets from an RCA or RRA on a graph based on your PM CEMS correlation line to determine if the criteria in paragraphs 10.4(5) or (6), respectively, are met.

(2) How do I calculate ACA accuracy? You must use either Equation 2-1a or 2-1b to calculate ACA accuracy for each of the three audit points. However, when calculating ACA accuracy for the first audit point (0 to 20 percent of measurement range), you must use Equation 2-1b to calculate ACA accuracy if the reference standard value ( $R_v$ ) equals zero.

$$\text{ACA Accuracy} = \frac{|R_{\text{CEMS}} - R_v|}{R_v} \times 100\% \quad \text{Eq. 2-1a}$$

Where:

ACA Accuracy = The ACA accuracy at each audit point, in percent,

$R_{\text{CEM}}$  = Your PM CEMS response to the reference standard, and

$R_V$  = The reference standard value.

$$\text{ACA Accuracy} = \frac{|C_{\text{CEM}} - C_{\text{RV}}|}{C_s} \times 100\% \quad \text{Eq. 2-1 b}$$

Where:

ACA Accuracy = The ACA accuracy at each audit point, in percent,

$C_{\text{CEM}}$  = The PM concentration that corresponds to your PM CEMS response to the reference standard, as calculated using the correlation equation for your PM CEMS,

$C_{\text{RV}}$  = The PM concentration that corresponds to the reference standard value in units consistent with  $C_{\text{CEM}}$ , and

$C_s$  = The PM concentration that corresponds to the applicable emission limit in units consistent with  $C_{\text{CEM}}$ .

(3) How do I calculate daily upscale and zero drift? You must calculate the upscale drift using to Equation 2-2 and the zero drift according to Equation 2-3:

$$\text{UD} = \frac{|R_{\text{CEM}} - R_U|}{R_U} \times 100 \quad (\text{Eq. 2-2})$$

Where:

UD = The upscale drift of your PM CEMS, in percent,

$R_{\text{CEM}}$  = Your PM CEMS response to the upscale check value, and

$R_U$  = The upscale check value.

$$\text{ZD} = \frac{|R_{\text{CEM}} - R_L|}{R_U} \times 100 \quad (\text{Eq. 2-3})$$

Where:

ZD = The zero (low-level) drift of your PM CEMS, in percent,

$R_{\text{CEM}}$  = Your PM CEMS response of the zero check value,

$R_L$  = The zero check value, and

$R_U$  = The upscale check value.

(4) How do I calculate SVA accuracy? You must use Equation 2-4 to calculate the accuracy, in percent, for each of the three SVA tests or the daily sample volume check:

$$\text{Accuracy} = \frac{(V_R - V_M)}{FS} \times 100 \quad (\text{Eq. 2-4})$$

Where:

$V_M$  = Sample gas volume determined/reported by your PM CEMS ( e.g., dscm),

$V_R$  = Sample gas volume measured by the independent calibrated reference device ( e.g., dscm) for the SVA or the reference value for the daily sample volume check, and

FS = Full-scale value.

Note: Before calculating SVA accuracy, you must correct the sample gas volumes measured by your PM CEMS and the independent calibrated reference device to the same basis of temperature, pressure, and moisture content. You must document all data and calculations.

*13.0 Method Performance[Reserved]*

*14.0 Pollution Prevention[Reserved]*

*15.0 Waste Management[Reserved]*

*16.0 Which References are Relevant to This Method?[Reserved]*

*17.0 What Tables, Diagrams, Flowcharts, and Validation Data Are Relevant to This Method?[Reserved]*

Procedure 3. [Reserved]

Procedure 4. [Reserved]

Procedure 5. Quality Assurance Requirements for Vapor Phase Mercury Continuous Emissions Monitoring Systems and Sorbent Trap Monitoring Systems Used for Compliance Determination at Stationary Sources

*1.0 Applicability and Principle*

1.1 Applicability. The purpose of Procedure 5 is to establish the minimum requirements for evaluating the effectiveness of quality control (QC) and quality assurance (QA) procedures as well as the quality of data produced by vapor phase mercury (Hg) continuous emissions monitoring systems (CEMS) and sorbent trap monitoring systems. Procedure 5 applies to Hg CEMS and sorbent trap monitoring systems used for continuously determining compliance with emission standards or operating permit limits as specified in an applicable regulation or permit. Other QA/QC procedures may apply to other auxiliary monitoring equipment that may be needed to determine Hg emissions in the units of measure specified in an applicable permit or regulation.

Procedure 5 covers the measurement of Hg emissions as defined in Performance Specification 12A (PS 12A) and Performance Specification 12B (PS 12B) in appendix B to this part, *i.e.*, total vapor phase Hg representing the sum of the elemental ( $Hg^0$ , CAS Number 7439–97–6) and oxidized ( $Hg+2$ ) forms of gaseous Hg.

Procedure 5 specifies the minimum requirements for controlling and assessing the quality of Hg CEMS and sorbent trap monitoring system data submitted to EPA or a delegated permitting authority. You must meet these minimum requirements if you are responsible for one or more Hg CEMS or sorbent trap monitoring systems used for compliance monitoring. We encourage you to develop and implement a more extensive QA program or to continue such programs where they already exist.

You must comply with the basic requirements of Procedure 5 immediately following successful completion of the initial performance test described in PS 12A or PS 12B in appendix B to this part (as applicable).

1.2 Principle. The QA procedures consist of two distinct and equally important functions. One function is the assessment of the quality of the Hg CEMS or sorbent trap monitoring system data by estimating accuracy. The other function is the control and improvement of the quality of the CEMS or sorbent trap monitoring system data by implementing QC policies and corrective actions. These two functions form a control loop: When the assessment function indicates that the data quality is inadequate, the quality control effort must be increased until the data quality is acceptable. In order to provide uniformity in the

assessment and reporting of data quality, this procedure explicitly specifies assessment methods for calibration drift, system integrity, and accuracy. Several of the procedures are based on those of PS 12A and PS 12B in appendix B to this part. Because the control and corrective action function encompasses a variety of policies, specifications, standards, and corrective measures, this procedure treats QC requirements in general terms to allow each source owner or operator to develop a QC system that is most effective and efficient for the circumstances.

## 2.0 Definitions

2.1 *Mercury Continuous Emission Monitoring System (Hg CEMS)* means the equipment required for the determination of the total vapor phase Hg concentration in the stack effluent. The Hg CEMS consists of the following major subsystems:

2.1.1 *Sample Interface* means that portion of the CEMS used for one or more of the following: sample acquisition, sample transport, sample conditioning, and protection of the monitor from the effects of the stack effluent.

2.1.2 *Hg Analyzer* means that portion of the Hg CEMS that measures the total vapor phase Hg concentration and generates a proportional output.

2.1.3 *Data Recorder* means that portion of the CEMS that provides a permanent electronic record of the analyzer output. The data recorder may provide automatic data reduction and CEMS control capabilities.

2.2 *Sorbent Trap Monitoring System* means the total equipment required for the collection of gaseous Hg samples using paired three-partition sorbent traps as described in PS 12B in appendix B to this part.

2.3 *Span Value* means the measurement range as specified for the affected source category in the applicable regulation and/or monitoring performance specification.

2.4 *Zero, Mid-Level, and High Level Values* means the reference gas concentrations used for calibration drift assessments and system integrity checks on a Hg CEMS, expressed as percentages of the span value ( see section 7.1 of PS 12A in appendix B to this part).

2.5 *Calibration Drift (CD)* means the absolute value of the difference between the CEMS output response and either the upscale Hg reference gas or the zero-level Hg reference gas, expressed as a percentage of the span value, when the entire CEMS, including the sampling interface, is challenged after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

2.6 *System Integrity (SI) Check* means a test procedure assessing transport and measurement of oxidized Hg by a Hg CEMS. In particular, system integrity is expressed as the absolute value of the difference between the CEMS output response and the reference value of either a mid- or high-level mercuric chloride ( $\text{HgCl}_2$ ) reference gas, as a percentage of span, when the entire CEMS, including the sampling interface, is challenged.

2.7 *Relative Accuracy (RA)* means the absolute mean difference between the pollutant concentrations determined by a continuous monitoring system (e.g., Hg CEMS or sorbent trap monitoring system) and the values determined by a reference method (RM) plus the 2.5 percent error confidence coefficient of a series of tests divided by the mean of the RM tests. Alternatively, for sources with an average RM concentration less than 5.0 micrograms per standard cubic meter ( $\mu\text{g}/\text{scm}$ ), the RA may be expressed as the absolute value of the difference between the mean CEMS and RM values.

2.8 *Relative Accuracy Test Audit (RATA)* means an audit test procedure consisting of at least nine runs, in which the accuracy of the total vapor phase Hg concentrations measured by a CEMS or sorbent trap monitoring system is evaluated by comparison against concurrent measurements made with a reference test method.

2.9 *Quarterly Gas Audit (QGA)* means an audit procedure in which the accuracy of the total vapor phase Hg concentrations measured by a CEMS is evaluated by challenging the CEMS with a zero and two upscale reference gases.

## 3.0 QC Requirements

3.1 Each source owner or operator must develop and implement a QC program. At a minimum, each

QC program must include written procedures which should describe in detail, complete, step-by-step procedures and operations for each of the following activities (as applicable):

- (a) Calibration drift (CD) checks of Hg CEMS.
- (b) CD determination and adjustment of Hg CEMS.
- (c) Weekly system integrity check procedures for Hg CEMS.
- (d) Routine operation, maintenance, and QA/QC procedures for sorbent trap monitoring systems.
- (e) Routine and preventive maintenance procedures for Hg CEMS (including spare parts inventory).
- (f) Data recording, calculations, and reporting.
- (g) Accuracy audit procedures for Hg CEMS and sorbent trap monitoring systems including sampling and analysis methods.
- (h) Program of corrective action for malfunctioning Hg CEMS and sorbent trap monitoring systems.

These written procedures must be kept on record and available for inspection by the responsible enforcement agency. Also, as noted in Section 5.2.4, below, whenever excessive inaccuracies of a Hg CEMS occur for two consecutive quarters, the source owner or operator must revise the current written procedures or modify or replace the CEMS or sorbent trap monitoring system to correct the deficiency causing the excessive inaccuracies.

#### *4.0 Calibration Drift (CD) Assessment*

**4.1 CD Requirement.** As described in 40 CFR 60.13(d) and 63.8(c), source owners and operators of Hg CEMS must check, record, and quantify the CD at two concentration values at least once daily (approximately 24 hours) in accordance with the method prescribed by the manufacturer. The Hg CEMS calibration must, as minimum, be adjusted whenever the daily zero (or low-level) CD or the daily high-level CD exceeds two times the limits of the applicable PS in appendix B of this part.

**4.2 Recording Requirement for Automatic CD Adjusting CEMS.** CEMS that automatically adjust the data to the corrected calibration values (e.g., microprocessor control) must either be programmed to record the unadjusted concentration measured in the CD prior to resetting the calibration, if performed, or to record the amount of adjustment.

**4.3 Criteria for Excessive CD.** If either the zero (or low-level) or high-level CD result exceeds twice the applicable drift specification in section 13.2 of PS 12A in appendix B to this part for five, consecutive, daily periods, the CEMS is out-of-control. If either the zero (or low-level) or high-level CD result exceeds four times the applicable drift specification in PS 12A during any CD check, the CEMS is out-of-control. If the CEMS is out-of-control, take necessary corrective action. Following corrective action, repeat the CD checks.

**4.3.1 Out-Of-Control Period Definition.** The beginning of the out-of-control period is the time corresponding to the completion of the fifth, consecutive, daily CD check with a CD in excess of two times the allowable limit, or the time corresponding to the completion of the daily CD check preceding the daily CD check that results in a CD in excess of four times the allowable limit. The end of the out-of-control period is the time corresponding to the completion of the CD check following corrective action that results in the CD's at both the zero (or low-level) and high-level measurement points being within the corresponding allowable CD limit ( *i.e.*, either two times or four times the allowable limit in the applicable PS in appendix B).

**4.3.2 CEMS Data Status During Out-of-Control Period.** During the period the CEMS is out-of-control, the CEMS data may not be used either to determine compliance with an emission limit or to meet a minimum data availability requirement specified in an applicable regulation or permit.

#### *5.0 Data Accuracy Assessment*

**5.1 Hg CEMS Audit Requirements.** For each Hg CEMS, an accuracy audit must be performed at least once each calendar quarter. Successive quarterly audits must, to the extent practicable, be performed no less than 2 months apart. The audits must be conducted as follows:

5.1.1 Relative Accuracy Test Audit (RATA). A RATA of the Hg CEMS must be conducted at least once every four calendar quarters, except as otherwise noted in section 5.1.4 of this appendix. Perform the RATA as described in section 8.5 of PS 12A in appendix B to this part. Calculate the results according to section 12.4 of PS 12A.

5.1.2 Quarterly Gas Audit. A quarterly gas audit (QGA) may be conducted in three of four calendar quarters, but in no more than three quarters in succession. To perform a QGA, challenge the CEMS with a zero-level and two upscale level audit gases of known concentrations, first of elemental Hg and then of oxidized Hg, within the following ranges:

Audit point	Audit range
1	20 to 30% of span value.
2	50 to 60% of span value.

Sequentially inject each of the three audit gases (zero and two upscale), three times each for a total of nine injections. Inject the gases in such a manner that the entire CEMS is challenged. Do not inject the same gas concentration twice in succession.

Use elemental Hg and oxidized Hg (mercuric chloride, HgCl<sub>2</sub>) audit gases that are National Institute of Standards and Technology (NIST)-certified or NIST-traceable following an EPA Traceability Protocol. If audit gas cylinders are used, do not dilute gas when challenging the Hg CEMS. For each reference gas concentration, determine the average of the three CEMS responses and subtract the average response from the reference gas value. Calculate the measurement error at each gas level using Equation 12A-1 in section 8.2 of PS 12A.

5.1.3 Relative Accuracy Audit (RAA). As an alternative to the QGA, a RAA may be conducted in three of four calendar quarters, but in no more than three quarters in succession. To conduct a RAA, follow the RATA test procedures in section 8.5 of PS 12A in appendix B to this part, except that only three test runs are required.

5.1.4 Alternative Quarterly Audits. Alternative quarterly audit procedures may be used as approved by the Administrator for three of four calendar quarters. One RATA is required at least every four calendar quarters, except in the case where the affected facility is off-line (does not operate) in the fourth calendar quarter since the quarter of the previous RATA. In that case, the RATA must be performed in the quarter in which the unit recommences operation. Also, quarterly gas audits (or RAAs, if applicable) are not required for calendar quarters in which the affected facility does not operate.

5.2 Sorbent Trap Monitoring System Audit Requirements. For each sorbent trap monitoring system, a RATA must be conducted at least once every four calendar quarters, except as otherwise noted in section 5.1.4 of this appendix. Perform the RATA as described in section 8.3 of PS 12B in appendix B to this part. Calculate the results according to section 12.4 of PS 12A.

5.3 Excessive Audit Inaccuracy. If the results of a RATA, QGA, or RAA exceed the applicable criteria in section 5.3.3, the Hg CEMS or sorbent trap monitoring system is out-of-control. If the Hg CEMS or sorbent trap monitoring system is out-of-control, take necessary corrective action to eliminate the problem. Following corrective action, the source owner or operator must audit the CEMS or sorbent trap monitoring system using the same type of test that failed to meet the accuracy criterion. For instance, a RATA must always be performed following an out-of-control period resulting from a failed RATA. Whenever audit results show the Hg CEMS or sorbent trap monitoring system to be out-of-control, the owner or operator must report both the results of the failed test and the results of the retest following corrective action showing the CEMS to be operating within specifications.

5.3.1 Out-Of-Control Period Definition. The beginning of the out-of-control period is the hour immediately following the completion of a RATA, RAA, QGA or system integrity check that fails to meet the applicable performance criteria in section 5.3.3, below. The end of the out-of-control period is the time corresponding to the completion of a subsequent successful test of the same type.

5.3.2 Monitoring Data Status During Out-Of-Control Period. During the period the monitor is out-of-control, the monitoring data may not be used to determine compliance with an applicable emission limit or to meet a minimum data availability requirement in an applicable regulation or permit.

5.3.3 Criteria for Excessive Audit Inaccuracy. Unless specified otherwise in an applicable regulation or permit, the criteria for excessive inaccuracy are:

(a) For the RATA, the allowable RA in the applicable PS in appendix B (e.g., PS 12A or PS 12B).

(b) For the QGA,  $\pm 15$  percent of the average audit value or  $\pm 0.5 \mu\text{g}/\text{m}^3$ , whichever is greater.

(c) For the RAA,  $\pm 20$  percent of the three run average or  $\pm 10$  percent of the applicable standard, whichever is greater.

5.3.4 Criteria for Acceptable QC Procedures. Repeated excessive inaccuracies (*i.e.*, out-of-control conditions resulting from the quarterly audits) indicates the QC procedures are inadequate or that the CEMS or sorbent trap monitoring system is incapable of providing quality data. Therefore, whenever excessive inaccuracies occur for two consecutive quarters, the source owner or operator must revise the QC procedures ( see Section 3) or modify, repair, or replace the CEMS or sorbent trap monitoring system.

## 6.0 Reporting Requirements

6.1 Data Assessment Report. At the reporting interval specified in the applicable regulation or permit, report for each Hg CEMS and/or sorbent trap monitoring system the accuracy assessment results from Section 5, above. For Hg CEMS, also report the CD assessment results from Section 4, above. Report this information as a Data Assessment Report (DAR), and include the appropriate DAR(s) with the emissions report required under the applicable regulation or permit.

6.2 Contents of the DAR. At a minimum, the DAR must contain the following information:

6.2.1 Facility name and address including identification of source owner/operator.

6.2.2 Identification and location of each Hg CEMS and/or sorbent trap monitoring system.

6.2.3 Manufacturer, model, and serial number of each Hg CEMS and/or sorbent trap monitoring system.

6.2.4 CD Assessment for each Hg CEMS, including the identification of out-of-control periods.

6.2.5 System integrity check data for each Hg CEMS.

6.2.6 Accuracy assessment for each Hg CEMS and/or sorbent trap monitoring system, including the identification of out-of-control periods. The results of all required RATAs, QGAs, RAAs, and audits of auxiliary equipment must be reported. If an accuracy audit shows a CEMS or sorbent trap monitoring system to be out-of-control, report both the audit results that caused the out-of-control period and the results of the retest following corrective action, showing the monitoring system to be operating within specifications.

6.2.6. Summary of all corrective actions taken when the Hg CEMS and/or sorbent trap monitoring system was determined to be out-of-control.

6.3 Data Retention. As required in 40 CFR 60.7(d) and 63.10(b), all measurements from CEMS and sorbent trap monitoring systems, including the quality assurance data required by this procedure, must be retained by the source owner for at least 5 years.

## 7.0 Bibliography

7.1 Calculation and Interpretation of Accuracy for Continuous Emission Monitoring Systems (CEMS). Section 3.0.7 of the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods. EPA-600/4-77-027b. August 1977. U.S. Environmental Protection Agency. Office of Research and Development Publications, 26 West St. Clair Street, Cincinnati, OH 45268.

[52 FR 21008, June 4, 1987; 52 FR 27612, July 22, 1987, as amended at 56 FR 5527, Feb. 11, 1991; 69 FR 1816, Jan. 12, 2004; 72 FR 32768, June 13, 2007; 74 FR 12590, Mar. 25, 2009; 75 FR 55040, Sept. 9, 2010]

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## **Title 40: Protection of Environment**

### **PART 60—STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES**

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#### **Subpart L—Standards of Performance for Secondary Lead Smelters**

##### **§ 60.120 Applicability and designation of affected facility.**

(a) The provisions of this subpart are applicable to the following affected facilities in secondary lead smelters: Pot furnaces of more than 250 kg (550 lb) charging capacity, blast (cupola) furnaces, and reverberatory furnaces.

(b) Any facility under paragraph (a) of this section that commences construction or modification after June 11, 1973, is subject to the requirements of this subpart.

[42 FR 37937, July 25, 1977]

##### **§ 60.121 Definitions.**

As used in this subpart, all terms not defined herein shall have the meaning given them in the Act and in subpart A of this part.

(a) *Reverberatory furnace* includes the following types of reverberatory furnaces: stationary, rotating, rocking, and tilting.

(b) *Secondary lead smelter* means any facility producing lead from a leadbearing scrap material by smelting to the metallic form.

(c) *Lead* means elemental lead or alloys in which the predominant component is lead.

(d) *Blast furnace* means any furnace used to recover metal from slag.

[39 FR 9317, Mar. 8, 1974; 39 FR 13776, Apr. 17, 1974, as amended at 65 FR 61756, Oct. 17, 2000]

##### **§ 60.122 Standard for particulate matter.**

(a) On and after the date on which the performance test required to be conducted by §60.8 is completed, no owner or operator subject to the provisions of this subpart shall discharge or cause the discharge into the atmosphere from a blast (cupola) or reverberatory furnace any gases which:

(1) Contain particulate matter in excess of 50 mg/dscm (0.022 gr/dscf).

(2) Exhibit 20 percent opacity or greater.

(b) On and after the date on which the performance test required to be conducted by §60.8 is completed, no owner or operator subject to the provisions of this subpart shall discharge or cause the discharge into the atmosphere from any pot furnace any gases which exhibit 10 percent opacity or greater.

[39 FR 9317, Mar. 8, 1974, as amended at 40 FR 46259, Oct. 6, 1975]

**§ 60.123 Test methods and procedures.**

(a) In conducting the performance tests required in §60.8, the owner or operator shall use as reference methods and procedures the test methods in appendix A of this part or other methods and procedures as specified in this section, except as provided in §60.8(b).

(b) The owner or operator shall determine compliance with the particulate matter standards in §60.122 as follows:

(1) Method 5 shall be used to determine the particulate matter concentration during representative periods of furnace operation, including charging and tapping. The sampling time and sample volume for each run shall be at least 60 minutes and 0.90 dscm (31.8 dscf).

(2) Method 9 and the procedures in §60.11 shall be used to determine opacity.

[54 FR 6667, Feb. 14, 1989]

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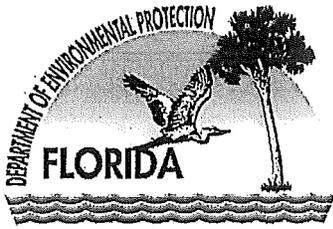
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**APPENDIX B**  
**OPERATING PERMIT**

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# Florida Department of Environmental Protection

Bob Martinez Center  
2600 Blairstone Road  
Tallahassee, Florida 32399-2400

Charlie Crist  
Governor  
Jeff Kottkamp  
Lt. Governor.  
Michael W. Sole  
Secretary

## PERMITTEE

EnviroFocus Teclmologies, LLC (EFT)  
1901 North 66th Street  
Tampa, Florida 33619

Authorized Representative: Mr. Jolm Tapper  
Chief Operating Officer

Air Permit No. PSD-FL-404  
DEP File No. 0570057-020-AC  
EFT Lead-Acid Battery Recycling Facility  
Facility Upgrade and Production Increase  
Permit Expires: June 30, 2012  
Hillsborough County

## PROJECT AND LOCATION

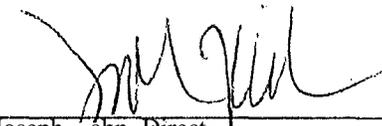
This permit authorizes facility improvements and expansion of production to 150,000 tons per year (TPY) of lead alloy products at the EFT lead-acid battety recycling facility located in Hillsborough County on 1901 North 66th Street in Tampa, Florida. The UTM coordinates for the site are Zone 17, 364.0 Idlometers (km) East and 3093.5 km North.

## STATEMENT OF BASIS

This air pollution construction permit is issued under the provisions of Chapter 403 of the Florida Statutes (F.S.), and Chapters 62-4, 62-204, 62-210, 62-212, 62-296 and 62-297 of the Florida Administrative Code (F.A.C.). The pennittee is authorized to conduct the proposed work in accordance with the conditions of this permit and as described in the application, approved drawings, plans and other documents on file with the Department. This project is subject to the general preconstruction review requirements in Rule 62-212.300, F.A.C. and the preconstruction review requirements for major stationmy sources in Rule 62-212.400, F.A.C. for the Prevention of Significant Deterioration (PSD) of Air Quality.

Upon issuance of this final pennit, any patty to this order has the right to seek judicial review of it under Section 120.68 of the Florida Statutes by filing a notice of appeal under Rule 9.110 of the Florida Rules of Appellate Procedure with the clerk of the Department of Environmental Protection in the Office of General Counsel (Mail Station #35, 3900 Commonwealth Boulevard, Tallahassee, Florida, 32399-3000) and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate District Comt of Appeal. The notice must be filed within 30 days after this order is filed with the clerk of the Depattment.

Executed in Tallahassee, Florida

  
\_\_\_\_\_  
Joseph Ahn, Director  
Division of Air Resource Management

9/22/09  
(Date)

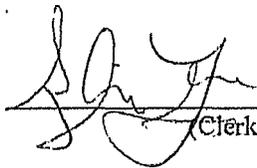
CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this Final Air Permit package (including the Final Determination and Final Permit with Appendices) was sent by electronic mail, or a link to these documents made available electronically on a publicly accessible server, with received receipt requested before the close of business on tj(d+j a9 to the persons listed below.

John Tapper, EnviroFocus Technologies, LLC: [jtapper@gopherresource.com](mailto:jtapper@gopherresource.com)  
Heather Abrams, EPA Region 4: [abrams.heather@epa.gov](mailto:abrams.heather@epa.gov)  
Jerry Campbell, Hillsborough County EPC: [campbell@epchc.com](mailto:campbell@epchc.com)  
Russell S. Kemp, P.E., Environ: [rkemp@environcorp.com](mailto:rkemp@environcorp.com)  
Victoria Gibson, DEP BAR: [victoria.gibson@dep.state.fl.us](mailto:victoria.gibson@dep.state.fl.us) (for read file)

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED, on this date, pursuant to Section 120.52(7), Florida Statutes, with the designated agency clerk, receipt of which is hereby acknowledged.

  
\_\_\_\_\_  
(Clerk)

g/j | fc)lr;

## **FINAL DETERMINATION**

Air Construction Permit  
EnviroFocus Technologies, LLC  
Lead-Acid Battery Recycling Facility  
DEP File No. 0570057-020-AC (PSD-FL-404)

### **PERMITTEE**

EnviroFocus Technologies, LLC (EnviroFocus)  
1901 North 66<sup>th</sup> Street  
Tampa, Florida 33619

### **PERMITTING AUTHORITY**

Florida Department of Environmental Protection (Department)  
Division of Air Resource Management  
Bureau of Air Regulation, Special Projects Section  
2600 Blair Stone Road, MS #5505  
Tallahassee, Florida 32399-2400

### **PROJECT**

DEP File No. 0570057-020-AC (PSD-FL-404)  
EnviroFocus Lead-Acid Battery Recycling Facility  
Facility Upgrade and Production Increase  
Hillsborough County

The project required a review under the rules for the Prevention of Significant Deterioration (PSD) of Air Quality and determinations of Best Available Control Technology (BACT) for nitrogen oxides (NO<sub>x</sub>) and particulate matter (PM<sub>10</sub>). The key changes comprising the facility upgrade project and the associated production increase from 32,000 to 150,000 tons per year (TPY) of lead include: replacement of the existing battery breaker with a larger hammer mill; addition of a feed dryer and installation of a reverberatory furnace for additional smelting; and installation of six kettles for additional refining. A plastics plant will be constructed at the facility to turn the recycled plastic from the battery casings into saleable pellets.

Air pollution control measures include: a new wet impingement scrubber and stack and other improvements at the battery breaking area; a larger afterburner, dryer baghouse, process baghouse, wet scrubber and stack for the lead smelting operation; and a new hygiene baghouse and stack for the refining/casting operation. The entire recycling process will be completely enclosed, placed under negative pressure and exhausted via an expanded building ventilation system through a cyclone collector and stack.

### **NOTICE AND PUBLICATION**

The Department distributed a major modification air construction (PSD) permit package on August 7, 2009. The applicant filed a request for extension of time to file a petition for an administrative hearing on August 11 to resolve several provisions that in their opinion warranted clarification or correction. The Department withdrew the draft and distributed a revised permit package version on August 12.

The applicant published the Public Notice of Intent to Issue Air Construction Permit in The Tampa Tribune on August 17. The Department received the proof of publication on August 31.

## COMMENTS

No written comments on the draft permit were received from the public or the Environmental Protection Commission of Hillsborough County (EPCHC). Written comments were received from the applicant and from the EPA Region 4 Office.

### Applicant

On September 16, 2009 the Department received comments from the applicant. The following summarizes the comments and the Department's response.

1. EnviroFocus Comment 1: Section 3.B., Conditions 14 and 15. EnviroFocus requests that the combined carbon monoxide (CO) and sulfur dioxide (SO<sub>2</sub>) emission limits for the furnaces be expressed as 12-month rolling totals in terms of tons within the 12-month period rather than as 30-day pounds per hour (lb/hr) averages. In the event that the Department will not change the limits as 12-month rolling total tons, the applicant *"requests confirmation of its interpretation that the 30-day rolling average lb/hr emissions rate should be computed as the total pounds emitted in that 30-day period divided by 30x24 = 720 hours"*.

Department response: The Department will maintain the form of the limits for CO and SO<sub>2</sub> (the pollutants that did not trigger PSD) as proposed in the public-noticed draft permit.

Averaging in zero emissions for hours when the facility is down would be a substantial change from the public noticed permit limits and would present a different perception of the performance of the pollution control equipment.

2. EnviroFocus Comment 2: Section 3.C., Condition 14. With respect to SO<sub>2</sub> and NO<sub>x</sub> hygiene stack testing, EnviroFocus requests removal of the reference to development of a factor used to convert parts per million measurements to lb/hr.

Department response: The Department agrees because the continuous emissions monitoring systems (CEMS) include software and a flow meter that together make the appropriate conversion. The Department will revise the referenced condition as follows:

14. SO<sub>2</sub> and NO<sub>x</sub> Compliance Tests: The hygiene stack exhaust shall be tested to demonstrate initial compliance with the SO<sub>2</sub> and NO<sub>x</sub> standards no later than 180 days after the initial startup of this emissions unit in order to establish a conversion factor for the purpose of converting SO<sub>2</sub> and NO<sub>x</sub> GEMS monitoring data from ppm into units of lbs per hour as specified in Specific Condition Nos. 8 and 9. [Rule 62-4.070(3), F.A.C.]

### EPA Region 4 Office

On September 18, 2009 the Department received comments from the EPA Region 4 Office. The following summarizes the comments and the Department's response.

1. EPA Comment 1: *"In reviewing the draft permit and preliminary determination, Region 4 finds that the permitting authority has not provided an adequate rationale to support the use of the PM<sub>10</sub> surrogate approach for this project. The preliminary determination should contain an analysis as to whether or not PM<sub>10</sub> is a reasonable surrogate for PM<sub>2.5</sub> under the facts and circumstances of the specific project at issue and not proceed with the general presumption that PM<sub>10</sub> is always a reasonable surrogate for PM<sub>2.5</sub>."*

Department response: On September 16, 1997, EPA revised the national ambient air quality standards (AAQS) for particulate matter, which includes a new AAQS for PM<sub>2.5</sub>. Florida implemented an ambient monitoring program for PM<sub>2.5</sub>. As EPA mentioned in its guidance dated

October 23, 1997, there are significant technical difficulties with respect to  $PM_{2.5}$  monitoring, emissions estimation and modeling.

This guidance recommended the use of  $PM_{10}$  as a surrogate for  $PM_{2.5}$  in meeting new source review (NSR) requirements under the Clean Air Act, including the permit programs for PSD. Meeting these measures in the interim will serve as a surrogate approach for reducing  $PM_{2.5}$  emissions and protecting air quality. Florida is in the process of revising its State Implementation Plan to address the new  $PM_{2.5}$ , AAQS, PSD significant emissions rates and ambient air quality impact thresholds for modeling analyses as required by EPA for approved states by 2011. Until state regulations support PSD preconstruction review for  $PM_{2.5}$  emissions, limiting  $PM_{10}$  emissions and precursors of  $PM_{2.5}$  (e.g., sulfuric acid mist (SAM),  $SO_2$ , ammonia, and  $NO_x$ ) will be used as a surrogate as suggested by EPA's guidance memoranda.

For this project, there are no expected increases in actual emissions of  $SO_2$  or SAM, which are precursors of  $PM_{2.5}$ . Furthermore a BACT determination was conducted for  $NO_x$  which is a precursor of  $PM_{2.5}$ . Ammonia emissions will be minimal due to wastewater pretreatment requirements for scrubber water.

Finally, the complete enclosure of the facility and use of a negative air system coupled with cartridge filtration devices will directly minimize PM emissions as its purpose is to minimize emissions of lead (Pb) in order to comply with a recent ambient air quality standard that is 10 percent of the previous standard.

In conclusion, the Department does not expect the project to cause adverse impacts related to  $PM_{2.5}$  emissions.

## **CONCLUSION**

The final action of the Department is to issue the permit with the changes, corrections and clarifications as described above.

