United States
Environmental Protection
Agency

Office Of Water
(4203)

EPA 833-B-94-003
June 1994

THC Continuous Emission Monitoring Guidance For Part 503 Sewage Sludge Incinerators

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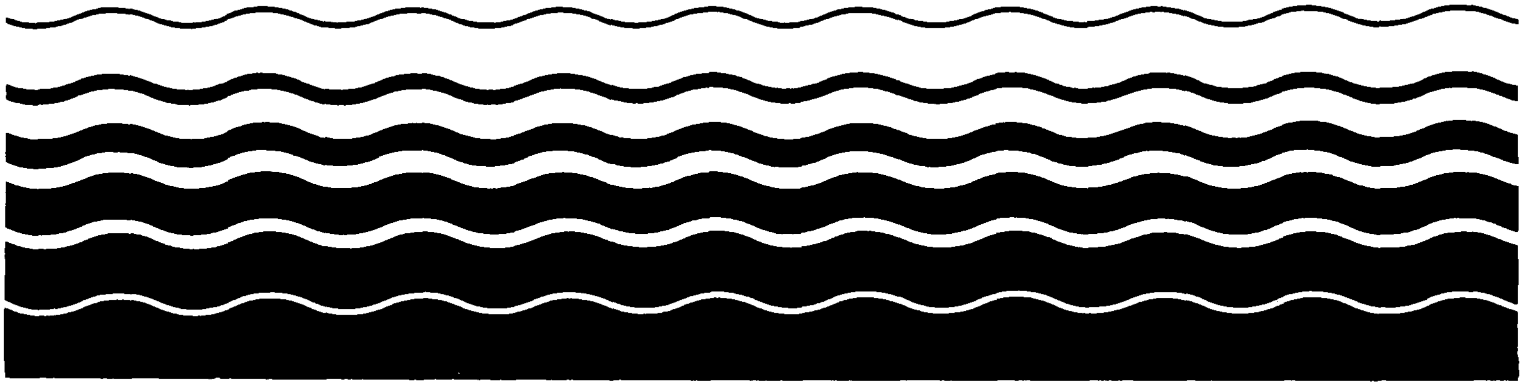

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 30 1994

OFFICE OF
WATER

MEMORANDUM

SUBJECT: THC Continuous Emission Monitoring Guidance for Part 503, Sewage Sludge Incinerators

FROM: Cynthia Dougherty, Director
Permits Division (Mail Code 4203)

TO: Recipients of subject guidance

Attached is the Environmental Protection Agency's guidance document for monitoring of total hydrocarbons (THCs) at sewage sludge incinerators. This document was finalized in response to comments received from Federal, State and local government agencies.

EPA's Standards for the Use of Disposal of Sewage Sludge were promulgated February 19, 1993, at 40 CFR Part 503. Subpart E of that regulation requires, in §503.45:

> (a)(1) An instrument that measures and records the total hydrocarbons concentration in the sewage sludge incinerator stack exit gas continuously shall be installed, calibrated, operated, and maintained for each sewage sludge incinerator, as specified by the permitting authority.
>
> (a)(2) The total hydrocarbons instrument shall employ a flame ionization detector; shall have a heated sampling line maintained at a temperature of 150 degrees Celsius or higher at all times; and shall be calibrated at least once every 24-hour operating period using propane.
>
> (b) An instrument that measures and records the oxygen concentration in the sewage sludge incinerator stack exit gas continuously shall be installed, calibrated, operated, and maintained for each sewage sludge incinerator, as specified by the permitting authority.
>
> (c) An instrument that measures and records information used to determine the moisture content in the sewage sludge incinerator stack exit gas continuously shall be installed, calibrated, operated, and maintained for each sewage sludge incinerator, as specified by the permitting authority.

The attached document contains recommendations for compliance with these requirements. It addresses installation, calibration, operation, and maintenance procedures for sewage sludge incinerators in the following areas: (1) THC continuous emissions monitoring (CEM); (2) oxygen CEM; (3) moisture CEM; (4) quality assurance; and (5) recordkeeping and reporting. The attached final document will provide guidance for both the interim and long-term sludge permitting programs.

This document was finalized in response to comments received from Federal, State and local government agencies. If you have any questions please contact me at (202) 260-9545 or Cristina Gaines, the project manager, at (202) 260-6284.

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FOR
PART 503
SEWAGE SLUDGE INCINERATORS

I. INTRODUCTION

On February 19, 1993, the United States Environmental Protection Agency (EPA) published a regulation, at 40 CFR Part 503, governing the use or disposal of sewage sludge (58 FR 9248). Included in the regulation (which is Attachment A of this document) are requirements that apply to the incineration of sewage sludge. This document is for use by regulatory agencies and by incinerator owners and operators subject to Part 503 incineration requirements, for guidance on compliance with the total hydrocarbon (THC) continuous emissions monitoring (CEM) requirements. The methodologies presented in this guidance document are recommended as minimum requirements and standards to be followed by all permitting authorities and sewage sludge incinerator operators, based on the national requirements. As always, the permitting authority has the option of establishing more stringent CEM requirements in the incinerator's permit, on a case by case basis, in order to protect human health and the environment.

Subpart E, the incineration portion of Part 503, establishes, among other things, an operational standard for total hydrocarbon (THC) emissions from sewage sludge incinerators. The regulation requires that:

- an instrument that continuously measures and records the THC concentration in the sewage sludge incinerator stack exit gas shall be installed, calibrated, operated, and maintained for each sewage sludge incinerator, as specified by the permitting authority. [40 CFR §503.45(a)(1)]

- the THC instrument shall employ a flame ionization detector; shall have a heated sampling line maintained at a temperature of 150 degrees Celsius or higher at all times; and shall be calibrated at least once every 24-hour operating period using propane. [40 CFR §503.45(a)(2)]

- an instrument that continuously measures and records the oxygen concentration in the sewage sludge incinerator stack exit gas shall be installed, calibrated, operated, and maintained for each sewage sludge incinerator, as specified by the permitting authority. [40 CFR §503.45(b)]

- an instrument that continuously measures and records information used to determine the moisture content in the sewage sludge incinerator stack exit gas shall be

> installed, calibrated, operated, and maintained for each sewage sludge incinerator, as specified by the permitting authority. [40 CFR §503.45(c)].

It is important to note that the regulation defines continuous monitoring as obtaining at least two THC measurements per hour.

The operation of continuous emission monitors (CEM) as a tool to determine compliance with a regulatory requirement is not new. Numerous air quality regulations and permit requirements that have been established by EPA and State agencies have included requirements for CEM systems. EPA's Resource Conservation and Recovery Act (RCRA) program has also made use of CEM technology to enforce emission standards for incinerators and other combustion units that burn hazardous wastes. As a result of the extensive use of CEM systems, EPA and State air quality agencies have established a variety of programs to implement their CEM requirements.

Unlike most regulations that establish requirements for CEM systems, Part 503 does not include detailed instructions on how these requirements are to be implemented. Rather, Part 503 provides that many of the implementation details are to be specified by the Part 503 permitting authorities. Recognizing the large measure of flexibility granted to permitting authorities, EPA is seeking to ensure as much consistency as possible with other EPA programs' existing THC CEM policies, procedures, and requirements. In preparing this guidance document, EPA hopes to ensure more consistent and efficient application of CEM requirements.

On February 25, 1994, EPA published amendments to Part 503 (59 FR 9095). These amendments, which are included as Attachment B of this document, contain an alternative to the THC CEM requirements. Incinerators with a monthly average concentration of carbon monoxide (CO) that does not exceed 100 parts per million on a volume basis (ppm_v), after correction to zero percent moisture and to seven percent oxygen, can continuously monitor CO as an alternative to monitoring THC. **This document does not address CO CEM and all references to CEM in this document are to THC CEM.**

II. GENERAL CEM REQUIREMENTS

A. Compliance Demonstration

The primary purpose of a CEM system under Part 503 is to document compliance with a THC operational standard. The sewage sludge regulation in 40 CFR §503.44(c) establishes a monthly average concentration of THC in the exit gas from a sewage sludge incinerator of 100 parts per million, by volume (ppm_v), corrected to zero percent moisture and to seven percent oxygen. Compliance with the THC operational standard is determined by multiplying the measured THC concentration by moisture and oxygen correction factors. The moisture and oxygen correction factors are calculated as follows:

Correction factor (moisture) = 1/(1-X); and
Correction factor (oxygen) = 14/(21-Y)

Where: X = percent moisture content expressed as a fraction in the sewage sludge incinerator exhaust gas (in hundredths); and

Y = percent oxygen concentration in the sewage sludge incinerator exhaust gas (by dry volume).

This corrected THC concentration is never to exceed the THC operational standard of 100 ppm_v, as propane, as a monthly average.

40 CFR §503.41(h) defines "monthly average" as "the arithmetic mean of the hourly averages for the hours a sewage sludge incinerator operates during the month." Further, 40 CFR §503.41(f) defines "hourly average" as "the arithmetic mean of all measurements, taken during an hour." Continuous is defined as at least two measurements per hour. All CEM hourly averages generated during hours when a sewage sludge incinerator is not operating or is not fired with sewage sludge are not to be included in the calculation of a monthly average. Data recorded during periods of CEM system breakdowns, repairs, calibration checks, and any adjustments to the CEM systems are not be included in the computation of hourly averages but must be documented and explained in a log. All data points recorded during each one-hour operational period must be used to calculate an hourly average.

1. Data Capture

The data capture rate identifies the percentage of time that the hourly corrected THC averages were collected during the hours that sewage sludge was incinerated. For example, if the incinerator burned sewage sludge 24 hours per day for 15 days per month but it only collected corrected THC data for 8 hours each day of the 15 days, then its data capture would be 33%.

$$\frac{8hr}{24hr}\times\frac{15days}{15days}\times 100=33\%$$

If it collected corrected THC data for 24 hours every day of the 15 days of operation that month except for 3 days when the oxygen unit failed, the data capture would be 80%.

$$\frac{24hr}{24hr}\times\frac{12days}{15days}\times 100=80\%$$

Existing air permits often contain data capture rates for CEMs based on extended time periods (e.g., 90 percent based on quarterly reporting periods). Part 503, however, requires determination of average THC on a monthly basis. EPA also considers the performance specification test period (time during which calibration drift, calibration error, and response time tests are conducted) as part of the down time for determination of the data capture rate.

The CEM system required by Part 503 (i.e., a THC monitor and oxygen and moisture analyzers to standardize the measured THC to zero moisture content and 7 percent oxygen) is similar to those required in air or hazardous waste regulatory programs. Such systems have been able to demonstrate a data capture rate of 100 percent, based on four measurements per minute.

For Part 503 THC CEMs, EPA recommends a data capture rate of 100 percent, based on two measurements per hour. Operational history for these CEMs does not yet exist. For this reason, the permit writer may establish a phased-in approach, requiring, for example, 80 percent in the first year, 90 percent in the second, 95 percent in the third, and 100 percent in all subsequent years.

The permit should clarify that this requirement may be modified based on the operation of the THC CEM system. If the permit specifies a data capture rate for a monthly average, and that rate is not attained, the permittee will not have demonstrated compliance with a permit condition implementing the Part 503 THC operational standard.[1]

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[1] During development of the Part 503 regulation, EPA, in collaboration with Metropolitan Waste Control Commission (MWCC) in St. Paul, Minnesota, installed a THC CEM system to evaluate its feasibility for sewage sludge incinerators. As demonstrated during the first phase of the study, the THC analyzer achieved an 88 percent data capture rate, with 4.8 percent of the time lost due to relocation of the analyzer and the remaining 7.2 percent due to actual CEM downtime. If you factor out the 4.8% relocation time lost, the THC CEM realized a 92.4 percent uptime when installed.

$$\frac{88}{100-4.8}=\frac{x}{100} \qquad \therefore x = 92.4\%$$

This test verified that THC CEM systems are viable. It also provides a reasonable starting point for evaluating THC CEM system reliability. Until an

Continuous monitoring means analyzing and recording at least two THC measurements, corrected for zero percent moisture and to seven percent oxygen, per hour. Except for necessary maintenance, it is prohibited to deliberately shut down any CEM device or method required under the regulation while the incinerator is in operation or emitting exit gas. If a CEM device is deliberately shut down for necessary maintenance or if any monitoring device or method breaks down or fails during incinerator operation, all reasonable measures must be taken to ensure resumption of monitoring as soon as possible or as soon as the unit begins to incinerate sewage sludge.

If CEM equipment is expected to be broken or shut down for more than 72 hours, and the incinerator is operated during that period, EPA recommends that the owner/operator notify the permitting authority and document similar information in the log. Notice is recommended as soon as practical after the two required measurements per hour from the CEM were not obtained. It should include the known or presumed reason for the breakdown or shutdown, the steps being taken to restore monitoring, the expected duration of the equipment stoppage, and the length of time that the incinerator will operate during CEM downtime.

For shutdowns or breakdowns of less than 72 hours, the incinerator owner/operator should document this information in the log and keep this documentation on file for later review by the permitting authority or for submission to the permitting authority, if so requested. Log documentation is recommended as soon as practical after the two required measurements per hour from the CEM were not obtained. This notification or documentation does not relieve the owner/operator from responsibility to comply with standards or with the data capture rate.

Where a sewage sludge incinerator owner/operator has difficulty achieving consistently high data capture rates, EPA recommends consideration of measures that will increase the data capture capabilities of the THC CEM system. One such measure is to purchase equipment from manufacturers that design THC CEM systems specifically to minimize downtime (e.g., spare capillary sampling line to reduce downtime due to clogged lines, and multiple pre-filter trains to retain one pre-filter in service at all times while the second is reconditioned). Another measure is the limited use of portable systems that can be used during primary system maintenance, breakdown, etc. Also, the

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operational history of THC CEM systems at sewage sludge incinerators has been developed, EPA will consider not requiring a minimum CEM up-time to demonstrate compliance.

sewage sludge incinerator owner/operator can install backup or portions of backup THC CEM systems that can be switched over quickly from the primary system so that the minimum two measurements can still be determined during any given hour. Note that if a backup system is used it must be certified using the same procedures as for the primary system.

2. Certification

Under Federal air quality control programs, CEM data used to demonstrate compliance with an emission standard must be generated by a CEM system that has been certified by a regulatory agency. In short, the certification process demonstrates to regulatory agencies and emission sources that a CEM system has been designed and installed adequately and that, through extensive testing and documentation, the data generated by the CEM system can be used to determine compliance with an air quality emission standard. After certification, the data generated by the CEM system can be used to demonstrate compliance with applicable regulations.

The THC CEM system should also undergo certification testing before the system is used to demonstrate compliance with the Part 503 THC operational standard. The incinerator owner/operator should verify that the THC CEM system is installed, operated, and maintained pursuant to the manufacturer's written instructions and recommendations, meets CEM performance specification criteria (as described later in section III.F.), and is suitable for compliance evaluation purposes. This certification statement (signed by a responsible official) should be submitted to the permitting authority within 90 days after the installation of the CEM system. If the permittee does not submit a complete certification statement, the CEM data collected will **not** be considered valid to demonstrate compliance with the THC operational standard, even if performance specification test procedures are followed. Upon submission of a complete certification statement to the permitting authority, all CEM data collected after the completion of the CEM performance specification test will be considered valid to demonstrate compliance, provided that performance specification test procedures are followed.

Although the use of non-certified CEM systems may be acceptable in other programs, when the CEM system is down, EPA considers the use of a non-certified CEM system unacceptable for evaluating compliance with Part 503. For this reason, the permittee should submit a certification for any backup CEM systems in addition to the certification for the primary system. The backup monitors must also undergo the performance specification testing. If a non-certified system is used, the data generated by this system cannot be used to demonstrate compliance. Details of the certification steps for Part 503 THC CEM systems are presented later in this document.

B. Indication of Incinerator Operations

THC CEM data can also be used as an indicator of adequate incinerator operations. The Part 503 regulation does not specify excess emission or excursion reporting requirements for THC emissions from sewage sludge incinerators, but the permitting authority may choose to implement such a provision.

Under Federal air quality regulations at 40 CFR 60.7(c), EPA requires certain air emission sources to submit periodic excess emissions and monitoring systems performance reports. However, the definition of excess emissions and the criteria that trigger excess emissions reporting are specific to the regulated emission source and its applicable performance standard. The use of CEM data to generate excess emissions or excursion reports differs from the use of CEM data to determine compliance with an emission standard.

III. CEM SYSTEM SPECIFICATIONS

A. Applicability

The requirements and specifications presented in this document apply to the THC CEM system(s), including the THC, oxygen, and moisture analyzers, installed on sewage sludge incinerators that are subject to the requirements of 40 CFR Part 503 Subpart E. Some of these requirements include procedures used to evaluate the acceptability of CEM systems prior to installation. Other requirements ensure the proper calibration, operation, and maintenance of CEM systems and evaluate CEM system performance over an extended period of time.

Attachments C and D are appendices for compliance with CEM requirements under 40 CFR Part 60, Standards of Performance for New Stationary Sources. Although the appendices are not requirements for sewage sludge incinerators under Part 503, EPA believes they provide appropriate guidance for Part 503 compliance.

B. Definitions

1. Continuous Emission Monitoring (CEM) System

The total equipment used to acquire data. It includes sample handling hardware; total hydrocarbon, oxygen, and stack gas moisture analyzer hardware; calibration gas system hardware; and data acquisition and reporting system hardware and software. The CEM system consists of the major components described below.

a. Sample Interface

That portion of the CEM system that touches the sample. It is used for sample acquisition, sample transportation, and sample conditioning. At a minimum, it includes the THC analyzer, the oxygen analyzer and the moisture content analyzer. No portion of the sample interface may lower the sample temperature below 150°C.

b. THC Analyzer

That portion of the CEM system that senses total hydrocarbon concentration using a flame ionization detector and generates an output proportional to the total hydrocarbon concentration.

c. Oxygen Analyzer

That portion of the CEM system that senses oxygen concentration and generates an output proportional to the oxygen concentration.

d. Moisture Analyzer

That portion of the CEM system that provides, or senses, information which will be used to determine stack gas moisture concentration, and generates an output proportional to the stack gas moisture concentration. A moisture analyzer need not be a single instrument or analyzer; it may be a series of one or several instruments used in combination with other information or non-instrumental techniques.

e. Data Recorder

That portion of the CEM system that is designed to interpret and convert individual output signals from the CEM to produce a permanent record of measured parameters in the required measurement units.

2. Span or Span Value

The required full scale range of the analyzer.

3. Calibration

The systematic process of checking, adjusting, or standardizing the graduations of a quantitative measuring instrument.

4. Calibration Drift (CD)

The difference in the CEM output readings from the established reference value after 24 hours of operation during which no maintenance, repair, or adjustment of the CEM takes place. A CD test is performed to demonstrate the stability of the CEM calibration over 24 hours.

5. Calibration Error (Cal Error)

The difference between the concentration indicated by the CEM and the known concentration of a reference gas. A Cal Error test procedure is performed to document the accuracy and linearity of the CEM over the entire measurement range.

6. Response Time

The time interval between the start of a step change in input into the CEM (e.g., calibration gas input) and the time when the data recorder displays 90 percent of the final value for that input.

7. Accuracy

A measurement of agreement between a measured value and an accepted or true value, expressed as the percentage difference between the true value and measured values relative to the true value. For THC CEM requirements and specifications, accuracy is checked by conducting a calibration error (Cal Error) test.

8. Flame Ionization Detector (FID) Fuel

The fuel that is burned in the detector of the flame ionization detector (e.g., 40 percent hydrogen/60 percent helium).

9. Performance Specification Test (PST) Period

The period during which CD, Cal Error, and response time tests are conducted.

C. Instrument Design Specifications

Part 503 requires that the THC CEM employ a flame ionization detector (FID), have a heated sampling line maintained at a temperature of 150°C or higher at all times, and be calibrated at least once every 24-hour operating period using propane. All system components such as the sample probe, calibration valve, filter(s), sample lines, pumps, and the FID must be maintained at no less than 150°C such that no moisture is condensed out of the THC CEM system. The THC CEM must be equipped with indicators that measure temperature at key points in the system and, because of this temperature requirement, it should be designed and equipped to include a mechanism that produces and records an alarm when any portion of the THC CEM falls below this temperature.

The FID fuel specified by the FID manufacturer (e.g., 40 percent hydrogen/60 percent helium) should be used. Any carrier gases, combustion gases, or probe blowback gases used to operate the THC CEM should meet a standard of high purity air with less than 0.2 ppm_v THC (as propane) or less. Gas used for carrier, combustion, or probe blowback can be generated on site but cannot be used as a calibration gas.

CEM systems regulated under Subpart E should be designed such that calibration gases are introduced as close as possible to the stack gas sampling probe. Calibration gases should pass through as much of the sample interface as possible, but at a minimum, these gases must pass through any out-of-stack filters.

Many different design options are acceptable to EPA for oxygen and moisture CEM analyzers for a sewage sludge incinerator's stack gas. For example, a CEM may be designed such that a single sample is extracted from stack gases using a single sample line and that sample is conveyed to separate THC, oxygen, and moisture content analyzers. Another acceptable design might convey an extractive sample via a heated sampling line to the THC analyzer, having part of that sample conveyed to a moisture condenser and an oxygen analyzer, and having another part of that sample conveyed directly to an in-situ analyzer for oxygen measurement on a wet basis. In this design, the wet and dry basis oxygen concentrations could be used to calculate stack gas moisture content.

Different techniques for measuring and recording stack gas moisture content are also acceptable. Options for stack gas moisture monitoring include the use of a proprietary moisture analyzer, the use of wet and dry basis oxygen concentrations as indicated above, or the use of stack gas temperature measuring devices alone or in combination with psychrometric charts. The key item to remember is that the moisture measurement technique must include an instrumental portion in the method, and must produce an output signal that can be correlated to the stack gas moisture content. The instrumental portion of the method must have the ability to be calibrated and adjusted to reflect actual stack gas moisture concentrations.

D. Installation Specifications

To comply with Part 503, a CEM system must be installed such that representative measurements of THC, oxygen, and stack gas moisture concentrations in exhaust gases from sewage sludge incinerators are obtained. EPA strongly recommends that sample points for THC, oxygen, and stack gas moisture be located as close together as possible[2].

The optimum location of a CEM sample interface is determined by a number of factors, including ease of access for calibration and maintenance, the degree to which sample conditioning will be required, and the degree to which the sample location represents total emissions. The location should be as free from in- or out-leakage as possible and free from severe flow disturbances. The sample location should be at least two duct diameters from the nearest control device, point of pollutant generation, or other point at which a change in measured concentration occurs, and at least 0.5 diameter upstream from the discharge point or a control device. For rectangular cross sections, the equivalent duct diameter (D_e) is calculated as:

$$D_e = \frac{2 \times L \times W}{L + W}$$

where:

L = length
W = width

(Ref: 40 CFR Part 60, Appendix A, Method 1, Section 2.1)

If these installation criteria are not achievable or if the location is otherwise less than optimum, then the sample will possibly be unrepresentative.

E. Span Settings

The oxygen CEM span should be 0-25 percent by volume and the instrumental part of the stack gas moisture CEM analyzer

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[2] See Attachment C pg 1109 item 3, Installation and Measurement Location Specifications for specific representative sampling points.

span should be 0-100 percent by volume. The THC span has a greater potential for variation than either the moisture or oxygen concentration CEM. At a minimum, the THC CEM span should be 0-200 ppm$_v$, or greater where THC concentrations above 200 ppm$_v$ occur.

An option on many CEM systems is an auto-rangefinder that automatically changes the span range depending on the THC concentration. For example, a CEM system with dual span auto-rangefinder (i.e., 0-200 ppm$_v$ and 0-2000 ppm$_v$) has a controller that automatically switches from the 0-200 span to the 0-2000 span as the THC concentration approaches 200 ppm$_v$. The controller will switch back to the lower span as the THC concentration falls back below some value less than 200 ppm$_v$. In this way, the CEM is precise enough at lower concentrations but also capable of analyzing and recording higher concentrations. A span value of 0-100 ppm$_v$ is inappropriate since the auto-rangefinder will switch span values as the THC concentration approaches the THC limit of 100 ppm$_v$, as propane, creating greater uncertainty about the time and value of the reading as it hovers near the limit. It would be better to switch the ranges at above 110 ppm$_v$. EPA may reconsider the recommended THC span value after establishing a history of THC CEM operations if operating experience indicates the need for such a change.

F. Performance Specifications

Prior to certifying a THC CEM system, the incinerator owner/ operator should perform a performance specification test (PST) to demonstrate that the CEM system, as installed, will conform to performance specifications. Besides the CEM design and installation criteria described earlier, the CEM operator should also demonstrate that the installed CEM will meet performance criteria for response time, Cal Error, and CD at the operational conditions and ranges used during the metals performance testing or as otherwise specified in the permit. (In other words, the CEM performance criteria must not be tested outside of acceptable operating conditions for compliance with metals limits and operational settings.) This demonstration is to be conducted during an initial PST period using specific test procedures.

1. Calibration Gases

The use of EPA Protocol 1 calibration gases is **not** required for response time, CD, or daily calibration testing. All PST and Cal Error testing, however, should be conducted using calibration gases that have been certified by comparison to National Bureau of Standards (NBS) gaseous Standard Reference Materials (SRMs) or NBS/EPA-approved gas manufacturer's Certified Reference Materials (CRMs)[3] following EPA Traceability Protocol No. 1[4]. The calibration gas cylinder manufacturer should provide a recommended shelf life over which the concentration of the gas does not change by more than ±2 percent from the certified value.

2. THC CEM Performance Specifications

a. Calibration Drift (CD).

The CD of THC CEM should be determined at two levels: zero and high. The CEM calibration response should not differ by more than 6 ppm_v THC, as propane, after each 24-hour period of the 7-day CD test at both zero and high levels. Test point values for THC CD testing are as follows:

Zero-level -- zero to 20% of the span.

High-level -- 70 to 90% of the span.

b. Calibration Error (Cal Error).

The Cal Error of THC CEM should be determined at three levels: zero, mid, and high. The mean difference between the CEM and reference values at the mid- and high-level test points (specified below) should be no greater than 10 ppm_v THC, as propane. The mean difference between the CEM and reference values at the zero-level test point should be no greater than 5 ppm_v. Test point values for THC Cal Error testing are as follows:

Zero-level -- zero to 20% of span.

Mid-level -- 30 to 50% of span.

High-level -- 70 to 90% of span.

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[3] "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. Available from the EPA Quality Assurance Division (MD-77). Research Triangle Park, NC 27711.

[4] "Traceability Protocol for Establishing True Concentrations of Gases Used for Calibration and Audits of Continuous Source Emission Monitors (Protocol Number 1)" June 1978. Section 3.0.4 of the Quality Assurance Handbook for Air Pollution Measurement Systems. Volume III. Stationary Source Specific Methods. EPA-600/4-77-027b. August 1977. EPA Office of Research and Development Publications, 26 West St. Clair Street, Cincinnati, OH 45268.

c. Response Time.

The response time for the THC CEM should not exceed 200 seconds to achieve 90 percent of the final stable value.

3. Oxygen CEM Performance Specifications

a. Calibration Drift (CD).

The CD of oxygen CEM should be determined at two levels: zero and high. The CEM calibration response should not differ by more than 0.5 percent oxygen after each 24-hour period of the 7-day CD test at both zero and high levels. Test point values for THC CD testing are as follows:

Zero-level -- zero to 4% oxygen.

High-level -- 14% to 21% oxygen.

b. Calibration Error (Cal Error).

The Cal Error of the oxygen CEM should be determined at three levels: zero, mid, and high. The mean difference between the CEM and reference values at the zero-, mid-, and high-level test points (specified below) should be no greater than 0.5 percent oxygen. Test point values for oxygen Cal Error testing are as follows:

Zero-level -- zero to 4% oxygen.

Mid-level -- 6% to 10% oxygen.

High-level -- 14% to 21% oxygen.

All Cal Error testing should be conducted using EPA Protocol 1 calibration gases[4].

c. Response Time.

The response time for oxygen CEM should not exceed 200 seconds to achieve 90 percent of the final stable value.

G. Testing Requirements

Performance specification tests should be conducted to determine if a CEM meets the performance specifications outlined above. Performance specification test (PST) procedures to be used for compliance with Subpart E are described below.

The operating ranges set during the metals performance test must not be exceeded during the PST. In other words, the CEM performance criteria must be tested within acceptable normal operating conditions for compliance with metals limits and operational parameters. Failure to run the PST at ranges at or below those set during the metals test may cause metals limits to be exceeded, and may necessitate repetition of the metals performance test, so that a control efficiency (CE) and the metals limits can be recalculated and the incinerator and air pollution control device(s) settings can be redetermined.

1. Calibration Drift Testing

While the sewage sludge incinerator is operating either in compliance with settings and ranges established during the metals performance test or its permit conditions, the magnitude of CD should be determined at 24-hour intervals for seven consecutive days using calibration gases at zero- and high-level concentrations. All CD determinations should be made following a 24-hour period during which no maintenance, repair, or adjustment takes place. If the sewage sludge incinerator 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.

Introduce the zero and span gas into the sampling system as close to the probe inlet as practical. The system must be designed so that the introduction of calibration gas does not pressurize the gas sampling line. (If the lines are pressurized during the calibration drift check, leaks will not be detected.) The gas must pass through all CEM components used during normal sampling. Before adjusting either the zero or calibration settings, repeat the CD test. Record the CEM response and subtract the recorded value from the reference (calibration gas) value. The differences represent CD values. Summarize the recorded values, reference values, and calculated differences on a data sheet like that in Table 1.

2. Calibration Error Testing

Cal Error testing should be conducted during the time period when CD testing is conducted. Challenge the CEM by introducing EPA Protocol No. 1 calibration gases using the criteria described in section III.F above. Operate the CEM as nearly as possible in its normal sampling mode. The calibration gas should be injected into the sampling system as close as possible to the sampling probe outlet and should pass through all filters, scrubbers, conditioners, and other monitoring components used during normal sampling. Challenge the CEM three non-consecutive times at each measurement point and record the responses (i.e., do not test the upper point three times in a row; instead test one point then test a different point). Each gas injection should last long enough to ensure that the CEM surfaces are conditioned and a stable measured value is achieved.

Summarize the results of Cal Error testing on a data sheet like the one in Table 2. Average the differences between the CEM response and the certified cylinder gas value for each gas measurement level. These average differences represent values for Cal Error.

3. Response Time Testing

Response time testing should be conducted during the time period when CD and Cal error testing are conducted. Response time testing should begin after relatively stable incinerator operations and/or THC concentrations have been achieved. The entire system, including sample extraction and transport, sample conditioning, gas analysis, and the data recording system, should be checked during the following response time test.

Introduce all calibration gases at the probe as near to the sample location as possible. First introduce zero gas into the system. When the system output has stabilized (no change greater than 1 percent of full scale for 30 seconds), switch to monitor stack effluent and wait for a stable value. Record the time required to reach 90 percent of final stable value (the upscale response time). The response time should be 200 seconds or less. Next, determine the downscale response time by introducing a high-level calibration gas and repeating the above procedure. Repeat both procedures three times and determine the mean upscale and downscale response times. The longer of the two mean values is the system response time.

4. Retesting

If the results of the CEM testing meet the criteria specified above, the test is successful. If the CEM does not meet one or more of the specified criteria, necessary corrections should be made and any unsuccessful performance tests must be repeated until all are successful. If the operational settings for the incinerator are changed to settings which do not meet either the permit requirements or the settings or ranges established during the metals performance test, then either the metals performance test must be repeated at the new conditions or the CEM settings must be changed and retested to reflect settings which meet the permit requirements or the metals performance test settings or ranges.