**SECTION 1. GENERAL INFORMATION**

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**FACILITY AND PROJECT DESCRIPTION**

The EFT facility recycles automotive and industrial lead-acid batteries, as well as other lead-acid bearing scrap materials to produce lead alloys. The process involves several key operations (or steps) including: receiving of batteries and recyclable materials; battery breaking and separation into lead, lead salts, plastic and acid electrolyte; storage and containment of recovered lead and lead waste; acid neutralization and wastewater treatment; lead smelting and refining; casting; and shipping.

The present operation includes a battery breaker, one blast furnace and four refining kettles. The key changes include the replacement of the battery breaker with a larger hammer mill, the addition of a reverberatory furnace, the enlargement of the four existing refining kettles and the addition of six new kettles to support a production increase from 32,000 to 150,000 TPY of lead. The entire recycling process will be totally enclosed, placed under negative pressure and exhausted via an expanded building ventilation system through a cartridge collector and stack. The entire facility upgrade and production increase project includes:

- Installation of a feed dryer;
- Replacement of the battery breaker with a larger hammer mill with a wet impingement scrubber to control particulate matter (PM/PM<sub>10</sub>/PM<sub>2.5</sub>, hence both referred to as PM) and lead (Pb) emissions;
- Replacement of the existing soda ash silo with a soda ash receiving silo and two soda ash process silos;
- Installation of a reverberatory (reverb) furnace;
- The addition of four 100-ton refining kettles and two 150-ton refining kettles while the four existing kettles will be converted from 75-ton to 100-ton capacities;
- Construction of a plastics plant, including four plastic pellet silos, to convert plastic from the battery casings into pellets;
- New baghouses with additional air flow capacity for the dryer, furnaces and refining kettles to control PM and Pb emissions;
- Replacement of the afterburner with a larger unit to control carbon monoxide (CO) and volatile organic compounds (VOC) from the blast and reverb furnaces;
- Installation of a wet scrubber to control sulfur dioxide (SO<sub>2</sub>) emissions from the furnaces;
- Complete enclosure of the process areas and its placement under negative pressure;
- Increasing the capacity of the existing high-efficiency cartridge collector to control PM and Pb emissions from the enclosed building (including those from process upsets and fugitive sources); and
- Control of emissions of nitrogen oxides (NO<sub>x</sub>) emissions from the dryer, furnaces and kettles at the upgraded facility through good combustion practices.

This project creates the following emissions units.

<b>JDNo.</b>	<b>New Emission Unit Description</b>
021	Battery breaking area including plastics plant
022	Feed dryer
023	Collocated reverb furnace
024	(4) plastic pellet silos
025	Propane vaporizer (1) and soda ash slurry heaters (2)
026	500 kilowatt (kW) emergency generator

SECTION 1. GENERAL INFORMATION

This project modifies or deletes the following emissions units.

IDNo	Existing Emission Unit Description
001	Collocated blast furnace
004	Tapping and charging (DELETED)
008	(1) Soda ash silo receiving silo and (2) soda ash processing silos (MODIFIED)
009	Facility grounds and roadways (MODIFIED)
011	Furnace tapping, charging and lead refining (process fugitive emissions).
013	Combustion exhaust consisting of 10 oxy/fuel burners and associated stacks fueled by natural gas and propane as a backup to heat the refining kettles.
015	Building ventilation (MODIFIED)

**FACILITY REGULATORY CLASSIFICATION**

- The EFT facility is subject to 40 Code of Federal Regulations (CFR), Part 60-Standards of Performance for New Stationary Sources (NSPS). The facility and project are subject to 40 CFR 60, Subpart L- NSPS for Secondary Lead Smelters. A proposed emergency diesel engine is subject to 40 CFR 60, Subpart IIII - NSPS for Compression Ignition Internal Combustion Engines.
- The EFT facility is a "Major Stationary Source" as defined in Rule 62-210.200, Florida Administrative Code (F.A.C.). The project triggers the rules for the Prevention of Significant Deterioration (PSD) pursuant to Rule 62-212.400, F.A.C. and requires a best available control technology (BACT) determination.
- The EFT facility is a Title V or "Major Source" of air pollution as defined in Rule 62-210.200, F.A.C. because the potential emissions of at least one regulated pollutant exceed 100 tons per year (TPY). Regulated pollutants include pollutants such CO, NOx, PM, SO<sub>2</sub>, VOC and sulfuric acid mist (SAM).
- The EFT facility is also a "Major Source of Hazardous Air Pollutants (HAP)" because it has the potential to emit, in the aggregate, 10 TPY of any one HAP, 25 TPY of any combination of HAPs, or any lesser quantity of a HAP as established through EPA rulemaking.
- The EFT facility is subject to 40 Code of Federal Regulations (CFR), Part 63-National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Categories. The facility is subject to 40 CFR 63, Subpart X - NESHAP for Secondary Lead Smelting. A proposed emergency diesel engine is subject to 40 CFR 63, Subpart ZZZZ-NESHAP for Stationary Reciprocating Internal Combustion Engines (RICE).

## SECTION 2. ADMINISTRATIVE REQUIREMENTS

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1. Permitting Authority: The permitting authority for this project is the Bureau of Air Regulation, Division of Air Resource Management, Florida Department of Environmental Protection (Department). The Bureau of Air Regulation's mailing address is 2600 Blair Stone Road (MS #5505), Tallahassee, Florida 32399-2400. All documents related to applications for permits to operate an emissions unit shall be submitted to the Title V Section of the same office.
2. Compliance Authority: All documents related to compliance activities such as permits, tests, and notifications shall be submitted to the Environmental Protective Commission of Hillsborough County (EPCHC), Air Management Division, 3629 Queen Palm Drive, Tampa, Florida 33619. The telephone number of the EPCHC is 813/627-2600.
3. Appendices: In addition to the permit conditions, the permittee shall comply with the applicable requirements listed in the following Appendices that are attached as part of this permit:
  - a. Appendix CC. Common Conditions;
  - b. Appendix CEMS. Continuous Emission Monitoring System (CEMS) Requirements;
  - c. Appendix CF. Citation Formats and Glossary of Common Terms;
  - d. Appendix CTR. Common Testing Requirements;
  - e. Appendix FDCC. Standard Operation Procedures for Fugitive Dust Control During Construction Activities;
  - f. Appendix FDCO. Standard Operation Procedures for Fugitive Dust Control During Operational Activities;
  - g. Appendix GC. General Conditions;
  - h. Appendix GP. NSPS, Subpart A and NESHAP Subpart A- Identification of General Provisions;
  - i. Appendix IIII. NSPS, Subpart IIII - Stationary Compression Ignition Internal Combustion Engines;
  - j.** Appendix L. NSPS, Subpart L - Secondary Lead Smelters;
  - k. Appendix ZZZZ. NESHAP, Subpart ZZZZ- Stationary Reciprocating Internal Combustion Engines (RICE); and,
    1. Appendix X. NESHAP, Subpart X- Secondary Lead Smelting.
4. Applicable Regulations, Forms and Application Procedures: Unless otherwise specified in this permit, the construction and operation of the subject emissions units shall be in accordance with the capacities and specifications stated in the application unless superseded by submittals by the applicant to requests for additional information (RAI) from the Department. The facility is subject to all applicable provisions of: Chapter 403, F.S.; and Chapters 62-4, 62-204, 62-210, 62-212, 62-213, 62-296 and 62-297, F.A.C. Issuance of this permit does not relieve the permittee from compliance with any applicable federal, state, or local permitting or regulations.
5. New or Additional Conditions: For good cause shown and after notice and an administrative hearing, if requested, the Department may require the permittee to conform to new or additional conditions. The Department finds, independently of this permit, good cause requiring the permittee to conform to new or additional conditions. Therefore, the permittee is required to upgrade the facility such that all battery building, material storage and handling, smelting, refining, and casting operations are conducted within totally enclosed building(s) by December 2011 whether or not the permittee installs any of the process equipment (such as a reverberatory furnace, a larger hammer mill or kettles) needed to increase lead production. The enclosed building(s) shall be maintained under negative pressure and vented through control devices designed to limit lead (Pb) emissions to less than:
  - (a) Battery building area stack- 0.8 mg/dry standard cubic meter (dscm);
  - (b) Smelting process stack- 0.3 mg/dscm;
  - (c) Tapping, charging and lead refining (hygiene) stack- 0.2 mg/dscm; and
  - (d) Building ventilation stack- 0.05 mg/dscm.

[Rules 62-4.070(3) and 62-4.080(1)(a), (b) and (c), F.A.C.; 40 CFR Part 50, Section 50.16]

## SECTION 2. ADMINISTRATIVE REQUIREMENTS

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6. Modifications: The permittee shall notify the Compliance Authority upon commencement of construction. No new emissions unit shall be constructed and no existing emissions unit shall be modified without obtaining an air construction permit from the Department. Such permit shall be obtained prior to beginning construction or modification.  
[Rules 62-210.300(1) and 62-212.300(1)(a), F.A.C.]
7. Construction and Expiration: The permit expiration date includes sufficient time to complete construction, perform required testing, submit test reports, and submit an application for a Title V operation permit to the Department. For good cause, the permittee may request that this air construction permit be extended. Such a request shall be submitted to the Department's Bureau of Air Regulation at least sixty (60) days prior to the expiration of this permit.  
[Rules 62-4.070(4), 62-4.080, and 62-210.300(1), F.A.C.]
8. Authorization to Construct: Authorization to construct shall expire if construction is not commenced within 18 months after receipt of the permit, if construction is discontinued for a period of 18 months or more, or if construction is not completed within a reasonable time. This provision does not apply to the time period between construction of the approved phases of a phased construction project except that each phase must commence construction within 18 months of the commencement date established by the Department in the permit. [Rule 62-212.400(12)(a), F.A.C.]
9. Source Obligation: At such time that a particular source or modification becomes a major stationary source or major modification (as these terms were defined at the time the source obtained the enforceable limitation) solely by virtue of a relaxation in any enforceable limitation which was established after August 7, 1980, on the capacity of the source or modification otherwise to emit a pollutant, such as a restriction on hours of operation, then the requirements of subsections 62-212.400(4) through (12), F.A.C., shall apply to the source or modification as though construction had not yet commenced on the source or modification. [Rule 62-212.400(12)(b), F.A.C.]
10. Application for Title V Permit: This permit authorizes construction and/or modification of the permitted emissions units and the initial operation of the upgrades for the EFT facility to determine compliance with Department rules. A Title V air operation permit is required for regular operation of the permitted emissions units. The permittee shall apply for a Title V air operation permit at least 90 days prior to expiration of this permit, but no later than 180 days after commencing operation. To apply for a Title V operation permit, the applicant shall submit the appropriate application form, compliance test results, and such additional information as the Department may by law require. The application shall be submitted to the appropriate Permitting Authority with copies to the Compliance Authority. [Rules 62-4.030, 62-4.050, 62-4.220 and Chapter 62-213, F.A.C.]
11. Objectionable Odors Prohibited: No person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor. [Rule 62-296.320(2), F.A.C.]  
*{Note: An objectionable odor is defined in Rule 62-210.200(Definitions), F.A.C., as any odor present in the outdoor atmosphere which by itself or in combination with other odors, is or may be harmful or injurious to human health or welfare, which unreasonably interferes with the comfortable use and enjoyment of life or property, or which creates a nuisance.}*
12. Annual Operating Report (AOR): The owner or operator shall submit an AOR for the Air Pollutant Emitting Facility (DEP Form No. 62-210.900(5)) to the Department annually pursuant to subsection 62-210.370(3), F.A.C.

SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

A. Battery Brealdng Area

This section of the permit addresses the following emissions unit.

IDNo.	Emission Unit Description
021	Battery breaking area including a maximum 60 tons per hom (TPH) hammer mill, separation equipment, plastics plant and wet impingement scrubber.

In the battery breaker area, spent batteries are conveyed to a hammer mill where they are crushed into primarily metallic lead, lead salts and plastics. After desulfurization, the lead salts are transferred to the material charging storage area along with the metallic lead. The majority of the plastic is shipped off-site for recycling or sent to the on-site plastic plant where it is reduced in size by a small wet hammer mill then melted and extruded into water to form plastic pellets. The plastic pellets are dried by a spin dtyer and transferred pneumatically to one of the four plastic pellet silos (EU ID 024).

Emissions from the hammer mill (primarily of PM (including SAM) and Pb) and the plastic plant (PM and VOC) are routed to a wet impingement scrubber and exhausted via a 130 foot stack

CONSTRUCTION

1. Equipment: The permittee is authorized to construct a lead-acid battery brealdng area including a plastics plant consisting of the following equipment.
  - a. Enclosure: The applicant shall fully enclose and ventilate the battety breaking area and plastics plant before using the new hammer mill (battety breaker) described below. PM, SO<sub>2</sub> and Pb emissions from the battery breaker and PM and VOC emissions from the plastics plant shall be controlled by the wet impingement scrubber. Fugitive emissions from the battery breaker and plastics plant will also vent to the wet impingement scrubber.  
[Application No. 0570057-020-AC and Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
  - b. Battery Breaking Area Stack: The permittee is authorized to construct a battery breaker stack that is at least 130 feet.  
[Application No. 0570057-020-AC and Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
  - c. Hammer mill (Battety Breaker): The applicant is authorized to replace the hammer mill with a larger tmit. [Application No. 0570057-020-AC]
  - d. Wet Hammer Mill (Plastics Plant): The pennittee is authorized to construct a wet hammer mill to reduce the size of the feedstock plastic chips from the battery breaker.  
[Application No. 0570057-020-AC]
  - e. Extruder (Plastics Plant): The permittee is authorized to construct one extruder to melt and extrude the processed plastic chips to form plastic pellets. [Application No. 0570057-020-AC]
  - f. Spin Dt:yer (Plastics Plant): The permittee is authorized to construct a spin dtyer to dry the plastic pellets. [Application No. 0570057-020-AC]
  - g. Wet impingement scrubber: The applicant is required to install a wet impingement scrubber to control emissions from the new battety breaking area and the plastics plant and must be operational before use of the new hammer mills.  
[Application No. 0570057-020-AC; and Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
2. Circumvention: The permittee shall not circumvent the air pollution control equipment or allow the emission of air pollutants without this equipment operating properly. [Rule 62-210.650, F.A.C.]

SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

A. Battery Brealdng Area

606/6  
43800  
504/1

PERFORMANCE RESTRICTIONS

- 3. Battery Breaker Capacity: The battery breaker shall be limited to **6H** of spent lead-acid batteries with a maximum rate many consecutive twelve month period of **138,000** (average of 50 TPH). [Application No. 0570057-020-AC and Rule 62-210.200(PTE), F.A.C.]
- 4. Plastic Plant Capacity: The maximum capacity of the plastic plant is 3,500 pounds per hour (lbs/hr) of plastic chips with a maximum rate in any consecutive twelve month period of 24,000,000 pounds (lbs). [Application No. 0570057-020-AC]
- 5. Hours of Operation: The hours of operation of the battery breaker and plastics plant are not limited (8,760 hours per year). [Application No. 0570057-020-AC; and Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]

EMISSIONS STANDARDS

- 6. PM Emissions Standard (including SAM): PM emissions including SAM from the ...\$.cy-bn akiarea and plastics plant as measured at the battery brealdng area stack shall not exceed **0.0089 g/dscf** : ns-:W?r-dty standard cubic foot (gr/dscf) or 1.1lbs/hr as demonstrated by initial and annual compliance tests. [Application No. 0570057-020-AC; and Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
- 7. Pb Emission Standard: Pb emissions from the battery breaker stack shall not exceed 0.80 milligram per dry standard cubic meter (mg/dscm) or 0.077 lbs/hr as demonstrated by initial and annual compliance tests. [Application No. 0570057-020-AC; and Rules 62-4.070(3) and 62-2f6200(PTE), F.A.C.]
- 8. SO<sub>2</sub> Emission Standard: SO<sub>2</sub> emissions from the battery breaker stack shall not exceed 5.0 mg/dscm or 0.48lbs/hr as demonstrated by an initial test. [Application No. 0570057-020-AC; and Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
- 9. VOC Emissions Standard: VOC emissions from the battery breaker stack shall not exceed 0.28 lbs/hr as demonstrated by initial test. [Application No. 0570057-020-AC; and Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
- 10. Visible Emission (VE) Standard: VE from the battery breaker area shall not exceed 3% opacity as demonstrated by initial and annual compliance tests on the battmy brealdng area stack. [Application No. 0570057-020-AC; Rules 62-296.603 and 62-296.712, F.A.C.; and 40 CFR 60.122(a)(2)]

0.0089 g/dscf  
1.1 lbs/hr  
0.80 mg/dscm  
0.077 lbs/hr  
5.0 mg/dscm  
0.48 lbs/hr

TESTING AND MONITORING REQUIREMENTS

- 11. PM, Pb, SO<sub>2</sub>, and VOC Compliance Tests: The battery breaker stack shall be tested to demonstrate initial compliance with the PM, Pb, SO<sub>2</sub> and VOC standards no later than 180 days after initial operation of the hammer mill (battery breaker). During each federal fiscal year (October 1st to September 30th), the battery breaker stack shall be tested to demonstrate compliance with the PM and Pb standards. [Application No. 0570057-020-AC; and Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
- 12. VE Compliance Tests: The battmy breaker stack shall be tested to demonstrate initial compliance with the VE standards no later than 180 days after initial operation of the EFT facility and during each federal fiscal year (October 1st to September 30th) thereafter. [Rule 62-4.070(3), F.A.C.]
- 13. Test Requirements: The permittee shall notify the EPCHC (Compliance Authority) in writing at least 5 days prior to any required tests. Tests shall be conducted in accordance with the applicable requirements specified in Appendix CTR (Common Testing Requirements) of this pennit. [Rule 62-297.310(7)(a)9, F.A.C.]



### SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

#### B. Lead Smelting

This section of the permit addresses the following emissions units.

IDNo.	Emission Unit Description
001	Collocated blast furnace
022	Feed dryer
023	Collocated reverb furnace

The metallic lead and desulfurized lead salts from the battery breaker area are conveyed to the Qmed J dryer to remove most of the moisture prior to being into the reverb furnace. The feed dryer is fueled by 10 mmBtu per hour (mmBtu/hr) natural gas burners (with propane as a backup fuel). PM and Pb emissions from the feed dryer are controlled by a shaker type baghouse with a design flow rate of 18,000 acfm at approximately 200 degrees Fahrenheit (°F) before being ducted to the process stack.

The reverb furnace is heated using primarily natural gas or propane as a backup fuel. Molten soft lead from the reverb furnace will be conveyed through channels called launders directly to the refining kettles. The reverb furnace is fired by 23 mmBtu/hr burners. Slag from the reverb furnace and other lead bearing scrap materials will be fed to a blast furnace that produces hard lead. Metallurgical coke will be combined with slag to help supply fuel for the blast furnace smelting process.

Exhaust gases from both furnaces will be ducted to a new afterburner, followed by a shaker type baghouse and a wet scrubber before being combined with the exhaust gases from the feed dryer for final discharge through the new 130 foot process stack.

#### CONSTRUCTION

1. **Equipment:** The permittee is authorized to construct a feed dryer and a collocated reverb furnace and modify the existing collocated blast furnace consisting of the following equipment.
  - a. **Enclosure:** The applicant shall fully enclose and ventilate the feed dryer and the collocated blast and reverb furnaces before operation of these emission units can commence. Emissions from the dryer are controlled by a baghouse while emissions from the furnaces will be controlled by an afterburner, baghouse and wet scrubber. Fugitive emissions of PM and Pb from the dryer and furnaces due to process upsets and other sources within the enclosed facility will be vented to the Torit filter of the enclosed facility's ventilation system (EU ID 015). [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
  - b. **Process Stack:** The permittee is authorized to construct a process stack that is 19 feet above grade, has an exit diameter of 86 inches, with an exhaust flow rate of approximately 86,000 cfm at an average temperature of 500°F. [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
  - c. **Feed Dryer:** The permittee is authorized to construct a feed dryer capable of drying a maximum of 40 TPH of lead feed material with a maximum capacity of 338,400 tons in any consecutive twelve month period utilizing 10 mmBtu/hr burners fired by natural gas with propane as a backup fuel. [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
  - d. **Feed Dryer Baggouse:** One shaker type baghouse shall be designed, installed and maintained to remove PM and Pb from the dryer exhaust. The baghouse shall be installed and operational before the dryer becomes operational. The baghouse shall have a design flow rate of 18,000 acfm and operate at a temperature of approximately 200 °F. [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]

SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

B. Lead Smelting

Handwritten notes: 7.5 TPH, 65,700, 40 TPH, 262,800

- e. Collocated Blast Furnace: The permittee is authorized to modify the existing blast furnace capable of processing a maximum of 7.5 TPH of lead feed material with a maximum capacity of 65,700 tons in any consecutive twelve month period utilizing metallurgical coke mixed with the lead-bearing feed as fuel. [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
f. Collocated Reverb Furnace: The permittee is authorized to construct a reverb furnace capable of processing a maximum of 40 TPH of lead-bearing feed material with a maximum capacity of 262,800 tons per any consecutive twelve month period utilizing burners fired by natural gas with propane as a backup fuel. [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
g. Furnace Afterburner, Baghouse, and Scrubber: One afterburner, shaker type baghouse and wet scrubber shall be designed, installed and maintained to control CO, VOC, PM, Ph and SO2 emissions from the blast and reverb furnaces. The afterburner, baghouse and wet scrubber must be operational before the furnaces commence operations. The afterburner, baghouse and scrubber shall vent to the 130 foot process stack. The afterburner and baghouse shall have a design flow rate of 54,000 acfm at approximately 350° F. The scrubber shall have a design flow rate of 42,800 acfm at approximately 125° F with a gas usage rate of approximately 1.5 million gallons per year (GPH). [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
2. Circumvention: The permittee shall not circumvent the air pollution control equipment or allow the emission of air pollutants without this equipment operating properly. [Rule 62-210.650, F.A.C.]

PERFORMANCE RESTRICTIONS

- 3. Blast and Reverb Furnace Capacities: The maximum charge rate of the reverb furnace is 40 TPH with a maximum capacity of 262,800 tons in any twelve month consecutive period. The maximum charge rate of the blast furnace is 7.5 TPH with a maximum capacity of 65,700 tons in any twelve month consecutive period. [Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]
4. Reverb Furnace Burner Capacity: The maximum heat input rating of the reverb furnace burner is 120 million Btu per hour. [Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]
5. Feed Dryer Capacity: The maximum charge rate of the dryer is 40 TPH with a maximum capacity of 338,400 tons in any twelve month consecutive period. [Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]
6. Feed Dryer Burner Capacity: The maximum heat input rating of the dryer burner is 10 million Btu per hour. [Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]
7. Hours of Operation: The hours of operation of the dryer and blast and reverb furnaces are not limited (8,760 hours per year). [Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]
8. Reverb Furnace Fuel: Natural gas is the primary fuel for the reverb furnace burners. Propane may be used as a backup fuel. A combination of the fuels shall not exceed a total heat input of 201,480 million Btu to the reverb furnace burners during any consecutive twelve month period. [Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]
9. Feed Dryer Fuel: Natural gas is the primary fuel for the feed dryer burner. Propane may be used as a backup fuel. A combination of the fuels shall not exceed a total heat input of 87,600 million Btu to the dryer burner during any consecutive twelve month period. [Application No. 0570057-020-AC and Rule 62-210.200(PTE), F.A.C.]

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SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

B. Lead Smelting

- 10. Lead Production: The maximum lead produced from the EFT facility shall not exceed 50,000 tons any consecutive twelve month period.  
[Application No. 0570057-020-AC and Rule 62-210.200(PTE), F.A.C.]

EMISSIONS STANDARDS

- 11. PM Emission Standard: PM emissions from the dryer, blast furnace and reverb furnace shall not exceed 0.005 gr/dscfas demonstrated by initial and ammal compliance tests on the process stack.  
[Application No. 0570057-020-AC; Rules 62-4.070(3), 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]

- 12. Pb Emission Standard: Pb emissions from the dryer and blast furnace and reverb furnace shall not exceed 0.3 mg/dscm as demonstrated by initial and annual compliance tests on the process stack. O/ (1  
[Application No. 0570057-020-AC; Rules 62-4.070(3), 62-210.200(PTE), and 62-212.400(10)(c), F.A.C. and 40 CFR 63.543(a)]

- 13. NOx Emission Standard: NOx emissions from the feed dryer shall not exceed 0.21 ppuntls .LtQl:l (lbtton) \ 1  
of material charged and 2.1 pounds per hour (!!>Lbx). \S demonstrated by a combinedq9.1\_lb/4i 1 0-day il:  
rolling CEMS average o!lthepe-ocess-ifta --:NOx emissions from the blast furnac( na-reveiofurnace shall  
not exceed 0.4lb/ton and 0.6lb/ton ofmatenal charged as demonstrated by a comHmed 29,;1,13/hr 30-day  
rolling CEMS average on the process stack. \> :;:;"  
[Application No. 0570057-020-AC; Rules 62-4.070(3), 62-210.200(PTE), and 62-212.4C10(10)(c), F.A.C.]

- 14. CO Emission Standard: CO emissions from the feed dtyer and blast furnace and reverb furnace shall not exceed 204.7lb/hr as demonstrated by a combined 30-day rolling CEMS average on the process stack. 1  
[Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]

- 15. SO2 Emission Standard: SO2 emissions from the feed dryer and blast furnace and reverb furnace shall not exceed 194.3 lb/hr as demonstrated by a combined 30-day rolling CEMS average on the process stack.  
[AppliCafiOil:No:0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]

- 16. VOC Emission Standard: The blast furnace shall not discharge VOC in excess of360 ppm by volume, expressed as propane conected to 4 percent carbon dioxide (CO2), to the atmosphere when the reverb furnace is not operating as demonstrated by initial and annual compliance tests on the process stack. When the blast furnace and reverb furnace are both operating, the collocated blast and reverb furnace shall not discharge VOC in excess of20 ppm by volume, expressed as propane conected to 4 percent CO 2, to the atmosphere as demonstrated by initial imd ammal compliance tests on the process stack.  
[Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE) F.A.C.; and 40 CFR 63.543(c)]

- 17. VE Standard: VE from the dryer, blast and reverb furnaces shall not exceed 3% opacity as demonstrated by initial and annual compliance tests on the process stack.  
[Application No. 0570057-020-AC; Rules 62-296.603 and 62-296.712, F.A.C.; and 40 CFR 60.122(a)(2)]

TESTING AND MONITORING REQUIREMENTS

- 18. PM, Pb and VOC Compliance Tests: The feed dryer and blast and reverb furnace process stack exhaust i , , }  
shall be tested to demonstrate initial compliance with theYM,-P]), .and Y\_OC standards no later than180 , ,  
days after initial stmtup ofthese emissions units and during each federal :fis-c-al year (October 1st to  
September 30th) thereafter. [Rule 62-4.070(3), F.A.C.]

- 19. SO2, NOx and CO Compliance Tests: The feed dryer, and blast and reverb furnace process stack exhaust shall be tested to demonstrate initial compliance with the SO2, NOx and CO standards no later than 180 days after initial startup of these emission units. The SO2, NOx and CO CEMS monitors shall install, calibrate, cetiify, operate and maintain in accordance with the CEMS requirements specified in Appendix CEMS of this permit. [Rule 62-4.070(3), F.A.C.]

**SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS**

**B. Lead Smelting**

- 20. **VE Compliance Tests:** The feed dryer and blast and reverb furnace process stack exhaust shall be tested to demonstrate initial compliance with the VE standards no later than 180 days after initial startup of these emissions units and during each federal fiscal year (October 1st to September 30th) thereafter. [Rule 62-4.070(3), F.A.C.]
- 21. **Test Requirements:** The permittee shall notify the EPCHC in writing at least 15 days prior to any required tests. Tests shall be conducted in accordance with the applicable requirements specified in Appendix CTR (Common Testing Requirements) of this permit. [Rule 62-297.310(7)(a)9, F.A.C.]
- 22. **Test Methods:** Any required stack tests shall be performed in accordance with the following methods:

<b>Method</b>	<b>Description of Method and Comments</b>
EPA 5/29	Determination of Particulate Emissions. The minimum sample volume shall be 30 dry standard cubic feet.
EPA 6, 6C	Determination of Sulfur Dioxide Emissions from Stationary Sources
EPA 7, 7A, 7B, 7C, 7D or 7E	Determination of Nitrogen Oxide Emissions from Stationary Sources
EPA 9	Determination of Visible Emissions. Each EPA Method 9 test shall be thirty (30) minutes in duration pursuant to Rule 62-297.310, F.A.C. and concurrent with one of the EPA Method 12 runs.
EPA 10	Determination of Carbon Monoxide Emissions from Stationary Sources.
EPA 12/29	Determination of Lead Emissions.
EPA 25A	Determination of Total Gaseous Organic Concentration using a flame ionization analyzer.

- 23. **Required CEMS:** The permittee shall install, calibrate, certify, operate and maintain CEMS on the process stack (blast furnace, reverb furnace and feed dryer emissions) to demonstrate compliance with the SO<sub>2</sub>, NO<sub>x</sub> and CO emissions standards in this section. The permittee shall comply with the CEMS requirements specified in Appendix CEMS of this permit. [Rule 62-4.070(3), F.A.C.]
- 24. **Monitoring Afterburner:** The permittee shall monitor and record the temperature of the afterburner at least every 15 minutes during the annual VOC compliance demonstration. The permittee shall determine an arithmetic average of the recorded temperature measurements. If the 3-hour average temperature is 50 °F below the 3-hour average temperature during the previous annual VOC compliance demonstration, it shall constitute a violation of the applicable emission standard for VOC listed in this permit. [40 CFR 63.5480(1)]
- 25. **Pressure Drop:** The permittee shall install, maintain, and calibrate a device which continuously measures and records the pressure drop across each baghouse compartment controlling the dryer (dryer baghouse) and blast and reverb furnaces (process baghouse). [Rule 62-4.070(3), F.A.C. and 40 CFR 63.548(c)(1)]
- 26. **Bag Leak Detection:** The permittee shall maintain continuous operation of bag leak detection systems on the dryer baghouse as well as the blast and reverb furnace baghouse in accordance with 40 CFR 63.548. [Rule 62-4.070(3), F.A.C. and 40 CFR 63.548]

**RECORDS AND REPORTS**

- 27. **Notification, Recordkeeping and Reporting Requirements:** The permittee shall determine the amount of natural gas and steam in the dryer and the blast and reverb furnaces on a monthly basis and shall comply with the notification, recordkeeping and reporting requirements pursuant to 40 CFR 63.550. These records shall be submitted to the EPCHC on an annual basis or upon request. [Rule 62-4.070(3), F.A.C. and 40 CFR 60]

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### SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

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#### B. Lead Smelting

28. Test Reports: The permittee shall prepare and submit reports for all required tests in accordance with the requirements specified in Appendix CTR (Common Testing Requirements) of this permit. For each test run, the report shall also indicate the operating rate. [Rule 62-297.310(8), F.A.C.]

#### NSPS AND NESHAP APPLICABILITY

- cf29. NSPS Subpart L Applicability: The furnaces are subject to and shall comply with all applicable requirements of 40 CFR 60 Subpart L which applies to Secondary Lead Smelters emissions of PM. Subpart L is provided in Appendix L of this permit. [Rule 62-204.800(11)(b) and 40 CFR 60, -Subpart L-New Source Performance Standards (NSPS) for Secondary Lead Smelting].
30. NESHAP Subpart X Applicability: The feed dryer and blast and reverberatory furnaces are subject to and shall comply with all applicable requirements of 40 CFR 63, Subpart X which applies to Secondary Lead Smelting. Specifically, the feed dryer and furnaces shall comply with 40 CFR (53.550 Reporting and Recordkeeping Requirements. Subpart X is provided in Appendix X of this permit. [Rule 62-204.800(11)(b) and 40 CFR 63, -Subpart X-National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Secondary Lead Smelting].

SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

C. Furnace Tapping, Charging and Lead Refining

This section of the permit addresses the following emissions unit.

ID No.	Emission Unit Description
011	Furnace tapping, charging and lead refining (process fugitive emissions).

Furnace tapping, charging and lead refining generate emissions that are termed as process fugitive emissions in the lead recycling process. This emissions unit includes the operations related to charging and tapping the collocated reverb and blast furnaces as well as the direct exhaust from the 10 refining kettles that receive and process lead from the furnaces. The emissions are captured by hooding, routed to 72,000 acfm process fugitive emissions (hygiene) baghouse and exhausted via a 130 foot hygiene stack.

The refining kettles are indirectly heated by natural gas burners (EU ID 013) described in Subsection D. Alloying and fluxing agents such as sulfur and niter (sodium nitrate) are mixed in to produce lead alloys that meet predetermined specifications. The pollutant emissions consist of PM, Pb, NOx, VOC, SO2 and trace metal HAP. The PM and metals HAP, including Pb, are controlled by the hygiene baghouse.

CONSTRUCTION

1. Equipment: The permittee is authorized to modify and construct a refining area capable of processing approximately 20 TPH of hard and soft lead and consisting of the following equipment.

a. Enclosure: The permittee shall include the operations related to charging and tapping the collocated reverb and blast furnaces as well as the direct exhaust from the 10 refining kettles that receive and process lead from the furnaces, hence forth called process fugitive emissions, within a fully enclosed and ventilated facility. Process fugitive emissions of PM and Pb are controlled by a baghouse. Fugitive emissions of PM and Pb due to process upsets and from other fugitive sources within the enclosed facility will be vented to the Torit filter of the enclosed facility ventilation system (EU ID 015). [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]

b. Hygiene Stack: The permittee is authorized to construct a hygiene stack that is 130 feet tall has a diameter of 60 inches with an exhaust flow rate of approximately 72,000 acfm at an average temperature of 150 °F. [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]

c. 100-Ton Refining Kettles: The permittee is authorized to modify the four existing kettles to capacities of 100-tons each and to construct four new 100-ton refining kettles. [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]

d. 150-Ton Refining Kettles: The permittee is authorized to construct two new 150-ton refining kettles. [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]

e. Hygiene Baghouse: One shaker-type baghouse shall be designed, installed and maintained to remove PM and Pb from the process fugitive emissions. The baghouse shall have a flow rate of approximately 72,000 acfm and operate an average temperature of 150 °F. The hygiene baghouse must be installed and operational before this emissions unit commences operations. [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]

f. Enclosure Hoods: The permittee is authorized to construct and/or modify the enclosure hoods for the furnaces and refining kettles (modified and new) including tapping and charging in accordance with 40 CFR 63.544 of Subpart X which applies to standards for process fugitive sources from Secondary Lead Smelting. [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]

2. Circumvention: The permittee shall not circumvent the air pollution control equipment or allow the emission of air pollutants without this equipment operating properly. [Rule 62-210.650, F.A.C.]

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C. Furnace Tapping, Charging and Lead Refining

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PERFORMANCE RESTRICTIONS

3. Refining Kettle Production: The maximum production rate of the ten refining kettles [Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c) F.A.C.]
4. Hours of Operation: The hours of operation of the refining kettles are not limited (8,760 hours per year). [Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]
5. Lead Production: The maximum lead produced from the EFT facility shall not exceed 150,000 tons in any consecutive twelve month period. [Application No. 0570057-020-AC and Rule 62-210.200(PTE), F.A.C.]

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EMISSIONS STANDARDS

6. PM Emissions Standard: PM emissions from the hygiene stack shall not exceed 0.005 gr/dscf or 2.68 lbs/hr as demonstrated by initial and annual compliance tests. [Application No. 0570057-020-AC; Rules 62-4.070(3), 62-210.200(PTE), and 62-212.400(10)(c), F.A.C.]
7. Pb Emissions Standard: Pb emissions from the hygiene stack shall not exceed 0.2 mg/dscm or 0.051lbs/hr as demonstrated by initial and annual compliance tests. [Application No. 0570057-020-AC; Rules 62-4.070(3), 62-210.200(PTE), and 62-212.400(10)(c), F.A.C. and 40 CPR 63.543(a)]
8. NOx Emissions Standard: NOx emissions shall not exceed 14.33lbs/hr as demonstrated by a 30-day rolling CEMS average on the hygiene stack. [Application No. 0570057-020-AC; Rules 62-4.070(3), 62-210.200(PTE), and 62-212.400(10)(c), F.A.C.]
9. SO<sub>2</sub> Emissions Standard: SO<sub>2</sub> emissions shall not exceed 7.94lbs/lu as demonstrated by 30-day rolling **CEMS average on the hygiene stack.** [Application No. 0570057-020-AC; Rules 62-4.070(3), 62-210.200(PTE), and 62-212.400(10)(c), F.A.C.]
10. VOC Emissions Standard: VOC emissions from the hygiene stack shall not exceed 20 parts per million or 8.95 lbs/hr as demonstrated by initial test on the hygiene stack. [Application No. 0570057-020-AC; Rules 62-4.070(3), 62-210.200(PTE), and 62-212.400(10)(c), F.A.C.]
11. VB Standard: VB from the hygiene stack shall not exceed 3% opacity as demonstrated by initial and annual compliance tests. [Application No. 0570057-020-AC; Rules 62-296.603 and 62-296.712, F.A.C.; and 40 CPR 60.122(a)(2)]

TESTING AND MONITORING REQUIREMENTS

12. PM, Pb and VOC Compliance Tests: The hygiene stack exhaust shall be tested to demonstrate initial compliance with the PM, Pb and VOC standards no later than 180 days after initial startup of this emissions unit. PM and Pb testing will also take place during each federal fiscal year (October 1st to September 30th) thereafter. [Rule 62-4.070(3), F.A.C.]
13. VB Compliance Tests: The hygiene stack exhaust shall be tested to demonstrate initial compliance with the VB standards no later than 180 days after initial startup of this emissions unit and during each federal fiscal year (October 1st to September 30th) thereafter. [Rule 62-4.070(3), F.A.C.]
14. SO<sub>2</sub> and NOx Compliance Tests: The hygiene stack exhaust shall be tested to demonstrate initial compliance with the SO<sub>2</sub> and NOx standards no later than 180 days after the initial startup of this emissions unit. [Rule 62-4.070(3), F.A.C.]

**SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS**

**C. Furnace Tapping, Charging and Lead Refining**

15. **Test Requirements:** The permittee shall notify the EPCHC in writing at least 15 days prior to any required tests. Tests shall be conducted in accordance with the applicable requirements specified in Appendix CTR (Common Testing Requirements) of this permit. [Rule 62-297.310(7)(a)9, F.A.C.]

16. **Test Methods:** Any required stack tests shall be performed in accordance with the following methods:

Method	Description of Method and Comments
EPA 5/29	Determination of Particulate Emissions. The minimum sample volume shall be 30 dry standard cubic feet.
EPA6, 6C	Determination of Sulfur Dioxide Emissions from Stationary Sources
EPA 7, 7A, 7B, 7C, 7D or 7E	Determination of Nitrogen Oxide Emissions from Stationary Sources
EPA9	Determination of Visible Emissions. Each EPA Method 9 test shall be thirty (30) minutes in duration pursuant to Rule 62-297.310, F.A.C. and concurrent with one of the EPA Method 12 tests.
EPA 12/29	Determination of Lead Emissions.
EPA25A	Determination of Total Gaseous Organic Concentration using a flame ionization analyzer.

17. **Required CEMS:** The permittee shall install, calibrate, certify, operate and maintain CEMS on the hygiene stack to demonstrate compliance with the SO<sub>2</sub> and NO<sub>x</sub> emissions standards in this section. The permittee shall comply with the CEMS requirements specified in Appendix CEMS of this permit. [Rule 62-4.070(3), F.A.C.]

18. **Pressure Drop:** The permittee shall maintain and calibrate a device which continuously measures and records the pressure drop across each hygiene baghouse compartment controlling process fugitive emissions. [Rule 62-4.070(3), F.A.C. and 40 CFR 63.548(c)(1)]

19. **Bag Leak Detection:** The permittee shall maintain continuous operation of bag leak detection systems on the hygiene baghouse in conjunction with 40 CFR 63.548. [Rule 62-4.070(3), F.A.C. and 40 CFR 63.548]

**RECORDS AND REPORTS**

20. **Notification, Recordkeeping and Reporting Requirements:** The permittee shall maintain records of the **am ter** used in the refining kettles on a monthly-basis and shall comply with the notification, recordkeeping and reporting requirements pursuant to 40 CFR 63.550. These records shall be submitted to the EPCHC on an annual basis or upon request. [Rule 62-4.070(3), F.A.C. and 40 CFR 60]

21. **Test Reports:** The permittee shall prepare and submit reports for all required tests in accordance with the requirements specified in Appendix CTR (Common Testing Requirements) of this permit. For each test run, the report shall also indicate the operating rate. [Rule 62-297.310(8), F.A.C.]

**NSPS AND NESHAP APPLICABILITY**

22. **NSPS Subpart L Applicability:** The furnaces are subject to and must comply with all applicable requirements of 40 CFR 60 Subpart L which applies to Secondary Lead Smelters emissions of PM. Subpart L is provided in Appendix L of this permit. [Rule 62-204.800(11)(b) and 40 CFR 60, -Subpart L- New Source Performance Standards (NSPS) for Secondary Lead Smelting].

23. **NESHAP Subpart X Applicability:** The process fugitive emissions are subject to all applicable requirements of 40 CFR 63, Subpart X which applies to Secondary Lead Smelting. Specifically, the feed dryer shall comply with 40 CFR 63.550 Reporting and Recordkeeping Requirements. Subpart X is provided in Appendix X of this permit. [Rule 62-204.800(11)(b) and 40 CFR 63, -Subpart X- National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Secondary Lead Smelting].

SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

D. Refining Kettles Exhaust

This section of the permit addresses the following emissions unit.

IDNo.	Emission Unit Description
013	Combustion exhaust consisting of 10 burners and associated stacks fueled by natural gas and propane as <b>kup</b> to heat the refining kettles.

Individual oxygen enhanced burners. Therefore, the stacks that exhaust these combustion products are **denilfiocrasa'Sepa on** unit from the process fugitive emissions (EU ID No. 011). The kettles' indirect combustion emissions are vented to the atmosphere through three separate stacks.

EQUIPMENT

1. Refining Kettle Burners: The permittee is authorized to construct ten oxygen enhanced burners fired by natural gas with propane as a backup fuel. The burners will exhaust combustion gases through three separate stacks. [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]

PERFORMANCE RESTRICTIONS

2. Heat Input Rate: The maximum combined heat to the 10 burners used to indirectly heat the refining kettles shall not exceed 40, mmBtu/In. [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]

3. Refining Kettle Burner Fuels: Natural gas is the primary fuel for the refining kettle combustion. Propane may be used as a backup fuel. In any consecutive two month period, the total heat input to the refining kettles shall not exceed 350,000,000 Btu. [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]

EMISSION STANDARDS

4. VB Standard: Visible emissions from the kettle combustion stacks shall not exceed 3% opacity as demonstrated by initial and annual compliance tests on the kettle exhaust stacks. [Application No. 0570057-020-AC; Rules 62-296.603 and 62-296.712, F.A.C.; and 40 CFR 60.122(a)(2)]

TESTING AND MONITORING REQUIREMENTS

5. VB Compliance Tests: The kettle exhaust gas stacks shall be tested to demonstrate initial compliance with the VB standards no later than 180 days after the startup of this emissions unit and during each federal fiscal year (October 1st to September 30th) thereafter. [Rule 62-4.070(3), F.A.C.]
6. Test Methods: Any required stack tests shall be performed in accordance with the following methods.

Method	Description of Method and Comments
EPA9	Determination of Visible Emissions. Each EPA Method 9 test shall be thirty (30) minutes in duration pursuant to Rule 62-297.310, F.A.C. and concurrent with one of the EPA Method 12 runs.

RECORDS AND REPORTS

7. Notification, Recordkeeping and Reporting Requirements: The permittee shall maintain records of the amount of natural gas and propane used in the kettle combustors on a monthly basis and shall comply with the notification, recordkeeping and reporting requirements pursuant to 40 CFR 63.550. These records shall be submitted to the EPCHC on an annual basis or upon request. [Rule 62-4.070(3), F.A.C. and 40 CFR 60]

### SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

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#### D. Refining Kettles Exhaust

8. Test Reports: The permittee shall prepare and submit reports for all required tests in accordance with the requirements specified in Appendix CTR (Common Testing Requirements) of this permit. For each test run, the report shall also indicate the operating rate. [Rule 62-297.310(8), F.A.C.]

#### **NESHAP APPLICABILITY**

9. NESHAP Subpart X Applicability: The process fugitive emissions are subject to and must comply with all applicable requirements of 40 CFR 63, Subpart X which applies to Secondary Lead Smelting. Specifically, the feed dryer shall comply with 40 CFR 63.550 Reporting and Recordkeeping Requirements. Subpart X is provided in Appendix X of this permit. IRule 62-204.800(11)(b) and 40 CFR 63, -Subpart X- National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Secondary Lead Smelting].

SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

E. Soda Ash Silos

This section of the permit addresses the following emissions unit.

IDNo.	Emission Unit Description
008	The soda silos consist of a small soda ash receiving silo for receiving soda ash by truck and two larger soda ash process silos.

The soda ash is received by the soda ash receiving silo and then distributed to the soda ash process silos. The soda ash is then transferred from the process silos to the desulfurization process and the sulfur dioxide scrubber used to control SO<sub>2</sub> emissions from the reverb and blast furnaces. Emissions from these silos consist of PM and will be controlled by bin vent filters (fabric filters) atop the silos that filter the air displaced from the silos as they are filled.

CONSTRUCTION

1. Equipment: The permittee is authorized to construct the following.
  - a. One soda ash receiving silo with a bin filter, with a stack height of 16 feet and a diameter of 16 inches and a flow rate of approximately 650 acfm.
  - b. Two soda ash process silos with bin filters, with stack heights of 70 feet, diameters of 16 inches and flow rates of approximately 650 acfm.

[Application No. 0570057-020-AC]

PERFORMANCE RESTRICTION

2. Maximum Fill-Rate: The maximum fill rate for the soda ash silos shall not exceed 50 TP.B with a maximum capacity of 25,000 tons per S\_Q CJJibleJ:w IY !!!\_Q.Jlth.P iQ!:(J

[Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTB), F.A.C.]

EMISSIONS STANDARDS

3. PM Emission Standard: PM emissions from each bin vent filters of the soda ash silos shall not exceed 0.005 gr/dscf. [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
4. VB Standard: VB from the soda ash silos bin filters shall not exceed 3% opacity as demonstrated by initial and annual compliance tests. A visible emission reading of 3% opacity or less may be used to establish compliance with the PM emission standard in Specific Condition 3. A visible emission reading greater than 3% opacity will require the permittee to perform a PM emissions stack test within 60 days to show compliance.

[Application No. 0570057-020-AC; Rules 62-296.603 and 62-296.712, F.A.C.; and 40 CFR 60.122(a)(2)]

TESTING AND MONITORING REQUIREMENTS

5. Initial Compliance Tests: Each unit shall be tested to demonstrate initial compliance with the VB emissions standards specified in Specific Condition 4. The initial test shall be conducted within 180 days after initial operation. [Rule 62-297.310(7)(a)l., F.A.C. and Rule 62-4.070(3), F.A.C.]
6. Annual Compliance Tests: During each federal fiscal year (October 1st to September 30th), each unit shall be tested to demonstrate compliance with the VB standard specified in Specific Condition 4. [Rule 62-297.310(7)(a)4, F.A.C. and Rule 62-4.070(3), F.A.C.]
7. PM Compliance Test: The initial and VB tests in Specific Conditions 5 and 6 shall serve as a surrogate for the PM tests. If the VB emissions standard in Specific Condition 4 is not met, PM tests utilizing BP e 6 must be conducted within 60 days on the silo bin vent filters to show compliance with the PM emissions standard in Specific Condition 3. [Rule 62-297.620(4), F.A.C.]

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SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

E. Soda Ash Silos

8. **Test Requirements:** The permittee shall notify the EPC of Hillsborough County in writing at least 15 days prior to any required tests. Tests shall be conducted in accordance with the applicable requirements specified in Appendix CTR (Common Testing Requirements) of this permit. [Rule 62-297.310(7)(a)9, F.A.C.]
9. **Test Methods:** Any required stack tests shall be performed in accordance with the following methods.

<b>Method</b>	<b>Description of Method and Comments</b>
EPA5	Determination of Particulate Emissions. The minimum sample volume shall be 30 dry_ standard cubic feet.
EPA9	Method 9- Visual Determination of the Opacity of Emissions from Stationary Sources.

**RECORDS AND REPORTS**

10. **Test Reports:** The permittee shall prepare and submit reports for all required tests in accordance with the requirements specified in Appendix CTR (Common Testing Requirements) of this permit. For each test run, the report shall also indicate the operating rate. [Rule 62-297.310(8), F.A.C.]

SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

F. Facility Grounds and Roadways

This section of the permit addresses the following emissions unit.

ID No.	Emission Unit Description
009	Facility grounds and roadways controlled by wet suppression, vacuum sweeping and wheel washing.

Vehicular traffic movement on plant roads and in parking areas will produce fugitive emissions of PM and Ph. These fugitive emissions from paved areas at the plant will be controlled by a variety of work practice standards, including vacuum sweeping and wet suppression. Also, as required by the Secondary Lead Maximum Achievable Control Technology (MACT), (40 CFR 63, Subpart X, see Appendix X) the building will have wheel wash stations to remove lead contamination from vehicles prior to exiting the building.

CONSTRUCTION ACTIVITIES

1. Standard Operating Procedures (SOP) During Construction Activities: In order to limit the potential to emit emissions of PM and Ph from the roadways and grounds during construction activities, the permittee must follow the SOP for Fugitive Dust Control During Construction Activities given in Appendix FDCA of this permit upon commencement of construction activities.  
[Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]

FACILITY OPERATION

2. SOP During Facility Operation: To show compliance with the emission limits of PM and Ph from the roadways and grounds of the upgraded facility during operation, the permittee must follow the SOP for Fugitive Dust Control During Operational Activities given in Appendix FDCO of this permit once construction activities are completed and the EFT facility becomes operational.  
[Application No. 0570057-020 AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]

*[Permitting Note: PM<sub>10</sub> and Pb from the roadways and grounds during operation of the facility after it is upgraded are estimated to be 0.084 and 0.023 tons in any consecutive twelve month period. [Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]]*

3. Revised Operational SOP: If the permittee desires, a revised SOP to control fugitive dust emissions during facility operation can be submitted no later than 60 days from when the EFT facility becomes operational. Once the Operational SOP is in effect, the permittee may submit additional revisions to improve its effectiveness to the EPCHC for approval.

AMBIENT MONITORING AND MODELING REQUIRED

Lead-Total Suspended Particles (Pb-TSP) Monitors: The owner or operator shall install and operate two ambient monitoring stations for Lead in TSP (Pb-TSP) at **offsite**. ~~See~~ **to be in accordance with** Department. The devices shall be installed and operational **with issuance** of this permit and shall operate at a sampling frequency to be determined by the ~~the~~ **Department** and/or the Ambient Monitoring Section (AMS) of the Department's Bureau of Air Monitoring and Mobile Sources (BAMMS). Access to the monitoring sites and instruments must be provided to the EPCHC, and/or the AMS of the Department's BAMMS. The monitoring devices shall be those designated as EPA reference or equivalent methods and must be operated in accordance with BAMMS-approved quality assurance policies and procedures.

5. Quality Assurance: Ambient monitoring activities required by this permit for Ph shall be conducted in such a manner so as to meet the Department's minimum quality assurance requirements as delineated in 40 CFR Parts 50 and 58.14; Part 58, Appendices A, C, D and E; and the Department's *State-Wide Quality Assurance Air Program Plan (Zan)*. Changes to the *Plan* will be distributed by BAMMS to the owner or operator. The owner or operator shall comply with *Plan* changes as soon as practicable, but no later than upon renewal of this permit.

*Zone shut off 120 days to remove monitors*

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SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

December 22, 2009

Notes

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6. Department and/or EPCHC for review and approval standard operating procedures for each monitor, ancillary piece of equipment, and calibration equipment

- 7. Monitoring Data: The owner or operator shall submit the verified monitoring data and quality assurance results to BAMMS and EPCHC within ninety (90) days after the end of each calendar quarter in an electronic medium and format: either Aerometric Information Retrieval System (AIRS) or other EPA acceptable electronic format for the monitoring data, and the Precision and Accuracy Data (PAData) or other EPA acceptable electronic format for the quality assurance data, as specified by the Department.
- 8. The owner or operator shall allow the Department and/or EPCHC auditors, with a minimum of seven (7) days prior notification, access to the monitoring locations for the purpose of the performance of accuracy audits which may be completed in lieu of, or in addition to, the owner or operator's quarterly accuracy audits as specified in 40 CFR, Part 58, Appendix A, 3.2 and 3.4. The owner or operator shall also submit to an annual systems audit as specified in 40 CFR Part 58, Appendix A, 2.5. The systems audit, which reviews the quality assurance and monitoring efforts for the preceding year, shall be conducted between February and June of the year following the year in which the audited data were produced. In addition, the Department and/or EPCHC staff shall be allowed access to the monitoring locations, with a minimum of seven (7) days prior notification, on an annual basis, for the purpose of determining compliance with the siting requirements as specified in 40 CFR Part 58, Appendix E.  
[Rule 62 212.400(7), F.A.C. and 62 4.070(3) Reasonable Assurance]

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LIMITATIONS ON FACILITY OPERATIONS

- 9. Sprinkler System: If the sprinkler system used for the wet suppression of PM and Pb fugitive emissions from the EFT facility's roadways and grounds malfunctions, a water truck or other means shall be used to maintain wet suppression of affected zones. Truck traffic shall be halted in any zones for which wet suppression cannot be maintained until the sprinkler system is repaired.  
[Rule 62 4.070, F.A.C. Reasonable Assurance and Rule 62 210.200(PTE).]
- 10. Truck Traffic: Truck traffic that is involved with the receiving of lead bearing materials, including lead acid batteries, at EFT facility and the shipping of lead alloy products from the EFT facility is only allowed between the hours of 6:00am to 10:00 pm seven days a week.  
[Rule 62 4.070, F.A.C. Reasonable Assurance and Rule 62 210.200(PTE).]

NESHAP APPLICABILITY

- 11. NESHAP Subpart X Applicability: The facility grounds and roadways at the EFT facility are subject to all applicable requirements of 40 CFR 63, Subpart X which applies to Secondary Lead Smelting. Specifically, the feed dryer shall comply with 40 CFR 63.550 Reporting and Recordkeeping Requirements. Subpart X is provided in Appendix X of this permit. [Rule 62 204.800(11)(b) and 40 CFR 63, Subpart X - National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Secondary Lead Smelting].

SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

G. Building Ventilation

This section of the permit addresses the following emissions unit.

ID No.	Emission Unit Description
015	Building ventilation of enclosed facility controlled by Torit filter.

EFT will enclose all process areas of the facility and ventilate the air exhausted from the facility through a large 195,000 acfm cartridge collector identified as the Torit filter. This air flow will produce an inward draft velocity at all openings in the building of 50 feet per minute (fpm) to prevent PM and Ph emissions from escaping uncontrolled. The filtered gases will be emitted from a new stack identified as the Torit stack.

CONSTRUCTION

1. **Equipment:** The permittee is required to construct in phases a fully enclosed and ventilated facility consisting of the following equipment.
  - a. **Enclosure:** The applicant shall construct a fully enclosed and ventilated facility that when completed will contain the feed dryer (EU ID 022), blast furnace (EU ID 001), reverberatory furnace (EU ID 023) and furnace tapping and charging and refining (EU ID 011). The full enclosure shall be completed before the entire EFT facility commences operations that utilize all the emissions units cited in the previous sentence. As specified in Subsections III-A, -B and -C of this permit, individual emissions units may commence operations once they have been individually enclosed. Fugitive emissions consisting of PM and Ph within the enclosed facility are controlled by a Torit filter.  
[Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
  - b. **Torit Stack:** The permittee is authorized to construct a Torit stack that is 130 feet tall and has a diameter of 96 inches with a design exhaust flow rate of 195,000 acfm at ambient temperature.  
[Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
2. **Circumvention:** The permittee shall not circumvent the air pollution control equipment or allow the emission of air pollutants without this equipment operating properly. [Rule 62-210.650, F.A.C.]

PERFORMANCE RESTRICTIONS

3. **Hours of Operation:** The hours of operation of the enclosed facility are not limited (8,760 hours per year).  
[Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]
4. **Malfunction:** If the Torit filter malfunctions causing the complete loss of negative pressure inside the enclosure, lead production at the EFT facility must stop until the malfunction can be corrected. The permittee must notify the EPC of Hillsborough County within 12 hours of a malfunction occurring.  
[Rule 62-210.200(PTE), F.A.C.]
5. **Production:** Upon completion of the total enclosure, the maximum lead produced from the enclosed facility shall not exceed 150,000 tons any consecutive twelve month period. [Application No. 0570057-020-AC and Rule 62-210.200(PTE), F.A.C.]

EMISSIONS STANDARDS

6. **PM Emissions Standard:** PM emissions from the Torit stack shall not exceed 0.005 gr/dscf or 36.60 lbs/hr as demonstrated by initial and annual compliance tests.  
[Application No. 0570057-020-AC; Rules 62-4.070(3), 62-210.200(PTE), and 62-212.400(10)(c), F.A.C.]
7. **Ph Emissions Standard:** Ph emissions from the Torit stack shall not exceed 0.05 mg/dscm or 0.160 lbs/hr as demonstrated by initial and annual compliance tests.  
[Application No. 0570057-020-AC; Rules 62-4.070(3), 62-210.200(PTE), and 62-212.400(10)(c), F.A.C. and 40 CFR 63.543(a)]

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SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

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G. Building Ventilation

8. VE Standard: Visible emissions from the Torit stack shall not exceed 3% opacity as demonstrated by initial and annual compliance tests.  
[Application No. 0570057-020-AC; Rules 62-296.603 and 62-296.712, F.A.C.; and 40 CFR 60.122(a)(2)]

**TESTING AND MONITORING REQUIREMENTS**

9. PM and Pb Compliance Tests: The Torit stack exhaust shall be tested to demonstrate initial compliance with the PM and Pb standards no later than 180 days after initial operation of the total enclosure and during each federal fiscal year (October 1st to September 30th) thereafter. [Rule 62-4.070(3), F.A.C.]
10. VE Compliance Tests: The Torit stack exhaust shall be tested to demonstrate initial compliance with the VE standards no later than 180 days after initial operation and during each federal fiscal year (October 1st to September 30th) thereafter. [Rule 62-4.070(3), F.A.C.]
11. Test Requirements: The permittee shall notify the EPC of Hillsborough County in writing at least 15 days prior to any required tests. Tests shall be conducted in accordance with the applicable requirements specified in Appendix CTR (Common Testing Requirements) of this permit.  
[Rule 62-297.310(7)(a)9, F.A.C.]
12. Opening In-Draft Velocity Requirement: The in-draft velocity at all openings of the enclosed facility shall be at a minimum of 50 fpm. [Application No. 0570057-020-AC]
- a. Opening In-Draft Monitoring: Compliance with the doorway in-draft requirement of Specific Condition No. 12 shall be determined using either of the following two procedures:
- (i) The permittee shall use a propeller anemometer or equivalent device meeting the requirements of 40 CFR 63.547(d)(2)(ii) through (d)(2)(iv).
  - (ii) Doorway in-draft shall be determined by placing the anemometer in the plane of the doorway opening near its center.
  - (iii) Doorway in-draft shall be demonstrated for each doorway that is open during normal operation, excluding the passageway between the enclosure and containment room, with all remaining doorways in the position they are in during normal operation.
- b.
- (i) The permittee shall install a differential pressure gauge on the leeward wall of the building to measure the pressure difference between the inside and outside of the building.
  - (ii) The pressure gauge shall be certified by the manufacturer to be capable of measuring pressure differential in the range of 0.02 to 0.2 mm mercury (Hg.)
  - (iii) Both the inside and outside taps shall be shielded to reduce the effects of wind.
  - (iv) The permittee shall demonstrate the inside of the building is maintained at a negative pressure as compared to the outside of the building of no less than 0.02 mm Hg when all doors are in the position they are in during normal operation.
- [Rule 62-4.070(3), F.A.C. and 40 CFR 63.547]

**SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS**

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**G. Building Ventilation**

13. Test Methods: Any required stack tests shall be performed in accordance with the following methods:

<b>Method</b>	<b>Description of Method and Comments</b>
EPA 5/29	Determination of Particulate Emissions. The minimum sample volume shall be 30 dry standard cubic feet.
EPA9	Determination of Visible Emissions. Each EPA Method 9 test shall be thirty (30) minutes in duration pursuant to Rule 62-297.310, F.A.C. and concurrent with one of the EPA Method 12 nms.
EPA 12/29	Detetmination of Lead Emissions.

**RECORDS AND REPORTS**

14. Test Reports: The permittee shall prepare and submit repmis for all required tests in accordance with the requirements specified in Appendix CTR (Common Testing Requirements) of this petmit. For each test run, the report shall also indicate the operating rate. [Rule 62-297.310(8), F.A.C.]

**NESHAP APPLICABILITY**

15. NESHAP Subpart X Applicability: The fugitive Pb emissions from the enclosed facility are subject to and must comply with all applicable requirements of 40 CPR 63, Subpart X which applies to Secondary Lead Smelting. Specifically, the feed dryer shall comply with 40 CPR 63.550 Reporting and Recordkeeping Requirements. Subpati X is provided in Appendix X of this permit. IRule 62-204.800(11)(b) and 40 CFR 63, -Subpart ~~X~~-National Emissions StaNdards for Hazardous Air Pollutants (NESHAP) for Secondary Lead Smelting].

**SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS**

**H. Plastic Pellet Silos**

This section of the permit addresses the following emissions unit

ID No.	Emission Unit Description
024	Four (4) plastic pellet silos

ETF will install a total of four Plastic Pellet Silos for off-loading to truck and railcar. Two of the silos will be dedicated to truck loading and two for railcar loading. The silos will emit minor amounts of PM when they are being filled. The PM will be controlled by bin vent filters (fabric filters) atop the silos.

**CONSTRUCTION**

1. **Equipment:** The permittee is authorized to construct four plastic pellet silos (two for truck loading and two for train loading) with bin filters to control PM emissions. Each silo will have a stack height of 68.5 feet, a stack diameter of 14 inches and a flow rate of approximately 1,750 acfm.  
[Application No. 0570057-020-AC]

**PERFORMANCE RESTRICTIONS**

2. **Maximum Fill Rate:** The maximum fill rate for each plastic pellet silo shall not exceed 1.75 TPH with a maximum capacity of 12,000 tons in any consecutive twelve month period.  
[Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]

**EMISSIONS STANDARDS**

3. **PM Emission Standard:** PM emissions from each bin filter of the plastic pellet silos shall not exceed 0.001 gr/dscf. [Application No. 0570057-020-AC; Rules 62-4.070(3) and 62-210.200(PTE), F.A.C.]
4. **VE Standard:** VE from the plastic pellet silo bin vent filters shall not exceed 3% opacity as demonstrated by initial and annual compliance tests. A visible emission reading of 3% opacity or less may be used to establish compliance with the PM emission standard in Specific Condition 3. A visible emission reading greater than 3% opacity will require the permittee to perform a PM emissions stack test within 60 days to show compliance with the PM standard.  
[Application No. 0570057-020-AC; Rules 62-296.603 and 62-296.712, F.A.C.; and 40 CFR 60.122(a)(2)]

**TESTING AND MONITORING REQUIREMENTS**

5. **Initial Compliance Tests:** Each unit shall be tested to demonstrate initial compliance with the VE emissions standards specified in Specific Condition 4. The initial test shall be conducted within 180 days after initial operation. [Rule 62-297.310(7)(a)1., F.A.C. and Rule 62-4.070(3), F.A.C.]
6. **Annual Compliance Tests:** During each federal fiscal year (October 1st to September 30th), each unit shall be tested to demonstrate compliance with the VE standard specified in Specific Condition 4. [Rule 62-297.310(7)(a)4, F.A.C. and Rule 62-4.070(3), F.A.C.]
7. **PM Compliance Test:** The initial and annual VE tests in Specific Conditions 5 and 6 shall serve as a surrogate for the PM emissions tests. If the VE emissions standard in Specific Condition 4 is not met, PM tests utilizing EPA Method 5 must be conducted on the silo bin filters to show compliance with the PM emissions standard in Specific Condition 3 within 60 days. [Rule 62-297.620(4), F.A.C.]
8. **Test Methods:** Any required stack tests shall be performed in accordance with the following methods.

Method	Description of Method and Comments
EPA5	Determination of Particulate Emissions. The minimum sample volume shall be 30 dry standard cubic feet
EPA9	Method 9- Visual Determination of the Opacity of Emissions from Stationary Sources

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### SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

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#### H. Plastic Pellet Silos

##### RECORDS AND REPORTS

9. Test Reports: The permittee shall prepare and submit reports for all required tests in accordance with the requirements specified in Appendix CTR (Common Testing Requirements) of this permit. For each test run, the report shall also indicate the operating rate. [Rule 62-297.310(8), F.A.C.]

### SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

#### I. Propane Vaporizer and Slurry Heaters

This section of the permit addresses the following emissions unit.

IDNo.	Emission Unit Description
025	Propane vaporizer (1) with 1.2 mmBtu/hour burner and soda ash slurry heaters (2) with 0.25 mmBtu/hour burners.

Natural gas will be used as the primary fuel for many of the processes at the EFT facility, such as the furnaces (EU ID 001 and EU ID 023) and dryer (EU ID 022). However, the site will maintain a propane tank to use in the event of natural gas curtailment. The propane tank operation will require the use of a propane vaporizer that includes a 1.2 mmBtu/hr burner.