H. Certification

As indicated earlier, upon satisfactory PST results (i.e., all tests are within the performance specifications identified previously), the CEM owner/operator should notify the permitting authority of its findings by letter and certify the CEM as being acceptable for demonstrating compliance with the THC operational standard. In addition to a statement regarding the satisfactory PST results, the CEM owner/operator should certify that the system has been installed and will be operated and maintained according to the manufacturer's instructions and recommendations. CEM compliance data collection begins from the date the performance specification test generates satisfactory results. The installation and/or performance test certification can be a joint certification with the CEM manufacturer if the CEM manufacturer performs the installation and/or PST. Only the sewage sludge incinerator operator, however, can attest to operational certification.

I. Quality Assurance and Quality Control (QA/QC) Maintenance Requirements

The CEM certification process described above ensures that CEM systems meet minimum standards when installed. To ensure that CEM data quality is maintained during the life of the CEM, EPA recommends that the criteria provided at 40 CFR Part 60, Appendix F, Sections 3 and 4 be used to establish minimum QC criteria. (This reference is provided as Attachment D to the guidance.) At a minimum, CEM owners/operators should follow the daily CD checks and quarterly Cal Error checks described below.

1. Daily CD Checks

A daily calibration drift check is required for each monitor in the THC CEM. The CD check procedures and specifications described for the 7-day CD test should be used to conduct the daily check of each CEM. As with the CD PSTs, EPA Protocol 1 calibration gases are not required for daily CD checks, just as they are not required for PSTs. However, any zero and upscale calibration gases that are used for daily CD checks of THC and oxygen CEM cannot be generated on-site; rather, they should be certified cylinder gases. For CEM data to be used to document compliance with the THC operational standard, minimum acceptable criteria for daily CD checks should be established. EPA recommends that the criteria provided at

40 CFR Part 60, Appendix F, Sections 3 and 4 be used to establish minimum QC criteria. (See Attachment D.)

a. THC

If the daily THC CEM CD check indicates that the CD exceeds ± 12 ppm$_v$, the THC CEM should be adjusted and recalibrated such that the CD is less than or equal to ± 6 ppm$_v$ for any daily check. If the daily THC CD exceeds ± 12 ppm$_v$ for seven consecutive daily periods or if the daily THC CD ever exceeds ± 24 ppm$_v$, the THC CEM is considered out-of-control and all subsequent data is deemed invalid until necessary corrective action is taken to control the CEM. The out-of-control period is deemed to begin at the time corresponding to the completion of the seventh consecutive daily CD check with a ± 12 ppm$_v$ exceedance (if daily THC CD exceeds ± 12 ppm$_v$ for seven consecutive daily CD checks) or after completion of the daily CD check (if THC CD exceeds ± 24 ppm$_v$). Data cannot be used to demonstrate compliance until recalibration results in a daily CD within ± 6 ppm$_v$ THC.

b. Oxygen

If the daily oxygen CD indicates a CD in excess of ± 1.0 percent oxygen, the oxygen CEM should be adjusted and recalibrated so that the CD is within ± 0.5 percent oxygen. If the daily CD exceeds ± 1.0 percent oxygen for seven consecutive daily CD checks or if the CD exceeds ± 2.0 percent oxygen for any daily check, data from the oxygen CEM is considered out-of-control and its data cannot be used to demonstrate compliance until a recalibration that results in a CD within ± 0.5 percent is achieved. Similar to the THC CEM, the out-of-control period, at which time data is deemed invalid, occurs after completion of the seventh daily CD check (if oxygen CD exceeds ± 1.0 percent oxygen for seven consecutive daily CD checks) or after completion of the daily CD check (if oxygen CD exceeds ± 2.0 percent).

c. Moisture

Because there are numerous options for determining moisture content in the incinerator emissions, this document does not identify specific calibration procedures. Rather, the CEM owner/operator should follow manufacturer's written instructions and recommendations for calibrating the instrumental portion used to measure the moisture content. An example of appropriate calibration for one particular moisture analysis would be daily calibration and CD checking on the thermocouple used in conjunction with a psychrometric chart to determine moisture content of a saturated stream coming off a wet electrostatic precipitator.

2. Cal Error Checks

At a minimum, Cal Error checks should be conducted every 90-day operating period for the THC and oxygen CEM. The Cal Error PST procedures and specifications described earlier should be used to conduct quarterly Cal Error checks. All Cal Error checks should be conducted using EPA Protocol 1 calibration gases.

If a 90-day operating period Cal Error check results in a value in excess of an allowable Cal Error performance specification, the CEM is considered out-of-control and its data cannot be used to demonstrate compliance until a Cal Error check that results in a Cal Error within the performance specification is achieved. All data collected prior to the out-of-control Cal Error check, but after the previous in-compliance Cal Error check, is considered invalid for demonstrating compliance. Since the owner/operator cannot prove compliance with the THC standard, the incinerator is considered to be out of compliance with the standard. (Incinerator owner/operators may wish to increase the frequency of the Cal Error checks to once per month to avoid invalidating 90 days of data.) If this happens, the owner/operator should notify the permitting authority of corrective action(s) that will be taken to prevent further out-of-control emissions.

J. Recordkeeping Requirements

At a minimum, Part 503 Subpart E CEM operators must maintain records for the following items:

i. Hourly averages for THC concentration, oxygen content, stack gas moisture content, and THC concentration corrected to zero percent moisture and to 7 percent oxygen. These records should include the information identified in Table 3.

ii. PST reports and results. These records should include the information resulting from any CD, Cal Error, and response time performance specification testing performed by the incinerator owner/operator.

iii. Daily CD checks. These records should include the time and date of calibration, the person conducting the test or overseeing the test results, calibration gas concentration and cylinder number, the CEM response to the calibration gas, and the difference between the calibration gas value and the CEM response.

iv. Cal Error checks every 90 operating days. Cal Error check records should include the information presented in Table 2, the name of the person conducting the check, the time and data of the check, and calibration gas cylinder numbers.

v. CEM maintenance logs. These records should include a description of the maintenance conducted, why maintenance was conducted (corrective or preventative), the person who conducted the maintenance, the time and date of maintenance, and the duration of maintenance activities for which CEM data were not generated. If major components are replaced, the Cal Error and response time determinations, as appropriate, should be repeated as per the initial protocol and the results kept in the maintenance log. For example, if a sampling pump is replaced, the response time test should be repeated. If the sensor is replaced, the CD and Cal Error tests should be repeated.

vi. CEM downtime. These records should include an identification of the hours when a CEM was not gathering data suitable for demonstrating compliance and the reason for the CEM downtime if the unit was not able to obtain the required two readings for the hour.

All records must be maintained and available for inspection. The recordkeeping requirements specified in this guidance only pertain to the CEM systems described here. For a comprehensive list of recordkeeping requirements, refer to Attachment A (40 CFR §503.47).

K. Reporting

The incinerator owner/operator should submit the signed certification statement (described in section H above) to the permitting authority within 90 days after installation of the CEM system. Specifically, the owner/operator in conjunction with the CEM manufacturer, if appropriate, should certify that the THC CEM system is installed, operated, and maintained pursuant to the manufacturer's written instructions and recommendations, meets performance specification criteria, and is suitable for compliance evaluation purposes.

In addition, because sewage sludge incinerators are generally considered "class I sludge management facilities," CEM owners/operators must prepare at minimum an annual report of THC emissions from each sewage sludge incinerator to demonstrate compliance with the Part 503 THC operational standard. This annual report should contain the information presented in Tables 3 and 4 for each month of the year, whether or not the incinerator fired sewage sludge during that month. Table 3 information is only required for those days that sewage sludge was fired to the incinerator. In these emission reports, missing CEM data should also be identified by the use of codes that designate the reason for missing data. At a minimum, these codes should include:

Code 1 -- unit down, no sewage sludge or auxiliary fuel fired during that hour.

Code 2 -- unit did not fire sewage sludge in that hour, but did fire auxiliary fuel.

Code 3 -- CEM down or unable to gather data sufficient to generate a hourly average (includes both maintenance and QA/QC activities). The coding should also indicate, where appropriate, if the downtime was due to the THC, oxygen, or moisture analyzer (could be coded 3A for THC, 3B for oxygen, 3C for moisture, and 3D for other).

In addition to emission data, annual reports should also present a summation of the total number of hours per month:

i. with valid CEM data.

ii. that sewage sludge was fired to the incinerator.

iii. without valid CEM data in which there was sewage sludge fired to the incinerator.

An NPDES or other permit issued to the sewage sludge incinerator may require reporting of any of the above data as an enforceable permit condition. In addition, the permit may require more frequent reporting and/or non-compliance reports in cases where the THC standard is violated. A permit typically will require a signed certification from a responsible official within the organization submitting the report that indicates that the information is, to the best of his/her knowledge, true, accurate, and conforms with applicable requirements.

IV. POLLUTION PREVENTION IDEAS FOR CEMS

While pollution prevention techniques are not routinely evaluated for analytical equipment and procedures, this is an area that is being evaluated more and more. Incinerators may want to consider appropriate pollution prevention techniques both to reduce the pollution produced by the incinerator as well as to reduce operational costs. Auxiliary fuels, which are fossil fuels or derivatives, contribute to greenhouse gas production and contribute to operating expenses. Optimizing their use will optimize incinerator efficiency and reduce a source of THC which will enable an incinerator to more easily meet the THC limit.

Another specific pollution prevention area concerns THC samples and calibration gas handling and management practices. Minimizing sample exhaust (i.e., sample and/or calibration gas that is extracted from the stack but not analyzed) and burner exhaust (i.e., sample and/or calibration gas that is extracted from the stack, analyzed, and then exhausted) will reduce calibration gas use and thus reduce costs, as well as reduce pollutant emissions to the environment.

TABLES

Table 1
Calibration Drift Determination Results

	Day	Date	Time	Reference Value	CEM Value	Difference
Zero	1					
	2					
	3					
	4					
	5					
High	1					
	2					
	3					
	4					
	5					

Table 2
Calibration Error Determination Results

Run Number	Calibration Value	CEM Response	Differences		
			Zero	Mid	High
1-Zero				■	■
2-Mid			■		■
3-High			■	■	
4-Mid			■		■
5-Zero				■	■
6-High			■	■	
7-Zero				■	■
8-Mid			■		■
9-High			■	■	
Mean Difference (Calibration Error)					

Table 3

Data Records for THC CEM

Date: ___/___/___

End Time	THC ppm$_v$, (raw)	% Stack Moisture	% Oxygen, Dry	THC ppm$_v$ (dry @ 7% O_2)
1 am				
2 am				
3 am				
4 am				
5 am				
6 am				
7 am				
8 am				
9 am				
10 am				
11 am				
12 pm				
1 pm				
2 pm				
3 pm				
4 pm				
5 pm				
6 pm				
7 pm				
8 pm				
9 pm				
10 pm				
11 pm				
12 am				

Table 4: Monthly THC CEM Report																								
Hourly THC Averages (ppm, dry @ 7% oxygen)																								
Hr **Day**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
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Monthly THC Average (dry @ 7% oxygen) = _____ ppm,

ATTACHMENT A

FR Notice of Part 503 Subpart E (2/19/93)

septage) is placed on an active sewage sludge unit.

(5) One of the vector attraction reduction requirements in § 503.33 (b)(9), (b)(10), or (b)(12) shall be met when domestic septage is applied to agricultural land, forest, or a reclamation site and one of the vector attraction reduction requirements in § 503.33 (b)(9) through (b)(12) shall be met when domestic septage is placed on an active sewage sludge unit.

(b)(1) The mass of volatile solids in the sewage sludge shall be reduced by a minimum of 38 percent (see calculation procedures in "Environmental Regulations and Technology—Control of Pathogens and Vector Attraction in Sewage Sludge", EPA-625/R-92/013, 1992, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268).

(2) When the 38 percent volatile solids reduction requirement in § 503.33(b)(1) cannot be met for an anaerobically digested sewage sludge, vector attraction reduction can be demonstrated by digesting a portion of the previously digested sewage sludge anaerobically in the laboratory in a bench-scale unit for 40 additional days at a temperature between 30 and 37 degrees Celsius. When at the end of the 40 days, the volatile solids in the sewage sludge at the beginning of that period is reduced by less than 17 percent, vector attraction reduction is achieved.

(3) When the 38 percent volatile solids reduction requirement in § 503.33(b)(1) cannot be met for an aerobically digested sewage sludge, vector attraction reduction can be demonstrated by digesting a portion of the previously digested sewage sludge that has a percent solids of two percent or less aerobically in the laboratory in a bench-scale unit for 30 additional days at 20 degrees Celsius. When at the end of the 30 days, the volatile solids in the sewage sludge at the beginning of that period is reduced by less than 15 percent, vector attraction reduction is achieved.

(4) The specific oxygen uptake rate (SOUR) for sewage sludge treated in an aerobic process shall be equal to or less than 1.5 milligrams of oxygen per hour per gram of total solids (dry weight basis) at a temperature of 20 degrees Celsius.

(5) Sewage sludge shall be treated in an aerobic process for 14 days or longer. During that time, the temperature of the sewage sludge shall be higher than 40 degrees Celsius and the average temperature of the sewage sludge shall be higher than 45 degrees Celsius.

(6) The pH of sewage sludge shall be raised to 12 or higher by alkali addition and, without the addition of more alkali, shall remain at 12 or higher for two hours and then at 11.5 or higher for an additional 22 hours.

(7) The percent solids of sewage sludge that does not contain unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 75 percent based on the moisture content and total solids prior to mixing with other materials.

(8) The percent solids of sewage sludge that contains unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 90 percent based on the moisture content and total solids prior to mixing with other materials.

(9)(i) Sewage sludge shall be injected below the surface of the land.

(ii) No significant amount of the sewage sludge shall be present on the land surface within one hour after the sewage sludge is injected.

(iii) When the sewage sludge that is injected below the surface of the land is Class A with respect to pathogens, the sewage sludge shall be injected below the land surface within eight hours after being discharged from the pathogen treatment process.

(10)(i) Sewage sludge applied to the land surface or placed on a surface disposal site shall be incorporated into the soil within six hours after application to or placement on the land.

(ii) When sewage sludge that is incorporated into the soil is Class A with respect to pathogens, the sewage sludge shall be applied to or placed on the land within eight hours after being discharged from the pathogen treatment process.

(11) Sewage sludge placed on an active sewage sludge unit shall be covered with soil or other material at the end of each operating day.

(12) The pH of domestic septage shall be raised to 12 or higher by alkali addition and, without the addition of more alkali, shall remain at 12 or higher for 30 minutes.

Subpart E—Incineration

§ 503.40 Applicability.

(a) This subpart applies to a person who fires sewage sludge in a sewage sludge incinerator, to a sewage sludge incinerator, and to sewage sludge fired in a sewage sludge incinerator.

(b) This subpart applies to the exit gas from a sewage sludge incinerator stack.

§ 503.41 Special definitions.

(a) *Air pollution control device* is one or more processes used to treat the exit gas from a sewage sludge incinerator stack.

(b) *Auxiliary fuel* is fuel used to augment the fuel value of sewage sludge. This includes, but is not limited to, natural gas, fuel oil, coal, gas generated during anaerobic digestion of sewage sludge, and municipal solid waste (not to exceed 30 percent of the dry weight of sewage sludge and auxiliary fuel together). Hazardous wastes are not auxiliary fuel.

(c) *Control efficiency* is the mass of a pollutant in the sewage sludge fed to an incinerator minus the mass of that pollutant in the exit gas from the incinerator stack divided by the mass of the pollutant in the sewage sludge fed to the incinerator.

(d) *Dispersion factor* is the ratio of the increase in the ground level ambient air concentration for a pollutant at or beyond the property line of the site where the sewage sludge incinerator is located to the mass emission rate for the pollutant from the incinerator stack.

(e) *Fluidized bed incinerator* is an enclosed device in which organic matter and inorganic matter in sewage sludge are combusted in a bed of particles suspended in the combustion chamber gas.

(f) *Hourly average* is the arithmetic mean of all measurements, taken during an hour. At least two measurements must be taken during the hour.