The plant will use a soda ash slurry injection system in the furnace gases as needed to supplement the sulfur dioxide removal performance of the scrubber. Soda ash may also be used as a backup reagent to the caustic ordinarily used in the scrubber. The soda ash slurry will be heated by two natural gas fired 0.25 mmBtu/hr burners. Heating the slurry will improve the soda ash dissolve time.

#### EQUIPMENT

- Propane Vaporizer: The permittee is authorized to install a propane vaporizer with a burner rated at 1.2 mmBtu/hr of heat input when firing propane. The propane vaporizer shall only operate during time of natural gas curtailment. [Application No. 0570057-020-AC]
- Propane Vaporizer Stack: The permittee is authorized to install a propane vaporizer stack with a height of 9 feet, a diameter of 8 inches and a flow rate of approximately 500 acfm at an average temperature of 600 °F. [Application No. 0570057-020-AC]
- Slurry Heaters: The permittee is authorized to install two 0.25 mmBtu/hr soda ash slurry heaters. [Application No. 0570057-020-AC]
- Slurry Heater Stacks: The permittee is authorized to install two soda ash slurry heater stacks with heights of 11.2 feet, diameters of 8 inches and flow rates of approximately 1,600 acfm at an average temperature of 300 °F. [Application No. 0570057-020-AC]

#### PERFORMANCE RESTRICTIONS

- Hours of Operation: The hours of operation of the propane vaporizer and soda ash slurry heaters are not limited (8,760 hours per year). [Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]
- Burner Heat Input Rates: The maximum heat input rate to the propane vaporizer burner shall not exceed 1.2 mmBtu/hr. The maximum heat input rate to the soda ash slurry heaters shall not exceed 0.50 mmBtu/hr (2 @ 0.25 mmBtu/hr). [Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]
- Propane Vaporizer Heat Input: The maximum heat input into the propane vaporizer in any consecutive twelve month period shall not exceed 10,512 mmBtu. [Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]
- Soda Ash Slurry Heaters Heat Input: Natural gas is the primary fuel used for the soda ash slurry heaters. Propane may be used as a backup fuel. The maximum heat input into the soda ash slurry heaters in any consecutive twelve month period shall not exceed 4,380 mmBtu. [Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]

**SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS**

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**I. Propane Vaporizer and Slurry Heaters**

**EMISSIONS STANDARDS**

9. VB Standard: VB from the propane vaporizer and soda ash slurry heaters stacks shall not exceed 3% opacity as demonstrated by initial and annual compliance tests.  
[Application No. 0570057-020-AC; Rules 62-210.200(PTE) and 62-212.400(10)(c), F.A.C.]

**TESTING AND MONITORING REQUIREMENTS**

10. VB Compliance Tests: The propane vaporizer and soda ash slurry heater stacks exhausts shall be tested to demonstrate initial compliance with the VB standards no later than 180 days after initial operation and during each federal fiscal year (October 1st to September 30th) thereafter. [Rule 62-4.070(3), F.A.C.]
11. Test Requirements: The permittee shall notify the EPCHC in writing at least 15 days prior to any required tests. Tests shall be conducted in accordance with the applicable requirements specified in Appendix CTR (Common Testing Requirements) of this permit.  
[Rule 62-297.310(7)(a)9, F.A.C.]
12. Test Methods: Any required stack tests shall be performed in accordance with the following methods:

Method	Description of Method and Comments
EPA9	Determination of Visible Emissions. Each EPA Method 9 test shall be thirty (30) minutes in duration pursuant to Rule 62-297.310, F.A.C. and concurrent with one of the EPA Method 12 runs.

**RECORDS AND REPORTS**

13. Notification, Recordkeeping and Reporting Requirements: The permittee shall maintain records of the amount of natural gas and propane used in the soda ash slurry heaters and the amount of propane used in the propane vaporizer on a monthly basis and shall comply with the notification, recordkeeping and reporting requirements pursuant to 40 CFR 63.550. These records shall be submitted to the EPCHC on an annual basis or upon request. [Rule 62-4.070(3), F.A.C. and 40 CFR 60]
14. Test Repmis: The permittee shall prepare and submit repmis for all required tests in accordance with the requirements specified in Appendix CTR (Common Testing Requirements) of this permit. For each test run, the report shall also indicate the heat input rate. [Rule 62-297.310(8), F.A.C.]

SECTION 3. EMISSIONS UNIT SPECIFIC CONDITIONS

J. Emergency Generator

This section of the permit addresses the following emissions unit.

ID No.	Emission Unit Description
026	One 500 Idlowatt (kW) liquid fueled emergency generator

The facility will install a diesel-fired emergency generator with an anticipated capacity of 500 kW. The generator will only be used when power is not available fi-om the local utility. The maximum hours of operation are not to exceed 500 hours per year.

1. Equipment: The permittee is authorized to install, operate, and maintain one 500 kW emergency generator. [Applicant Request and Rule 62-210.200(PTE), F.A.C.]
2. Hours of Operation and Fuel Specifications: The hours of operation shall not exceed 500 hours in any consecutive 12 month period. The generator shall burn ultralow sulfur diesel fuel oil (0.0015% sulfur). [Applicant Request and Rule 62-210.200(PTE), F.A.C.]
3. NSPS Subpart IIIIApplicability: The emergency generator is Stationary Compression Ignition Internal Combustion Engines (Stationmy ICE) and shall comply with applicable provisions of 40 CFR 60, Subpart IIII, including emission testing or certification. [40 CFR 60, Subpart IIII- Standards of Performance for Stationaty Compression Ignition Internal Combustion Engines, See Appendix IIII]
4. NESHAPS Subpart ZZZZ Applicability: The emergency generator is a Liquid Fueled Reciprocating Internal Combustion Engines (RICE) and shall comply with applicable provisions of 40 CFR 63, Subpart ZZZZ. Pursuant to 40 CFR 63.6590(c) the generator must meet the requirements of Subpart ZZZZ by meeting the requirements of 40 CFR 60, Subpart IIII. [40 CFR 63, Subpart ZZZZ- National Emission Standards for Hazardous Air Pollutants for Stationaty Reciprocating Intemal Combustion Engines (RICE)]
5. Emissions Limits: Each emergency generator shall comply with the following emission limits and demonstrate compliance in accordance with the procedures given in 40 CFR 60, Subpart IIII the language of which is given in Appendix IIII. Manufacturer certification can be provided to the Department in lieu of actual stack testing.

Source (model year)"	CO (g/hp-hr)	PM (g/hp-hr)	Hydrocarbons (g/hp-hr)	NOx (g/hp-hr/
Subpart IIII (2007 and later)	---	0.12	4.0 (NMHCb+NOx)	

- a. Asper40CFR§89.113.
- b. NI\1HC means Non-Methane Hydrocm-bons.
- c. g/hp-hr means grams per horsepower-hour

[Application No. 0570057-020-AC; 40 CFR 60, Subpart IIII and Rule 62-4.070(3), F.A.C.]

6. Visible Emission (VB) Limit: The liquid-fueled emergency generator shall comply with a visible emission limit of3% opacity. An initial VE test shall be conducted in accordance with EPA Method 9 within 60 days after achieving the maximum production rate at which the unit will be operated, but not later than 180 days after initial statuip. [Rules 62-296.603, 62-296.712, F.A.C.; and 40 CFR60.122(a)(2)]
7. Notification, Recordkeeping and Reporting Requirements: The permittee shall maintain records of the amount of fuel oil used in the emergency generator along with the hours of operation and shall comply with the notification, recordkeeping and reporting requirements pursuant to 40 CFR 60.4214 and 40 CFR 60.7. These records shall be submitted to the Compliance Authority on an annual basis or upon request. [Rule 62-4.070(3), F.A.C. and 40 CFR 60, Subpatis A and IIII]

## SECTION IV. APPENDICES

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AppendixCC	Common Conditions
Appendix CEMS	Continuous Emissions Monitoring System (CEMS) Requirements
AppendixCF	Citation Formats and Glossary of Common Terms
Appendix CTR	Common Testing Requirements
Appendix FDCC	Standard Operating Procedures for Fugitive Dust Control during Construction Activities
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AppendixGP	NSPS Subpart A and NESHAP Subpart A - Identification of General Provisions
Appendix IIII	NSPS, Subpart IIII - Stationary Compression Ignition Internal Combustion Engines
AppendixL	NSPS, Subpart L - Secondary Lead Smelters
Appendix ZZZZ	NESHAP, Subpart ZZZZ- Stationary Reciprocating Internal Combustion Engines (RICE)
Appendix X	NESHAP, Subpart X - Secondary Lead Smelting

## SECTION IV. APPENDIX CC

### COMMON CONDITIONS

Unless otherwise specified in the permit, the following conditions apply to all emissions units and activities at the EFT facility.

#### EMISSIONS AND CONTROLS

1. Plant Operation- Problems: If temporarily unable to comply with any of the conditions of the permit due to breakdown of equipment or destruction by fire, wind or other cause, the permittee shall notify each Compliance Authority as soon as possible, but at least within one working day, excluding weekends and holidays. The notification shall include: pertinent information as to the cause of the problem; steps being taken to correct the problem and prevent future recurrence; and, where applicable, the owner's intent toward reconstruction of destroyed facilities. Such notification does not release the permittee from any liability for failure to comply with the conditions of this permit or the regulations. [Rule 62-4.130, F.A.C.]
2. Circumvention: The permittee shall not circumvent the air pollution control equipment or allow the emission of air pollutants without this equipment operating properly. [Rule 62-210.650, F.A.C.]
3. Excess Emissions Allowed: Excess emissions resulting from startup, shutdown or malfunction of any emissions unit shall be permitted providing (1) best operational practices to minimize emissions are adhered to and (2) the duration of excess emissions shall be minimized but in no case exceed 2 hours in any 24-hour period unless specifically authorized by the Department for longer duration. Pursuant to Rule 62-210.700(5), F.A.C., the permit subsection may specify more or less stringent requirements for periods of excess emissions. Rule 62-210-700(Excess Emissions), F.A.C., cannot vary or supersede any federal NSPS or NESHAP provision. [Rule 62-210.700(1), F.A.C.]
4. Excess Emissions Prohibited: Excess emissions caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure that may reasonably be prevented during startup, shutdown or malfunction shall be prohibited. [Rule 62-210.700(4), F.A.C.]
5. Excess Emissions- Notification: In case of excess emissions resulting from malfunctions, the permittee shall notify the Compliance Authority in accordance with Rule 62-4.130, F.A.C. A full written report on the malfunctions shall be submitted in a quarterly report, if requested by the Department. [Rule 62-210.700(6), F.A.C.]
6. VOC or OS Emissions: No person shall store, pump, handle, process, load, unload or use in any process or installation, volatile organic compounds (VOC) or organic solvents (OS) without applying known and existing vapor emission control devices or systems deemed necessary and ordered by the Department. [Rule 62-296.320(1), F.A.C.]
7. Objectionable Odor Prohibited: No person shall cause, suffer, allow or permit the discharge of air pollutants, which cause or contribute to an objectionable odor. An "objectionable odor" means any odor present in the outdoor atmosphere which by itself or in combination with other odors, is or may be harmful or injurious to human health or welfare, which unreasonably interferes with the comfortable use and enjoyment of life or property, or which creates a nuisance. [Rules 62-296.320(2) and 62-210.200(Definitions), F.A.C.]
8. General Visible Emissions: No person shall cause, let, permit, suffer or allow to be discharged into the atmosphere the emissions of air pollutants from any activity equal to or greater than 20% opacity. This regulation does not impose a specific testing requirement. [Rule 62-296.320(4)(b)1, F.A.C.]
9. Unconfined Particulate Emissions: During the construction period, unconfined particulate matter emissions shall be minimized by dust suppressing techniques such as covering and/or application of water or chemicals to the affected areas, as necessary. [Rule 62-296.320(4)(c), F.A.C.]

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SECTION IV. APPENDIX CC

COMMON CONDITIONS

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RECORDS AND REPORTS

10. Records Retention: All measurements, records, and other data required by this permit shall be documented in a permanent, legible format and retained for at least 5 years following the date on which such measurements, records, or data are recorded. Records shall be made available to the Department upon request. [Rule 62-213.440(1)(b)2, F.A.C.]
11. Emissions Computation and Reporting
- a. *Applicability*. This rule sets forth required methodologies to be used by the owner or operator of a facility for computing actual emissions, baseline actual emissions, and net emissions increase, as defined at Rule 62-210.200, F.A.C., and for computing emissions for purposes of the reporting requirements of subsection 62-210.370(3) and paragraph 62-212.300(1)(e), F.A.C., or of any permit condition that requires emissions be computed in accordance with this rule. This rule is not intended to establish methodologies for determining compliance with the emission limitations of any air permit.
  - b. *Computation of Emissions*. For any of the purposes set forth in subsection 62-210.370(1), F.A.C., the owner or operator of a facility shall compute emissions in accordance with the requirements set forth in this subsection.
    - (1) *Basic Approach*. The owner or operator shall employ, on a pollutant-specific basis, the most accurate of the approaches set forth below to compute the emissions of a pollutant from an emissions unit; provided, however, that nothing in this rule shall be construed to require installation and operation of any continuous emissions monitoring system (CEMS), continuous parameter monitoring system (CPMS), or predictive emissions monitoring system (PEMS) not otherwise required by rule or permit, nor shall anything in this rule be construed to require performance of any stack testing not otherwise required by rule or permit.
      - (a) **If** the emissions unit is equipped with a CEMS meeting the requirements of paragraph 62-210.370(2)(b), F.A.C., the owner or operator shall use such CEMS to compute the emissions of the pollutant, unless the owner or operator demonstrates to the department that an alternative approach is more accurate because the CEMS represents still-emerging technology.
      - (b) If a CEMS is not available or does not meet the requirements of paragraph 62-210.370(2)(b), F.A.C., but emissions of the pollutant can be computed pursuant to the mass balance methodology of paragraph 62-210.370(2)(c), F.A.C., the owner or operator shall use such methodology, unless the owner or operator demonstrates to the department that an alternative approach is more accurate.
      - (c) If a CEMS is not available or does not meet the requirements of paragraph 62-210.370(2)(b), F.A.C., and emissions cannot be computed pursuant to the mass balance methodology, the owner or operator shall use an emission factor meeting the requirements of paragraph 62-210.370(2)(d), F.A.C., unless the owner or operator demonstrates to the department that an alternative approach is more accurate.
    - (2) *Continuous Emissions Monitoring System (CEMS)*.
      - (a) An owner or operator may use a CEMS to compute emissions of a pollutant for purposes of this rule provided:
        - 1) The CEMS complies with the applicable certification and quality assurance requirements of 40 CFR Part 60, Appendices B and F, or, for an acid rain unit, the certification and quality assurance requirements of 40 CFR Part 75, all adopted by reference at Rule 62-204.800, F.A.C.; or

**SECTION IV. APPENDIX CC**

**COMMON CONDITIONS**

- 2) The owner or operator demonstrates that the CEMS otherwise represents the most accurate means of computing emissions for purposes of this rule.
  - (b) Stack gas volumetric flow rates used with the CEMS to compute emissions shall be obtained by the most accurate of the following methods as demonstrated by the owner or operator:
    - 1) A calibrated flowmeter that records data on a continuous basis, if available; or
    - 2) The average flow rate of all valid stack tests conducted during a five-year period encompassing the period over which the emissions are being computed, provided all stack tests used shall represent the same operational and physical configuration of the unit.
  - (c) The owner or operator may use CEMS data in combination with an appropriate f-factor, heat input data, and any other necessary parameters to compute emissions if such method is demonstrated by the owner or operator to be more accurate than using a stack gas volumetric flow rate as set forth at subparagraph 62-210.370(2)(b)2., F.A.C., above.
- (3) Mass Balance Calculations.
- (a) An owner or operator may use mass balance calculations to compute emissions of a pollutant for purposes of this rule provided the owner or operator:
    - 1) Demonstrates a means of validating the content of the pollutant that is contained in or created by all materials or fuels used in or at the emissions unit; and
    - 2) Assumes that the emissions unit emits all of the pollutant that is contained in or created by any material or fuel used in or at the emissions unit if it cannot otherwise be accounted for in the process or in the capture and destruction of the pollutant by the unit's air pollution control equipment.
  - (b) Where the vendor of a raw material or fuel which is used in or at the emissions unit publishes a range of pollutant content from such material or fuel, the owner or operator shall use the highest value of the range to compute the emissions, unless the owner or operator demonstrates using site-specific data that another content within the range is more accurate.
  - (c) In the case of an emissions unit using coatings or solvents, the owner or operator shall document, through purchase receipts, records and sales receipts, the beginning and ending VOC inventories, the amount of VOC purchased during the computational period, and the amount of VOC disposed of in the liquid phase during such period.
- (4) Emission Factors.
- a. An owner or operator may use an emission factor to compute emissions of a pollutant for purposes of this rule provided the emission factor is based on site-specific data such as stack test data, where available, unless the owner or operator demonstrates to the department that an alternative emission factor is more accurate. An owner or operator using site-specific data to derive an emission factor, or set of factors, shall meet the following requirements.
    - 1) If stack test data are used, the emission factor shall be based on the average emissions per unit of input, output, or gas volume, whichever is appropriate, of all valid stack tests conducted during at least a five-year period encompassing the period over which the emissions are being computed, provided all stack tests used shall represent the same operational and physical configuration of the unit.
    - 2) Multiple emission factors shall be used as necessary to account for variations in emission rate associated with variations in the emissions unit's operating rate or operating conditions during the period over which emissions are computed.

## SECTION IV. APPENDIX CC

### COMMON CONDITIONS

- 3) The owner or operator shall compute emissions by multiplying the appropriate emission factor by the appropriate input, output or gas volume value for the period over which the emissions are computed. The owner or operator shall not compute emissions by converting an emission factor to pounds per hour and then multiplying by hours of operation, unless the owner or operator demonstrates that such computation is the most accurate method available.
    - b.** If site-specific data are not available to derive an emission factor, the owner or operator may use a published emission factor directly applicable to the process for which emissions are computed. If no directly-applicable emission factor is available, the owner or operator may use a factor based on a similar, but different, process.
  - (5) Accounting for Emissions During Periods of Missing Data from CEMS, PEMS, or CPMS. In computing the emissions of a pollutant, the owner or operator shall account for the emissions during periods of missing data from CEMS, PEMS, or CPMS using other site-specific data to generate a reasonable estimate of such emissions.
  - (6) Accounting for Emissions During Periods of Startup and Shutdown. In computing the emissions of a pollutant, the owner or operator shall account for the emissions during periods of startup and shutdown of the emissions unit.
  - (7) Fugitive Emissions. In computing the emissions of a pollutant from a facility or emissions unit, the owner or operator shall account for the fugitive emissions of the pollutant, to the extent quantifiable, associated with such facility or emissions unit.
  - (8) Recordkeeping. The owner or operator shall retain a copy of all records used to compute emissions pursuant to this rule for a period of five years from the date on which such emissions information is submitted to the department for any regulatory purpose.
- c. Annual Operating Report for Air Pollutant Emitting Facility*
- (1) The Annual Operating Report for Air Pollutant Emitting Facility (DEP Form No. 62-210.900(5)) shall be completed each year for the following facilities:
    - (a) All Title V sources.
    - (b)** All synthetic non-Title V sources.
    - (c) All facilities with the potential to emit ten (10) tons per year or more of volatile organic compounds or twenty-five (25) tons per year or more of nitrogen oxides and located in an ozone nonattainment area or ozone air quality maintenance area.
    - (d) All facilities for which an annual operating report is required by rule or permit.
  - (2) Notwithstanding paragraph 62-210.370(3)(a), F.A.C., no annual operating report shall be required for any facility operating under an air general permit.
  - (3) The annual operating report shall be submitted to the appropriate Department of Environmental Protection (DEP) division, district or DEP-approved local air pollution control program office by April of the following year.
  - (4) Beginning with 2007 annual emissions, emissions shall be computed in accordance with the provisions of subsection 62-210.370(2), F.A.C., for purposes of the annual operating report.

[Rule 62-210.370, F.A.C.]

SECTION IV. APPENDIX CEMS

CONTINUOUS EMISSIONS MONITORING SYSTEM (CEMS) REQUIREMENTS

CEMS OPERATION PLAN

1. CEMS Operation Plan: The owner or operator shall create and implement a facility-wide plan for the proper installation, calibration, maintenance and operation of each CEMS required by this permit. The owner or operator shall submit the CEMS Operation Plan to the Bureau of Air Monitoring and Mobile Sources for approval at least 60 days prior to CEMS installation. The CEMS Operation Plan shall become effective 60 days after submittal or upon its approval. If the CEMS Operation Plan is not approved, the owner or operator shall submit a new or revised plan for approval.

*{Permitting Note: The Department maintains both guidelines for developing a CEMS Operation Plan and example language that can be used as the basis for the facility-wide plan required by this permit. Contact the Emissions Monitoring Section of the Bureau of Air Monitoring and Mobile Sources at (850)488-0114.}*

INSTALLATION, PERFORMANCE SPECIFICATIONS AND QUALITY ASSURANCE

2. Timelines:
  - a. *New and Existing Emission Units*. For new emission units, the owner or operator shall install each CEMS required by this permit prior to initial startup of the unit. The owner or operator shall conduct the appropriate performance specification for each CEMS within 90 operating days of achieving permitted capacity as defined in Rule 62-297.310(2), F.A.C., but no later than 180 calendar days after initial start-up.
3. Installation: All CEMS shall be installed such that representative measurements of emissions or process parameters from the facility are obtained. The owner or operator shall locate the CEMS by following the procedures contained in the applicable performance specification of 40 CFR part 60, Appendix B.
4. Span Values and Dual Range Monitors: The owner or operator shall set appropriate span values for the CEMS. The owner or operator shall install dual range monitors if required by and in accordance with the CEMS Operation Plan.
5. Continuous Flow Monitor: For compliance with mass emission rate standards, the owner or operator shall install a continuous flow monitor to determine the stack exhaust flow rate. The flow monitor shall be certified pursuant to 40 CFR part 60, Appendix B, Performance Specification 6.
6. Diluent Monitor: If it is necessary to correct the CEMS output to the oxygen concentrations specified in this permit's emission standards, the owner or operator shall either install an oxygen monitor or install a CO<sub>2</sub> monitor and use an appropriate F-Factor computational approach.
7. Moisture Correction: If necessary, the owner or operator shall determine the moisture content of the exhaust gas and develop an algorithm to enable correction of the monitoring results to a dry basis (0% moisture).

*{Permitting Note: The CEMS Operation Plan will contain additional CEMS-specific details and procedures for installation.}*
8. Performance Specifications: The owner or operator shall evaluate the acceptability of each CEMS by conducting the appropriate performance specification, as follows. CEMS determined to be unacceptable shall not be considered installed for purposes of meeting the timelines of this permit.
  - a. *CO Monitors*. For CO monitors, the owner or operator shall conduct Performance Specification 4 or 4A of 40 CFR part 60, Appendix B
  - b. *NO<sub>x</sub> and SO<sub>2</sub> Monitors*. For NO<sub>x</sub> and SO<sub>2</sub> monitors, the owner or operator shall conduct Performance Specification 2 of 40 CFR part 60, Appendix B.

## SECTION IV. APPENDIX CEMS

### CONTINUOUS EMISSIONS MONITORING SYSTEM (CEMS) REQUIREMENTS

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9. Quality Assurance: The owner or operator shall follow the quality assurance procedures of 40 CFR part 60, Appendix F.
  - a. *CO Monitors*. The required relative accuracy test audit (RATA) tests shall be performed using EPA Method 10 in Appendix A of 40 CFR part 60 and shall be based on a continuous sampling train.
  - b. *NO<sub>x</sub> Monitors*. The required RATA tests shall be performed using EPA Method 7E in Appendix A of 40 CFR part 60. NO<sub>x</sub> shall be expressed "as NO<sub>2</sub>."
  - c. *SO<sub>2</sub> Monitors*. The required RATA tests shall be performed using EPA Method 6C in Appendix A of 40 CFR part 60.
10. Substituting RATA Tests for Compliance Tests: Data collected during CEMS quality assurance RATA tests can substitute for annual stack tests, and vice versa, at the option of the owner or operator, provided the owner or operator indicates this intent in the submitted test protocol and follows the procedures outlined in the CEMS Operation Plan.

#### CALCULATION APPROACH

11. CEMS Used for Compliance: Once adherence to the applicable performance specification for each CEMS is demonstrated, the owner or operator shall use the CEMS to demonstrate compliance with the applicable emission standards as specified by this permit.
12. CEMS Data: Each CEMS shall monitor and record emissions during all periods of operation and whenever emissions are being generated, including during episodes of startups, shutdowns, and malfunctions. All data shall be used, except for invalid measurements taken during monitor system breakdowns, repairs, calibration checks, zero adjustments and span adjustments, and except for allowable data exclusions as per Condition 20 of this appendix.
13. Operating Hours and Operating Days: For purposes of this appendix, the following definitions shall apply. An hour is the 60-minute period beginning at the top of each hour. Any hour during which an emissions unit is in operation for more than 15 minutes is an operating hour for that emission unit. A day is the 24-hour period from midnight to midnight. Unless otherwise specified by this permit, any day with at least one operating hour for an emissions unit is an operating day for that emission unit.
14. Valid Hourly Averages: Each CEMS shall be designed and operated to sample, analyze and record data evenly spaced over the hour at a minimum of one measurement per minute. All valid measurements collected during an hour shall be used to calculate a 1-hour block average that begins at the top of each hour.
  - a. Hours that are not operating hours are not valid hours.
  - b. For each operating hour, the 1-hour block average shall be computed from at least two data points separated by a minimum of 15 minutes. If less than two such data points are available, there is insufficient data, the 1-hour block average is not valid, and the hour is considered as "monitor unavailable."
15. Calculation Approaches: The owner or operator shall implement the calculation approach specified by this permit for each CEMS, as follows:
  - a. *Rolling 30-day average*. Compliance shall be determined after each operating day by calculating the arithmetic average of all the valid hourly averages from that operating day and the prior 30-1 operating days.

## SECTION N. APPENDIX CEMS

### CONTINUOUS EMISSIONS MONITORING SYSTEM (CEMS) REQUIREMENTS

#### MONITOR AVAILABILITY

16. Monitor Availability: The quarterly excess emissions report shall identify monitor availability for each quarter in which the unit operated. Monitor availability for the CEMS shall be 95% or greater in any calendar quarter in which the unit operated for more than 760 hours. In the event the applicable availability is not achieved, the permittee shall provide the Department with a report identifying the problems in achieving the required availability and a plan of corrective actions that will be taken to achieve 95% availability. The permittee shall implement the reported corrective actions within the next calendar quarter. Failure to take corrective actions or continued failure to achieve the minimum monitor availability shall be violations of this permit.

#### EXCESS EMISSIONS

17. Definitions:
- Startup* is defined as the commencement of operation of any emissions unit which has shut down or ceased operation for a period of time sufficient to cause temperature, pressure, chemical or pollution control device imbalances, which result in excess emissions.
  - Shutdown* means the cessation of the operation of an emissions unit for any purpose.
  - Malfunction* means any unavoidable mechanical and/or electrical failure of air pollution control equipment or process equipment or of a process resulting in operation in an abnormal or unusual manner.
18. Excess Emissions Prohibited: Excess emissions caused entirely or in part by poor maintenance, poor operation or any other equipment or process failure that may reasonably be prevented during startup, shutdown or malfunction shall be prohibited.
19. Data Exclusion Procedures for SIP Compliance: As per the procedures in this condition, limited amounts of CEMS emissions data may be excluded from the corresponding compliance demonstration, provided that best operational practices to minimize emissions are adhered to and the duration of data excluded is minimized. The data exclusion procedures of this condition apply only to SIP-based emission limits.
- Excess Emissions*. Data in excess of the applicable emission standard may be excluded from compliance calculations if the data are collected during periods of permitted excess emissions (for example, during startup, shutdown or malfunction). The maximum duration of excluded data is 2 hours in any 24-hour period, unless some other duration is specified by this permit.
  - Limited Data Exclusion*. If the compliance calculation using all valid CEMS emission data, as defined in Condition 12 of this appendix, indicates that the emission unit is in compliance, then no CEMS data shall be excluded from the compliance demonstration.
  - Event Driven Exclusion*. The underlying event (for example, the startup, shutdown or malfunction event) must precede the data exclusion. If there is no underlying event, then no data may be excluded. Only data collected during the event may be excluded.
  - Reporting Excluded Data*. The data exclusion procedures of this condition are not necessarily the same procedures used for excess emissions as defined by federal rules. Quarterly or semi-annual reports required by this permit shall indicate not only the duration of data excluded from SIP compliance calculations but also the number of excess emissions as defined by federal rules.

SECTION IV. APPENDIX CEMS

CONTINUOUS EMISSIONS MONITORING SYSTEM (CEMS) REQUIREMENTS

20. Notification Requirements: The owner or operator shall notify the Compliance Authority within one working day of discovering any emissions that demonstrate noncompliance for a given averaging period. Within one working day of occurrence, the owner or operator shall notify the Compliance Authority of any malfunction resulting in the exclusion of CEMS data. For malfunctions, notification is sufficient for the owner or operator to exclude CEMS data.

ANNUAL EMISSIONS

21. CEMS Used for Calculating Annual Emissions: All valid data, as defined in Condition 12 of this appendix, shall be used when calculating annual emissions.
- Annual emissions shall include data collected during startup, shutdown and malfunction periods.
  - Annual emissions shall include data collected during periods when the emission unit is not operating but emissions are being generated (for example, when firing fuel to warm up a process for some period of time prior to the emission unit's startup).
  - Annual emissions shall not include data from periods of time where the monitor was functioning properly but was unable to collect data while conducting a mandated quality assurance/quality control activity such as calibration tests, RATA, calibration gas audit or RAA. These periods of time shall be considered missing data for purposes of calculating annual emissions.
  - Annual emissions shall not include data from periods of time when emissions are in excess of the calibrated span of the CEMS. These periods of time shall be considered missing data for purposes of calculating annual emissions.
22. Accounting for Missing Data: All valid measurements collected during each hour shall be used to calculate a 1-hour block average. For each hour, the 1-hour block average shall be computed from at least two data points separated by a minimum of 15 minutes. If less than two such data points are available, the owner or operator shall account for emissions during that hour using site-specific data to generate a reasonable estimate of the 1-hour block average.
23. Emissions Calculation: Hourly emissions shall be calculated for each hour as the product of the 1-hour block average and the duration of pollutant emissions during that hour. Annual emissions shall be calculated as the sum of all hourly emissions occurring during the year.

## SECTION 4. APPENDIX CF

### CITATION FORMATS AND GLOSSARY OF COMMON TERMS

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#### CITATION FORMATS

The following illustrate the formats used in the permit to identify applicable requirements from permits and regulations.

##### Old Permit Numbers

Example: Permit No. AC50-123456 or Permit No. A050-123456

Where: "AC" identifies the permit as an Air Construction Permit  
"AO" identifies the permit as an Air Operation Permit  
"123456" identifies the specific permit project number

##### New Permit Numbers

Example: Pennit Nos. 099-2222-001-AC, 099-2222-001-AF, 099-2222-001-AO, or 099-2222-001-AV

Where: "099" represents the specific county ID number in which the project is located  
"2222" represents the specific facility ID number for that county  
"001" identifies the specific permit project number  
"AC" identifies the permit as an air construction permit  
"AF" identifies the permit as a minor source federally enforceable state operation permit  
"AO" identifies the pennit as a minor source air operation permit  
"AV" identifies the permit as a major Title V air operation permit

##### PSD Permit Numbers

Example: Pennit No. PSD-FL-317

Where: "PSD" means issued pursuant to the preconstruction review requirements of the Prevention of Significant Deterioration of Air Quality  
"FL" means that the permit was issued by the State of Florida  
"317" identifies the specific permit project number

##### Florida Administrative Code (F.A.C.)

Example: [Rule 62-213.205, F.A.C.]