(g) *Incineration* is the combustion of organic matter and inorganic matter in sewage sludge by high temperatures in an enclosed device.

(h) *Monthly average* is the arithmetic mean of the hourly averages for the hours a sewage sludge incinerator operates during the month.

(i) *Risk specific concentration* is the allowable increase in the average daily ground level ambient air concentration for a pollutant from the incineration of sewage sludge at or beyond the property line of the site where the sewage sludge incinerator is located.

(j) *Sewage sludge feed rate* is either the average daily amount of sewage sludge fired in all sewage sludge incinerators within the property line of the site where the sewage sludge incinerators are located for the number of days in a 365 day period that each sewage sludge incinerator operates, or the average daily design capacity for all sewage sludge incinerators within the property line of the site where the sewage sludge incinerators are located.

(k) *Sewage sludge incinerator* is an enclosed device in which only sewage sludge and auxiliary fuel are fired.

(l) *Stack height* is the difference between the elevation of the top of a sewage sludge incinerator stack and the elevation of the ground at the base of the stack when the difference is equal to or less than 65 meters. When the difference is greater than 65 meters, stack height is the creditable stack height determined in accordance with 40 CFR 51.100 (ii).

(m) *Total hydrocarbons* means the organic compounds in the exit gas from a sewage sludge incinerator stack measured using a flame ionization detection instrument referenced to propane.

(n) *Wet electrostatic precipitator* is an air pollution control device that uses both electrical forces and water to remove pollutants in the exit gas from a sewage sludge incinerator stack.

(o) *Wet scrubber* is an air pollution control device that uses water to remove pollutants in the exit gas from a sewage sludge incinerator stack.

§ 503.42 General requirements.

No person shall fire sewage sludge in a sewage sludge incinerator except in compliance with the requirements in this subpart.

§ 503.43 Pollutant limits.

(a) Firing of sewage sludge in a sewage sludge incinerator shall not violate the requirements in the National Emission Standard for Beryllium in subpart C of 40 CFR part 61.

(b) Firing of sewage sludge in a sewage sludge incinerator shall not violate the requirements in the National Emission Standard for Mercury in subpart E of 40 CFR part 61.

(c) *Pollutant limit—lead.*

(1) The daily concentration of lead in sewage sludge fed to a sewage sludge incinerator shall not exceed the concentration calculated using Equation (4).

$$C = \frac{0.1 \times NAAQS \times 86{,}400}{DF \times (1 - CE) \times SF} \qquad \text{Eq. (4)}$$

Where:

C=Daily concentration of lead in sewage sludge in milligrams per kilogram of total solids (dry weight basis).

NAAQS=National Ambient Air Quality Standard for lead in micrograms per cubic meter.

DF=Dispersion factor in micrograms per cubic meter per gram per second.

CE=Sewage sludge incinerator control efficiency for lead in hundredths.

SF=Sewage sludge feed rate in metric tons per day (dry weight basis).

(2)(i) When the sewage sludge stack height is 65 meters or less, the actual sewage sludge incinerator stack height shall be used in an air dispersion model specified by the permitting authority to determine the dispersion factor (DF) in equation (4).

(ii) When the sewage sludge incinerator stack height exceeds 65 meters, the creditable stack height shall be determined in accordance with 40 CFR 51.100(ii) and the creditable stack height shall be used in an air dispersion model specified by the permitting authority to determine the dispersion factor (DF) in equation (4).

(3) The control efficiency (CE) in equation (5) shall be determined from a performance test of the sewage sludge incinerator, as specified by the permitting authority.

(d) Pollutant limit—arsenic, cadmium, chromium, and nickel.

(1) The daily concentration for arsenic, cadmium, chromium, and nickel in sewage sludge fed to a sewage sludge incinerator each shall not exceed the concentration calculated using equation (5).

$$C = \frac{RSC \times 86{,}400}{DF \times (1 - CE) \times SF} \qquad \text{Eq. (5)}$$

Where:

C=Daily concentration of arsenic, cadmium, chromium, or nickel in sewage sludge in milligrams per kilogram of total solids (dry weight basis).

CE=Sewage sludge incinerator control efficiency for arsenic, cadmium, chromium, or nickel in hundredths.

DF=Dispersion factor in micrograms per cubic meter per gram per second.

RSC=Risk specific concentration in micrograms per cubic meter. S

F=Sewage sludge feed rate in met.ric tons per day (dry weight basis).

(2) The risk specific concentrations for arsenic, cadmium, and nickel used in equation (6) shall be obtained from Table 1 of § 503 .43.

TABLE 1 OF § 503.43.—RISK SPECIFIC CONCENTRATION ARSENIC, CADMIUM, AND NICKEL

Pollutant	Risk specific concentration (micrograms per cubic meter)
Arsenic	0.023
Cadmium	0.057
Nickel	2.0

(3) The risk specific concentration for chromium used in equation (5) shall be obtained from Table 2 of § 503.43 or shall be calculated using equation (6), as specified by the permitting authority.

TABLE 2 OF § 503.43.—RISK SPECIFIC CONCENTRATION—CHROMIUM

Type of incinerator	Risk specific concentration (micrograms per cubic meter)
Fluidized bed with wet scrubber	0.65
Fluidized bed with wet scrubber and wet electrostatic precipitator	0.23
Other types with wet scrubber	0.064
Other types with wet scrubber and wet electrostatic precipitator	0.016

$$RSC = \frac{0.0085}{r} \qquad \text{Eq. (6)}$$

Where:

RSC=risk specific concentration for chromium in micrograms per cubic meter used in equation (5).

r=decimal fraction of the hexavalent chromium concentration in the total chromium concentration measured in the exit gas from the sewage sludge incinerator stack in hundredths.

(4)(i) When the sewage sludge incinerator stack height is equal to or less than 65 meters, the actual sewage sludge incinerator stack height shall be used in an air dispersion model, as specified by the permitting authority, to determine the dispersion factor (DF) in equation (5).

(ii) When the sewage sludge incinerator stack height is greater than 65 meters, the creditable stack height shall be determined in accordance with 40 CFR 51.100(ii) and the creditable stack height shall be used in an air dispersion model, as specified by the permitting authority, to determine the dispersion factor (DF) in equation (5).

(5) The control efficiency (CE) in equation (5) shall be determined from a performance test of the sewage sludge incinerator, as specified by the permitting authority.

§ 503.44 Operational standard—total hydrocarbons.

(a) The total hydrocarbons concentration in the exit gas from a sewage sludge incinerator shall be corrected for zero percent moisture by multiplying the measured total hydrocarbons concentration by the correction factor calculated using equation (7).

$$\text{Correction factor (percent moisture)} = \frac{1}{(1-X)} \qquad \text{Eq. (7)}$$

Where:

X=decimal fraction of the percent moisture in the sewage sludge incinerator exit gas in hundredths.

(b) The total hydrocarbons concentration in the exit gas from a sewage sludge incinerator shall be corrected to seven percent oxygen by multiplying the measured total hydrocarbons concentration by the correction factor calculated using equation (8).

$$\text{Correction factor (oxygen)} = \frac{14}{(21-Y)} \qquad \text{Eq. (8)}$$

Where:

Y=Percent oxygen concentration in the sewage sludge incinerator stack exit gas (dry volume/dry volume).

(c) The monthly average concentration for total hydrocarbons in the exit gas from a sewage sludge incinerator stack, corrected for zero percent moisture using the correction factor from equation (7) and to seven percent oxygen using the correction factor from equation (8), shall not exceed 100 parts per million on a volumetric basis when measured using the instrument required by § 503.45(a).

§ 503.45 Management practices.

(a)(1) An instrument that measures and records the total hydrocarbons concentration in the sewage sludge incinerator stack exit gas continuously shall be installed, calibrated, operated, and maintained for each sewage sludge incinerator, as specified by the permitting authority.

(2) The total hydrocarbons instrument shall employ a flame ionization detector; shall have a heated sampling line maintained at a temperature of 150 degrees Celsius or higher at all times; and shall be calibrated at least once every 24-hour operating period using propane.

(b) An instrument that measures and records the oxygen concentration in the sewage sludge incinerator stack exit gas continuously shall be installed, calibrated, operated, and maintained for each sewage sludge incinerator, as specified by the permitting authority.

(c) An instrument that measures and records information used to determine the moisture content in the sewage sludge incinerator stack exit gas continuously shall be installed, calibrated, operated, and maintained for each sewage sludge incinerator, as specified by the permitting authority.

(d) An instrument that measures and records combustion temperatures continuously shall be installed, calibrated, operated, and maintained for each sewage sludge incinerator, as specified by the permitting authority.

(e) The maximum combustion temperature for a sewage sludge incinerator shall be specified by the permitting authority and shall be based on information obtained during the performance test of the sewage sludge incinerator to determine pollutant control efficiencies.

(f) The values for the operating parameters for the sewage sludge incinerator air pollution control device shall be specified by the permitting authority and shall be based on information obtained during the performance test of the sewage sludge incinerator to determine pollutant control efficiencies.

(g) Sewage sludge shall not be fired in a sewage sludge incinerator if it is likely to adversely affect a threatened or endangered species listed under section 4 of the Endangered Species Act or its designated critical habitat.

§ 503.46 Frequency of monitoring.

(a) *Sewage sludge.*

(1) The frequency of monitoring for beryllium and mercury shall be specified by the permitting authority.

(2) The frequency of monitoring for arsenic, cadmium, chromium, lead, and nickel in sewage sludge fed to a sewage sludge incinerator shall be the frequency in Table 1 of § 503.46.

TABLE 1 OF § 503.46.—FREQUENCY OF MONITORING—INCINERATION

Amount of sewage sludge[1] (metric tons per 365 day period)	Frequency
Greater than zero but less than 290.	Once per year.
Equal to or greater than 290 but less than 1,500.	Once per quarter (four times per year).
Equal to or greater than 1,500 but less than 15,000.	Once per 60 days (six times per year).
Equal to or greater than 15,000	Once per month (12 times per year).

[1] Amount of sewage sludge fired in a sewage sludge incinerator (dry weight basis).

(3) After the sewage sludge has been monitored for two years at the frequency in Table 1 of § 503.46, the permitting authority may reduce the frequency of monitoring for arsenic, cadmium, chromium, lead, and nickel, but in no case shall the frequency of monitoring be less than once per year when sewage sludge is fired in a sewage sludge incinerator.

(b) Total hydrocarbons, oxygen concentration, information to determine moisture content, and combustion temperatures.

The total hydrocarbons concentration and oxygen concentration in the exit gas from a sewage sludge incinerator stack, the information used to measure moisture content in the exit gas, and the combustion temperatures for the sewage sludge incinerator shall be monitored continuously.

(c) Air pollution control device operating parameters.

The frequency of monitoring for the sewage sludge incinerator air pollution control device operating parameters shall be specified by the permitting authority.

(Approved by the Office of Management and Budget under control number 2040–0157)

§ 503.47 Recordkeeping.

(a) The person who fires sewage sludge in a sewage sludge incinerator shall develop the information in § 503.47(b) through § 503.47(n) and shall retain that information for five years.

(b) The concentration of lead, arsenic, cadmium, chromium, and nickel in the sewage sludge fed to the sewage sludge incinerator.

(c) The total hydrocarbons concentrations in the exit gas from the sewage sludge incinerator stack.

(d) Information that indicates the requirements in the National Emission Standard for beryllium in subpart C of 40 CFR part 61 are met.

(e) Information that indicates the requirements in the National Emission Standard for mercury in subpart E of 40 CFR part 61 are met.

(f) The combustion temperatures, including the maximum combustion temperature, for the sewage sludge incinerator.

(g) Values for the air pollution control device operating parameters.

(h) The oxygen concentration and information used to measure moisture content in the exit gas from the sewage sludge incinerator stack.

(i) The sewage sludge feed rate.

(j) The stack height for the sewage sludge incinerator.

(k) The dispersion factor for the site where the sewage sludge incinerator is located.

(l) The control efficiency for lead, arsenic, cadmium, chromium, and nickel for each sewage sludge incinerator.

(m) The risk specific concentration for chromium calculated using equation (6), if applicable.

(n) A calibration and maintenance log for the instruments used to measure the total hydrocarbons concentration and oxygen concentration in the exit gas from the sewage sludge incinerator stack, the information needed to determine moisture content in the exit gas, and the combustion temperatures.

(Approved by the Office of Management and Budget under control number 2040–0157)

§ 503.48 Reporting.

Class I sludge management facilities, POTWs (as defined in 40 CFR 501.2) with a design flow rate equal to or greater than one million gallons per day, and POTWs that serve a population of 10,000 people or greater shall submit the information in § 503.47(b) through § 503.47(h) to the permitting authority on February 19 of each year.

(Approved by the Office of Management and Budget under control number 2040–0157)

Appendix A to Part 503—Procedure to Determine the Annual Whole Sludge Application Rate for a Sewage Sludge

Section 503.13(a)(4)(ii) requires that the product of the concentration for each pollutant listed in Table 4 of § 503.13 in sewage sludge sold or given away in a bag or other container for application to the land and the annual whole sludge application rate (AWSAR) for the sewage sludge not cause the annual pollutant loading rate for the pollutant in Table 4 of § 503.13 to be exceeded. This appendix contains the procedure used to determine the AWSAR for a sewage sludge that does not cause the annual pollutant loading rates in Table 4 of § 503.13 to be exceeded.

The relationship between the annual pollutant loading rate (APLR) for a pollutant and the annual whole sludge application rate (AWSAR) for 1a sewage sludge is shown in equation (1).

$$APLR = C \times AWSAR \times 0.001 \qquad (1)$$

Where:

APLR=Annual pollutant loading rate in kilograms per hectare per 365 day period.

C=Pollutant concentration in milligrams, per kilogram of total solids (dry weight basis).

AWSAR=Annual whole sludge application rate in metric tons per hectare per 365 day period (dry weight basis).

0.001=A conversion factor.

To determine the AWSAR, equation (1) is rearranged into equation (2):

$$AWSAR = \frac{APLR}{C \times 0.001} \qquad (2)$$

The procedure used to determine the AWSAR for a sewage sludge is presented below.

Procedure:

1. Analyze a sample of the sewage sludge to determine the concentration for each of the pollutants listed in Table 4 of § 503.13 in the sewage sludge.

2. Using the pollutant concentrations from Step 1 and the APLRs from Table 4 of § 503.13, calculate an AWSAR for each pollutant using equation (2) above.

3. The AWSAR for the sewage sludge is the lowest AWSAR calculated in Step 2.

Appendix B to Part 503—Pathogen Treatment Processes

A. Processes to Significantly Reduce Pathogens (PSRP)

1. Aerobic digestion—Sewage sludge is agitated with air or oxygen to maintain aerobic conditions for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 40 days at 20 degrees Celsius and 60 days at 15 degrees Celsius.

2. Air drying—Sewage sludge is dried on sand beds or on paved or unpaved basins. The sewage sludge dries for a minimum of three months. During two of the three months, the ambient average daily temperature is above zero degrees Celsius.

3. Anaerobic digestion—Sewage sludge is treated in the absence of air for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 15 days at 35 to 55 degrees Celsius and 60 days at 20 degrees Celsius.

4. Composting—Using either the within-vessel, static aerated pile, or windrow composting methods, the temperature of the sewage sludge is raised to 40 degrees Celsius or higher and remains at 40 degrees Celsius or higher for five days. For four hours during the five days, the temperature in the compost pile exceeds 55 degrees Celsius.

5. Lime stabilization—Sufficient lime is added to the sewage sludge to raise the pH of the sewage sludge to 12 after two hours of contact.

B. Processes to Further Reduce Pathogens (PFRP)

1. Composting—Using either the within-vessel composting method or the static aerated pile composting method, the temperature of the sewage sludge is maintained at 55 degrees Celsius or higher for three days.

Using the windrow composting method, the temperature of the sewage sludge is maintained at 55 degrees or higher for 15 days or longer. During the period when the compost is maintained at 55 degrees or higher, there shall be a minimum of five turnings of the windrow.