Means: Title 62, Chapter 213, Rule 205 of the Florida Administrative Code

##### Code of Federal Regulations (CFR)

Example: [40 CFR 60.7]

Means: Title 40, Pmt 60, Section 7

#### GLOSSARY OF COMMON TERMS

°F: degrees Fahrenheit

ARMS: Air Resource Management System  
(Department's database)

acfm: actual cubic feet per minute

SECTION 4. APPENDIX CF

CITATION FORMATS AND GLOSSARY OF COMMON TERMS

BACT: best available control technology	MSDS: material safety data sheets
Btu: British thermal units	MW: megawatt
CAM: compliance assurance monitoring	NESHAP: National Emissions Standards for Hazardous Air Pollutants
CEMS: continuous emissions monitoring system	NOx: nitrogen oxides
cfm: cubic feet per minute	NSPS: New Source Performance Standards
CFR: Code of Federal Regulations	O&M: operation and maintenance
CO: carbon monoxide	Oz: oxygen
COMS: continuous opacity monitoring system	Pb: lead
DEP: Department of Environmental Protection	PM: particulate matter
Department: Department of Environmental Protection	PM <sub>10</sub> : particulate matter with a mean aerodynamic diameter of 10 microns or less
dscfm: dry standard cubic feet per minute	PSD: prevention of significant deterioration
EPA: Environmental Protection Agency	psi: pounds per square inch
ESP: electrostatic precipitator (control system for reducing particulate matter)	PTE: potential to emit
EU: emissions unit	RACT: reasonably available control technology
F.A.C.: Florida Administrative Code	RATA: relative accuracy test audit
F.D.: forced draft	SAM: sulfuric acid mist
F.S.: Florida Statutes	scf: standard cubic feet
FGR: flue gas recirculation	scfm: standard cubic feet per minute
Fl: fluoride	SIC: standard industrial classification code
ft <sup>2</sup> : square feet	SNCR: selective non-catalytic reduction (control system used for reducing emissions of nitrogen oxides)
ft <sup>3</sup> : cubic feet	SO <sub>2</sub> : sulfur dioxide
gpm: gallons per minute	TPH: tons per hour
gr: grains	TPY: tons per year
HAP: hazardous air pollutant	UTM: Universal Transverse Mercator coordinate system
Hg: mercury	VE: visible emissions
I.D.: induced draft	VOC: volatile organic compounds
ID: identification	
kPa: kilopascals	
lb: pound	
MACT: maximum achievable technology	
MMBtu: million British thermal units	

**SECTION IV. APPENDIX CTR**  
**COMMON TESTING REQUIREMENTS**

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Unless otherwise specified in the permit, the following testing requirements apply to all emissions units at the ETF facility.

**COMPLIANCE TESTING REQUIREMENTS**

1. Operating Rate During Testing: Testing of emissions shall be conducted with the emissions unit operating at permitted capacity. If it is impractical to test at permitted capacity, an emissions unit may be tested at less than the maximum permitted capacity; in this case, subsequent emissions unit operation is limited to 110 percent of the test rate until a new test is conducted. Once the unit is so limited, operation at higher capacities is allowed for no more than 15 consecutive days for the purpose of additional compliance testing to regain the authority to operate at the permitted capacity. Permitted capacity is defined as 90 to 100 percent of the maximum operation rate allowed by the permit. [Rule 62-297.310(2), F.A.C.]
2. Applicable Test Procedures - Opacity Compliance Tests. When either EPA Method 9 or DEP Method 9 is specified as the applicable opacity test method, the required minimum period of observation for a compliance test shall be sixty (60) minutes for emissions units which emit or have the potential to emit 100 tons per year or more of particulate matter, and thirty (30) minutes for emissions units which have potential emissions less than 100 tons per year of particulate matter and are not subject to a multiple-valued opacity standard. The opacity test observation period shall include the period during which the highest opacity emissions can reasonably be expected to occur. Exceptions to these requirements are as follows:
  - a. For batch, cyclical processes, or other operations which are normally completed within less than the minimum observation period and do not recur within that time, the period of observation shall be equal to the duration of the batch cycle or operation completion time.
  - b. The observation period for special opacity tests that are conducted to provide data to establish a surrogate standard pursuant to Rule 62-297.310(5)(k), F.A.C., Waiver of Compliance Test Requirements, shall be established as necessary to properly establish the relationship between a proposed surrogate standard and an existing mass emission limiting standard.
  - c. The minimum observation period for opacity tests conducted by employees or agents of the Department to verify the day-to-day continuing compliance of a unit or activity with an applicable opacity standard shall be twelve minutes.

[Rule 62-297.310(4), F.A.C.]

3. Determination of Process Variables
  - a. *Required Equipment*. The owner or operator of an emissions unit for which compliance tests are required shall install, operate, and maintain equipment or instruments necessary to determine process variables, such as process weight input or heat input, when such data are needed in conjunction with emissions data to determine the compliance of the emissions unit with applicable emission limiting standards.
  - b. *Accuracy of Equipment*. Equipment or instruments used to directly or indirectly determine process variables, including devices such as belt scales, weight hoppers, flow meters, and tank scales, shall be calibrated and adjusted to indicate the true value of the parameter being measured with sufficient accuracy to allow the applicable process variable to be determined within 10% of its true value.

[Rule 62-297.310(5), F.A.C.]

4. Frequency of Compliance Tests: The following provisions apply only to those emissions units that are subject to an emissions limiting standard for which compliance testing is required.
  - a. *General Compliance Testing*.

SECTION IV. APPENDIX CTR  
COMMON TESTING REQUIREMENTS

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1. The owner or operator of a new or modified emissions unit that is subject to an emission limiting standard shall conduct a compliance test that demonstrates compliance with the applicable emission limiting standard prior to obtaining an operation permit for such emissions unit.
  2. The owner or operator of an emissions unit that is subject to any emission limiting standard shall conduct a compliance test that demonstrates compliance with the applicable emission limiting standard prior to obtaining a renewed operation permit. Emissions units that are required to conduct an annual compliance test may submit the most recent annual compliance test to satisfy the requirements of this provision. In renewing an air operation permit pursuant to sub-subparagraph 62-210.300(2)(a)3.b., c., or d., F.A.C., the Department shall not require submission of emission compliance test results for any emissions unit that, during the year prior to renewal:
    - (a) Did not operate; or
    - (b) In the case of a fuel burning emissions unit, burned liquid and/or solid fuel for a total of no more than 400 hours,
  3. During each federal fiscal year (October 1 – September 30), unless otherwise specified by rule, order, or permit, the owner or operator of each emissions unit shall have a formal compliance test conducted for visible emissions, if there is an applicable standard.
  4. The owner or operator shall notify the Department, at least 15 days prior to the date on which each formal compliance test is to begin, of the date, time, and place of each such test, and the test contact person who will be responsible for coordinating and having such test conducted for the owner or operator.
- b. *Special Compliance Tests.* When the Department, after investigation, has good reason (such as complaints, increased visible emissions or questionable maintenance of control equipment) to believe that any applicable emission standard contained in a Department rule or in a permit issued pursuant to those rules is being violated, it shall require the owner or operator of the emissions unit to conduct compliance tests which identify the nature and quantity of pollutant emissions from the emissions unit and to provide a report on the results of said tests to the Department.

[Rule 62-297.310(7), F.A.C.]

#### RECORDS AND REPORTS

5. Test Report: The owner or operator of an emissions unit for which a compliance test is required shall file a report with the Department on the results of each such test. The required test report shall be filed with the Department as soon as practical but no later than 45 days after the last sampling run of each test is completed. The test report shall provide sufficient detail on the emissions unit tested and the test procedures used to allow the Department to determine if the test was properly conducted and the test results properly computed. As a minimum, the test report shall provide the following information.
  - a. The type, location, and designation of the emissions unit tested.
  - b. The facility at which the emissions unit is located.
  - c. The owner or operator of the emissions unit.
  - d. The normal type and amount of fuels used and materials processed, and the types and amounts of fuels used and material processed during each test run.
  - e. The means, raw data and computations used to determine the amount of fuels used and materials processed, if necessary to determine compliance with an applicable emission limiting standard.
  - f. The date, starting time and end time of the observation.

**SECTION IV. APPENDIX CTR**  
**COMMON TESTING REQUIREMENTS**

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- g. The test procedures used.
- h. The names of individuals who furnished the process variable data, conducted the test, and prepared the report.
- i. The applicable emission standard and the resulting maximum allowable emission rate for the emissions unit plus the test result in the same form and unit of measure.
- j. A certification that to the knowledge of the owner or his authorized agent, all data submitted are true and correct. The owner or his authorized agent shall certify that all data required and provided to the person conducting the test are true and correct to his knowledge.

[Rule 62-297.310(8), F.A.C.]

## SECTION IV. APPENDIX FDCC

### STANDARD OPERATING PROCEDURES FOR FUGITIVE DUST CONTROL DURING CONSTRUCTION ACTIVITIES

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The construction at the EFT facility will involve activities that can create fugitive emissions. Certain practices, common in the lead and construction/demolition industries, can help mitigate these emissions. The intent of this plan is to spell out exactly what these practices are, how and when they will be used at EFT during the construction process, and who is responsible for insuring they are followed.

The Standard Operating Procedures (SOP) for the Control of Fugitive Dust Emissions (dated December 2006) under which the EFT facility is currently operating is provided at the end of this appendix. These procedures will by and large be followed during construction activities taking place at the EFT facility. Specifically, the wet dust suppression by sprinlding with water the roadways, parking lots and grounds and the vacuum sweeping of the roadways and parking lots will continue. These activities will be terminated as different pmiions of the facilities' footprint and emission units are covered over by the facility enclosure which will be under negative pressure. The ventilation from the facility enclosure will be ventilated to the Torit filter (EU ID 015) to control fugitive emissions from process upsets and other sources.

The EFT facility has been in operation for over 40 years on this site. Any structures that have been exposed to the lead recycling operation will have some lead deposited on surfaces (no matter how effective the on-going housekeeping program may be). These structures also include flooring (cement & asphalt) in the operations areas as well as paved areas within the fence line. When any of these materials are demolished and removed, fugitive lead emissions could potentially be released into the air. This plan addresses "best practices" designed to prevent fugitive air emissions from occurring.

The plan is broken down into "pre-demolition" tasks, tasks to control emissions during the activity, and finally, how these tasks will be coordinated. Overall compliance of this plan will be the responsibility of the Environmental Health & Safety Manager at EFT. These responsibilities will include the following:

- Insure that all EFT personnel and contractors are familiar with the contents of this plan and how it applies to them.
- Meet with contractor's on a set frequency when work is scheduled to be performed to coordinate pre-demolition tasks, emission control tasks, and so on.
- Insure that all EFT personnel and contractors comply with the requirements of this plan.
- Thoroughly document activities that could impact fugitive emissions, the controls that were utilized to minimize these emissions, and what weather conditions were present at those times.

#### PRE-DEMOLITION TASKS:

The following tasks must be perfmmed prior to demolition:

The residual lead deposited on the surfaces of building structures, equipment, and flooring must be thoroughly cleaned prior to demolition. Depending on the location, this can involve pressure washing the structures prior to the demolition to remove the lead. In outside areas where pressure washing may not be feasible, use of the Tennant sweeper to clean the asphalt or cement thoroughly must be used.

These tasks need to be coordinated between EFT personnel and the contracting crews since most ofthis "pre-demolition" work will be perfonned by EFT personnel. Personnel performing the pressure washing of structures must insur-e that the cleaning is thorough. All horizontal surfaces where dust can accumulate must be cleaned first and then the vertical surfaces cleaned. The cleaning must stmi from the top of the structure working down towards the bottom for maximum cleaning effectiveness.

Flooring inside the building must be pressure washed prior to saw cutting/removal. Liquids will be contained inside the building and captured in floor sumps. Cement/asphalt outside of the buildings must be thoroughly swept with the Tennant sweeper.

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## SECTION N. APPENDIX FDCC

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### STANDARD OPERATING PROCEDURES FOR FUGITIVE DUST CONTROL DURING CONSTRUCTION ACTIVITIES

All these activities will minimize the amount of lead dust/oxide that may be retained on the structure or flooring. It also insures that the lead dust/oxide removed during the cleaning process is captured either in the floor sumps or by the Tennant sweeper.

#### DEMOLITION/LOADING ACTNITIES

The following tasks must be completed during the demolition and loading activities:

Once the pre-demolition cleaning tasks have been completed, the actual demolition can begin. Demolition can include removal of siding, roofing, steel structural supports, processing equipment and cement & asphalt surfaces. All these materials could potentially still retain some slight amount of lead on them so the control of dust during the removal and loading process is critical.

The EHS Manager is responsible for insuring that all demolition activities are done in conjunction with this procedure. The coordination of water control applications would normally be carried out by contractor persotmel but overall compliance still remains with the EHS Manager.

An application of fine water spray must be applied to the structure/material during the removal and loading process. Drainage flow of the waste water stream must be either into the building including floor sumps or into the floor sumps located outdoors. When possible, flow into the building is the preferred method. The application of water should be sufficient to control the dusting while still minimizing the quantity of liquids generated. Effective control does not necessarily require large amounts of water-the key is applying the spray to specific locations.

Vehicles and equipment used for demolition and removal inside the buildings where lead dusts/oxides were present must have its tires pressure washed prior to exiting the building to insure that there would be no drag out of the dusts or oxides from the building.

Water controls must be used for all saw cutting activities. That operation is very dusty and the application of water will minimize the dusting. Water application must be used while breaking up cement/asphalt and while loading it into roll-offs, end dumps, etc. to minimize the dusting that is common when handling those types of materials.

Weather conditions must be evaluated prior to any demolition type work. Activities on vety windy days must be minimized or possibly eliminated depending on the type of work and the structure to be removed. This decision will be made by the EHS Manager and communicated to the relevant contractors promptly.

#### EMISSION UNIT ENCLOSURES AND CONSTRUCTION ENCLOSURES

Before the blast fumace (EU ID 001), process fugitive etnissions from the refining kettles and tapping and charging of the furnaces (EU ID 011), the battery breaking area (EU ID 021), the feed dryer (EU ID 022) and the reverb furnace (EU ID 023) emission units become operational, they must be within a enclosure under negative that is ventilated to the Torit filter of EU ID 015. Wherever possible, prior to demolition and loading activities an enclosure must be erected around the affected area to control fugitive dust emissions caused by these activities.

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STANDARD OPERATING PROCEDURES FOR FUGITIVE DUST CONTROL DURING CONSTRUCTION ACTIVITIES

STANDARD OPERATING PROCEDURES FOR  
THE CONTROL OF FUGITIVE EMISSIONS

ENVIROFOCUS TECHNOLOGIES, LLC  
1901 NORTH 66th STREET  
TAMPA, FL 33619

REVISED DECEMBER 2006

## SECTION IV. APPENDIX FDCC

### STANDARD OPERATING PROCEDURES FOR FUGITIVE DUST CONTROL DURING CONSTRUCTION ACTIVITIES

#### INTRODUCTION

EnviroFocus Technologies, LLC (EFT), formerly Gulf Coast Recycling, Inc. (GCR), is a secondary lead smelter. The facility processes spent lead acid batteries. Battery components are separated and the lead-bearing materials are smelted in a blast furnace rendering a product known as blast lead. The blast lead is further refined to produce specific grades of lead for the manufacture of new batteries, ammunition, and other uses.

The facility has a Battery Breaking Operation, a Blast Furnace Operation, a Refining Operation, and a Materials Storage and Handling Area for lead bearing materials.

EFT is committed to the operation of its facility in a manner that will comply with applicable federal, state, and county environmental regulations and in harmony with the surrounding community. GCR has operated at its present location for more than forty (40) years, and EFT expects to continue operation well into this century. Regulatory compliance is a corporate commitment. This commitment is vigorously reinforced throughout the company, from the top down.

#### PURPOSE

The purpose of this plan is to maintain effective fugitive controls to meet the requirements of the U.S. Environmental Protection Agency (EPA), the Florida Department of Environmental Protection (FDEP), and the Environmental Protection Commission of Hillsborough County (EPC).

The EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) for Secondary Lead Smelting (40 CFR 63 Subpart X) apply to this facility. This rule requires the owner to prepare and operate in accordance with a standard operating procedures (SOP) manual that describes the measures used to control fugitive emissions at the facility. The NESHAP requirements are also referred to as EPA Maximum Achievable Control Technology (MACT) standards for secondary lead smelters.

FDEP rule 62 296.601 requires lead-processing operations located within lead non-attainment or maintenance areas to employ reasonably available control technology (RACT) to control potential fugitive emissions at the facility. The RACT rule addresses measures that apply to measures and activities that are not addressed by the MACT rule or are more stringent than the MACT requirements. These measures are also covered in this SOP. Additionally, GCR entered into a Consent Order (CO), case No. 95-0728SKW057, with the EPC which has specific requirements which are also incorporated into this SOP manual.

The EPC is the administrator of the aforementioned EPA and FDEP regulations and is authorized to issue facility construction and operation permits. All of the NESHAP, MACT, RACT, and CO requirements were incorporated as specific conditions into GCR's Title V Permit issued by the County and all future renewals. This SOP manual will also be incorporated, by reference, as a specific permit condition.

Potential sources of fugitive emissions at the facility include:

- (1) Plant Roadways and Parking Areas
- (2) Battery Breaking
- (3) Blast Furnace Area
- (4) Refining and Casting Area
- (5) Materials Storage and Handling Area (Group Pile)
- (6) Unpaved Outside Areas

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STANDARD OPERATING PROCEDURES FOR FUGITIVE DUST CONTROL DURING CONSTRUCTION ACTIVITIES

OPERATING PROCEDURES

The following procedures will be used at EFT, at a minimum, for the control of fugitive emissions:

Plant Roadways and Parking Areas

Vehicular traffic areas are all paved and are periodically wetted down by an eleven (11) zone automatic sprinkler system. Each zone is setup with a timer and control valve that cycles the zone on several times a day. The timers are electronic programmable timers in lockable cases. Sprinkler operation will be noted on the Sprinkler Operation Log form on a daily basis. A copy of the form is included as Attachment 1. The sprinkler zones, approximate number of sprinkler heads, and on and off times are as follows:

Zone	Location	# Sprinklers	On/Off Time
1	North Parldng Lot Fence	11	3 Min./12 Min.
2	Maintenance Shop and Fuel	3	3 Min./12 Min.
3	Pig Warehouse and N.E. Comer ofFumace	3	3 Min./12 Min.
4	Fumace Baghouses	4	3 Min./12 Min.
5	S.E. Wall Section	9	3 Min./12 Min.
6	S.W. Wall Section	15	3 Min./12 Min.
7	Wastewater Treatment Plant	4	3 Min./12 Min.
8	West Pavement Perimeter	7	3 Min./12 Min.
9	Northwest Pavement Perimeter	4	3 Min./12 Min.
10	Refining Area & Refining Warehouse	4	3 Min./12 Min.
11	Hygiene Building & Covered Parking	6	3 Min./12 Min.

The sprindlers cycle according to the following table. After the first fifteen minutes at least two zones will be on at all times.

ZONE 1--3 minutes		
ZONE 2--3 minutes		
ZONE 3--3 minutes		
ZONE 4--3 minutes		
ZONE 45--3 minutes		
ZONE 6--3 minutes	ZONE 1--3 minutes	
ZONE 7--3 minutes	ZONE 2--3 minutes	
ZONE 8--3 minutes	ZONE 3--3 minutes	
ZONE 9--3 minutes	ZONE 4--3 minutes	
ZONE 10--3 minutes	ZONE 5--3 minutes	
ZONE 11--3 minutes	ZONE 6--3 minutes	ZONE 1--3 minutes
	ZONE 7--3 minutes	ZONE 2--3 minutes
	ZONE 8--3 minutes	ZONE 3--3 minutes
	ZONE 9--3 minutes	ZONE 4--3 minutes
	ZONE 10--3 minutes	ZONE 5--3 minutes

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STANDARD OPERATING PROCEDURES FOR FUGITIVE DUST CONTROL DURING CONSTRUCTION ACTIVITIES

	ZONE 11--3 minutes	ZONE 6--3 minutes	ZONE 1--3 minutes
		ZONE 7--3 minutes	ZONE 2--3 minutes
		ZONE 8--3 minutes	ZONE 3--3 minutes
		ZONE 9--3 minutes	ZONE 4--3 minutes
		ZONE 10--3 minutes	ZONE 5--3 minutes
		ZONE 11--3 minutes	ZONE 6--3 minutes

Traffic paths shall be vacuumed three (3) times each day with a Tennant, or equivalent, vacuum sweeper, except when rain occurs or when areas are sufficiently wetted by the pavement sprinkler system. The employee parking lots will be vacuumed a minimum of three (3) times each week, unless prohibited by prolonged periods of rainfall. Records of the areas swept shall be included in documentation of sweeper operation. Sweeper operation will be noted on the Sweeper Operation Log form. Copies of the form are included as Attachment 2.

**Battery Breathing Area**

Partial walls surround this area on three (3) sides. The walls extend down from the roofline to approximately ten (10) feet from the top of the curbing that is around the entire floor area. Approximately three quarters of the east wall (the fourth wall) is directly adjacent to the west wall of the Materials Storage and Handling Area that provides a wall from the roof to the floor. Any wash-down water or process water from the operation gravity flows to a collection sump on the north side of the building. Water collected in the sump is pumped to the on-site wastewater treatment plant for treatment. The battery breathing area is washed down at least two times each day. The directed wash-down is noted on the daily operation log form and signed by the operator. A copy of the form is included as Attachment 3. Equipment leaving the roofed area are pressure washed or washed.

**Blast Furnace Area**

The Blast Furnace Area is partially enclosed with walls on the south, east and west sides that extend down from the roof to approximately fourteen (14') feet from the floor. The furnace is bordered on the south by the baghouses that are walled in and is bordered on the west (approximately 30 feet away) by the Materials Storage and Handling Area building. The furnace work area is washed/hosed down at least two times each day. Each wash-down will be noted on a shift operation form and signed by the operator. A copy of the form is included as Attachment 4. The wash-down water in the furnace area gravity flows to one of two floor sumps. The sumps are located on the east and west sides of the Blast Furnace Area. Water collected in these sumps will be pumped to the wastewater treatment plant for treatment. Equipment leaving the roofed area is pressure washed or washed.

Enclosures and hoods that are vented to a baghouse control potential process fugitive emissions in the blast furnace operation. The blast furnace slag tapping enclosure, the lead tapping hood and the blast furnace charging enclosure are vented to the furnace hygiene baghouse. Dust from the baghouses is conveyed via covered screws to a tank where it is weighed, sluffed with water, and pumped to a reactor in the battery breathing area for desulfurization. The openings or faces of these hoods and enclosures meet the MACT face velocity requirements when access doors are in their normal operating position.

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**SECTION IV. APPENDIX FDCC**

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STANDARD OPERATING PROCEDURES FOR FUGITIVE DUST CONTROL DURING CONSTRUCTION ACTIVITIES

**Refining and Casting Area**

The Refining and Casting Area is also partially enclosed. The work area is washed/hosed down at least two (2) times each day. Each wash-down is noted on the daily operation form and signed by the operator. A copy of the fomt is included as Attachment 5. Wash-down water in the refming area is collected in a floor sump and pumped to the wastewater treatment plant for treatment. Equipment leaving the roofed area is pressure washed or washed.

Potential process fugitive emissions in the Refining and Casting Area are controlled by hoods over each of the four refining kettles and by enclosures for the dross receptacles. The hoods and enclosures are vented to a baghouse. The kettle hoods meet the MACT face velocity requirements when the access doors are in their notmal operating position.

Molten lead is pumped from the kettles to one of two casting machines. A pre-set amount of lead is delivered to the pig molds through a star ladle at the front end of the casting machines. The star ladles are kept hot by a gas flame. A hood is provided over each star ladle to capture potential emissions. The face of the hood meets the MACT face velocity requirement.

**Materials Storage and Handling Area (Group Pile)**

The Materials Storage and Handling Area has walls from the roof to the floor on a four sides. There is an approximately 24' x 14' equipment access opening on the west side of the area. There is an approximately 12' x 13' loading/unloading ramp access opening on the north side of the area. Accumulated water in this area gravity flows to one of two floor sumps. There is a collection sump on the east wall near the southeast corner of the area and one sump on the north side of the area. Water collected in the sumps is pumped to the wastewater treatment plant for treatment. The pathways within this area will be wetted down as needed to prevent the generation of dust. The materials stored in this area are washed and wetted prior to storage and will remain moist even after long-term storage. Additional wetting of the stored material will be provided, if necessary, to prevent the generation of dust; however, it is not anticipated that additional wetting will be necessary.

The main entrance/exit to the Materials Storage and Handling Area is under a contiguous roof that provides covered access for equipment moving between the materials storage and handling, blast furnace, and refining areas. Forklifts and front-end loaders leaving the roofed area are pressure washed or washed. The fonn used to document the washing of the equipment is included as Attachment 6.

**Unpaved Outside Areas**

The unpaved areas of the facility are grassed and will be maintained as such. There will be no routine traffic in these areas. Equipment traffic in the grassed areas will be limited to access for maintenance and up keep or to affect repairs to equipment (i.e. pumps, motors) that are located off or at the edge of the paved areas.

## SECTION IV. APPENDIX FDCO

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### STANDARD OPERATING PROCEDURES FOR FUGITIVE DUST CONTROL DURING OPERATIONAL ACTIVITIES

#### INTRODUCTION

EnviroFocus Technologies, LLC (EFT), formerly Gulf Coast Recycling, Inc. (GRC), is a secondary lead smelter. The facility applied for a PSD construction permit on August 7, 2008 to expand the capacity of the plant. As part of the PSD permit application process, EFT is required to enclosing all process operations, such as battery brealdng, material drying, material handling, smelting, refining, and casting and to direct the ventilation from these areas through air pollution control devices. Additionally, EFT is required to control fugitive emissions from paved and unpaved surfaces at the site. These procedures describe these sources of fugitive emissions and the controls that shall be employed upon completion of the expansion project.

#### OPERATING PROCEDURES

##### Plant Roadways and Parldng Areas

Vehicular traffic areas will be paved and periodically wetted down by an eight (8) zone automatic sprindler system (see drawing and end of appendix). The system will be controlled by a time that cycles the zones on several times a day. The timer will be an electronic programmable timer in a lockable case. Sprinkler operation will be noted on a Sprinkler Operation Log form on a daily basis. The sprindler timer will operate on the following schedule, except when rain occurs:

Day Time (9AM to 7PM)

May through September

Each zone shall run 3.75 minutes per cycle and run two 30-minute cycles per hour (continuous)

November through April

Each zone shall run 3.75 minutes per cycle for one 30-minute cycle per hour

Night Time (7PM to 9AM)

May through September

Each zone shall run 3.75 minutes per cycle for one 30-minute cycle per hour

November through April

Each zone shall run 3.75 minutes per cycle for one 30-minute cycle every other hour

In addition to wetting, traffic paths shall be shall be vacuumed three (3) times each day with a Tennant, or equivalent, vacuum sweeper, except when rain occurs or when areas are sufficiently wetted by the pavement sprindler system. Employee parldng lots will be vacuumed a minimum of three (3) times each week, unless prohibited by prolonged periods of rainfall. Records of the areas swept shall be included in documentation of sweeper operation. Sweeper operation will be noted on a Sweeper Operation Log fom.

Finally, vehicle wash stations will be installed in the process area enclosure at locations adjacent to building openings through which vehicles may exit the process area (see attached drawing). Dust and accumulated materials will be removed from the wheels and underside of all vehicles at the vehicle wash stations to prevent the transfer of lead contaminated material to another area of the smelter or to the paved surfaces outside the enclosure. Each wash down will be noted on a Vehicle Wash Log form.

##### Unpaved Outside Areas

The unpaved areas of the facility will be grassed and will be maintained as such. There will be no routine traffic in these areas. Equipment traffic in the grassed areas will be limited to access for maintenance and up keep or to affect repairs to equipment (i.e. pumps, motors) that are located off or at the edge of paved areas.

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SECTION IV. APPENDIX GC

GENERAL CONDITIONS

The permittee shall comply with the following general conditions from Rule 62-4.160, F.A.C.

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.
2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.
3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey and vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.
4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.
5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.
6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.
7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:
  - a. Have access to and copy and records that must be kept under the conditions of the permit;
  - b. Inspect the facility, equipment, practices, or operations regulated or required under this permit, and,
  - c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.Reasonable time may depend on the nature of the concern being investigated.
8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:
  - a. A description of and cause of non-compliance; and
  - b. The period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

SECTION IV. APPENDIX GC

GENERAL CONDITIONS

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.73 and 403.111, Florida Statutes. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.
10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.
11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 62-4.120 and 62-730.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.
12. This permit or a copy thereof shall be kept at the work site of the permitted activity.
13. This permit also constitutes:
  - a. Determination of Best Available Control Technology (X);
  - b. Determination of Prevention of Significant Deterioration (X);
  - c. Compliance with National Emission Standards for Hazardous Air Pollutants (X); and
  - d. Compliance with New Source Performance Standards (X).
14. The permittee shall comply with the following:
  - a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.
  - b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application or this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.
  - c. Records of monitoring information shall include:
    - 1) The date, exact place, and time of sampling or measurements;
    - 2) The person responsible for performing the sampling or measurements;
    - 3) The dates analyses were performed;
    - 4) The person responsible for performing the analyses;
    - 5) The analytical techniques or methods used; and
    - 6) The results of such analyses.
15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SECTION N. APPENDIX GP

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NSPS SUBPART A AND NESHAP SUBPART A -IDENTIFICATION OF GENERAL PROVISIONS

NSPS -SUBPART A, IDENTIFICATION OF GENERAL PROVISIONS

The provisions of this Subpart may be provided in full upon request. Emissions units subject to a New Source Performance Standard of 40 CFR 60 are also subject to the applicable requirements of Subpart A, the General Provisions, including:

- § 60.1 Applicability.
- § 60.2 Definitions.
- § 60.3 Units and abbreviations.
- § 60.4 Address.
- § 60.5 Determination of construction or modification.
- § 60.6 Review of plans.
- § 60.7 Notification and Record Keeping.
- § 60.8 Performance Tests.
- § 60.9 Availability of information.
- § 60.10 State Authority.
- § 60.11 Compliance with Standards and Maintenance Requirements.
- § 60.12 Circumvention.
- § 60.13 Monitoring Requirements.
- § 60.14 Modification.
- § 60.15 Reconstruction.
- § 60.16 Priority List.
- § 60.17 Incorporations by Reference.
- § 60.18 General Control Device Requirements.
- § 60.19 General Notification and Reporting Requirements.

Individual subparts may exempt specific equipment or processes from some or all of these requirements. The general provisions may be provided in full upon request.

NESHAP- SUBPART A, IDENTIFICATION OF GENERAL PROVISIONS

The provisions of this Subpart may be provided in full upon request. Emissions units subject to a National Emission Standards for Hazardous Air Pollutants of 40 CFR 63 are also subject to the applicable requirements of Subpart A, the General Provisions, including:

- § 63.1 Applicability.
- § 63.2 Definitions.
- § 63.3 Units and abbreviations.
- § 63.4 Prohibited Activities and Circumvention.
- § 63.5 Preconstruction Review and Notification Requirements.
- § 63.6 Compliance with Standards and Maintenance Requirements.

**SECTION IV. APPENDIX GP**

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**NSPS SUBPART A AND NESHAP SUBPART A- IDENTIFICATION OF GENERAL PROVISIONS**

§ 63.7 Performance Testing Requirements.

§ 63.8 Monitoring Requirements.

§ 63.9 Notification Requirements.

§ 63.10 Recordkeeping and Reporting Requirements.

§ 63.11 Control Device Requirements.

§ 63.12 State Authority and Delegations.

§ 63.13 Addresses of State Air Pollution Control Agencies and EPA Regional Offices.

§ 63.14 Incorporation by Reference.

§ 63.15 Availability of Information and Confidentiality.

Individual subparts may exempt specific equipment or processes from some or all of these requirements. The general provisions may be provided in full upon request.

SECTION IV. **APPENDIX 1111**

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NSPS, SUBPART **III**- STATIONARY COMPRESSION IGNITION INTERNAL COMBUSTION ENGINES

A nominal 500 kW emergency generator (EU ID 026) is proposed for the EFT facility and is subject to the applicable requirements of 40 CFR 60, Subpart **III**--Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. The provisions of this Subpart may be provided in full upon request and are also available at the following link:

[Link to Subpart III](#)

## SECTION IV. APPENDIX L

### NSPS, SUBPART L- SECONDARY LEAD SMELTERS

The blast furnace (EU ID 001) and reverb furnace (EU ID 023) located at the EFT facility are subject to all applicable provisions of 40 CFR 60, Subpart L --Standards of Performance for Secondary Lead Smelters. The provisions of this Subpart are given below in their entirety:

§ 60.120 Applicability and designation of affected facility.

- (a) The provisions of this subpart are applicable to the following affected facilities in secondary lead smelters: Pot furnaces of more than 250 kg (550 lb) charging capacity, blast (cupola) furnaces, and reverberatory furnaces.
- (b) Any facility under paragraph (a) of this section that commences construction or modification after June 11, 1973, is subject to the requirements of this subpart.

[42 FR 37937, July 25, 1977]

§ 60.121 Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given them in the Act and in subpart A of this part.

- (a) *Reverberatory furnace* includes the following types of reverberatory furnaces: stationary, rotating, rocking, and tilting.
- (b) *Secondary lead smelter* means any facility producing lead from a lead bearing scrap material by smelting to the metallic form.
- (c) *Lead* means elemental lead or alloys in which the predominant component is lead.
- (d) *Blast furnace* means any furnace used to recover metal from slag.

[39 FR 9317, Mar. 8, 1974; 39 FR 13776, Apr. 17, 1974, as amended at 65 FR 61756, Oct. 17, 2000]

§ 60.122 Standard for particulate matter.

- (a) On and after the date on which the performance test required to be conducted by §60.8 is completed, no owner or operator subject to the provisions of this subpart shall discharge or cause the discharge into the atmosphere from a blast (cupola) or reverberatory furnace any gases which:
  - (1) Contain particulate matter in excess of 50 mg/dscm (0.022 gr/dscf).
  - (2) Exhibit 20 percent opacity or greater.
- (b) On and after the date on which the performance test required to be conducted by §60.8 is completed, no owner or operator subject to the provisions of this subpart shall discharge or cause the discharge into the atmosphere from any pot furnace any gases which exhibit 10 percent opacity or greater.

[39 FR 9317, Mar. 8, 1974, as amended at 40 FR 46259, Oct. 6, 1975]

§ 60.123 Test methods and procedures.

- (a) In conducting the performance tests required in §60.8, the owner or operator shall use as reference methods and procedures the test methods in appendix A of this part or other methods and procedures as specified in this section, except as provided in §60.8(b).
- (b) The owner or operator shall determine compliance with the particulate matter standards in §60.122 as follows:
  - (1) Method 5 shall be used to determine the particulate matter concentration during representative periods of furnace operation, including charging and tapping. The sampling time and sample volume for each run shall be at least 60 minutes and 0.90 dscm (31.8 dscf).
  - (2) Method 9 and the procedures in §60.11 shall be used to determine opacity.

SECTION IV. APPENDIX ZZZZ

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NESHAP SUBPART ZZZZ- STATIONARY RECIPROCATING INTERNAL COMBUSTION ENGINES

A nominal 500 kW emergency generator (EU ID 026) is proposed for the EFT facility is a reciprocating internal combustion engine (RJCE) and is subject to the requirements of 40 CFR 63, Subpart ZZZZ--National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.

The complete provisions of Subpart ZZZZ may be provided in full upon request and are also available beginning at Section 63.6580 at:

[Link to Subpart ZZZZ](#)

**SECTION N. APPENDIX X**

**NESHAP, SUBPART X -SECONDARY LEAD SMELTERS**

The blast furnace (EU ID 001), facility grounds and roads (EU ID 009), process fugitive emissions from the refining kettles and tapping and charging of the furnaces (EU ID 011), the kettle combustors (EU ID 013), building ventilation (EU ID 015), the battery brealdng area (EU ID 021), the feed dtyer (EU ID 022) and the reverb furnace (EU ID 023) located at the EFT facility are subject to all applicable provisions of 40 CFR 63, Subpatt X- National Emission Standards for Hazardous Air Pollutants from Secondary Lead Smelting.

Linlc to Subpart X

The applicable provisions of 40 CFR 63, Subpatt X are given below.

Title 40: Protection of Environment, Part 63, Subpart X-National Emission Standards for Hazardous Air Pollutants from Secondary Lead Smelting

Source: 62 FR 32216, June 13, 1997, unless otherwise noted.

§ 63.541 Applicability.

- (a) The provisions of this subpart apply to the following affected sources at all secondary lead smelters: blast, reverberatmy, rotary, and electric smelting furnaces; refining kettles; agglomerating fumaces; dryers; process fugitive sources; and fugitive dust sources. The provisions ofthis subpatt do not apply to primary lead smelters, lead refiners, or lead remelters.
- (b) Table 1 of this subpart specifies the provisions of subpart A that apply and those that do not apply to owners and operators of secondary lead smelters subject to this subpatt.

**Table 1-General Provisions Applicability to Subpart X**

Reference	Applies to subpart X	Comment
63.1	Yes	
63.2	Yes	
63.3	Yes	
63.4	Yes	
63.5	Yes	
63.6 (a), (b), (c), (e), (f), (g), (i) and G)	Yes	
63.6 (d) and (h)	No	No opacity limits in rule.
63.7	Yes	
63.8	Yes	
63.9 (a), (b), (c), (d), (e), (g), (h)(1-3), (h)(5-6), and G)	Yes	
63.9 (f) and (h)(4)	No	No opacity or visible emission limits in subpart X.
63.10	Yes	
63.11	No	lares will not be used to comply with the emission imits.
63.12 to 63.15	Yes	

(c) [Condition already satisfied]

SECTION **N**. APPENDIX X  
NESHAP, SUBPART X-SECONDARY LEAD SMELTERS

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§ 63.542 Definitions.

Terms used in this subpart are defined in the Act, in subpart A of this part, or in this section as follows:

*Bag leak detection system* means an instrument that is capable of monitoring particulate matter (dust) loadings in the exhaust of a baghouse in order to detect bag failures. A bag leak detection system includes, but is not limited to, an instrument that operates on triboelectric, light scattering, transmittance or other effect to monitor relative particulate matter loadings.

*Battery breaking area* means the plant location at which lead-acid batteries are broken, crushed, or disassembled and separated into components.

*Blast furnace* means a smelting furnace consisting of a vertical cylinder atop a crucible, into which lead-bearing charge materials are introduced at the top of the furnace and combustion air is introduced through tuyeres at the bottom of the cylinder, and that uses coke as a fuel source and that is operated at such a temperature in the combustion zone (greater than 980 °C) that lead compounds are chemically reduced to elemental lead metal.

*Blast furnace charging location* means the physical opening through which raw materials are introduced into a blast furnace.

*Collocated blast furnace and reverberatory furnace* means operation at the same location of a blast furnace and a reverberatory furnace with the volumetric flow rate discharged from the blast furnace being at equal to or less than that discharged from the reverberatory furnace.

*Dryer* means a chamber that is heated and that is used to remove moisture from lead-bearing materials before they are charged to a smelting furnace.

*Dryer transition piece* means the junction between a dryer and the charge hopper or conveyor, or the junction between the dryer and the smelting furnace feed chute or hopper located at the ends of the dryer.

*Enclosure hood* means a hood that covers a process fugitive emission source on the top and on all sides, with openings only for access to introduce or remove materials to or from the source and through which an induced flow of air is ventilated.

*Fugitive dust source* means a stationary source of hazardous air pollutant emissions at a secondary lead smelter that is not associated with a specific process or process fugitive vent or stack. Fugitive dust sources include, but are not limited to, roadways, storage piles, materials handling transfer points, materials transport areas, storage areas, process areas, and buildings.

*Furnace and refining/casting area* means any area of a secondary lead smelter in which:

- (1) Smelting furnaces are located; or
- (2) Refining operations occur; or
- (3) Casting operations occur.

*High efficiency particulate air (HEPA) filter* means a filter that has been certified by the manufacturer to remove 99.97 percent of all particles 0.3 micrometers and larger.

*Lead alloy* means an alloy in which the predominant component is lead.

*Materials storage and handling area* means any area of a secondary lead smelter in which lead-bearing materials (including, but not limited to, broken battery components, reverberatory furnace slag, flue dust, and dross) are stored or handled between process steps including, but not limited to, areas in which materials are stored in piles, bins, or tubs, and areas in which material is prepared for charging to a smelting furnace. Materials storage and handling area does not include areas used exclusively for storage of blast furnace slag.

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### NESHAP, SUBPART X-SECONDARY LEAD SMELTERS

*Partial enclosure* means a structure comprised of walls or partitions on at least three sides or three-quarters of the perimeter surrounding stored materials or process equipment to prevent the entrainment of particulate matter into the air.

*Pavement cleaning* means the use of vacuum equipment, water sprays, or a combination thereof to remove dust or other accumulated material from the paved areas of a secondary lead smelter.

*Plant roadway* means any area of a secondary lead smelter that is subject to vehicle traffic, including traffic by forklifts, front-end loaders, or vehicles carrying whole batteries or cast lead ingots. Excluded from this definition are employee and visitor parking areas, provided they are not subject to traffic by vehicles carrying lead-bearing materials.

*Pressurized dryer breaching seal* means a seal system connecting the dryer transition pieces which is maintained at a higher pressure than the inside of the dryer.

*Process fugitive emission source* means a source of hazardous air pollutant emissions at a secondary lead smelter that is associated with lead smelting or refining, but is not the primary exhaust stream from a smelting furnace, and is not a fugitive dust source. Process fugitive sources include, but are not limited to, smelting furnace charging points, smelting furnace lead and slag taps, refining kettles, agglomerating furnaces, and drying idler transition pieces.

*Refining kettle* means an open-top vessel that is constructed of cast iron or steel and is indirectly heated from below and contains molten lead for the purpose of refining and alloying the lead. Included are pot furnaces, receiving kettles, and holding kettles.

*Reverberatory furnace* means a refractory-lined furnace that uses one or more flames to heat the walls and roof of the furnace and lead-bearing scrap to such a temperature (greater than 980 °C) that lead compounds are chemically reduced to elemental lead metal.

*Secondary lead smelter* means any facility at which lead-bearing scrap material, primarily, but not limited to, lead-acid batteries, is recycled into elemental lead or lead alloys by smelting.

*Smelting* means the chemical reduction of lead compounds to elemental lead or lead alloys through processing in high-temperature (greater than 980 °C) furnaces including, but not limited to, blast furnaces, reverberatory furnaces, rotary furnaces, and electric furnaces.

*Total enclosure* means a roofed and walled structure with limited openings to allow access and egress for people and vehicles that meets the requirements of 40 CFR 265.1101(a)(1), (a)(2)(i), and (c)(1)(i).

*Vehicle wash* means a device for removing dust and other accumulated material from the wheels, body, and underside of a vehicle to prevent the inadvertent transfer of lead contaminated material to another area of a secondary lead smelter or to public roadways.

*Wet suppression* means the use of water, water combined with a chemical surfactant, or a chemical binding agent to prevent the entrainment of dust into the air from fugitive dust sources.

[62 FR 32216, June 13, 1997, as amended at 63 FR 45011, Aug. 24, 1998]

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NESHAP, SUBPART X-SECONDARY LEAD SMELTERS

§ 63.543 Standards for process sources.

- (a) No owner or operator of a secondary lead smelter shall discharge or cause to be discharged into the atmosphere from any existing, new, or reconstructed blast, reverberatory, rotary, or electric smelting furnace any gases that contain lead compounds in excess of 2.0 milligrams of lead per dry standard cubic meter (mg/dscm).
- (b) [Reserved]
- (c) No owner or operator of a secondary lead smelter with a collocated blast furnace and reverberatory furnace shall discharge or cause to be discharged into the atmosphere from any existing, new, or reconstructed blast furnace or reverberatory furnace any gases that contain total hydrocarbons in excess of 20 parts per million by volume, expressed as propane corrected to 4 percent carbon dioxide (ppmv as propane @4% CO<sub>2</sub>), except as allowed under Paragraphs (c)(1) and (c)(2) of this section.
- (d) No owner or operator of a secondary lead smelter with a collocated blast furnace and reverberatory furnace shall discharge or cause to be discharged into the atmosphere from any existing blast furnace any gases that contain total hydrocarbons in excess of 360 ppmv as propane @4% CO<sub>2</sub>, during periods when the reverberatory furnace is not operating.
  - (1) No owner or operator of a secondary lead smelter with a collocated blast furnace and reverberatory furnace shall discharge or cause to be discharged into the atmosphere from any blast furnace that commences construction or reconstruction after June 9, 1994, any gases that contain total hydrocarbons in excess of 70 ppmv as propane @4% CO<sub>2</sub>, during periods when the reverberatory furnace is not operating.
- (e) [Not applicable]
- (f) [Not applicable]
- (g) [Not applicable]
- (h) If the owner or operator of a blast furnace or a collocated blast furnace and reverberatory furnace does not combine the blast furnace charging process fugitive emissions with the blast furnace process emissions and discharge such emissions to the atmosphere through separate emission points, then exhaust shall not contain total hydrocarbons in excess of 20 parts per million by volume, expressed as propane.
- (i) Except as provided in paragraph (i) of this section, following the initial test to demonstrate compliance with paragraph (a) of this section, the owner or operator of a secondary lead smelter shall conduct a compliance test for lead compounds on an annual basis (no later than 12 calendar months following the previous compliance test).
- (j) [Not applicable]
- (k) The standards for process sources are summarized in table 2.

Table 2-Summary of Standards for Process Sources Collocated blast furnace and reverberatory furnace:

Furnace configuration	Lead compounds (mg/dscm)	Total hydrocarbons	Citation
When both furnaces operating	2.0	20ppmv <sup>1</sup>	§63.543(a),(c).
When reverberatory furnace not operating	2.0	360 ppmv <sup>1</sup> (existing)	§63.543(a),(c)(1).
		70 ppmv <sup>1</sup> (new)	§63.543(a),(c)(2).

<sup>1</sup>Total hydrocarbons emissions limits are as propane at 4 percent carbon dioxide to correct for dilution, based on a 3-hour average.

<sup>2</sup>New sources include those furnaces that commence construction or reconstruction after June 9, 1994.

§ 63.544 Standards for process fugitive sources.

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NESHAP, SUBPART X -SECONDARY LEAD SMELTERS

- (a) Each owner or operator of a secondary lead smelter shall control the process fugitive emission sources listed in paragraphs (a)(1) through (a)(6) of this section in accordance with the equipment and operational standards presented in paragraphs (b) and (c) of this section.
  - (1) Smelting furnace and dryer charging hoppers, chutes, and skip hoists;
  - (2) Smelting furnace lead taps, and molds during tapping;
  - (3) Smelting furnace slag taps, and molds during tapping;
  - (4) Refining kettles;
  - (5) Dryer transition pieces; and
  - (6) [Not applicable]
- (b) Process fugitive emission sources shall be equipped with an enclosure hood meeting the requirements of paragraphs (b)(1), (b)(2), or (b)(3) of this section, or be located in a total enclosure subject to general ventilation that maintains the building at a lower than ambient pressure to ensure in-draft through any doorway opening.
  - (1) All process fugitive enclosure hoods except those specified for refining kettles and dryer transition pieces shall be ventilated to maintain a face velocity of at least 300 feet per minute (fpm) at all hood openings.
  - (2) Process fugitive enclosure hoods required for refining kettles in paragraph (a) of this section shall be ventilated to maintain a face velocity of at least 250 fpm.
  - (3) Process fugitive enclosure hoods required over dryer transition pieces in paragraph (a) of this section shall be ventilated to maintain a face velocity of at least 350 fpm.
- (c) Ventilation air from all enclosures hoods and total enclosures shall be conveyed to a control device. Gases discharged to the atmosphere from these control devices shall not contain lead compounds in excess of 2.0 mg/dscm.
- (d) All dryer emission vents shall be ventilated to a control device that shall not discharge to the atmosphere any gases that contain lead compounds in excess of 2.0 mg/dscm.
- (e) Following the date of the initial test to demonstrate compliance with paragraphs (c) and (d) of this section, the owner or operator of a secondary lead smelter shall conduct a compliance test for lead compounds on an annual basis (no later than 12 calendar months following the previous compliance test).
- (f) [Not applicable]
- (g) [Not applicable]
- (h) The standards for process fugitive sources are summarized in table 3.

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Table 3--Summary of Standards for Process Fugitive Sources

Fugitive emission source	Control device lead compound emission limit (mg/dscm)	Enclosed hood or doorway face velocity (fpm)	Citation
<b>Control Option I</b>			
Smelting furnace and dryer charging hoppers, chutes, and skip hoists	2.0	300 <sup>1</sup>	§63.544 (b), (c).
Smelting furnace lead taps and molds during tapping	2.0	300 <sup>1</sup>	§63.544 (b), (c).
Smelting furnace slag taps and molds during tapping	2.0	300 <sup>1</sup>	§63.544 (b), (c).
Refining kettles	2.0	250 <sup>1</sup>	§63.544 (b), (c).
Dryer transition pieces	2.0	350 <sup>1</sup>	§63.544 (b), (c).
Agglomerating furnace process vents and product taps	2.0	300 <sup>1</sup>	§63.544 (b), (c).
<b>Control Option II</b>			
Enclosed building ventilated to a control device	2.0		§63.544 (b), (c).
<b>Applicable to Both Control Options</b>			
Dryer and agglomerating furnace emission vents	2.0		§63.544(d).

<sup>1</sup>Enclosure hood face velocity applicable to those process fugitive sources not located in an enclosed building ventilated to a control device.

[62 FR 32216, June 13, 1997, as amended at 63 FR 45011, Aug. 24, 1998]

§ 63.545 Standards for fugitive dust sources.

- (a) Each owner or operator of a secondary lead smelter shall prepare and at all times operate according to a standard operating procedures manual that describes in detail the measures that will be put in place to control fugitive dust emission sources within the areas of the secondary lead smelter listed in paragraphs (a)(1) through (a)(5) of this section.
  - (1) Plant roadways;
  - (2) Battery breaking area;
  - (3) Furnace area;
  - (4) Refining and casting area; and
  - (5) Materials storage and handling area.
- (b) The standard operating procedures manual shall be submitted to the Administrator or delegated authority for review and approval.

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- (c) The controls specified in the standard operating procedures manual shall at a minimum include the requirements of paragraphs (c)(1) through (c)(5) of this section, unless the owner or operator satisfies the requirements in paragraph (f) of this section.
- (1) Plant roadways-paving of all areas subject to vehicle traffic and pavement cleaning twice per day of those areas, except on days when natural precipitation makes cleaning unnecessary or when sand or a similar material has been spread on plant roadways to provide traction on ice or snow.
  - (2) Battery breaking area-total enclosure of the battery breaking area.
  - (3) Furnace area-total enclosure and ventilation of the enclosure to a control device.
  - (4) Refining and casting area-total enclosure and ventilation of the enclosure to a control device.
  - (5) Materials storage and handling area-total enclosure of the area and ventilation of the enclosure to a control device, and a vehicle wash at each exit.
- (d) The standard operating procedures manual shall require that daily records be maintained of all wet suppression, pavement cleaning, and vehicle washing activities performed to control fugitive dust emissions.
- (e) No owner or operator of a secondary lead smelter shall discharge or cause to be discharged into the atmosphere from any building or enclosure ventilation system any gases that contain lead compounds in excess of 2.0 mg/dscm.
- (f) [Not applicable]

[62 FR 32216, June 13, 1997, as amended at 68 FR 37350, June 23, 2003]

§ 63.546 Compliance dates.

- (a) Each owner or operator of an existing secondary lead smelter shall achieve compliance with the requirements of this subpart no later than December 23, 1997. Existing sources wishing to apply for an extension of compliance pursuant to section §63.6(i) of this part must do so no later than June 23, 1997.
- (b) Each owner or operator of a secondary lead smelter that commences construction or reconstruction after June 9, 1994, shall achieve compliance with the requirements of this subpart by June 13, 1997 or upon startup of operations, whichever is later.

[62 FR 32216, June 13, 1997, as amended at 64 FR 4572, Jan. 29, 1999]

§ 63.547 Test methods.

- (a) The following test methods in appendix A of part 60 listed in paragraphs (a)(1) through (a)(5) of this section shall be used to determine compliance with the emission standards for lead compounds under §§63.543(a), 63.544 (c), and (d), and 63.545(e):
  - (1) Method 1 shall be used to select the sampling point location and the number of traverse points.
  - (2) Method 2 shall be used to measure volumetric flow rate.
  - (3) Method 3 shall be used for gas analysis to determine the dry molecular weight of the stack gas.
  - (4) Method 4 shall be used to determine moisture content of the stack gas.
  - (5) Method 12 shall be used to determine compliance with the lead compound emission standards. The minimum sample volume shall be 0.85 dry standard cubic meters (30 dry standard cubic feet) and the minimum sampling time shall be 60 minutes for each run. Three runs shall be performed and the average of the three runs shall be used to determine compliance.

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- (b) The following tests methods in appendix A of part 60 listed in paragraphs (b)(1) through (b)(4) of this section shall be used, as specified, to determine compliance with the emission standards for total hydrocarbons §63.543(c), (d), (e), and (g).
- (1) Method 1 shall be used to select the sampling point location to determine compliance under §63.543(c), (d), (e), and (g).
  - (2) The Single Point Integrated Sampling and Analytical Procedure of Method 3B shall be used to measure the carbon dioxide content of the stack gases to determine compliance under §63.543(c), (d), and (e).
  - (3) Method 4 shall be used to measure moisture content of the stack gases to determine compliance under §63.543(c), (d), (e), and (g).
  - (4) Method 25A shall be used to measure total hydrocarbon emissions to determine compliance under §63.543(c), (d), (e), and (g). The minimum sampling time shall be 1 hour for each run. A minimum of three runs shall be performed. A 1-hour average total hydrocarbon concentration shall be determined for each run and the average of the three 1-hour averages shall be used to determine compliance. The total hydrocarbon emissions concentrations for determining compliance under §63.543(c), (d), and (e) shall be expressed as propane and shall be corrected to 4 percent carbon dioxide, as described in paragraph (c) of this section.
- (c) For the purposes of determining compliance with the emission limits under §63.543 (c), (d), and (e), the measured total hydrocarbon concentrations shall be corrected to 4 percent carbon dioxide as listed in paragraphs (c)(1) through (c)(2) of this section in the following manner:
- (1) If the measured percent carbon dioxide is greater than 0.4 percent in each compliance test, the correction factor shall be determined by using equation (1).

$$F = \frac{4.0}{CO_2} \quad (1)$$

where:

F = correction factor (no units)

CO<sub>2</sub> = percent carbon dioxide measured using Method 3B, where the measured carbon dioxide is greater than 0.4 percent.

- (2) If the measured percent carbon dioxide is equal to or less than 0.4 percent, then a correction factor (F) of 1.0 shall be used.
  - (3) The corrected total hydrocarbon concentration shall be determined by multiplying the measured total hydrocarbon concentration by the correction factor (F) determined for each compliance test.
- (d) Compliance with the face velocity requirements under §63.544(b) for process fugitive enclosure hoods shall be determined by the following test methods in paragraphs (d)(1) or (d)(2) of this section.
- (1) Owners and operators shall calculate face velocity using the procedures in paragraphs (d)(1)(i) through (d)(1)(iv) of this section.
    - (i) Method 1 shall be used to select the sampling port location in the duct leading from the process fugitive enclosure hood to the control device.
    - (ii) Method 2 shall be used to measure the volumetric flow rate in the duct from the process fugitive enclosure hood to the control device.

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- (iii) The face area of the hood shall be determined from measurement of the hood. If the hood has access doors, then face area shall be determined with the access doors in the position they are in during normal operating conditions.
  - (iv) Face velocity shall be determined by dividing the volumetric flow rate determined in paragraph (d)(1)(ii) of this section by the total face area for the hood determined in paragraph (d)(1)(iii) of this section.
- (2) The face velocity shall be measured directly using the procedures in paragraphs (d)(2)(i) through (d)(2)(v) of this section.
- (i) A propeller anemometer or equivalent device shall be used to measure hood face velocity.
  - (ii) The propeller of the anemometer shall be made of a material of uniform density and shall be properly balanced to optimize performance.
  - (iii) The measurement range of the anemometer shall extend to at least 1,000 fpm.
  - (iv) A known relationship shall exist between the anemometer signal output and air velocity, and the anemometer must be equipped with a suitable readout system.
  - (v) Hood face velocity shall be determined for each hood open during normal operation by placing the anemometer in the plane of the hood opening. Access doors shall be positioned consistent with normal operation.
- (e) Owners and operators shall determine compliance with the doorway in-draft requirement for enclosed buildings in §63.544(b) using the procedures in paragraphs (e)(1) or (e)(2) of this section.
- (1)
- (i) Owners and operators shall use a propeller anemometer or equivalent device meeting the requirements of paragraphs (d)(2)(ii) through (d)(2)(iv) of this section.
  - (ii) Doorway in-draft shall be determined by placing the anemometer in the plane of the doorway opening near its center.
  - (iii) Doorway in-draft shall be demonstrated for each doorway that is open during normal operation with all remaining doorways in the position they are in during normal operation.
- (2)
- (i) Owners and operators shall install a differential pressure gage on the leeward wall of the building to measure the pressure difference between the inside and outside of the building.
  - (ii) The pressure gage shall be certified by the manufacturer to be capable of measuring pressure differential in the range of 0.02 to 0.2 millimeters of mercury (mmHg).
  - (iii) Both the inside and outside taps shall be shielded to reduce the effects of wind.
  - (iv) Owners and operators shall demonstrate the inside of the building is maintained at a negative pressure as compared to the outside of the building of no less than 0.02 mm Hg when all doors are in the position they are in during normal operation.

[62 FR32216, June 13, 1997, as amended at 63 FR45011, Aug. 24, 1998]

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§ 63.548 Monitoring requirements.

- (a) Owners and operators of secondary lead smelters shall prepare, and at all times operate according to, a standard operating procedures manual that describes in detail procedures for inspection, maintenance, and bag leak detection and corrective action plans for all baghouses (fabric filters) that are used to control process, process fugitive, or fugitive dust emissions from any source subject to the lead emission standards in §§63.543, 63.544, and 63.545, including those used to control emissions from building ventilation. This provision shall not apply to process fugitive sources that are controlled by wet scrubbers.
- (b) The standard operating procedures manual for baghouses required by paragraph (a) of this section shall be submitted to the Administrator or delegated authority for review and approval.
- (c) The procedures specified in the standard operating procedures manual for inspections and routine maintenance shall, at a minimum, include the requirements of paragraphs (c)(1) through (c)(9) of this section.
  - (1) Daily monitoring of pressure drop across each baghouse cell.
  - (2) Weekly confirmation that dust is being removed from hoppers through visual inspection, or equivalent means of ensuring the proper functioning of removal mechanisms.
  - (3) Daily check of compressed air supply for pulse-jet baghouses.
  - (4) An appropriate methodology for monitoring cleaning cycles to ensure proper operation.
  - (5) Monthly check of bag cleaning mechanisms for proper functioning through visual inspection or equivalent means.
  - (6) Monthly check of bag tension on reverse air and shaker-type baghouses. Such checks are not required for shaker-type baghouses using self-tensioning (spring loaded) devices.
  - (7) Quarterly confirmation of the physical integrity of the baghouse through visual inspection of the baghouse interior for air leaks.
  - (8) Quarterly inspection offans for wear, material buildup, and corrosion through visual inspection, vibration detectors, or equivalent means.
  - (9) Except as provided in paragraphs (g) and (h) of this section, continuous operation of a bag leak detection system.
- (d) The procedures specified in the standard operating procedures manual for maintenance shall, at a minimum, include a preventative maintenance schedule that is consistent with the baghouse manufacturer's instructions for routine and long-term maintenance.
- (e) The bag leak detection system required by paragraph (c)(9) of this section, shall meet the specification and requirements of paragraphs (e)(1) through (e)(8) of this section.
  - (1) The bag leak detection system must be certified by the manufacturer to be capable of detecting particulate matter emissions at concentrations of 10 milligram per actual cubic meter (0.0044 grains per actual cubic foot) or less.
  - (2) The bag leak detection system sensor must provide output of relative particulate matter loadings.
  - (3) The bag leak detection system must be equipped with an alarm system that will alarm when an increase in relative particulate loadings is detected over a preset level.

SECTION IV. APPENDIX X

NESHAP, SUBPART X - SECONDARY LEAD SMELTERS

- (4) The bag leak detection system shall be installed and operated in a manner consistent with available written guidance from the U.S. Environmental Protection Agency or, in the absence of such written guidance, the manufacturer's written specifications and recommendations for installation, operation, and adjustment of the system.
  - (5) The initial adjustment of the system shall, at a minimum, consist of establishing the baseline output by adjusting the sensitivity (range) and the averaging period of the device, and establishing the alarm set points and the alarm delay time.
  - (6) Following initial adjustment, the owner or operator shall not adjust the sensitivity or range, averaging period, alarm set points, or alarm delay time, except as detailed in the approved SOP required under paragraph (a) of this section. In no event shall the sensitivity be increased by more than 100 percent or decreased more than 50 percent over a 365 day period unless such adjustment follows a complete baghouse inspection which demonstrates the baghouse is in good operating condition.
  - (7) For negative pressure, induced air baghouses, and positive pressure baghouses that are discharged to the atmosphere through a stack, the bag leak detector must be installed downstream of the baghouse and upstream of any wet acid gas scrubber.
  - (8) Where multiple detectors are required, the system's instrumentation and alarm may be shared among detectors.
- (f) The standard operating procedures manual required by paragraph (a) of this section shall include a corrective action plan that specifies the procedures to be followed in the case of a bag leak detection system alarm. The corrective action plan shall include, at a minimum, the procedures used to determine and record the time and cause of the alarm as well as the corrective actions taken to correct the control device malfunction or minimize emissions as specified in paragraphs (f)(1) and (f)(2) of this section.
- (1) The procedures used to determine the cause of the alarm must be initiated within 30 minutes of the alarm.
  - (2) The cause of the alarm must be alleviated by taking the necessary corrective action(s) which may include, but not be limited to, paragraphs (f)(2)(i) through (f)(2)(vi) of this section.
    - (i) Inspecting the baghouse for air leaks, torn or broken filter elements, or any other malfunction that may cause an increase in emissions.
    - (ii) Sealing off defective bags or filter media.
    - (iii) Replacing defective bags or filter media, or otherwise repairing the control device.
    - (iv) Sealing off a defective baghouse compartment.
    - (v) Cleaning the bag leak detection system probe, or otherwise repairing the bag leak detection system.
    - (vi) Shutting down the process producing the particulate emissions.
- (g) Baghouses equipped with HEPA filters as a secondary filter used to control process, process fugitive, or fugitive dust emissions from any source subject to the lead emission standards in §63.543, 63.544, or 63.545 are exempt from the requirement in §63.548(c)(9) of this section to be equipped with a bag leak detector. The owner or operator of an affected source that uses a HEPA filter shall monitor and record the pressure drop across the HEPA filter system daily. If the pressure drop is outside the limit(s) specified by the filter manufacturer, the owner or operator must take appropriate corrective measures, which may include but not be limited to those given in paragraphs (g)(1) through (g)(4) of this section.
- (1) Inspecting the filter and filter housing for air leaks and torn or broken filters.

SECTION IV. APPENDIX X  
NESHAP, SUBPART X-SECONDARY LEAD SMELTERS

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- (2) Replacing defective filter media, or otherwise repairing the control device.
- (3) Sealing off a defective control device by routing air to other control devices.
- (4) Shutting down the process producing the particulate emissions.
- (h) Baghouses that are used exclusively for the control of fugitive dust emissions from any source subject to the lead emissions standard in §63.545 are exempt from the requirement in §63.548(c)(9) of this section to be equipped with a bag leak detector.
- (i) The owner or operator of a secondary lead smelter that uses a wet scrubber to control particulate matter and metal hazardous air pollutant emissions from a process fugitive source shall monitor and record the pressure drop and water flow rate of the wet scrubber during the initial test to demonstrate compliance with the lead emission limit under §63.544(c) and (d). Thereafter, the owner or operator shall monitor and record the pressure drop and water flow rate at least once every hour and shall maintain the pressure drop and water flow rate no lower than 30 percent below the pressure drop and water flow rate measured during the initial compliance test.
- G) The owner or operator of a blast furnace or collocated blast furnace and reverberatory furnace subject to the total hydrocarbon standards in §63.543 (c), (d), or (e), must comply with the requirements of either paragraph G)(1) or 0)(2) of this section, to demonstrate continuous compliance with the total hydrocarbon emission standards.
  - (1) *Continuous temperature monitoring.*
    - (i) The owner or operator of a blast furnace or a collocated blast furnace and reverberatory furnace subject to the total hydrocarbon emission standards in §63.543 (c), (d), or (e) shall install, calibrate, maintain, and continuously operate a device to monitor and record the temperature of the afterburner or the combined blast furnace and reverberatory furnace exhaust streams consistent with the requirements for continuous monitoring systems in subpart A, General Provisions.
    - (ii) Prior to or in conjunction with the initial compliance test to determine compliance with §63.543 (c), (d), or (e), the owner or operator shall conduct a performance evaluation for the temperature monitoring device according to §63.8(e) of the General Provisions. The definitions, installation specifications, test procedures, and data reduction procedures for determining calibration drift, relative accuracy, and reporting described in Performance Specification 2, 40 CFR part 60, appendix B, sections 2, 3, 5, 7, 8, 9, and 10 shall be used to conduct the evaluation. The temperature monitoring device shall meet the following performance and equipment specifications:
      - (A) The recorder response range must include zero and 1.5 times the average temperature identified in paragraph G)(1)(iii) of this section.
      - (B) The monitoring system calibration drift shall not exceed 2 percent of 1.5 times the average temperature identified in paragraph G)(1)(iii) of this section.
      - (C) The monitoring system relative accuracy shall not exceed 20 percent.
      - (D) The reference method shall be an National Institute of Standards and Technology calibrated reference thermocouple-potentiometer system or an alternate reference, subject to the approval of the Administrator.
    - (iii) The owner or operator of a blast furnace or a collocated blast furnace and reverberatory furnace subject to the total hydrocarbon emission standards shall monitor and record the temperature of the afterburner or the combined blast furnace and reverberatory furnace exhaust streams every 15 minutes during the total hydrocarbon compliance test and determine an arithmetic average for the recorded temperature measurements.

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NESHAP, SUBPART X-SECONDARY LEAD SMELTERS

- (iv) To remain in compliance with the standards for total hydrocarbons, the owner or operator must maintain an afterburner or combined exhaust temperature such that the average temperature in any 3-hour period does not fall more than 28 OC (50 °F) below the average established in paragraph G)(1)(iii) of this section. An average temperature in any 3-hour period that falls more than 28 OC (50 °F) below the average established in paragraph (j)(1)(iii) of this section, shall constitute a violation of the applicable emission standard for total hydrocarbons under §63.543 (c), (d), or (e).