2. Heat drying—Sewage sludge is dried by direct or indirect contact with hot gases to reduce the moisture content of the sewage sludge to 10 percent or lower. Either the temperature of the sewage sludge particles exceeds 80 degrees Celsius or the wet bulb temperature of the gas in contact with the sewage sludge as the sewage sludge leaves the dryer exceeds 80 degrees Celsius.

3. Heat treatment—Liquid sewage sludge is heated to a temperature of 180 degrees Celsius or higher for 30 minutes.

4. Thermophilic aerobic digestion—Liquid sewage sludge is agitated with air or oxygen to maintain aerobic conditions and the mean cell residence time of the sewage sludge is 10 days at 55 to 60 degrees Celsius.

5. Beta ray irradiation—Sewage sludge is irradiated with beta rays from an accelerator at dosages of at least 1.0 megarad at room temperature (ca. 20 degrees Celsius).

6. Gamma ray irradiation—Sewage sludge is irradiated with gamma rays from certain isotopes, such as Cobalt 60 and Cesium 137, at room temperature (ca. 20 degrees Celsius).

7. Pasteurization—The temperature of the sewage sludge is maintained at 70 degrees Celsius or higher for 30 minutes or longer.

[FR Doc. 93–2 Filed 2–18–93; 8:45 am]

BILLING CODE 6560-01-M

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 122, 123, and 501

[FRL–4515–7]

National Pollutant Discharge Elimination System Sewage Sludge Permit Regulations; State Sludge Management Program Requirements

AGENCY: Environmental Protection Agency.

ACTION: Final rule; technical amendment.

SUMMARY: Under existing regulations that establish sewage sludge permitting and State sewage sludge program requirements, approximately 20,000 publicly owned treatment works and other treatment works treating domestic sewage are required to submit permit applications within 120 days after the promulgation of standards applicable to their sewage sludge use or disposal practice(s). The final sewage sludge use and disposal standards will be published in the **Federal Register** on or near the same date as this final rule. To facilitate the management of these applications, on May 27, 1992, EPA proposed to revise these rules to stagger the submission of permit applications. Additionally, EPA proposed to extend the time period during which the initial set of applications must be submitted from 120 days to 180 days after promulgation of the technical standards. In response to comments received on the May 27, 1992, proposal, EPA is issuing a final rule which requires permit applications in phases and extends the time period in which the initial applications are due following the publication of the final use or disposal standards.

On July 28, 1986, EPA promulgated final regulations for application requirements for facilities that discharge only non-process wastewater, which resulted in internal recodification of § 122.21. Conforming changes were not made to § 123.25(a)(4) which refers to the relevant portions of section 122. These technical corrections are being made as part of this rule.

EFFECTIVE DATE: The effective date of this final rule is March 22, 1993.

ATTACHMENT B

FR Notice of Part 503 THC/CO Amendment (2/25/94)

submitted and determined to be adequate and upon request by DowElanco, the Agency will take appropriate steps to make the tolerances permanent.

The available data do not support a change in the U.S. use pattern for the crops listed above. If such a change is desired, additional residue data generated in the U.S. must be submitted.

There was one comment received in response to the proposed rule. The comment supported the proposed rule.

Therefore, based on the information considered by EPA and discussed in detail in the December 28, 1993 proposal and in this final rule, the Agency is hereby establishing the tolerance revisions in 40 CFR 180.342 for residues of chlorpyrifos in or on the following raw agricultural commodities: nectarines, peaches, pears, and plums.

Any person adversely affected by this regulation may, within 30 days after publication of this document in the **Federal Register**, file written objections and/or a request for a hearing with the Hearing Clerk, at the address given above (40 CFR 178.20). The objections submitted must specify the provisions of the regulation deemed objectionable and the grounds for the objections (40 CFR 178.25). Each objection must be accompanied by the fee prescribed by 40 CFR 180.33(i). If a hearing is requested, the objections must include a statement of the factual issue(s) on which the hearing is requested, the requestor's contentions must include a statement of factual contentions on each issue and a summary of any evidence relied upon by the objector (40 CFR 178.27). A request for a hearing will be granted if the Administrator determines that the material submitted shows the following: There is a genuine and substantial issue of fact; there is a reasonable possibility that available evidence identified by the requestor would, if established, resolve one or more of such issues in favor of the requestor, taking into account uncontested claims or facts to the contrary; and the resolution of the factual issue(s) in the manner sought by the requestor would be adequate to justify the action requested (40 CFR 178.32).

Under Executive Order 12866 (58 FR 51735, Oct. 4, 1993), the Agency must determine whether the regulatory action is "significant" and therefore subject to review by the Office of Management and Budget (OMB) and the requirements of the Executive Order. Under section 3(f), the order defines a "significant regulatory action" as an action that is likely to result in a rule (1) having an annual effect on the economy of $100 million or more, or adversely and materially affecting a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities (also referred to as "economically significant"); (2) creating serious inconsistency or otherwise interfering with an action taken or planned by another agency; (3) materially altering the budgetary impacts of entitlement, grants, use fees, or loan programs or the rights and obligations of recipients thereof; or (4) raising novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

Pursuant to the terms of the Executive Order, EPA has determined that this rule is not "significant" and is therefore not subject to OMB review.

Pursuant to the requirements of the Regulatory Flexibility Act (Pub. L. 96-354, 94 Stat. 1164, 5 U.S.C. 601-612), the Administrator has determined that regulations establishing new tolerances or raising tolerance levels or establishing exemptions from tolerance requirements do not have a significant economic impact on a substantial number of small entities. A certification statement to this effect was published in the **Federal Register** of May 4, 1981 (46 FR 24950).

List of Subjects in 40 CFR Part 180

Environmental protection, Administrative practice and procedure, Agricultural commodities, Pesticides and pests, Reporting and recordkeeping requirements.

Dated: February 10, 1994.

Douglas D. Campt,

Director, Office of Pesticide Programs.

Therefore, 40 CFR part 180 is amended as follows:

PART 180—[AMENDED]

1. The authority citation for part 180 continues to read as follows:

Authority: 21 U.S.C. 346a and 371.

2. In § 180.342, by amending paragraph (c) by removing the entries in the table therein for nectarines, peaches, pears, and plums and by adding new paragraph (e), to read as follows:

§ 180.342 Chlorpyrifos; tolerances for residues.

* * * * *

(e) Tolerances are established as follows for residues of the insecticide chlorpyrifos [*O,O*-diethyl *O*-(3,5,6-trichloro-2-pyridyl) phosphorothioate] in or on the following raw agricultural commodities:

Commodity	Parts per million	
	Until Jan. 28, 1996	After Jan. 28, 1996
Nectarines	0.05	0.01
Peaches	0.05	0.01
Pears	0.05	0.01
Plums	0.05	0.01

[FR Doc. 94-4379 Filed 2-24-94; 8:45 am]

BILLING CODE 6560-50-F

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40 CFR Part 503

[FRL-4842-6]

Standards for the Use or Disposal of Sewage Sludge

AGENCY: U.S. Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: On November 25, 1992, pursuant to section 405 of the Clean Water Act (CWA), EPA promulgated a regulation to protect public health and the environment from reasonably anticipated adverse effects of certain pollutants in sewage sludge (February 19, 1993). This regulation established requirements for the final use or disposal of sewage sludge when: (1) The sludge is applied to the land either to condition the soil or to fertilize crops grown in the soil; (2) the sludge is disposed on land by placing it in surface disposal sites; and (3) the sludge is incinerated. Today's action amends this regulation with respect to two aspects of the rule pending EPA's reconsideration of certain issues. The issues under reevaluation concern the appropriate pollutant limits for molybdenum in sewage sludge when land applied and the requirement for certain sewage sludge incinerators to monitor incinerator emissions continuously for total hydrocarbons (THC).

EFFECTIVE DATE: February 19, 1994.

FOR FURTHER INFORMATION CONTACT: Alan Hais, Chief, Sludge Risk Assessment Branch, Health and Ecological Criteria Division (4304), Office of Science and Technology, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460, telephone (202) 260-5389.

SUPPLEMENTARY INFORMATION:

A. Authority

Today's rule is being promulgated under the authority of section 405 of the Clean Water Act (CWA). Section 405(d) requires EPA to establish management practices and numerical limits adequate to protect public health and the environment against reasonably anticipated adverse effects of toxic pollutants in sewage sludge. Section 405(e) prohibits any person from disposing of sludge from a publicly-owned treatment works or other treatment works treating domestic sewage except in compliance with the section 405 regulations.

B. Amendment of Pollutant Limits for Molybdenum When Land Applied

On November 25, 1992, the U.S. Environmental Protection Agency promulgated, pursuant to section 405 of the Clean Water Act, Standards for the Use or Disposal of Sewage Sludge (40 CFR part 503) published in the Federal Register on February 19, 1993 (58 FR 9248). This regulation establishes requirements for the final use or disposal of sewage sludge that are codified at 40 CFR part 503. By letter dated May 25, 1993, Climax Metals Company filed a petition with the Agency asking that EPA reconsider the molybdenum pollutant limits for sewage sludge when it is applied to the land and to stay the February 19, 1994, compliance date for these pollutant limits pending reconsideration. Subsequently, on June 25, 1993, Climax Metals Company, American Mining Congress, The Chem-Met Company, Eastern Technologies, Inc., Gulf Coast Chemical, Jamestown Chemical Company, Inc., Midland Research Labs, Inc., and North Metals and Chemical Company, generators or users of molybdenum, filed a petition with the United States Court of Appeals for the 10th Circuit seeking review of the land application pollutant limits for molybdenum in the part 503 Rule. This petition for review was subsequently transferred to the D.C. Circuit.

The molybdenum cumulative pollutant loading rate (CPLR) promulgated at Table 2 of § 503.13 in the final part 503 rule is 18 kg of molybdenum per hectare of land. The CPLR was determined from Pathway 6 of the land application risk assessment. Pathway 6 evaluates the amount of a pollutant in sewage sludge that is protective of livestock and wild animals that consume plants grown on sludge-amended soil. In the case of molybdenum, the CPLR is designed to protect cattle from molybdenosis. The major concern that Climax and others have brought to the Agency's attention is related to the studies used to assess exposure conditions and the exposure assumptions for the establishment of the molybdenum CPLR for land application of sewage sludge. In particular, Climax and others questioned the use of the data from the Pierzynski and Jacobs (1986) study to determine the crop uptake slope used in the Pathway 6 risk assessment. These interested parties state that this approach results in an overprotective molybdenum limit because the sludges used in the study were highly contaminated with molybdenum (1500 mg molybdenum per kg of sewage sludge, while sewage sludge usually contains 40 mg/kg) and because the Pierzynski and Jacobs data were inappropriately weighted with data from only one other study (Soon and Bates, 1985).

EPA has reviewed Climax's request and has evaluated additional data and additional information submitted by Climax supporting a different crop uptake slope for molybdenum. Based on this preliminary evaluation, EPA is amending part 503 to delete the molybdenum pollutant limits in Tables 2, 3, and 4 of § 503.13 pending its reconsideration of appropriate molybdenum pollutant limits. EPA's preliminary review of the data indicates the appropriateness of reevaluation of the cumulative pollutant loading rate for molybdenum established in Table 2 of § 503.13 of the February 19, 1993 rule. Because the molybdenum cumulative pollutant loading rate is used to develop the molybdenum pollutant concentration limit and annual pollutant loading rate in Tables 3 and 4 of § 503.13, respectively, EPA is also amending these tables to remove the molybdenum pollutant limits.

As noted, the molybdenum limits in Tables 2, 3 and 4 were determined from a risk assessment of Pathway 6 and are designed to protect animals consuming feed crops grown on sludge-amended soil from molybdenosis. Specifically, EPA, using a mathematical algorithm, calculated what quantity of molybdenum in sewage sludge per hectare of land could be added to the soil without resulting in exceeding the threshold in crops fed to domesticated animals that is associated with molybdenosis. That calculation is dependent on three variables. These are the threshold level of molybdenum in feed crops associated with molybdenosis, the background level of molybdenum in feed crops and the relationship between molybdenum added to the soil from sewage sludge and the resulting level in feed crops.

EPA has reviewed the data it used to establish the molybdenum limits, information submitted by Climax and others and additional information the Agency has obtained. EPA has concluded that the molybdenum limits are highly sensitive to how the molybdenum data base used in the part 503 regulation was treated. An example illustrates why the data are sensitive to the method used in the calculation. Assume that two field studies are used to calculate the uptake of molybdenum by feed crops grown on sludge-amended soil. One study shows low molybdenum uptake levels while the second shows high uptake. If the study with low molybdenum uptake levels includes only three data points while the study showing high uptake contains 20 data points, calculation of a single uptake value from the studies will differ depending on how the data points in the individual studies are treated. If all data points are weighted equally, then the results will be most heavily influenced by the high uptake data points. Contrarily, if the results are averaged for each study separately and then the studies, rather than data points, weighted equally, the influence of the high uptake data is mitigated.

Given the limited number of studies relied upon for the part 503 molybdenum limits and the resulting sensitivity of the results to the method adopted for weighting data points in those studies, EPA determined that it should reconsider these limits. A preliminary review of additional field studies suggests that use of data from sewage sludge that is highly contaminated by molybdenum may yield results that could overpredict crop uptake and background molybdenum levels in feed crops at the lower levels of molybdenum required by part 503. This leads the Agency to conclude that the limits adopted in Tables 2, 3, and 4 may be more restrictive than required to protect public health and the environment because of both an inappropriately high background molybdenum level in feed crops and molybdenum uptake rate. This information has led the Agency to conclude that it should reevaluate its determination of the molybdenum pollutant limits for land application of sewage sludge.

EPA has concluded that amending its regulation to delete the current land application molybdenum pollutant limits pending reconsideration will not adversely affect public health and the environment for the following reasons. First, EPA is not modifying the ceiling concentration limit for molybdenum (75 milligrams per kilogram of sewage sludge on a dry weight basis) in Table 1 of § 503.13. Sewage sludge that is land applied must have a molybdenum concentration equal to or less than this limit. Sewage sludge that exceeds this level cannot be land applied. Under a worst case scenario of 75 milligrams of molybdenum per kilogram of dry sewage sludge, if sewage sludge is applied at a rate of 10 metric tons of sewage sludge (dry weight basis) per hectare of land annually, it would take 24 years to reach the cumulative pollutant load of 18 kilograms per hectare for molybdenum—the CPLR adopted in Table 2 of § 503.13 in the final rule. Because EPA plans to propose and promulgate a new molybdenum cumulative pollutant loading rate in the near future, a new molybdenum pollutant concentration limit and a new annual pollutant loading rate (APLR), even if EPA concludes the same or lower limits are necessary to protect public health and the environment, the likelihood that the molybdenum in sewage sludge applied to the land during the time EPA reevaluates the molybdenum CPLR would harm public health and the environment is extremely low.

Similarly, under this worst case scenario, sewage sludge sold or given away in a bag or other container for application to the land (e.g., for use on lawns or home gardens) is limited to an annual application rate of 12 dry metric tons per hectare. This application rate is calculated based on the ceiling concentration of 75 mg molybdenum per kg of dry sewage sludge and the annual pollutant loading rate of 0.9 kg per hectare per 365 day period listed in Table 4 of § 503.13. Application rates above this amount would cause an exceedence of the molybdenum annual pollutant loading rate. However, the molybdenum pollutant limit on which the APLR is based is designed to protect animals consuming forage grown on sludge amended soils from molybdenum toxicity. The likelihood of cattle consuming feed crops grown on a lawn or home garden is small. In the multi-pathway risk assessment, the next most limiting pathway for molybdenum is Pathway 3, the ingestion of pure sewage sludge by a toddler. Pathway 3 is a more realistic concern for sewage sludge sold or given away in a bag or other container. The pollutant limit for this pathway is 400 milligrams of molybdenum per kilogram of dry sewage sludge, well above the ceiling concentration limit of 75 mg molybdenum per kg of dry sewage sludge. Because sewage sludge cannot be applied to the land if the molybdenum concentration is greater than 75 mg molybdenum per kg of dry sewage sludge, the toddler who may inadvertently ingest sewage sludge is protected during the time the Agency reconsiders the molybdenum pollutant limits. Therefore, today's amendments to the pollutant limits in Tables 2, 3, and 4 of § 503.13 will not threaten public health or the environment for land application of either bulk sewage sludge sold or sewage sludge sold or given away in a bag or other container.