(2) *Continuous monitoring of total hydrocarbon emissions.*

- (i) The owner or operator of a secondary lead smelter shall install, operate, and maintain a total hydrocarbon continuous monitoring system and comply with all of the requirements for continuous monitoring systems found in subpart A, General Provisions.
- (ii) Prior to or in conjunction with the initial compliance test to determine compliance with §63.543 (c), (d), or (e), the owner or operator shall conduct a performance evaluation for the total hydrocarbon continuous monitoring system according to §63.8(e) of the General Provisions. The monitor shall meet the performance specifications of Performance Specification 8, 40 CFR part 60, appendix B.
- (iii) Allowing the 3-hour average total hydrocarbon concentration to exceed the applicable total hydrocarbon emission limit under §63.543 shall constitute a violation of the applicable emission standard for total hydrocarbons under §63.543 (c), (d), or (e).
- (k) The owner or operator of a secondary lead smelter who uses pressurized dryer breaching seals in order to comply with the requirements of §63.544(g) shall equip each seal with an alarm that will "sound" or "go off" if the pressurized dryer breaching seal malfunctions.

[62 FR 32216, June 13, 1997, as amended at 63 FR 45011, Aug. 24, 1998]

§ 63.549 Notification requirements.

- (a) The owner or operator of a secondary lead smelter shall comply with all of the notification requirements of §63.9 of subpart A, General Provisions.
- (b) The owner or operator of a secondary lead smelter shall submit the fugitive dust control standard operating procedures manual required under §63.545(a) and the standard operating procedures manual for baghouses required under §63.548(a) to the Administrator or delegated authority along with a notification that the smelter is seeking review and approval of these plans and procedures. Owners or operators of existing secondary lead smelters shall submit this notification no later than July 23, 1997. The owner or operator of a secondary lead smelter that commences construction or reconstruction after June 9, 1994, shall submit this notification no later than 180 days before start-up of the constructed or reconstructed secondary lead smelter, but no sooner than June 13, 1997. An affected source that has received a construction permit from the Administrator or delegated authority on or before June 23, 1995, shall submit this notification no later than July 23, 1997.

§ 63.550 Recordkeeping and reporting requirements.

- (a) The owner or operator of a secondary lead smelter shall comply with all of the recordkeeping requirements under §63.10 of the General Provisions. In addition, each owner or operator of a secondary lead smelter shall maintain for a period of 5 years, records of the information listed in paragraphs (a)(1) through (a)(6) of this section.
  - (1) An identification of the date and time of all bag leak detection system alarms, their cause, and an explanation of the corrective actions taken.

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NESHAP, SUBPART X-SECONDARY LEAD SMELTERS

- (2) If an owner or operator chooses to demonstrate continuous compliance with the total hydrocarbon emission standards under §63.543 (c), (d), or (e) by employing the method allowed in §63.5480(1), the records shall include the output from the continuous temperature monitor, an identification of periods when the 3-hour average temperature fell below the minimum established under §63.5480(1), and an explanation of the corrective actions taken.
- (3) If an owner or operator chooses to demonstrate continuous compliance with the total hydrocarbon emission standard under §63.543 (c), (d), or (e) by employing the method allowed in §63.5480(2), the records shall include the output from the total hydrocarbon continuous monitoring system, an identification of the periods when the 3-hour average total hydrocarbon concentration exceeded the applicable standard and an explanation of the corrective actions taken.
- (4) Any recordkeeping required as part of the practices described in the standard operating procedures manual required under §63.545(a) for the control of fugitive dust emissions.
- (5) Any recordkeeping required as part of the practices described in the standard operating procedures manual for baghouses required under §63.548(a).
- (6) Records of the pressure drop and water flow rate for wet scrubbers used to control metal hazardous air pollutant emissions from process fugitive sources.
  - (b) The owner or operator of a secondary lead smelter shall comply with all of the reporting requirements under §63.10 of the General Provisions. The submittal of reports shall be no less frequent than specified under §63.10(e)(3) of the General Provisions. Once a source reports a violation of the standard or excess emissions, the source shall follow the reporting format required under §63.10(e)(3) until a request to reduce reporting frequency is approved.
  - (c) In addition to the information required under §63.10 of the General Provisions, reports required under paragraph (b) of this section shall include the information specified in paragraphs (c)(1) through (c)(6) of this section.
    - (1) The reports shall include records of all alarms from the bag leak detection system specified in §63.548(e).
    - (2) The reports shall include a description of the procedures taken following each bag leak detection system alarm pursuant to §63.548(f) (1) and (2).
    - (3) The reports shall include the information specified in either paragraph (c)(3)(i) or (c)(3)(ii) of this section, consistent with the monitoring option selected under §63.548(h).
      - (i) A record of the temperature monitor output, in 3-hour block averages, for those periods when the temperature monitored pursuant to §63.5480(1) fell below the level established in §63.5480(1).
      - (ii) A record of the total hydrocarbon concentration, in 3-hour block averages, for those periods when the total hydrocarbon concentration being monitored pursuant to §63.5480(2) exceeds the relevant limits established in §63.543 (c), (d), and (e).
    - (4) The reports shall contain a summary of the records maintained as part of the practices described in the standard operating procedures manual for baghouses required under §63.548(a), including an explanation of the periods when the procedures were not followed and the corrective actions taken.
    - (5) The reports shall contain an identification of the periods when the pressure drop and water flow rate of wet scrubbers used to control process fugitive sources dropped below the levels established in §63.548(i), and an explanation of the corrective actions taken.

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NESHAP, SUBPART X-SECONDARY LEAD SMELTERS

- (6) The reports shall contain a summary of the fugitive dust control measures performed during the required reporting period, including an explanation of the periods when the procedures outlined in the standard operating procedures manual pursuant to §63.545(a) were not followed and the corrective actions taken. The reports shall not contain copies of the daily records required to demonstrate compliance with the requirements of the standard operating procedures manuals required under §§63.545(a) and 63.548(a).

§ 63.551 Implementation and enforcement.

- (a) This subpart can be implemented and enforced by the U.S. EPA, or a delegated authority such as the applicable State, local, or Tribal agency. If the U.S. EPA Administrator has delegated authority to a State, local, or Tribal agency, then that agency, in addition to the U.S. EPA, has the authority to implement and enforce this subpart. Contact the applicable U.S. EPA Regional Office to find out if this subpart is delegated to a State, local, or Tribal agency.
- (b) In delegating implementation and enforcement authority of this subpart to a State, local, or Tribal agency under subpart E of this part, the authorities contained in paragraph (c) of this section are retained by the Administrator of U.S. EPA and cannot be transferred to the State, local, or Tribal agency.
- (c) The authorities that cannot be delegated to State, local, or Tribal agencies are as specified in paragraphs (c)(1) through (4) of this section.
- (i) Approval of alternatives to the requirements in §§63.541, 63.543 through 63.544, 63.545(a) and (c) through (e), and 63.546.
- (ii) Approval of major alternatives to test methods for under §63.7(e)(2)(ii) and (f), as defined in §63.90, and as required in this subpart.
- (iii) Approval of major alternatives to monitoring under §63.8(f), as defined in §63.90, and as required in this subpart.
- (iv) Approval of major alternatives to recordkeeping and reporting under §63.10(f), as defined in §63.90, and as required in this subpart.

[68 FR 37350, June 23, 2003]

**APPENDIX C**  
**SPARE PARTS**

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**ML675 Dilution System Spare Parts List**

JAN 2010

<u>Air Cleanup Plate</u>			
<u>Part Number</u>	<u>Description</u>	<u>Qty</u>	<u>Unit Price</u>
<b>LEVEL 1 - CONSUMABLE SUPPLIES</b>			
99600038-45	Filter Element Air Regulator Filter	1	\$ 28
27000068	Post Filter	1	\$ 258
98415105-1	Scrubber Assy Systems Charcoal	1	\$ 601
25000511	O-Ring, 2-030, Viton, Filter Bowl Seal	2	\$ 6
25000510	O-Ring, 2-021 Viton, Heat Exchanger	2	\$ 5
850-056500	Refill Kit Activated Charcoal (1LB)	1	\$ 26
25000447-130	O-Ring Charcoal Canister	2	\$ 4
98000242	Thomas Pump Rebuild Kit	2	\$ 128
<b>LEVEL 2- CRITICAL REPAIR ITEMS</b>			
29000229-1	Solenoid, 2-Way/24 VDC (Cal Valve)	1	\$ 118
45500003	Solenoid, 3-Way/24 VDC (SDV)	1	\$ 115
40000188	+/- 15V Power Supply Flow Meter	1	\$ 112
40000187	24V Power Supply	1	\$ 109
26000289-6	Dessicant Chamber CO2/H2O *do not shelve, order as needed	1	Call Factory
26000289-4	Desiccant Chamber CO/H2O *do not shelve, order as needed	1	Call Factory
45000181-3	Back Flush Valve	1	\$ 190
51000417	Pressure Switch (Inst Air)	1	\$ 108
<b>LEVEL 3 - INDEPTH REPAIR ITEMS</b>			
29000211	Regulator w/Filter & Gauge	1	\$ 131
55000041	Pressure Transducer	1	Call Factory
29000212	Vacuum Gauge 0-30 in HGSS 2.5" Dia	1	\$ 124
51000419	Vacuum Switch, 0-29" Hg, Sample Inlet Vacuum	1	\$ 106
51000417	Pressure Switch, 0-15 Psig, Sample/Calib Pressure	1	\$ 108
99600038-5	Pressure Gauge, Glycerine Filled, 0-15 Psig	1	\$ 308
22000204	Flow Meter, 10 Liters/Min, SS Needle Valve	1	\$ 153
53000234-1	Temperature Readout/Controller	1	\$ 339
29000232	Dilution Air Regulator w/Gauge	1	\$ 110
29000106-11	Bypass Regulator w/o Gauge	1	\$ 32

## ML675 Dilution System Spare Parts List

JAN 2010

<u>Air Cleanup Plate</u>			
<u>Part Number</u>	<u>Description</u>	<u>Qty</u>	<u>Unit Price</u>
29000106-10	0-60 Psig Gauge	1	Call Factory
28000785-5	3/8" Check Valve	1	\$ 67
22000209	Mass Flow Meter	1	\$ 1,738
98415105-1	Charcoal Canister w/charcoal	1	\$ 601
884-017300	Thomas Pump, Nox and SO2 analyzers	1	\$ 447

***Level 1: General maintenance supplies and expendables such as filters, O-rings, lamps etc.***

***Level 2: Critical items that are known from experience to have a higher failure rate, such as pump, heaters, converters, valves and circuit boards***

***Level 3: Other miscellaneous items not included in Level 1 or 2. This level includes other spare parts that are not expected to fail over a given time frame***

**Prices may change without notice**

## TML30U CO ANALYZER

with Recommended Spares List

July 2010

Part Number	Description	Options	Level	Price
TML30	SENSOR-E CO, LOW RANGE 100PPM			Call Factory
KIT000219	4-20 MA PCA KIT W/STANDOFF & SCREWS			191
RACK	RACK			Call Factory
	RECOMMENDED SPARE PARTS			
009690100	AKIT, TFE FLTR ELEMENT, 47MM, 5UM (25)		1	102
000940300	ORIFICE, 20 MIL, (SAMPLE FLOW)		2	30
009450400	ASSY, SAMPLE.CAL VALVE		2	228
009550500	ASSY, SOURCE, TML30 S/N>65		2	200
009690000	AKIT, TFE FLTR ELEMENT, 47MM, 5UM (100)		2	306
016290000	WINDOW, SAMPLE FILTER, 47MM		2	62
019340200	ASSY, SAMPLE THERMISTOR, BRASS		2	92
042410200	ASSY, PUMP, INTERNAL, SENSOR-E SERIES		2	783
042410300	ASSY,INTERNAL PUMP W/2 LITER FLOW CONTROL		2	877
042680000	SOLENOID, SS 3 WAY 12V		2	168
058800000	ASSY, THERMISTOR, OVEN		2	36
001761900	ASSY, FLOW CONTROL, 2 LITERS		3	100
003291500	ASSY, THERMISTOR, BENCH/WHEEL, TML30		3	32
009390000	APERTURE, TML30U		3	47
009560001	GF WHEEL, CO		3	1457
010790000	INPUT MIRROR, REPLICATED		3	368
010800000	OUTPUT MIRROR, REPLICATED		3	368
016300100	ASSY., SAMPLE FILTER, 47MM, 5UM,TML30U, SN>100		3	310
016300600	ASSY, SAMPLE FILTER, 47MM, ANG BKT, 5UM		3	310
016300900	ASSY., SAMPLE FILTER, 47MM, 5UM,TML30U, SN,100		3	172
033520000	MIRROR, OBJECT, 32 PASS, TML30		3	738
033520100	MIRROR, OBJECT, GOLD, 32 PASS, TML30U, SN>100		3	885
033560000	MIRROR, FIELD, 32 PASS, TML30		3	589
033560100	MIRROR, FIELD, GOLD, 32 PASS, TML30U, SN>100		3	742
038650100	ASSY., VOLTAGE PLUG, 115V, TML30U, S/N>100		3	5
039250000	MASK, FILTER WHEEL		3	104
040010000	ASSY, FAN REAR PANEL, E SERIES		3	41
040030900	PCA, FLOW/PRESSURE		3	846
041710000	ASSY, CPU, CONFIGURATION, "E" SERIES		3	897
042580000	PCA, KEYBOARD, E-SERIES, W/V-DETECT		3	356
20250092-E	CD, TML MANUALS		3	95
042900100	PROGRAMMED FLASH, E SERIES		3	8
043250100	CONFIGURATION PLUGS, 115V/60Hz	for 041350000	3	39
043250300	CONFIGURATION PLUGS, 220-240V/50Hz	for 041350000	3	39
043250400	CONFIGURATION PLUGS, 220-240V/60Hz	for 041350000	3	39

## TML30U CO ANALYZER

with Recommended Spares List

July 2010

Part Number	Description	Options	Level	Price
043940000	PCA, INTERFACE, ETHERNET, E-SERIES		3	442
048620200	PCA, SERIAL INTERFACE, w/ MD, E SERIES		3	112
049600000	ASSY, PERMAPURE DRYER, DR7, TML30U		3	4631
050320000	PCA, PHOTO-INTERRUPTER		3	310
052830200	ASSY, MOTOR HUB, MR7, "E", 115V		3	494
055100200	OPTION, PUMP ASSY., HIGH-VOLTAGE 240VAC		3	768
055540100	DISK-ON-CHIP, W/SOFTWARE, TML30U		3	147
058020100	PCA, MOTHERBOARD, SENSOR E, GEN-5 USE # 058021100		3	Call Factory
CN0000229	CONNECTOR, REAR PANEL, 8 PIN		3	16
CN0000458	CONNECTOR, REAR PANEL, 12 PIN		3	23
DS0000025	DISPLAY, E SERIES		3	428
FL0000001	FILTER, SS ,USE P/N 002-024900		1	4
HW0000020	SPRING		1	3
HW0000036	TFE TAPE, 1/4" (48 FT/ROLL)		1	8
OR0000001	ORING, FLOW CONTROL		1	4
PU0000022	REBUILD KIT, FOR PU20 & 04084		1	61
040360300	KIT, SPARE PARTS TML30U		1	280
009600400	KIT, EXPENDABLES, TML30		R1	161
016910000	KIT, EXPENDABLE, CO CATALYST		R1	97
037860000	ORING, TFE RETAINER, SAMPLE FILTER		R1	34
KIT000251	KIT, SHIPPING SCREWS, TML30U		R1	4
OR0000034	ORING, INPUT & OUTPUT MIRRORS		R1	4
OR0000039	ORING, IR SOURCE/BENCH		R1	4
OR0000041	ORING, OBJECT & FIELD MIRRORS		R1	3
OR0000088	ORING, DETECTOR		R1	3
OR0000094	ORING, SAMPLE FILTER		R1	16
OP0000009	WINDOW, IR SOURCE/BENCH		2	84
RL0000015	RELAY, DPDT, GORDOS PREFERRED		2	48
SW0000059	PRESSURE XDUCER, 0-15 PSIA		2	145
037250000	ASSY, HEATER, OPTICAL BENCH		R2	193
040360400	KIT, SPARE PARTS, TML30U, S/N >100		R2	292
041350000	PCA, RELAY BOARD, TML30		R2	501
055010000	ASSY, MTR WHL HEATER w/THERM, 200W		R2	87
057650100	ASSY., CO SCRUBBER, TML30U, S/N>100		R2	468
058770000	ASSY., BLOWER, 50MM, TML30U S/N>100		R2	52
058780000	ASSY., BLOWER, 75MM, TML30U S/N>100		R2	52
058820000	ASSY., HEATER, BLOWER W/THERM, TML30U, S/N>100		R2	44
KIT000178	RETROFIT, SYNC DMOD UPDATE, TML30		R2	800
SW0000055	SWITCH, THERMAL 80C		R2	16

## TML30U CO ANALYZER

with Recommended Spares List

July 2010

Part Number	Description	Options	Level	Price
CN0000520	CONNECTOR, REAR PANEL, 10 PIN		3	22
HW0000005	FOOT, CHASSIS		3	3
PS0000011	PWR SUPPLY, SW, +5V, +/-15V, 40W		3	207
PS0000024	COVER ENCLOSURE KIT,LPX 40/60		3	37
PS0000025	PWR SUPPLY, SW, 12V, 40W		3	141
SW0000051	SWITCH, POWER CIRC BREAK VDE/CE, w/RG		3	95

### INDEX OF OPTIONS FOR TML 30U

Description	Option
Current Loop Analog Output	41

### TML 30U INDIVIDUAL OPTIONS SPARE PARTS LIST

Option	Part Number / Description	Level	Price	
KIT000219	4-20MA OUTPUT	41	3	191

Levels marked with a 'R' are TML recommended parts to have on hand for typical repairs and maintenance.

Level 1: General maintenance supplies and expendables such as filters, O-rings, lamps, etc.

Level 2: Critical items that are known from experience to have a higher failure rate, such as pumps, heaters, converters, valves, and circuit boards.

Level 3: Other miscellaneous items not included in Level 1 or 2. This level includes other spare parts that are not expected to fail over a given time frame.

Prices or Part Numbers may change without notice

Prices reflect F.O.B. Englewood, Co

TO PLACE AN ORDER OR FOR QUESTIONS REGARDING SPARE PARTS CALL (800) 934-2319 OPTION 2 OR Email to GOTML@TELEDYNE.COM

## TML41 ANALYZER

with Recommended Spares List  
July 2010

Part Number	Description	Options	Level	Price
TML41	SENSOR-E NOX, LOW 20PPM NO PUMP			Call Factory
884-017300	EXTERNAL PUMP			447
KIT000219	4-20MA PCA KIT W/STANDOFF & SCREWS			191
RACK	RACK			Call Factory
	RECOMMENDED SPARE PARTS			
002270100	GASKET, WINDOW (PKG OF 12)		1	20
009690200	KIT, TFE FILTER ELEMENTS, 1 UM (100)		1	306
009690300	KIT, TFE FILTER ELEMENTS, 1 UM (25)		1	102
011630000	GASKET, HVPS INSULATOR		1	7
037860000	ORING, TFE RETAINER, SAMPLE FILTER		1	34
040010000	ASSY, FAN, REAR PANEL		1	41
046030000	KIT, EXPENDABLE, DESSICANT, OZONE FILTER		1	15
FL0000003	FILTER, DFU - USE 036-040180		1	27
OR0000001	ORING, FLOW CONTROL		1	4
OR0000002	ORING, REACTION CELL SLEEVE		1	4
OR0000034	ORING, (USED W/ FT10)		1	4
OR0000039	ORING, FLOW CONTROL		1	4
PU0000073	REBUILD KIT FOR PU71		1	Call Factory
047150000	KIT, EXPENDABLES, TML41		R1	296
850-056500	REFILL KIT, ACTIVATED CHARCOAL, 1 LB. FOR P/N 98415105-1		R1	26
OR0000027	ORING, COLD BLOCK/PMT HOUSING & HEATSINK		R1	6
OR0000044	ORING, REACTION CELL MANIFOLD		R1	6
OR0000058	ORING, SAMPLE FILTER		R1	9
OR0000083	ORING, PMT SIGNAL & OPTIC LED		R1	4
OR0000094	ORING, SAMPLE FILTER		R1	16
000940400	ORIFICE, 4 MIL, OZONE FLOW & O2 OPTION		2	30
001761800	ASSY, FLOW CTL, 90CC, OZONE DRYER		2	68
011310000	ASSY, OZONE DRYER W/FLOW CONTROL		2	652
013140000	ASSY, COOLER FAN		2	21
014080100	ASSY, HVPS		2	882
016290000	WINDOW, SAMPLE FILTER		2	62
016300800	ASSY, SAMPLE FILTER, 47MM (1 UM)		2	310
040400000	ASSY, HEATERS/THERMAL SWITCH, REACTION CELL		2	74
040420200	ASSY, O3 GENERATOR		2	1560
041920000	ASSY, THERMISTOR, REACTION CELL		2	38
042680100	ASSY, VALVE		2	168
20250092-E	INSTRUCTION MANUAL, TML41, Nox		2	95
044610000	ASSY, VALVES, MOLYCON		2	624
045500100	ASSY, ORIFICE HOLDER, 4 MIL, OZONE FLOW		2	125

## TML41 ANALYZER

with Recommended Spares List  
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Part Number	Description	Options	Level	Price
57000010	TUBE, SIDE ON PMT, R928		2	1255
045500300	ASSY, ORIFICE HOLDER, 10 MIL, SAMPLE FLOW & DIL MANIFOLD		2	125
884-017300	PUMP ASSY, EXTERNAL, 115V/60 HZ, THOMAS		2	447
98415105-1	CHARCOAL SCRUBBER ASSY REFILLABLE		2	238
FL0000001	FILTER SPEC SS SINTERED - USE 002-024900		2	4
HW0000020	SPRING, FLOW CONTROL		2	3
KIT000095	KIT, COOLER REPLACEMENT		2	102
PU0000071	PUMP, EXTERNAL, ULTRAQUIET, KNF, 115V/60HZ		2	Call Factory
SW0000059	PRESSURE XDUCER, 0-15 PSIA		2	145
000940600	ORIFICE, 10 MIL, SAMPLE FLOW & DILUTION & VACUUM MANIFOLDS		R2	30
002730000	FILTER, 665NM		R2	51
041800500	PCA, PMT PREAMP, TML41		R2	548
044600000	KIT, SPARES, TML41		R2	663
050700200	KIT, RELAY BOARD, TML41 CONFIGURATION		R2	Call Factory
062390000	ASSY, MOLY GUTS, W/WOOL & BAND HEATER TML41		R2	706
98000242	KIT, PUMP SERVICE, THOMAS PUMP		R2	128
KIT000051	KIT, REACTION CELL REBUILD		R2	129
001330000	SLEEVE, REACTION CELL		3	34
008830000	COLD BLOCK		3	81
011420500	ASSY, NOX REACTION CELL		3	792
018720100	ASSY, MOLY CONVERTER, W/O3 DESTRUCTOR		3	1318
039700100	HEATER, BAND, TYPE K,		3	179
040030800	PCA, FLOW/PRESSURE		3	542
040300100	ASSY.,CONFIG PLUG FOR 045230200, AC MAIN 100-115V 50/60HZ		3	27
040300200	ASSY.,CONFIG PLUG FOR 045230200, AC MAIN 220-240V 50/60HZ		3	11
040300300	ASSY.,CONFIG PLUG FOR 045230200, SINGLE HEATER		3	42
040410100	ASSY, VACUUM MANIFOLD,		3	220
040900000	ORIFICE HOLDER, TML41		3	62
041710000	ASSY, CPU, CONFIGURATION		3	897
042580000	PCA, KEYBOARD, E SERIES		3	356
042900100	PROGRAMMED FLASH, E SERIES		3	8
043170000	MANIFOLD, REACTION CELL		3	195
043890100	DISK-ON-CHIP, w/SOFTWARE, TML41		3	188
043940000	PCA, INTERFACE, ETHERNET		3	442
048620200	PCA, SERIAL INTERFACE W/MD		3	112
049310100	PCA, TEC CONTROL, E SERIES		3	281
051210000	ASSY, OZONE DESTRUCTOR		3	312
052930200	ASSY, BAND HEATER TYPE K		3	195

## TML41 ANALYZER

with Recommended Spares List  
July 2010

Part Number	Description	Options	Level	Price
058021100	PCA, MOTHERBOARD, E SERIES, GEN-5		3	1138
CN0000458	CONNECTOR, REAR PANEL, 12 PIN		3	23
CN0000520	CONNECTOR, REAR PANEL, 10 PIN		3	22
DS0000025	DISPLAY		3	428
FM0000004	FLOWMETER		3	245
FT0000010	FITTING, FLOW CONTROL		3	35
HW0000005	FOOT, CHASSIS		3	3
HW0000030	ISOLATOR, SENSOR ASSY		3	4
HW0000031	FERRULE, SHOCKMOUNT		3	Call Factory
HW0000099	STAND-OFF, #6-32 X .5, HEX,SS		3	2
KIT000218	KIT, TML41 RELAY RETROFIT, MOLY PLUG		3	670
KIT000249	KIT, TML41 RELAY BOARD RETROFIT, 220V		3	Call Factory
KIT000253	KIT, SPARE PS37, E SERIES		3	168
KIT000254	POWER SUPPLY, SWITCHING, 12V/60W		3	168
RL0000015	RELAY, DPDT, GORDOS PR		3	48
SW0000051	SWITCH, POWER, CIRC BR		3	95
INDEX OF OPTIONS FOR TML 41				
	Description	Option		
	Current Loop Analog Output	41		
	Zero/Span Valve	50		
	Internal Zero/Span (IZS)	51		
	Zero Air Scrubber	64B		
	Oxygen Sensor	65		
	Dilution Option	DIL		
	Part Number - Description	Option	Level	Unit Price
OR0000046	ORING, PERMEATION OVEN	51	1	4
014030000	KIT, EXPENDABLES, IZS	51	R1	308
005960000	KIT, EXPENDABLE, ACTIVATED CHARCOAL (6 LBS)	64B	R1	140
005970000	KIT, EXPENDABLE, PURAFIL (6 LBS)	64B	R1	145
OR0000025	ORING, ZERO AIR SCRUBBER	64B	R1	6
009450300	ASSY, SAMPLE/CAL VALVE	50,51	2	453
042680000	ASSY, VALVE, FOR SAMPLE/CAL VALVE ASSY	50,51	2	168
001763000	ASSY., FLOW CTL, 110 CC, 1/8 - B	65	2	66
000940700	ORIFICE, 5 MIL, FLOW CONTROL, O2 OPTION	65	R2	30
000940100	ORIFICE, 3 MIL, DILUTION & VACUUM MANIFOLDS & IZS	DIL	R2	30
KIT000219	PCA, 4-20MA OUTPUT, (E-SERIES)	41	3	191
052820000	ASSY, HEATER/THERMISTOR (IZS)	51	3	102

## TML41 ANALYZER

with Recommended Spares List  
July 2010

Part Number	Description	Options	Level	Price
004330000	ZERO AIR SCRUBBER (NO/NO2)	64B	3	214
043420000	ORIFICE, 3 MIL, DILUTION & VACUUM MANIFOLDS & IZS	65	3	64
OP0000030	OXYGEN TRANSDUCER	65	3	4488
045500400	ASSY, ORIFICE HOLDER, 3 MIL, DIL MANIFOLD	DIL	3	125
046480000	ASSY, DILUTION MANIFOLD	DIL	3	786

Levels marked with a 'R' are TML recommended parts to have on hand for typical repairs and maintenance.

Level 1: General maintenance supplies and expendables such as filters, O-rings, lamps, etc.

Level 2: Critical items that are known from experience to have a higher failure rate, such as pumps, heaters, converters, valves, and circuit boards.

Level 3: Other miscellaneous items not included in Level 1 or 2. This level includes other spare parts that are not expected to fail over a given time frame.

Prices or Part Numbers may change without notice

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## TML50 SO2 ANALYZER

with Recommended Spares List

July 2010

Part Number	Description	Options	Level	Price
TML50	SO2 LOW 20 PPM			Call Factory
KIT000219	4-20MA OUTPUT			191
RACK	RACK			Call Factory
009690100	AKIT, TFE FLTR ELEMENT, 47MM, 5UM (25)		1	102
037860000	ORING, TFE RETAINER, SAMPLE FILTER		1	34
048830000	KIT, EXP KIT, EXHAUST CLNSR, SILCA GEL		1	10
002-024900	FILTER, SS		1	3
000940400	ORIFICE, 4 MIL, BLUE		2	30
000940800	ORIFICE, 012 MIL, RXCELL		2	30
002690000	LENS, UV		2	175
002700000	LENS, PMT		2	212
002720000	FILTER, PMT OPTICAL, 330 NM		2	96
009690000	AKIT, TFE FLTR ELEMENT, 47MM, 5UM (100)		2	306
011630000	GASKET, HVPS INSULATOR		2	7
013140000	ASSY, COOLER FAN (NOX/SOX)		2	21
013420000	ASSY, ROTARY SOLENOID, TML50		2	218
016290000	WINDOW, SAMPLE FILTER, 47MM		2	62
040010000	ASSY, FAN REAR PANEL, E SERIES		2	41
042410200	ASSY,INTERNAL PUMP, SENSOR-E SERIES		2	783
046250000	ASSY, RXCELL HEATER/FUSE, TML50		2	70
050510200	PUMP, INT "E" SERIES, 115/240V		2	708
051990000	ASSY, SCRUBBER, INLINE EXHAUST, DISPOS		2	59
20250092-E	CD, TML MANUALS		2	95
FM0000004	FLOWMETER		2	245
HW0000020	SPRING		2	3
SW0000006	SWITCH, THERMAL, 60C		2	16
013210000	ASSY, VACUUM MANIFOLD, TML50		3	279
013390000	ASSY, KICKER, TML50		3	240
013400000	CD, PMT, SO2, TML50/E		3	983
013570000	ASSY, THERMISTOR (COOLER)		3	59
014080100	ASSY, HVPS, SOX/NOX		3	882
016300700	ASSY, SAMPLE FILTER, 47MM, ANG BKT, TFE		3	310
025730000	ASSY, HEATSINK/COOLER		3	286
040030100	PCA, FLOW/PRESSURE		3	415
040300100	ASSY.,CONFIG PLUG FOR 045230200, AC MAIN 100-115V 50/60HZ		3	27
040300200	ASSY.,CONFIG PLUG FOR 045230200, AC MAIN 220-240V 50/60HZ		3	11
040300300	ASSY.,CONFIG PLUG FOR 045230200, SINGLE HEATER		3	42

## TML50 SO2 ANALYZER

with Recommended Spares List

July 2010

Part Number	Description	Options	Level	Price
041710000	ASSY, CPU, CONFIGURATION, "E" SERIES		3	897
041920000	ASSY, THERMISTOR, REACTION CELL		3	38
042580000	PCA, KEYBOARD, E-SERIES, W/V-DETECT		3	356
042890100	ASSY.,CONFIG PLUG FOR 045230200, PUMP 110-115V/60 HZ		3	59
042890200	ASSY.,CONFIG PLUG FOR 045230200, PUMP 110-115V/50 HZ		3	59
042890300	ASSY.,CONFIG PLUG FOR 045230200, PUMP 220-240V/60 HZ		3	59
042890400	ASSY.,CONFIG PLUG FOR 045230200, PUMP 220-240V/50 HZ		3	59
042900100	PROGRAMMED FLASH, E SERIES		3	8
043880100	DISK-ON-CHIP, w/SOFTWARE, TML50		3	159
043940000	PCA, INTERFACE, ETHERNET, E-SERIES		3	442
044670000	PCA, ANALOG OUTPUT ISOLATOR, E SERIES		3	28
046260000	ASSY, THERMISTOR, RXCELL, TML50		3	29
048620200	PCA, SERIAL INTERFACE, w/ MD, E SERIES		3	112
049310100	PCA, TEC CONTROL, E SERIES		3	281
050630100	PCA, TML50 UV REF DETECTOR		3	611
058021100	PCA, MOTHERBOARD, E-SERIES, GEN5		3	1138
885-071600	THERMISTOR ASSY ENCASMENT		3	49
CN0000520	CONNECTOR, REAR PANEL, 10 PIN		3	22
DS0000025	DISPLAY, E SERIES		3	428
HW0000005	FOOT, CHASSIS		3	3
HW0000030	ISOLATOR		3	4
HW0000031	FERRULE, SHOCKMOUNT		3	Call Factory
HW0000101	ISOLATOR		3	8
KIT000207	KIT, TML50 RELAY RETROFIT		3	651
KIT000253	KIT, SPARE PS37, E SERIES		3	168
KIT000254	POWER SUPPLY, SWITCHING, 12V/60W		3	168
HW0000036	TFE TAPE, 1/4" (48 FT/ROLL)		1	8
OR0000001	ORING, FLOW CONTROL/IZS		1	4
OR0000084	ORING, UV FILTER		1	4
PU0000022	KIT, PUMP REBUILD		1	61
041800400	PCA, PMT PREAMP, TML50		R1	563
043570000	AKIT, EXPENDABLES, TML50		R1	180
045230200	PCA, RELAY CARD W/RELAYS, E SERIES, S/N'S >455		R1	623
047280000	KIT, SPARE PARTS, TML50		R1	479
055120100	PCA, BURSTING UV DRIVER, TML50, 43mA		R1	445
KIT000236	KIT, UV LAMP REPLACEMENT W/E-A ADAPTER		R1	647
OR0000004	ORING, OPTIC/CELL, CELL/TRAP		R1	6
OR0000006	ORING, CELL/PMT		R1	7
OR0000007	ORING, PMT/BARREL/CELL		R1	7

## TML50 SO2 ANALYZER

with Recommended Spares List

July 2010

Part Number	Description	Options	Level	Price
TML 50 INDIVIDUAL SPARE PARTS LIST				
Part Number	Description		Level	Unit Price
OR0000015	ORING, PMT FILTER		R1	4
OP0000031	WINDOW, QUARTZ, REF DETECTOR		2	16
RL0000015	RELAY, DPDT, GORDOS PREFERRED		2	48
SW0000059	PRESSURE XDUCER, 0-15 PSIA		2	145
KIT000093	REPLACEMENT KIT, 214NM FILTER (03187)		R2	311
OR0000016	ORING, UV LENS		R2	4
OR0000027	ORING, COLD BLOCK/PMT HOUSING & HEATSINK		R2	6
OR0000039	ORING, QUARTZ WINDOW/REF DETECTOR		R2	4
OR0000083	ORING, PMT SIGNAL & OPTIC LED		R2	4
OR0000094	ORING, SAMPLE FILTER		R2	16
KIT000095	REPLACEMENT, COOLER KIT, TML50/M200A		3	102
KIT000254	POWER SUPPLY, SWITCHING, 12V/60W		3	168
SW0000051	SWITCH, POWER, CIRC BR		3	95
INDEX OF OPTIONS FOR TML 50				
	Current Loop Analog Output		41	
	Zero/Span Valves		50	
	Internal Zero/Span Gas Generator (IZS)		51	
	Dilution Option		DIL	
TML 50 INDIVIDUAL OPTIONS SPARE PARTS LIST				
005960000	KIT, EXPENDABLE, ACTIVATED CHARCOAL (6 LBS)	51	R1	140
014750000	AKIT, EXP KIT, TML50/TML50, IZS	51	R1	214
036-040180	REPLACEMENT PARTICULATE FILTER	51	R1	18
OR0000025	ORING, ZERO AIR SCRUBBER	51	R1	6
OR0000046	ORING, PERMEATION OVEN	51	R1	4
012720100	OPTION, NOx, OPTICAL FILTER	51	2	150
055560000	ASSY, VALVE, VA59 W/DIODE	50,51	2	344
055560100	ASSY, VALVE, VA59 W/DIODE, 9" LEADS	50,51	2	337
000940100	ORIFICE, 3 MIL, IZS	51	R2	30
052660000	ASSY, HEATER/THERMISTOR (IZS)	51	R2	75
000940100	ORIFICE, 3 MIL DILUTION & VACUUM MANIFOLDS & IZS	DIL	R2	30

## TML50 SO2 ANALYZER

with Recommended Spares List

July 2010

Part Number	Description	Options	Level	Price
KIT000219	PCA, 4-20MA OUTPUT, TML 50 INDIVIDUAL OPTIONS SPARE PARTS LIST	41	3	191
Part Number	Description	Option	Level	Unit Price
014400100	OPTION, ZERO AIR SCRUBBER,	51	3	280
043420000	ASSY, HEATER/THERM, O2 SEN	51	3	64
045500400	ASSY, ORIFICE HOLDER 3 MIL, DIL MANIFOLD	DIL	3	125
OP0000030	OXYGEN TRANSDUCER	51	3	4488
046480000	ASSY, DILUTION MANIFOLD	DIL	3	786

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## **APPENDIX D GAS ANALYZER CALIBRATION PROCEDURES**

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## **D.1 INTRODUCTION**

Calibration of the Model 675 Dilution System is dependent on both the design configuration and the analyzers contained within the system.