C. Modification of the Applicability of the Continuous Emission Monitoring Requirements for Total Hydrocarbons for Certain Incinerators

On July 17, 1993, Gloucester County Utilities, Stony Brook Regional Sewerage Authority, Township of Wayne, Pequannock, Lincoln Park and Fairfield Sewerage Authority, Somerset Raritan Valley Sewerage Authority, Bayshore Regional Sewerage Authority, and the State of New Jersey filed a petition with the D.C. Circuit seeking review of the part 503 regulation. These petitioners challenged, among other things the failure of the part 503 regulation to allow site-specific sewage sludge incinerator emissions limits and the failure to allow State-imposed emissions limitations, including monitoring and reporting requirements, to replace the part 503 requirements. The petitioners argue that the requirements to demonstrate compliance with a 100 ppm total hydrocarbon (THC) operational standard through continuous monitoring of THC emissions should be changed.

Currently, the State of New Jersey requires that the exit gas from the petitioners' sewage sludge incinerators meet a 100 ppm carbon monoxide (CO) limit corrected for zero percent moisture and to seven percent oxygen. The State also requires the petitioners to monitor the exit gas continuously for CO. For these reasons, the petitioners asked for relief from the requirement to monitor THC continuously. To demonstrate compliance with the 100 ppm THC operational standard, the incinerator management practices in § 503.45(a) require installation of a continuous equipment THC monitor. In the petitioners' view, installation of this instrument is not needed because any sewage sludge incinerator complying with State of New Jersey 100 ppm emissions limitation and continuous CO monitoring requirements will comply with the 100 ppm THC operational standard.

EPA concluded that it is appropriate to reconsider its requirement for the continuous monitoring of THC in the case of certain incinerators. Based on a reassessment of information on THC emissions and CO emissions from certain types of sewage sludge incinerators, EPA has preliminary determined that incinerators that meet a 100 ppm CO emission limitation will easily achieve a 100 ppm THC operational standard. In these circumstances, EPA determined that requiring such incinerators to install and maintain continuous THC monitors was unduly burdensome and wasteful and would not result in increased environmental benefits. Accordingly, EPA finds there is good cause to amend its regulation, effective immediately, to authorize the demonstration of compliance with the 100 ppm THC operational standard by meeting a 100 ppm CO limit and by monitoring the exit gas continuously for CO during the interim period of reconsideration. Therefore, EPA is today issuing a final rule amending the applicability provision of the part 503—subpart E—Incineration to modify the applicability of certain management practices, frequency of monitoring requirements and recordkeeping requirements for sewage sludge incinerators meeting certain conditions.

As a result of the amendment, the following requirements will not apply to sewage sludge incinerators meeting defined conditions: the management practice in § 503.45(a); the frequency of monitoring requirements for THC concentration in § 503.46(b); and the recordkeeping requirements for THC concentration in § 503.47 (c) and (n). The management practice in 503.45(a) requires the installation of a continuous emissions monitor for total hydrocarbons. The monitoring requirements of § 503.46(b) concern THC concentration in the exit gas. The recordkeeping requirements in § 503.47 (c) and (n) deal with the total hydrocarbons concentration in the exit gas from the sewage sludge incinerator stack and with a calibration and maintenance log for THC concentration in the exit gas.

The requirements outlined above do not apply to sewage sludge incinerators in the following circumstances. The sewage sludge incinerator must achieve a CO concentration in the exit gas of 100 ppm (monthly average) or lower, corrected for zero percent moisture and to seven percent oxygen. The incinerator owner/operator also must monitor the exit gas continuously for CO, keep records on the CO emissions, and, in certain cases, report the monthly average CO concentration annually to the permitting authority.

EPA concluded there is good cause for taking today's action because current data support the petitioners' assertion that the THC concentration in the exit gas from the sewage sludge incinerators described above will comply with the 100 ppm (monthly average) THC operational standard in part 503 when the monthly average CO concentration in the exit gas is equal to or less than 100 ppm.

D. Procedural Requirements

EPA has reviewed the two requests discussed above and concluded that: (1) The molybdenum CPLR, pollutant concentration limit, and APLR for land application should be reconsidered based on the new information, and (2) the THC operational standard in § 503.44(c) will be achieved if a CO limit of 100 ppm is met. Accordingly, EPA is today taking final action amending its part 503 regulation. EPA's action amends the molybdenum pollutant limits for land application in Tables 2, 3, and 4 of § 503.13 and the applicability of various part 503 requirements related to THC in § 503.45, § 503.46, and § 503.47 for certain incinerators until such time as the Agency has an opportunity to study these issues further. At the completion of the studies, EPA will decide whether to propose new molybdenum pollutant limits and whether further amendments to part 503 are needed concerning the monitoring of CO to demonstrate compliance with the THC operational standard in lieu of monitoring THC continuously.

Section 553 of the Administrative Procedures Act provides that when an agency for good cause finds that notice and public procedure are impracticable, unnecessary or contrary to the public interest, it may first issue a rule without providing notice and comment. In addition, the agency may make the rule effective immediately. EPA has concluded here that it should both amend its part 503 regulation as described without providing for notice and comment and make these changes effective immediately.

1. Notice and Comment

By today's action, the Agency avoids the possibility that some treatment works treating domestic sewage would be required to comply with certain numerical limits for molybdenum in sewage sludge that is land applied. The Agency has concluded at this juncture that these limits may be too stringent and consequently should be reconsidered. Given the pendency of the compliance deadline for the land application requirements, it would be impracticable to provide notice and comment. Further, the public interest would suffer to the extent that treatment works treating domestic sewage incurred increased costs associated with compliance with requirements that the Agency determines are not needed to protect public health and the environment. Given the retention of the ceiling limit on molybdenum in sewage sludge which may be applied to the land, EPA has concluded that public health and the environment will be adequately protected while the Agency is reconsidering what are the appropriate molybdenum limits for Tables 2, 3 and 4 of § 503.13.

Further, in the case of the amendments to the requirements for sewage sludge incinerators, the Agency has similarly concluded that notice and comment is impracticable and contrary to the public interest. EPA has concluded that the public interest will suffer if sewage sludge incinerators that achieve a 100 ppm CO level, as demonstrated by continuous CO monitoring, are also required to install THC monitors. Based on its evaluation, EPA has concluded that, if incinerators are meeting a 100 ppm CO level, the likelihood is substantial that such incinerators are well below the 100 ppm THC operational standard. Given this information and the fact that the obligation for many of these incinerators to achieve a 100 ppm or lower CO standard and monitor continuously antedated the promulgation of the 100 ppm THC operational standard, EPA has concluded that the public interest does not support installation of THC monitors for such incinerators pending Agency reconsideration.

2. Effective Date

Under section 405 of the CWA, EPA's sewage sludge regulation must require compliance with the regulation as expeditiously as practicable but in no case later than 12 months after its publication, unless such regulation requires construction of new pollution control facilities, in which case the regulation must require compliance expeditiously, but not later than two years from publication. The part 503 regulation was effective on March 22, 1993. In the case of the molybdenum pollutant limits and the continuous monitoring requirements for THC, the regulation required compliance by February 19, 1994. Because of the potential adverse effect on public interest noted above, the Agency has determined there is good cause for making this regulation effective immediately.

E. Regulatory Requirements

1. Executive Order 12866

Executive Order 12866 requires EPA to prepare an assessment of the costs and benefits of any "significant regulatory action." Because the effect of today's rule is to modify current requirements and provide additional flexibility to the regulated community, costs to the regulated community should be reduced or at least remain unchanged. Consequently, no assessment of costs and benefits is required.

2. Regulatory Flexibility Act

Pursuant to the Regulatory Flexibility Act, 5 U.S.C. 601–612, whenever an agency is required to publish a General Notice of Rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the impact of the rule on small entities (i.e., small businesses, small organizations, and small governmental jurisdictions). No regulatory flexibility analysis is required, however, if the head of the Agency certifies that the rule will not have a significant impact on a substantial number of small entities.

This action to modify the part 503 regulation promulgated today is deregulatory in nature and thus will only provide beneficial opportunities for entities that may be affected by the rule. Accordingly, I certify that this regulation will not have a significant economic impact on a substantial number of small entities. This regulation, therefore, does not require a regulatory flexibility analysis.

3. Paperwork Reduction Act

There are no reporting, notification, or recordkeeping (information) provisions in this rule. Such provisions, were they included, would be submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*

List of Subjects in 40 CFR Part 503

Environmental protection, Frequency of monitoring, Incineration, Land application, Management practices, Pathogens, Pollutants, Reporting and recordkeeping requirements, Sewage sludge, Surface disposal and Vector attraction reduction.

Dated: February 18, 1994.

Carol M. Browner,

Administrator.

For the reasons set out in the preamble, part 503 of title 40 of the Code of Federal Regulations is amended as set forth below:

1. The authority citation for part 503 continues to read as follows:

Authority: Sections 405 (d) and (e) of the Clean Water Act, as amended by Pub. L. 95–217, Sec. 54(d), 91 Stat. 1591 (33 U.S.C. 1345 (d) and (e)); and Pub. L. 100–4, Title IV, Sec. 406 (a), (b), 101 Stat., 71, 72 (33 U.S.C. 1251 *et seq.*).

2. Section 503.13 is amended by revising paragraphs (b)(2), (b)(3), and (b)(4) to read as follows:

§ 503.13 Pollutant limits.

(b) * * *

(2) Cumulative pollutant loading rates.

TABLE 2 OF § 503.13.—CUMULATIVE POLLUTANT LOADING RATES

Pollutant	Cumulative pollutant loading rate (kilograms per hectare)
Arsenic	41
Cadmium	39
Chromium	3000
Copper	1500
Lead	300
Mercury	17
Nickel	420
Selenium	100
Zinc	2800

(3) Pollutant concentrations.

TABLE 3 OF § 503.13.—POLLUTANT CONCENTRATIONS

Pollutant	Monthly average concentrations (milligrams per kilogram)[1]
Arsenic	41
Cadmium	39
Chromium	1200
Copper	1500
Lead	300
Mercury	17
Nickel	420
Selenium	36
Zinc	2800

[1] Dry weight basis.

(4) Annual pollutant loading rates.

TABLE 4 OF § 503.13.—ANNUAL POLLUTANT LOADING RATES

Pollutant	Annual pollutant loading rate (kilograms per hectare per 365 day period)
Arsenic	2.0
Cadmium	1.9
Chromium	150
Copper	75
Lead	15
Mercury	0.85
Nickel	21
Selenium	5.0
Zinc	140

* * * * *

5. Section 503.40 is amended by adding paragraph (c) to read as follows:

§ 503.40 Applicability.

* * * * *

(c) The management practice in § 503.45(a), the frequency of monitoring requirement for total hydrocarbon concentration in § 503.46(b) and the recordkeeping requirements for total hydrocarbon concentration in § 503.47(c) and (n) do not apply if the following conditions are met:

(1) The exit gas from a sewage sludge incinerator stack is monitored continuously for carbon monoxide.

(2) The monthly average concentration of carbon monoxide in the exit gas from a sewage sludge incinerator stack, corrected for zero percent moisture and to seven percent oxygen, does not exceed 100 parts per million on a volumetric basis.

(3) The person who fires sewage sludge in a sewage sludge incinerator retains the following information for five years:

(i) The carbon monoxide concentrations in the exit gas; and

(ii) A calibration and maintenance log for the instrument used to measure the carbon monoxide concentration.

(4) Class I sludge management facilities, POTWs (as defined in 40 CFR 501.2) with a design flow rate equal to or greater than one million gallons per day, and POTWs that serve a population of 10,000 people or greater submit the monthly average carbon monoxide concentrations in the exit gas to the permitting authority on February 19 of each year.

[FR Doc. 94-4372 Filed 2-24-94; 8:45 am]

BILLING CODE 6560-50-P

DEPARTMENT OF TRANSPORTATION

Coast Guard

46 CFR Part 171

[CGD 93-041]

RIN 2115-AD33

Domestic Passenger Vessel Damage Stability Standards

AGENCY: Coast Guard, DOT.

ACTION: Notice of partial suspension of application.

SUMMARY: The Coast Guard announces an indefinite suspension of the application of 46 CFR 171.080(e), Damage Stability Standards for Inspected Passenger Vessels, for all vessels not requiring a SOLAS Passenger Ship Safety Certificate. The suspension will allow time for development of revised regulatory requirements. This action is being taken in response to a determination that there are technical problems in meeting these requirements for certain vessels, especially those designed for service on protected or partially-protected waters. Suspending the effective date will provide an opportunity to define the extent of the problem and to consider alternative regulations.

EFFECTIVE DATE: Effective February 25, 1994, the application of 46 CFR 170.210(e) is suspended indefinitely for all vessels not requiring a SOLAS Passenger Vessel Safety Certificate.

FOR FURTHER INFORMATION CONTACT: Ms. P. L. Carrigan, Marine Technical and Hazardous Materials Division (G-MTH-3), room 1308, Coast Guard Headquarters, 2100 Second Street SW., Washington, DC 20593-0001, telephone: (202) 267-2988, telefax: (202) 267-4816.

SUPPLEMENTARY INFORMATION:

Drafting Information

The principal persons involved in the drafting of this notice are Ms. Patricia L. Carrigan, Project Manager, Office of Marine Safety, Security and Environmental Protection and LT Ralph L. Hetzel, Project Counsel, Office of Chief Counsel.

Regulatory History

On February 13, 1990, the Coast Guard published a notice of proposed rulemaking (NPRM) entitled Stability Design and Operational Regulations in the **Federal Register** (55 FR 5120).

During the NPRM 60-day comment period, the Coast Guard received 28 letters commenting on the proposed rulemaking. Only two of the 28 letters received included comments on the new damage stability standards for passenger vessels.

On September 11, 1992, the Coast Guard published a final rule entitled Stability Design and Operational Regulations in the **Federal Register** (57 FR 41812) which adopted damage stability requirements for new passenger vessels from the proposed rule.

Following implementation of the final rule, the Coast Guard received inquiries on the appropriateness of the damage stability standards in 46 CFR 171.080(e) for certain types of new passenger vessels.

On July 7, 1993, the Coast Guard published a notice in the **Federal Register** to announce a public meeting on August 5, 1993 to discuss what problems were being encountered in complying with the standard and what actions might be appropriate.

ATTACHMENT C

40 CFR Part 60, Appendix B, Sections 2, 3, and 6

Y_{HC}=Assumed mole fraction of HC (dry as CH_4)
=0.0088 for catalytic wood heaters;
=0.0132 for noncatalytic wood heaters.
=0.0080 for pellet-fired wood heaters.
0.280=Molecular weight of N_2 or CO, divided by 100.
0.320=Molecular weight of O_2 divided by 100.
0.440=Molecular weight of CO_2 divided by 100.
42.5=Gram-moles of carbon in 1 kg of dry wood assuming 51 percent carbon by weight dry basis (.0425 lb/lb).
510=Grams of carbon in exhaust gas per kg of wood burned.
1,000=Grams in 1 kg.

6.2 Dry Molecular Weight. Use Equation 28a-1 to calculate the dry molecular weight of the stack gas.

$$M_d=0.440(\%CO_2)+0.320(\%O_2)+0.280(\%N_2+\%CO) \qquad \text{Eq. 28a-1}$$

NOTE: The above equation does not consider argon in air (about 0.9 percent, molecular weight of 37.7). A negative error of about 0.4 percent is introduced. The tester may opt to include argon in the analysis using procedures subject to approval of the Administrator.