The Model 675 Dilution System installed at this facility consists of a train of three individual analyzers configured for dedicated operation. All information contained in this appendix applies solely to this mode of operation.

### ***D.1.1 DEDICATED SAMPLE TRAIN***

The Model 675 System, when configured in the dedicated mode, combines a single dilution probe with each analyzer train. The sample path is continuous and always the same. All data acquired by the Data Acquisition and Handling System (DAHS) is a result of single point sampling.

## **D.2 CALIBRATION THEORY**

The Model 675 Dilution System requires the use of a critical orifice to effectively control the dilution ratio. Therefore, the dilution ratio of the system needs to be set before initial use to ensure the best operation of the monitoring system. While adjustment of the system to exactly the documented ratio is desired, ensuring that the dilution ratio of the monitoring system is within 10% of the documented ratio will ensure proper operation.

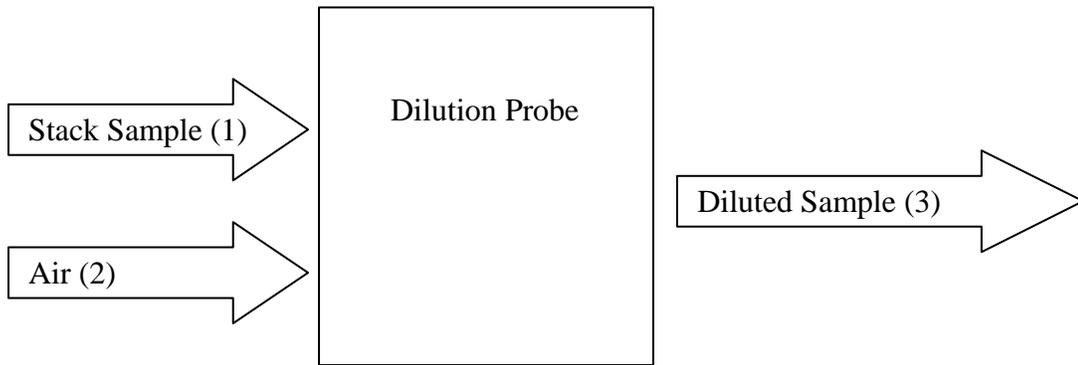
Once the dilution ratio has been properly set the individual analyzers are calibrated by using the analyzer's calibration controls.

### ***D.2.1 DILUTION RATIO CALIBRATION***

The volumetric ratio of gas educed from the stack effluent stream to the total quantity of diluted gas delivered to the sample manifold is the dilution ratio (see equation 1 below). A typical dilution ratio is 100:1. The analyzers measure the individual pollutants in this diluted sample. The amount of each pollutant in the stack effluent stream is then equal to the analyzer values multiplied by the dilution ratio (i.e., 2.55 ppm SO<sub>2</sub> times 100 = 255 ppm SO<sub>2</sub>).

The dilution ratio can be derived by simply performing a mass balance around the dilution probe. The sum of the flows in is equal to the sum of the flows out. If we let F = Flow Rate and call the Stack Sample 1, the Air 2, and Diluted Sample 3, we get:

$$F_1 + F_2 = F_3$$



Because we know that the concentration of a gas is really a volume percent, we can multiply the flow rate by the concentration and get the flow rate of a single gas. If we let  $C$  = Concentration, we get:

$$F_1C_1 + F_2C_2 = F_3C_3$$

The air used for dilution is clean (free of gas to be measured) so the concentration in that stream will be zero. The equation becomes:

$$F_1C_1 = F_3C_3$$

Since we are interested in the stack concentration, we solve for  $C_1$

$$C_1 = \frac{F_3}{F_1} C_3$$

Now it can be seen that the ratio (the dilution ratio) of flows  $F_3 / F_1$  is the amount by which the diluted sample must be multiplied in order to obtain the stack concentration. In order to get the flow rates and determine the dilution ratio, we need a clear understanding of how the dilution probe works. Clean air is used to drive an eductor. The eductor creates a vacuum which pulls stack sample through an orifice. Because a vacuum is used, the absolute pressure up stream of the orifice is much larger than the absolute pressure downstream of the orifice. This pressure difference across the orifice causes critical flow. Critical flow means that flow will be constant through the orifice and not affected by downstream pressure (the vacuum side) and only affected by the density of the gas flowing through the orifice. Therefore,  $F_1$  becomes a constant. It should be noted that temperature fluctuations will not only affect gas density but will also affect the orifice size. TML dilution probes are designed such that the orifice assembly is external to the stack and is under constant, controlled temperature and therefore not affected by changes in stack temperature. The other main contributor to changes in gas density is pressure. As the upstream pressure changes, so will the flow through the orifice. TML measures the pressure in front of the orifice and makes a correction to the orifice flow rate. This correction is straight multiplication of the ratio of the actual orifice pressure ( $P_o$ ) to a reference pressure ( $P_{ref}$ ) to the orifice flow.  $P_{ref}$  is one atmosphere or 14.7 psi. The equation above now becomes:

$$C_1 = \frac{F_3}{F_1 \frac{P_o}{Pr ef}} C_3 \quad \text{Or} \quad C_1 = \frac{F_3 Pr ef}{F_1 P_o} C_3$$

The final parameter needed to determine the dilution ratio is the total diluted sample flow or  $F_3$ . In the TML 675 system, this is done with a mass flow meter which makes a real time measurement of the total diluted sample flow.

If we summarize the above information, the stack concentration is determined by taking a small sample of stack gas and mixing it with clean air. The diluted sample is then sent to an analyzer for measurement. This measurement is multiplied by the dilution ratio in order to determine the stack concentration. If we take the equation above, and write it using a dilution ratio we get:

$$C_1 = DR C_3$$

Where DR is the dilution ratio or:

$$DR = \frac{F_3 Pr ef}{F_1 P_o}$$

Or

$$DR = \frac{(DilutedSampleflow)(14.7)}{(Orificeflow)(Orificepressure)}$$

### **D.3 CALIBRATION PREREQUISITES**

Prior to performing any calibrations (system or analyzer), the following components must be checked for proper setup and operation:

- Dilution Air Cleanup System
- Calibration Gas System

#### ***D.3.1 DILUTION AIR CLEANUP SYSTEM***

The Dilution Air Cleanup System includes the following components:

- Plant Air / Air Compressor
- Dilution Air Purifiers
- Supporting Hardware and Associated Piping

##### **A. PLANT AIR / AIR COMPRESSOR**

A supply of air is available to the dilution air system for probe operation. Recommended operating pressures are set at 90 psi for the primary supply (plant air) and 93-115 psi for the secondary supply (air compressor; optional).

##### **B. DILUTION AIR PURIFIERS**

A dilution air purifier is installed to remove moisture, hydrocarbons, SO<sub>2</sub>, NO<sub>x</sub>, CO and CO<sub>2</sub> from the air supply. The optimum operating pressure is 90 psi for removal of CO<sub>2</sub>.

##### **C. SUPPORTING HARDWARE AND ASSOCIATED PLUMBING**

The supporting hardware and plumbing allows the dilution air system to be set up for optimum operation and to facilitate maintenance requirements without sacrificing system availability.

#### ***D.3.2 CALIBRATION GAS SYSTEM***

The calibration gas system includes the calibration gas cylinders, regulators, valves, and associated controls. The calibration gas system supplies appropriate gases to the probe for operational verification of the analyzer train.

## A. CALIBRATION GAS CYLINDERS

The calibration gas cylinders contain the necessary gas compositions to provide both zero (or baseline reference) and upscale (or span) calibration values for all gas analyzers. The upscale values selected are dependent on the required analyzer response in accordance with the operational range and the applicable regulations.

## B. CALIBRATION GAS CYLINDER REGULATORS

Affixed to each calibration gas cylinder is a pressure regulator. On initial setup, set each regulator at sufficient pressure (about 15psi) to ensure gas flow of 2.0-5.0 ltr/min during normal calibration (or as required to overcome bypass eductor flow and flood the probe with cal gas). Flow rate is monitored and adjusted at the calibration flowmeter on the probe controller.

The duration of the calibration gas flow is preset using SpectraView to ensure a stable response from each of the gas analyzers.

## C. CALIBRATION CONTROLS

The Dilution Plate contains the necessary valves and flow measuring devices to precisely regulate the flow of calibration gas to the probe. The calibration gas solenoids admit the selected calibration gas to the needle valve on the probe controller. The calibration gas flow meter is regulated for normal calibration gas flow by adjusting it to provide the required displacement of the ball in the meter.

## D.4 CALIBRATION PROCEDURES

The required calibrations range from total system calibrations to individual analyzer checks. Select as appropriate the procedure required dependent on the calibration objective.

### D.4.1 System Calibration

- Setting Cal Gas Flow Rates
- Setting Sample Gas Flow Rates
- Setting Bypass Eductor Flow Rate
- Current Loop Calibrations
- Dilution Ratio Calibration

### D.4.2 Analyzer Calibration

- TML Model 41 - NO<sub>x</sub> Analyzer
- TML Model 50 - SO<sub>2</sub> Analyzer
- TML Model 30 – CO Analyzer

**NOTE:** It is recommended that all analyzers be taken **OUT OF SERVICE** before performing maintenance and procedures such as current loop calibrations, dilution ratio

calibrations, and direct calibrations, if those procedures are likely to interfere with proper emissions monitoring and reporting. While many of the procedures detailed below may be undertaken prior to startup and emissions reporting, it is considered good operating practice to take all analyzers out of service any time such procedures are performed. Use the PLC interface to take analyzers out of service.

#### ***D.4.1 SYSTEM CALIBRATION***

##### **A. SETTING CALIBRATION GAS FLOW RATES**

Flow of calibration gases is switched on and off using the Human-Machine Interface (HMI). See System Manual for initiation of manual calibration mode.

The DAS terminal displays the calculated concentration of gas in the stack emissions on the upper right of the screen, after a delay of approximately 10 seconds. This value is corrected for dilution factor.

**NOTE:** Since some cylinders contain gas mixtures, the same gas cylinder may be selected using more than one series of commands. Each cylinder need only be selected (and flow rate calibrated) once.

1. With the regulator on the calibration gas cylinders set at zero (backed off), slowly open the valve on each cylinder.
2. Check the calibration gas cylinders for sufficient reserve (>200 psi).
3. Completely shut the needle valve on the calibration gas flowmeter. The Calibration Gas Flowmeter is found on the Probe Controller Panel.
4. Select the desired calibration gas cylinder using the HMI.

**NOTE:** Analyzer ranges, calibration gas concentrations, and emission concentrations are to be confirmed by customer. **Refer to most recent System Drawings and/or gas cylinders for actual gas concentrations being used.**

5. Set calibration gas flow rate from the cal gas cylinders to the probe using both the calibration gas pressure regulators and the Calibration Gas Flowmeter on the Probe Controller Panel. This flow rate, as read on the Calibration Gas Flowmeter, should be ~ 2.0-5.0 ltr/min (or as required to overcome bypass eductor flow and flood the probe with cal gas).

**NOTE:** Actual flow rates will depend on the specific system and application.

6. Discontinue calibration gas flow.
7. Repeat steps 4 through 6 for all remaining calibration gas cylinders.

8. All calibration gas regulators used in calibration adjustments and daily calibration checks now provide the required calibration gas flow to the probes. The same procedure can be used to set up the proper flow rates for any audit gases attached to the system.

## **B. SETTING SAMPLE GAS FLOW RATES**

### **1. Dilution Air Cleanup System**

- a. Air Supply - Check local valves, regulators, and gauges to ensure the following pressures:
  - Primary - 90 psi
  - Secondary – 93-115 psi
- b. Air Purifiers - Select purifier #1 and #2 by lining up the appropriate input (not applicable if only one air purifier).

**WARNING:** Prior to admitting air, ensure that the power has been on for a minimum of five minutes.

**NOTE:** Optimum CO<sub>2</sub> removal occurs at 90 psi. Operating pressure for the purifiers can range for 50 to 150 psi.

- c. Associated Plumbing
  - i. Selected Purifier
    - CA Valve(s) – OPEN
  - ii. Unit Isolation Valve(s)
    - CA Valve(s) – OPEN

### **2. Diluted Sample Gas Flow Rate (Dilution Air)**

- a. Using the Dilution Air (DA) Regulator on the Dilution Controller panel, set the pressure at 45 to 55 psi or as required to maintain the eductor vacuum in the critical range.

-30" Hg   ←———— Critical Range —————→   -14.35" Hg

- b. Disconnect the sample line from all analyzers (or at least the first of any analyzers connected in series). Plug the removed sample line(s). **DO NOT PLUG THE SAMPLE FITTING ON THE BACK OF THE ANALYZER(S).**
- c. Read the sample excess flowmeter and adjust DA for a diluted sample (DS) flow rate equal to the manufacturer's suggested flow rate for the dilution unit/probe (for example: ~10LPM for M&C Probes, ~5LPM for EPM probes).

**NOTE:** Actual flow rate will depend on the specific system, probe and application.

- d. Reconnect the sample line(s) removed in step b.

### **C. SETTING BYPASS EDUCTOR FLOW RATE**

Set the Bypass Eductor flow rate at a level sufficient to pull air into the probe and past the critical orifice for dilution.

**NOTE:** Actual flow rate will depend on the specific system, probe and application.

### **D. CURRENT LOOP CALIBRATIONS**

1. Ensure that all analyzers have had sufficient warm-up time as recommended by manufacturer prior to performing calibrations:

<u>Analyzer</u>	<u>Warm-up</u>
NO <sub>x</sub>	90 minutes*
SO <sub>2</sub>	90 minutes
CO	90 minutes

\* although the NO<sub>x</sub> analyzer warms up after 90 minutes, it is recommended that the ozonator run overnight to obtain more accurate results

2. Check the switch positions and settings of each analyzer for the proper values.
3. Perform current loop calibrations on all analyzers while monitoring the DAS readings.
4. To perform current loop calibrations on the analyzers, refer to the Test Analog Outputs section of the manufacturer's manual. If internal adjustments are necessary, refer to the Output Board schematic (if available), or contact the service contractor or the manufacturer.
5. To perform current loop calibrations on the NO<sub>x</sub> analyzer, refer to the manufacturer's manual. If internal adjustments are necessary, refer to the Output Board schematic (if available), or contact the service contractor or the manufacturer.

## E. DILUTION RATIO CALIBRATION

Refer to the System Manual include with the system for proper adjustment of the dilution ratio.

### D.4.2 ANALYZER CALIBRATIONS

Calibration of the TML analyzers can only be accomplished once all prerequisites, including calibration gas, dilution air, probe controller, instrument current loops, and dilution ratio have been successfully completed. Refer to Section D.4.1 of this Appendix for instructions.

If an analyzer is being reinstalled after maintenance or a new analyzer installed, ensure that the analyzer has had sufficient warm up time as recommended by the manufacturer prior to performing calibrations:

<u>Analyzer</u>	<u>Warm-up</u>
NO <sub>x</sub>	90 minutes*
SO <sub>2</sub>	90 minutes
CO	90 minutes

\* although the NO<sub>x</sub> analyzer warms up after 90 minutes, it is recommended that the ozonator run overnight to obtain more accurate results

## A. ALL TML ANALYZERS

### Zero Calibration

1. Open the assigned calibration valve (CV<sub>x</sub>) for the zero gas.
2. Press TST> until the stability (STB) value appears.
3. Press CAL on the Main Menu.
4. Press CONC to set the calibration gas value, if necessary. Take into account the nominal dilution ratio and apply to the bottle value.
5. Wait until the analyzer STB value is less than the limit.
6. Press ZERO
7. Press ENTR
8. Press EXIT one time to return to the Main Menu.

### Span Calibration

1. Open the assigned calibration valve (CV<sub>x</sub>) for the span gas.
2. Press TST> until the stability (STB) value appears.
3. Press CAL on the Main Menu.

4. Press CONC to set the calibration gas value, if necessary. Take into account the nominal dilution ratio and apply to the bottle value.
5. Wait until the analyzer STB value is less than the limit.
6. Press SPAN
7. Press ENTR
8. Press EXIT one time to return to the Main Menu.

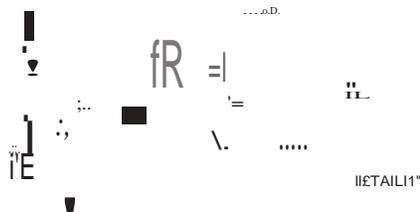
## **B. AUTOCALIBRATION**

Using the Human-Machine Interface, run the system through an auto-calibration cycle without making any adjustments.

## **APPENDIX E DIAGRAMS**

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 SCALE: 1/4" = 1'-0"

CERTIFIED  
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 CONSTRUCTION

GOPHER RESOURCE CORPORATION  
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 PROCESS / DRYER STACK B-PC-STD1

TN.4PA

STACK ELEVATION lie NOTES

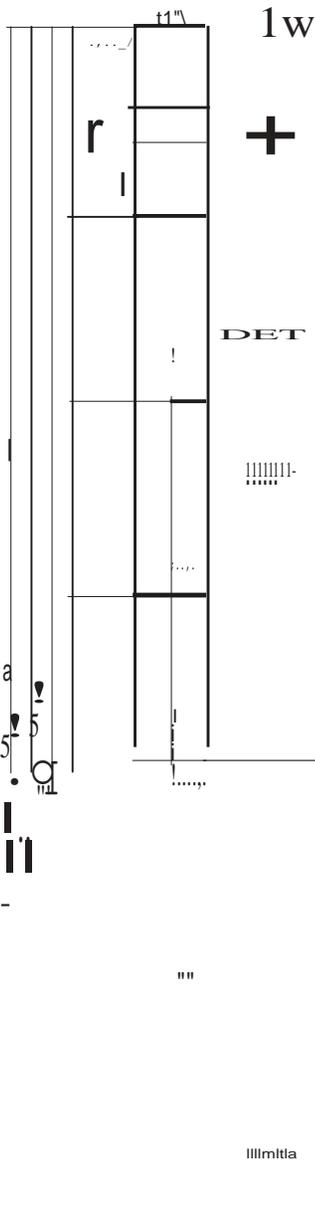
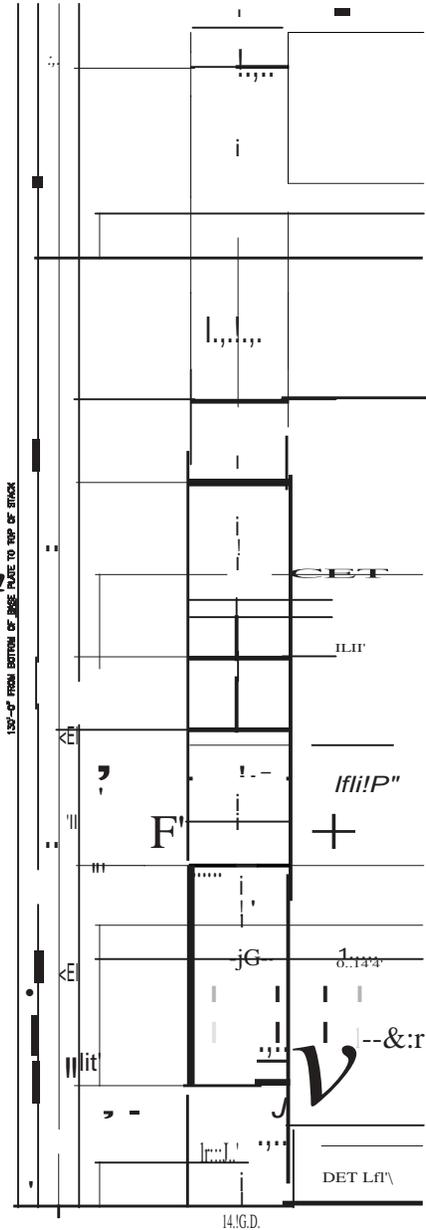
WARREN EIMRONWENT, INC.  
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 ATLANTA, GA 30342  
 111-24-10

NO.	DATE	REVISION	MADE	CHG'D.
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1	07-22-10	GENERAL REVISIONS / CPC	RHK	IBP

DRWING	KHK	IBP	DESIGN	DATE	SCALE
					AS SHOWN

CUSTOMER DWG. NO. WARREN DWG. NO. D10-17A-S1-2

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4. INSPECTION AND TESTING  
 MATERIAL TEST REPORTS FOR ALL MATERIAL UTILIZED FOR MAJOR COMPONENTS AND PARTNERS SHALL BE SUBMITTED TO WARRAN. THE MATERIAL TEST REPORTS ARE TO BE REQUESTED WHEN THE MATERIAL IS ORDERED AND FORWARDED TO WARRAN IMMEDIATELY UPON RECEIPT. THE TEST SHEETS ON THE TOUCH-UP PAINTS, THINNERS AND ANY OTHER HAZARDOUS MATERIAL IS TO BE INCLUDED WITH THE SHIPMENT OF THE TOOLS. ALL WELDS SHALL BE 100% VISUALLY INSPECTED BY A CERTIFIED WELDING INSPECTOR. THE STACK SHALL BE TO BE SPOT RADIOGRAPHED A MINIMUM OF ONE RADIOGRAPH PER EACH THREE SHOP CONJUNCTIONS. RADIOGRAPHIC CRITERIA FOR THE RADIOGRAPHS AND VISUAL INSPECTION SHALL BE IN ACCORDANCE WITH AWS D1.1 ACCEPTANCE CRITERIA. FINAL INSPECTION REPORTS, WELDING INSPECTION REPORT, AND RADIOGRAPH MAPS SHALL BE SUBMITTED.

5. SURFACE PREPARATION  
 A. ALL SHARP PROJECTIONS SHALL BE GROUND SMOOTH  
 B. ALL WELD FLUX AND SPATTER SHALL BE REMOVED BY POWER TOOL CLEANING  
 C. ALL EXTERIOR SURFACES ARE TO BE CLEANED PER AN SSPC-SP8 SANDBLAST CLEANING.

TO 4.0 MILS DFT. TOP COAT WITH ONE COAT OF DOWCORONA D1..... 8:11D:1-silTIDS111CJUZHaCIL IIPPLLEIE CDII" -  
 ALL PAINT SYSTEMS TO BE APPLIED PER MANUFACTURER'S SPECIFICATIONS.  
 INCLUDE 2 GALLONS OF TOUCH-UP PAINT FOR ALL PAINTS AND PRIMER USED ON STACK WITH SHIPMENT.  
 ALL TEMPORARY ITEMS THAT MUST BE REMOVED IN THE FIELD SHALL BE PAINTED YELLOW.  
 ADVISED THAT THERE IS AN INHERENT RISK OF DAMAGE TO THE PAINT DURING LOADING, SHIPMENT, UNLOADING AND DESTRUCTION OF THE STACK SYSTEM. FIELD REPAIR OF THE PAINT SHALL BE EXPEDITED, WARRAN WILL NOT ACCEPT RESPONSIBILITY FOR BLEACHES, STAINES, CHANGES OF COLOR DIFFERENCES, OR OTHER IMPERFECTIONS ASSOCIATED WITH THE REPAIR TO A SHOP PAINT SYSTEM.

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## GLOSSARY OF TERMS AND ABBREVIATIONS

**AC** - alternating current.

**Alternative monitoring system** - a system designed to provide direct or indirect determinations of mass per unit time emissions, pollutant concentrations and/or flow data that has EPA approval as an alternate.

**Annual availability** - the expected number of total hours of valid data capture per year, expressed as a percentage to total unit operating hours.

**Annual capacity factor** - the ratio between the actual heat input to a steam generating plant during a calendar year and the potential heat input of the unit had it been operated for 8,760 hours during the calendar year at the maximum steady-state design heat input capacity (40 CFR 60.41b).

**ASCII** - American Standard Code for Information Interchange.

**Bias** - systematic error. The result of bias is that measured values will be either consistently low or high relative to the true value.

**Btu** - British thermal units. The energy required to raise the temperature of one pound of water one degree Fahrenheit.

**°C** - degree(s) Celsius.

**CAL, Cal, cal** - calibration.

**Calibration error** - the difference between (1) the response of a gaseous monitor to a calibration gas and the known concentration of the gas, (2) the response of a flow monitor to a reference signal and the known value of the reference signal, or (3) the response of an opacity monitor to an attenuated filter and the known value of the filter.

**Calibration gas** - a known concentration of gas that is traceable to an SRM gas or an NIST/EPA-approved CRM or a Protocol 1 gas.

**CCW** - counterclockwise.

**CD** - calibration drift. The difference in CEMS output readings compared to a reference value after a period of operation during which no unscheduled maintenance, repair or adjustments took place.

**CEMS** - continuous emission monitoring system(s). The total equipment required for the determination of a gas concentration or emission rate.

**CERMS** - continuous emission rate monitoring system(s).

**Certified audit gases** - gases certified by comparison to NBS gaseous SRMs or NIST/EPA-approved gas manufacturer's CRMs following EPA Traceability Protocol No. 1.

**cfm** - cubic feet per minute.

**CFR** - Code of Federal Regulations. The document containing federal rules and regulations published in the Federal Register. Title 40 addresses regulations related to protection of the environment.

**Common stack** - the exhaust of two or more units through a single flue in a single stack.

**COMS** - continuous opacity monitoring system(s).

**CRM** - Certified Reference Material.

**CW** - clockwise.

**DAS** - data acquisition system.

**DC** - direct current.

**Deg** - degree(s).

**Diluent gas** - a major gaseous constituent in a gaseous pollutant mixture. For combustion sources, CO<sub>2</sub> and O<sub>2</sub> are the primary diluents of interest.

**EEPROM** - electrically erasable programmable read-only memory. A type of computer memory that can be programmed a number of times. The contents of EEPROMs are usually erased by subjecting the device to specific electrical signals.

**EPA** - Environmental Protection Agency.

**EPROM** - erasable programmable read-only memory. A type of computer memory that can be programmed a number of times. The contents of EPROMs are usually erased by exposure to hard UV radiation.

**°F** - degree(s) Fahrenheit.

**F-factor** - the ratio of the gas volume of the products of combustion to the heat content of the fuel (40 CFR 60, Appendix A, Method 19).

**fps** - feet per second.

**gal(s)** - gallon(s).

**Hg** - mercury.

**HV** - high voltage

**Hz** - hertz. A unit of frequency equal to one cycle per second.

**ID** - inside diameter.

**IRTP** - intelligent real time processor. The data acquisition component of the Model 20/20 Data Acquisition, Reporting and Management System from Spectrum Systems. The IRTP collects data from the analyzers and performs various supervisory functions.

**IR** - infrared.

**kV** - kilovolts.

**lb/hour** - pound(s) per hour

**lbs/mmBtu** - pounds per million Btu (British thermal units).

**LED** - light-emitting diode.

**l/minute** - liter(s) per minute.

**mmBtu** - million Btu(s) (British thermal units).

**mmBtu/hour** - million Btu(s) per hour.

**Mo** - molybdenum.

**MTCE** - maintenance.

**MWge** - gross megawatt(s) electrical.

**NBS** - see NIST.

**NDIR** - nondispersive infrared.

**NIST** - National Institute for Standards and Technology, formerly NBS (National Bureau of Standards).

**OD** - outside diameter.

**OOO** - out of control.

**Opacity** - the fraction of incident light that is attenuated by an optical medium.

**Out-of-control period** - any period beginning with the hour that a daily calibration error or electronic drift or quality assurance audit does not meet defined performance specifications. The out-of-control period ends only after completion of a retest showing the monitor to be within the defined performance specifications. During an out-of-control period substitute monitor data must be used following the specified missing data procedures.

**Percentile, 90%** - a value that would divide an ordered set of increasing values so that at least 90% are less than or equal to the value.

**PIA** - peripheral interface assembly.

**PLC** - programmable logic controller.

**PMT** - photomultiplier tube.

**P/N** - part number. **pot** -

potentiometer. **ppm** -

parts per million.

**PS** - Performance Specification.

**QAP** - Quality Assurance Program. A set of written procedures describing the quality assurance and quality control activities required to maintain CEMS in compliance with applicable regulations.

**RA** - relative accuracy. The absolute mean difference between the gas concentration or emission rate determined by the CEMS and the value determined by the reference method, plus the 2.5% error confidence coefficient of a series of tests divided by the mean of the reference method tests or the applicable emission limit.

**RATA** - relative accuracy test audit. The testing procedure defined in the federal regulations, using applicable reference methods to determine CEMS accuracy.

**RM** - reference method. The specific procedures used to analyze CEMS audit samples. Any method of sampling and analyzing for an air pollutant as specified in 40 CFR 60, Appendix A.

**S-Cal** - span calibration.

**scf** - standard cubic feet.

**scfh** - standard cubic feet per hour.

**sec** - seconds.

**Span** - the range of values that can be measured by a CEMS.

**SRM** - Standard Reference Materials.

**std** - standard.

**Substitute data** - emissions or flow data provided to assure 100% recording and reporting of emissions when all or part of a CEMS is not functioning or is operating outside applicable performance specifications (out-of-control).

**TP** - test point.

**UV** - ultraviolet.

**VDC** - volts, direct current.

**w.g.** - water gauge.

**YTD** - year to date.

**Z-Cal** - zero calibration.