6.3 Dry Moles of Exhaust Gas. Use Equation 28a-2 to calculate the total moles of dry exhaust gas produced per kilogram of dry wood burned.

$$N_T=\left(\frac{42.5}{(Y_{CO_2}+Y_{CO}+Y_{HC})}\right)$$

Eq. 28a-2

6.4 Air to Fuel Ratio. Use Equation 28a-3 to calculate the air to fuel ratio on a dry mass basis.

$$A/F=\left(\frac{(N_T \times M_d)-(510)}{(1000)}\right)$$

Eq. 28a-3

6.5 Burn Rate. Calculate the fuel burn rate as in Method 28, Section 8.3.

7. *Bibliography*

Same as Method 3, Section 7, and Method 5H, Section 7.

[36 FR 24877, Dec. 23, 1971]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting part 60, appendix A see the List of CFR Sections in the Finding Aids section of this volume.

APPENDIX B—PERFORMANCE SPECIFICATIONS

Performance Specification 1—Specifications and test procedures for opacity continuous emission monitoring systems in stationary sources
Performance Specification 2—Specifications and test procedures for SO_2 and NO_x continuous emission monitoring systems in stationary sources
Performance Specification 3—Specifications and test procedures for O_2 and CO_2 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 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 1—SPECIFICATIONS AND TEST PROCEDURES FOR OPACITY CONTINUOUS EMISSION MONITORING SYSTEMS IN STATIONARY SOURCES

1. *Applicability and Principle*

1.1 Applicability. This specification contains requirements for the design, performance, and installation of instruments for opacity continuous emission monitoring systems (CEMS's) and data computation procedures for evaluating the acceptability of a CEMS. Certain design requirements and test procedures established in this specification may not apply to all instrument designs. In such instances, equivalent design requirements and test procedures may be used with prior approval of the Administrator.

Performance Specification 1 (PS 1) applies to opacity monitors installed after March 30, 1983. Opacity monitors installed before March 30, 1983, are required to comply with the provisions and requirements of PS 1 except for the following:

(a) Section 4. "Installation Specifications."

d. Response below 400 nm, percent of peak.

e. Total angle of view, degrees.

f. Total angle of projection, degrees.

g. Results of optical alignment sight test.

h. Serial number, month/year of manufacturer for unit actually tested to show design conformance.

9.3 Performance Specification Test Results.

a. Calibration error, high-range, percent opacity.

b. Calibration error, mid-range, percent opacity.

c. Calibration error, low-range, percent opacity.

d. Response time, seconds.

e. 24-hour zero drift, percent opacity.

f. 24-hour calibration drift, percent opacity.

g. Lens cleanings, clock time.

h. Optical alignment adjustments, clock time.

9.4 Statements. Provide a statement that the conditioning and operational test periods were completed according to the requirements of Sections 7.3 and 7.4. In this statement, include the time periods during which the conditioning and operational test periods were conducted.

9.5 Appendix. Provide the data tabulations and calculations for the above tabulated results.

10. *Retest*

If the CEMS operates within the specified performance parameters of Table 1-1, the PS tests will be successfully concluded. If the CEMS fails one of the preliminary tests, make the necessary corrections and repeat the performance testing for the failed specification prior to conducting the operational test period. If the CEMS fails to meet the specifications for the operational test period, make the necessary corrections and repeat the operational test period; depending on the correction made, it may be necessary to repeat the design and preliminary performance tests.

11. *Bibliography*

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

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

PERFORMANCE SPECIFICATION 2—SPECIFICATIONS AND TEST PROCEDURES FOR SO_2 AND NO_x CONTINUOUS EMISSION MONITORING SYSTEMS IN STATIONARY SOURCES

1. *Applicability and Principle*

1.1 Applicability. This specification is to be used for evaluating the acceptability of SO_2 and NO_x continuous emission monitoring systems (CEMS's) at the time of or soon after installation and whenever specified in the regulations. The CEMS may include, for certain stationary sources, a diluent (O_2 or CO_2) monitor.

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 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 other times besides the initial test. See § 60.13(c).

1.2 Principle. Installation and measurement location specifications, performance and equipment specifications, test procedures, and data reduction procedures are included in this specification. Reference method tests and calibration drift tests are conducted to determined conformance of the CEMS with the specification.

2. *Definitions*

2.1 Continuous Emission Monitoring System. The total equipment required for the determination of a gas concentration or emission rate. The system consists of the following major subsystems:

2.1.1 Sample Interface. That portion of the CEMS used for one or more of the following: sample acquisition, sample transportation, and sample conditioning, or protection of the monitor from the effects of the stack effluent.

2.1.2 Pollutant Analyzer. That portion of the CEMS that senses the pollutant gas and generates an output proportional to the gas concentration.

2.1.3 Diluent Analyzer (if applicable). That portion of the CEMS that senses the diluent gas (e.g., CO_2 or O_2) and generates an output proportional to the gas concentration.

2.1.4 Data Recorder. That portion of the CEMS that provides a permanent record of the analyzer output. The data recorder may include automatic data reduction capabilities.

2.2 Point CEMS. 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.

2.3 Path CEMS. 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.

2.4 Span Value. The upper limit of a gas concentration measurement range specified for affected source categories in the applicable subpart of the regulations.

2.5 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.

2.6 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 took place.

2.7 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.

2.8 Representative Results. As defined by the RM test procedure outlined in this specification.

3. *Installation and Measurement Location Specifications*

3.1 The CEMS Installation and Measurement Location. 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 7). 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.

3.1.1 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.

3.1.2. Point CEMS. It is suggested that the measurement point be (1) no less than 1.0 meter from the stack or duct wall or (2) within or centrally located over the centroidal area of the stack or duct cross section.

3.1.3 Path CEMS. It is suggested that the effective measurement path (1) be totally within the inner area bounded by a line 1.0 meter 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.

3.2 Reference Method (RM) Measurement Location and Traverse Points. 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.

Then 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 (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 and pollutant stratification is not expected, the tester may choose to locate the three traverse points 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. The tester may select other traverse points, 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 (but no less than 3 cm from the stack or duct wall) of the traverse points.

4. *Performance and Equipment Specifications*

4.1 Data Recorder Scale. The CEMS data recorder response 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:

For a CEMS intended to measure an uncontrolled emission (e.g., SO_2 measurements at the inlet of a flue gas desulfurization unit), the high-level value must be between 1.25 and 2 times the average potential emission level, unless otherwise specified in an applicable subpart of the regulations. For a CEMS installed to measure controlled emissions or emissions that are in compliance with an applicable regulation, the high-level value must be between 1.5 times the pollutant concentration corresponding to the emission standard level and the span value. If a lower high-level value is used, the source must have the capability of measuring emission which exceed the full-scale limit of the CEMS in accordance with the requirements of applicable regulations.

The data recorder output must be established so that the high-level value is read between 90 and 100 percent of the data recorder full scale. (This scale requirement may not be applicable to digital data recorders.) The calibration gas, optical filter, or cell values used to establish the data recorder scale should produce the zero and high-level values. Alternatively, a calibration gas, optical filter, or cell value between 50 and 100 percent of the high-level value may be used in place of the high-level value provided the data recorder full-scale requirements as described above are met.

The CEMS design must 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, if not already approved, the Administrator may approve a single-point calibration-drift determination.

4.2 Calibration Drift. 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 calibration drift must be determined separately for each in terms of concentrations (see PS 3 for the diluent specifications).

4.3 The CEMS 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 the units of the emission standard or 10 percent of the applicable standard, whichever is greater. For SO_2 emission standards between 130 and 86 ng/J (0.30 and 0.20 lb/million Btu), use 15 percent of the applicable standard; below 86 ng/J (0.20 lb/million Btu), use 20 percent of emission standard.

5. *Performance Specification Test Procedure*

5.1 Pretest Preparation. Install the CEMS, prepare the RM test site according to the specifications in Section 3, and prepare the CEMS for operation according to the manufacturer's written instructions.

5.2 Calibration Drift Test Period. While the affected facility is operating at more than 50 percent of normal load, or as specified in an applicable subpart, determine the magnitude of the calibration drift (CD) once each day (at 24-hour intervals) for 7 consecutive days according to the procedure given in Section 6. To meet the requirement of Section 4.2, none of the CD's must exceed the specification.

5.3 RA Test Period. Conduct the RA test according to the procedure given in Section 7 while the affected facility is operating at more than 50 percent or normal load, or as specified in an applicable subpart. To meet the specifications, the RA must be equal to or less 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. 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.

The RA test may be conducted during the CD test period.

6. *The CEMS Calibration Drift Test Procedure*

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.

Conduct the CD test at the two points specified in Section 4.1. 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).

7. *Relative Accuracy Test Procedure*

7.1 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. Although it is preferable to conduct the diluent (if applicable), moisture (if needed), and pollutant measurements simultaneously, the diluent and moisture measurements that are taken within a 30- to 60-minute period, which includes the pollutant measurements, may be used to calculate dry pollutant concentration and emission rate.

In order to correlate the CEMS and RM data properly, mark the beginning and end of each RM test period of each run (including the exact time of the day) on the CEMS chart recordings or other permanent record of output. Use the following strategies for the RM tests:

7.1.1 For integrated samples, e.g., Method 6 and Method 4, make a sample traverse of at least 21 minutes, sampling for 7 minutes at each traverse point.

7.1.2 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 are an equal interval of time apart over a 21-minute (or less) period. 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.

7.2 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.

7.2.1 If the RM has an integrated sampling technique, make a direct comparison of the RM results and CEMS integrated average value.

7.2.2 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 tester may choose to use the arithmetic average of the CEMS value recorded at the time of each grab sample.

7.3 Number of RM Tests. Conduct a minimum of nine sets of all necessary RM tests. Conduct each set within a period of 30 to 60 minutes.

NOTE: The tester may choose to perform more than nine sets of RM tests. If this option is chosen, the tester may, at his discretion, reject a maximum of three sets of the test results so long as the total number of test results used to determine the RA is greater than or equal to nine, but he must report all data including the rejected data.

7.4 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_2 and CO_2), moisture, SO_2, and NO_x, respectively.

7.5 Calculations. Summarize the results on a data sheet. An example is shown in Figure 2-2. Calculate the mean of the RM values. Calculate the arithmetic differences between the RM and the CEMS output sets. Then calculate the mean of the difference, standard deviation, confidence coefficient, and CEMS RA, using Equations 2-1, 2-2, 2-3, and 2-4.

8. *Equations*

8.1 Arithmetic Mean. Calculate the arithmetic mean of the difference, d, of a data set as follows:

$$\bar{d} = \frac{1}{n} \sum_{i=1}^{n} d_i \qquad \text{(Eq. 2-1)}$$

Where:

n = Number of data points.

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

When the mean of the differences of pairs of data is calculated, be sure to correct the data for moisture, if applicable.

8.2 Standard Deviation. Calculate the standard deviation, S_d, as follows:

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

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

$$CC = t_{0.975} \frac{S_d}{\sqrt{n}} \qquad \text{Eq. 2-3}$$

Where:

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

TABLE 2-1—t-VALUES

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

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

8.4 Relative Accuracy. Calculate the RA of a set of data as follows:

$$RA = \frac{|\bar{d}| + |CC|}{\overline{RM}} \times 100 \quad \text{(Eq. 2-4)}$$

Where:

$|\bar{d}|$ = Absolute value of the mean of differences (from Equation 2-1).

$|CC|$ = Absolute value of the confidence coefficient (from Equation 2-3).

$\overline{RM}$ = Average RM value or applicable standard.

9. *Reporting*

At a minimum (check with the appropriate regional office, or State, or local agency for additional requirements, if any) summarize in tabular form the results of the CD tests and the relative accuracy 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 substantiate that the performance of the CEMS met the performance specifications.

10. *Alternative Procedures*

10.1 Alternative to Relative Accuracy Procedure in section 7. Paragraphs 60.13(j) (1) and (2) contain criteria for which the reference method relative accuracy may be waived and the following procedure substituted.

10.1.1 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.

10.1.2 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 following ranges:

MEASUREMENT RANGE

Measurement point	Pollutant monitor	Diluent monitor for	
		CO_2	O_2
1	20–30 percent of span value.	5–8 percent by volume.	4–6 percent by volume
2	50–60 percent of span value.	10–14 percent by volume.	8–12 percent by volume

Use a separate cylinder gas or calibration cell for measurement points 1 and 2. Challenge the CEMS and record the responses three times at each measurement point. Do not dilute gas from a cylinder when challenging the CEMS. Use the average of the three responses in determining relative accuracy.

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.

Use cylinder gases that have been certified by comparison to National Bureau of Standards (NBS) gaseous standard reference material (SRM) or NBS/EPA-approved gas manufacturer's certified reference material (CRM) (See Citation 2 in the Bibliography) following EPA traceability protocol Number 1 (See Citation 3 in the Bibliography). 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 Citation 2. Procedures for preparation of CRM are described in Citation 2.

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 Citation 4 in the Bibliography. The calibration cell certification procedure is subject to approval of the Administrator.

10.1.3 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 (RA) are as follows:

(a) For pollutant CEMS:

$$RA = \left| \frac{d}{AC} \times 100 \right| \leq 15 \text{ percent}$$

Where:

d=Difference between response and the known concentration/response.

AC=The known concentration/response of the cylinder gas or calibration cell.

(b) For diluent CEMS:

RA=$|d| \leq 0.7$ percent O_2 or CO_2, as applicable.

NOTE: Waiver of the relative accuracy test in favor of the alternative RA procedure does not preclude the requirements to complete the calibration drift (CD) tests nor any other requirements specified in the applicable regulation(s) for reporting CEMS data and performing CEMS drift checks or audits.

	Day	Date and time	Calibration value	Monitor value	Difference	Percent of span value
Low-level						
High-level						

Figure 2-1. Calibration drift determination.

Run No.	Date and time	SO_2			NO_x[b]			CO_2 or O_2[a]		SO_2[a]			NO_x[a]		
		RM	M	Diff	RM	M	Diff	RM	M	RM	M	Diff	RM	M	Diff
		ppm[c]			ppm[c]			%[c]	%[c]	mass/GCV			mass/GCV		
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
Average															
Confidence Interval															
Accuracy															

[a] For steam generators; [b] Average of three samples; [c] Make sure that RM and M data are on a consistent basis, either wet or dry.

Figure 2-2. Relative accuracy determination.

11. *Bibliography*

1. Department of Commerce. Experimental Statistics. Handbook 91. Washington, DC, 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, NC 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. Volume III is available from the U.S. EPA, Office of Research and Development Publications, 26 West St. Clair Street, Cincinnati, OH 45268.

4. "Gaseous Continuous Emission Monitoring Systems—Performance Specification Guidelines for SO_2, NO_x, CO_2, O_2, and TRS." EPA-450/3-82-026. Available from U.S. Environmental Protection Agency, Emission Standards and Engineering Division (MD-19), Research Triangle Park, NC 27711.

PERFORMANCE SPECIFICATION 3—SPECIFICATIONS AND TEST PROCEDURES FOR O_2 AND CO_2 CONTINUOUS EMISSION MONITORING SYSTEMS IN STATIONARY SOURCES

1. *Applicability and Principle*

1.1 Applicability. This specification is to be used for evaluating acceptability of O_2 and CO_2 continuous emission monitoring systems (CEM's) at the time of or soon after installation and whenever specified in an applicable subpart of the regulations. The specification applies to O_2 or CO_2 monitors that are not included under Performance Specification 2 (PS 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, 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).

The definitions, installation and measurement location specifications, test procedures, data reduction procedures, reporting requirements, and bibliography are the same as in PS 2, Sections 2, 3, 5, 6, 8, 9, and 10, and also apply to O_2 and CO_2 CEMS's under this specification. The performance and equipment specifications and the relative accuracy (RA) test procedures for O_2 and CO_2 CEMS do not differ from those for SO_2 and NO_x CEMS, except as noted below.

1.2 Principle. Reference method (RM) tests and calibration drift tests are conducted to determine conformance of the CEMS with the specification.

2. *Performance and Equipment Specifications*

2.1 Instrument Zero and Span. This specification is the same as Section 4.1 of PS 2.

2.2 Calibration Drift. The CEMS calibration must not drift by more than 0.5 percent O_2 or CO_2 from the reference value of the gas, gas cell, or optical filter.

2.3 The CEMS RA. The RA of the CEMS must be no greater than 20 percent of the mean value of the RM test data or 1.0 percent O_2 or CO_2, whichever is greater.

3. *Relative Accuracy Test Procedure*

3.1 Sampling Strategy for RM Tests, Correlation of RM and CEMS Data, Number of RM Tests, and Calculations. This is the same as PS 2, Sections 7.1, 7.2, 7.3, and 7.5, respectively.

3.2 Reference Method. Unless otherwise specified in an applicable subpart of the regulations, Method 3B of appendix A or any approved alternative is the RM for O_2 or CO_2.

PERFORMANCE SPECIFICATION 4—SPECIFICATIONS AND TEST PROCEDURES FOR CARBON MONOXIDE CONTINUOUS EMISSION MONITORING SYSTEMS IN STATIONARY SOURCES

1. *Applicability and Principle*

1.1 Applicability. This specification is to be used for evaluating the acceptability of carbon monoxide (CO) continuous emission monitoring systems (CEMS) at the time of or soon after installation and whenever specified in an applicable subpart of the regulations.

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 § 60.13(c).

The definitions, installation specifications, test procedures, data reduction procedures for determining calibration drifts (CD) and relative accuracy (RA), and reporting of may be conducted at a low level (up to 20 percent of span value) point. The components of an acceptable permeation tube system are listed on pages 87-94 of Citation 4.2 of the Bibliography.

2.2 Calibration Drift. The CEMS detector calibration must not drift or deviate from the reference value of the calibration gas by more than 5 percent (1.5 ppm) of the established span value of 30 ppm for 6 out of 7 test days. 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).

2.3 The CEMS Relative Accuracy. The RA of the CEMS shall be no greater than 20 percent of the mean value of the reference method (RM) test data in terms of the units of the emission standard or 10 percent of the applicable standard, whichever is greater.

3. *Relative Accuracy Test Procedure*

3.1 Sampling Strategy for RM Tests, Correlation of RM and CEMS Data, Number of RM Tests, and Calculations. This is the same as PS 2, Sections 7.1, 7.2, 7.3, and 7.5, respectively. Note: For Method 16, a sample is made up of at least three separate injects equally spaced over time. For Method 16A, a sample is collected for at least 1 hour.

3.2 Reference Methods. Unless otherwise specified in an applicable subpart of the regulations, Method 16, Method 16A, or other approved alternative, shall be the RM for TRS.

4. *Bibliography*

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.

PERFORMANCE SPECIFICATION 6—SPECIFICATIONS AND TEST PROCEDURES FOR CONTINUOUS EMISSION RATE MONITORING SYSTEMS IN STATIONARY SOURCES

1. Applicability and Principle

1.1 Applicability. The applicability for this specification is the same as Section 1.1 of Performance Specification 2 (PS 2), except this specification is to be used for evaluating the acceptability of continuous emission rate monitoring systems (CERMS's). The installation and measurement location specifications, performance specification test procedure, data reduction procedures, and reporting requirements of PS 2, Section 3, 5, 8, and 9, apply to this specification.

1.2 Principle. Reference method (RM), calibration drift (CD), and relative accuracy (RA) tests are conducted to determine that the CERMS conforms to the specification.

2. Definitions

The definitions are the same as in Section 2 of PS 2, except that this specification refers to the continuous emission rate monitoring system rather than the continuous emission monitoring system. The following definitions are added:

2.1 Continuous Emission Rate Monitoring System (CERMS). The total equipment required for the determination and recording of the pollutant mass emission rate (in terms of mass per unit of time).

2.2 Flow Rate Sensor. That portion of the CERMS that senses the volumetric flow rate and generates an output proportional to 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).

3. Performance and Equipment Specifications

3.1 Data Recorder Scale. Same as Section 4.1 of PS 2.

3.2 CD. 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 used for the measurement of flow rate except a temperature analyzer shall not drift or deviate from either of its reference values by more than 3 percent of 1.25 times the average potential absolute value for that measurement. For a temperature analyzer, the specification is 1.5 percent of 1.25 times the average potential absolute temperature. The CD specification for each analyzer for which other PS's have been established (e.g., PS 2 for SO_2 and NO_x), shall be the same as in the applicable PS.

3.3 CERMS RA. 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.

4. CD Test Procedure

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 what CD can be determined.

Conduct the CD tests for pollutant concentration at the two values specified in Section 4.1 of PS 2. For each of the other parameters that are selectively measured by the CERMS (e.g., velocity pressure), use two analogous values: one that represents zero to 20 percent of the high-level value (a value that is between 1.25 and 2 times the average potential value) for that parameter, and one that represents 50 to 100 percent of the high-level value. Introduce, or activate internally, the reference signals to the CERMS (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).

5. RA Test Procedure

5.1 Sampling Strategy for RM's Tests, Correlation of RM and CERMS Data, Number of RM's Tests, and Calculations. These are the same as PS 2, Sections 7.1, 7.2, 7.3, and 7.5, respectively. Summarize the results on a data sheet. An example is shown in Figure 6-2. The RA test may be conducted during the CD test period.

5.2 Reference Methods (RM's). 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 RM's for the determination of volumetric flow rate.

6. Bibliography

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. Envionmental Protection Agency. Research Triangle Park, NC. Publication No. EPA-650/2-75-020. February 1975. 248 p.

PERFORMANCE SPECIFICATION 7—SPECIFICATIONS AND TEST PROCEDURES FOR HYDROGEN SULFIDE CONTINUOUS EMISSION MONITORING SYSTEMS IN STATIONARY SOURCES

1. Applicability and Principle

1.1 *Applicability.* 1.1.1 This specification is to be used for evaluating the acceptability of hydrogen sulfide (H_2S) continuous emission monitoring systems (CEMS's) at the time of or soon after installation and whenever specified in an applicable subpart of the regulations.

1.1.2 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* § 60.13(c).

1.1.3 The definitions, installation specifications, test procedures, data reduction procedures for determining calibration drifts (CD) and relative accuracy (RA), and reporting of Performance Specification 2 (PS 2), Sections 2, 3, 5, 6, 8, and 9 apply to this specification.

1.2 Principle. Reference method (RM), CD, and RA tests are conducted to determine that the CEMS conforms to the specification.

2. Performance and Equipment Specifications

2.1 *Instrument zero and span.* This specification is the same as Section 4.1 of PS 2.

2.2 *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).

2.3 *Relative accuracy.* The RA of the CEMS shall be no 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.

3. Relative Accuracy Test Procedure

3.1 Sampling Strategy for RM Tests, Correlation of RM and CEMS Data Number of RM Tests, and Calculations. These are the same as that in PS 2, § 7.1, 7.2, 7.3, and 7.5, respectively.

3.2 Reference Methods. Unless otherwise specified in an applicable subpart of the regulation, Method 11 is the RM for this PS.

4. Bibliography

1. U.S. Environmental Protection Agency. Standards of Performance for New Stationary Sources; Appendix B; Performance Specifications 2 and 3 for SO_2, NO_x, CO_2, and O_2 Continuous Emission Monitoring Systems; Final Rule. 48 CFR 23608. Washington, DC, U.S. Government Printing Office. May 25, 1983.

2. U.S. Government Printing Office. Gaseous Continuous Emission Monitoring Systems—Performance Specification Guidelines for SO_2, NO_x, CO_2, O_2, and TRS. U.S. Envi-

ATTACHMENT D

40 CFR Part 60, Appendix F

Test a	Test b
Run 3. 110	125

5.2 Using Equation 1—

$$E_a=100+95+110/3=102$$
$$E_b=115+120+125/3=120$$

5.3 Using Equation 2—

$$S_a^2=(100-102)^2+(95-102)^2+(110-102)^2/3-1=58.5$$
$$S_b^2=(115-120)^2+(120-120)^2+(125-120)^2/3-1=25$$

5.4 Using Equation 3—

$$S_p=[(3-1)(58.5)+(3+1)(25)/3+3-2]\,{}^{1}\!/_{2}=6.46$$

5.5 Using Equation 4—

$$t=\frac{120-102}{6.46\left[\frac{1}{3}+\frac{1}{3}\right]^{1/2}}=3.412$$

5.6 Since $(n^1+n^2-2)=4$, $t'=2.132$ (from Table 1). Thus since $t>t'$ the difference in the values of E_a and E_b is significant, and there has been an increase in emission rate to the atmosphere.

6. *Continuous Monitoring Data.*

6.1 Hourly averages from continuous monitoring devices, where available, should be used as data points and the above procedure followed.

[40 FR 58420, Dec. 16, 1975]

APPENDIX D—REQUIRED EMISSION INVENTORY INFORMATION

(a) Completed NEDS point source form(s) for the entire plant containing the designated facility, including information on the applicable criteria pollutants. If data concerning the plant are already in NEDS, only that information must be submitted which is necessary to update the existing NEDS record for that plant. Plant and point identification codes for NEDS records shall correspond to those previously assigned in NEDS; for plants not in NEDS, these codes shall be obtained from the appropriate Regional Office.

(b) Accompanying the basic NEDS information shall be the following information on each designated facility:

(1) The state and county identification codes, as well as the complete plant and point identification codes of the designated facility in NEDS. (The codes are needed to match these data with the NEDS data.)

(2) A description of the designated facility including, where appropriate:

(i) Process name.

(ii) Description and quantity of each product (maximum per hour and average per year).

(iii) Description and quantity of raw materials handled for each product (maximum per hour and average per year).

(iv) Types of fuels burned, quantities and characteristics (maximum and average quantities per hour, average per year).

(v) Description and quantity of solid wastes generated (per year) and method of disposal.

(3) A description of the air pollution control equipment in use or proposed to control the designated pollutant, including:

(i) Verbal description of equipment.

(ii) Optimum control efficiency, in percent. This shall be a combined efficiency when more than one device operates in series. The method of control efficiency determination shall be indicated (e.g., design efficiency, measured efficiency, estimated efficiency).

(iii) Annual average control efficiency, in percent, taking into account control equipment down time. This shall be a combined efficiency when more than one device operates in series.

(4) An estimate of the designated pollutant emissions from the designated facility (maximum per hour and average per year). The method of emission determination shall also be specified (e.g., stack test, material balance, emission factor).

[40 FR 53349, Nov. 17, 1975]

APPENDIX E—[RESERVED]

APPENDIX F—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., $S0_2$ and $N0_x$) and diluent (e.g., 0_2 or $C0_2$) 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_2 and O_2 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. Conduct the RATA as described for the RA test procedure in the applicable PS in appendix B (e.g., PS 2 for SO_2 and NO_x). 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_2	O_2
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 audit gases that have been certified by comparision to National Bureau of Standards (NBS) gaseous Standard Reference Materials (SRM's) or NBS/EPA approved gas manufacturer's Certified Reference Materials (CRM's) (See Citation 1) following EPA Traceability Protocol No. 1 (See Citation 2). As an alternative to Protocol No. 1 audit gases, CRM's may be used directly as audit gases. A list of gas manufacturers that have prepared approved CRM's is available from EPA at the address shown in Citation 1. Procedures for preparation of CRM's are described in Citation 1. Procedures for preparation of EPA Traceability Protocol 1 materials are described in Citation 2.

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 once every four calendar quarters.

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 availabilty 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, ±15 percent of the average audit value or ±5 ppm, whichever is greater.

(3) For the RAA, ±15 percent of the three run average or ±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_2 or percent O_2). Each component of the CEMS must meet the acceptable accuracy requirement.

$$A = \frac{C_m - C_a}{C_a} \times 100 \qquad \text{Eq. 1-1}$$

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.

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. Available from the U.S. Environmental Protection Agency. Quality Assurance Division (MD-77). Research Triangle Park, NC 27711.

2. "Traceability Protocol for Establishing True Concentrations of Gases Used for Calibration and Audits of Continuous Source Emission Monitors (Protocol Number 1)" June 1978. Section 3.0.4 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.

3. 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.

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_2 ______ ppm, NO_x ______ 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_2 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/dsm³, 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/dsm³) (1) ______ (2) ______
d. Actual value (mg/dsm³)* (1) ______ (2) ______
e. Relative error* (1) ______ (2) ______

B. Cylinder gas audit (CGA) for ______ (e.g., SO_2 in ppm).

	Audit point 1	Audit point 2	
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_2 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/dsm³) (1) ______ (2) ______

d. Actual value (mg/dsm³) *(1) ______ (2)

e. Relative error* (1) ______ (2) ______

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 ______

[52 FR 21008, June 4, 1987; 52 FR 27612, July 22, 1987, as amended at 56 FR 5527, Feb. 11, 1991]

APPENDIX G—PROVISIONS FOR AN ALTERNATIVE METHOD OF DEMONSTRATING COMPLIANCE WITH 40 CFR 60.43 FOR THE NEWTON POWER STATION OF CENTRAL ILLINOIS PUBLIC SERVICE COMPANY

1. *Designation of Affected Facilities*

1.1 The affected facilities to which this alternative compliance method applies are the Unit 1 and 2 coal-fired steam generating units located at the Central Illinois Public Service Company's (CIPS) Newton Power Station in Jasper County, Illinois. Each of these units is subject to the Standards of Performance for Fossil-Fuel-Fired Steam Generators for Which Construction Commenced After August 17, 1971 (subpart D).

2. *Definitions*

2.1 All definitions in subparts D and Da of part 60 apply to this provision except that:

24-hour period means the period of time between 12:00 midnight and the following midnight.

CEMS means continuous emission monitoring system.

DAFGDS means the dual alkali flue gas desulfurizaiton system for the Newton Unit 1 steam generating unit.

Boiler operating day means a 24-hour period during which any fossil fuel is combusted in either the Unit 1 or Unit 2 steam generating unit and during which the provisions of § 60.43(e) are applicable.

Coal bunker means a single or group of coal trailers, hoppers, silos or other containers that: (1) are physically attached to the affected facility; and (2) provide coal to the coal pulverizers.

3. *Compliance Provisions*

3.1 If the owner or operator of the affected facility elects to comply with the 470 nanograms per joule (ng/J) (1.1 lb/million Btu) of combined heat input emission limit under § 60.43(e), he shall notify the Administrator at least 30 days in advance of the date such election is to take effect, stating the date such operation is to commence. When the owner or operator elects to comply with this limit after one or more periods of reverting to the 520 ng/J heat input (1.2 lb/million Btu) limit of § 60.43(a)(2), as provided under 3.4, he shall notify the Administrator in writing at least ten (10) days in advance of the date such election is to take effect.

3.2 Compliance with the sulfur dioxide emission limit under § 60.43(e) is determined on a continuous basis by performance testing using CEMS. Within 60 days after the initial operation subject to the combined emission limit in § 60.43(e), the owner or operator shall conduct an initial performance test, as required by § 60.8, to determine compliance with the combined emission limit. This initial performance test is to be scheduled so that the first boiler operating day of the 30 successive boiler operating days is completed within 60 days after initial operation subject to the 470 ng/J (1.1 lb/million Btu) combined emission limit. Following the initial performance test, a separate performance test is completed at the end of each boiler operating day Unit 1 and Unit 2 are subject to § 60.43(e), and new 30 day average emission rate calculated.

3.2.1 Following the initial performance test, a new 30 day average emission rate is calculated each boiler operating day the affected facility is subject to 60.43(e). If the owner or operator of the affected facility elects to comply with § 60.43(e) after one or more periods of reverting to the 520 ng/J heat input (1.2 lb/million Btu) limit under § 60.43(a)(2), as provided under 3.4, the 30 day average emission rate under § 60.43(e) is calculated using emissions data of the current boiler operating day and data for the previous 29 boiler operating days when the affected facility was subject to § 60.43(e). Operation of the affected facility under § 60.43(a)(2) is not considered a boiler operating day. Emissions data collected during such periods are considered relative to 4.0 and emissions data are not included in calculations of emissions under § 60.43(e).

3.2.2 When the affected facility is operated under the provisions of § 60.43(e), the

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* To be completed by the Agency.