stated above, the only reporting requirements are an initial report that allows the EPA to determine the universe of regulated entities, and reports that explain date codes if such codes are used to indicate the date of manufacture. The EPA believes that minimization of recordkeeping and reporting requirements will help to decrease impacts upon small entities.

For the foregoing reasons, the EPA anticipates that the proposed rule will not have a significant impact on a substantial number of small entities. The EPA believes that this conclusion is appropriate with respect to all entities to be regulated under the proposed rule, including the component manufacturers and importers encompassed by this supplemental proposal.

Unfunded Mandates Act of 1995

Under section 202 of the Unfunded Mandates Reform Act of 1995 (''Unfunded Mandates Act''), signed into law on March 22, 1995, the EPA must prepare a budgetary impact statement to accompany any proposed or final rule that includes a Federal mandate that may result in estimated costs to State, local, or tribal governments in the aggregate, or to the private sector, of $100 million or more.

The EPA has determined that today's action does not include a Federal mandate that may result in estimated costs of $100 million or more to either State, local, or tribal governments in the aggregate, or to the private sector. Therefore, the requirements of section 202 of the Unfunded Mandates Act do not apply to this action.

Electronic Submission of Comments

Comments may be submitted electronically by sending electronic mail (e-mail) to: a-and-r-docket@epamail.epa.gov. Electronic comments must be submitted as an ASCII file, avoiding the use of special characters and any form of encryption. Comments will also be accepted on diskette in WordPerfect 5.1 or ASCII file format. All comments in electronic form must be identified by the docket number A–95–18. No Confidential Business Information (CBI) should be submitted through e-mail. Electronic comments may be filed online at many Federal Depository Libraries.

List of Subjects in 40 CFR Part 59

Environmental protection, Air pollution control, Automobile refinish coatings, Consumer and commercial products, Volatile organic compounds.

Dated: December 9, 1997.
Richard D. Wilson,
Acting Assistant Administrator for Air and Radiation.
[FR Doc. 97–33963 Filed 12–29–97; 8:45 am]
BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 60 and 63

[FRL–5941–4]

Total Mercury and Particulate Continuous Emissions Monitoring Systems; Measurement of Low Level Particulate Emissions; Implementation at Hazardous Waste Combustors; Proposed Rule—Notice of Data Availability and Request for Comments

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of data availability and request for comments.

SUMMARY: This announcement is a notice of data availability and invitation for comment on the following reports pertaining to total mercury and particulate continuous emissions monitoring systems: DRAFT: Total Mercury CEMS Demonstration, Summary Table, dated December 1997; and DRAFT: Particulate Matter CEMS Demonstration, Volume I (with appendices), dated December 1997. EPA proposed requiring these monitors for hazardous waste combustors in the hazardous waste combustor proposed rule published on April 19, 1996. In addition, this document discusses topics for implementing particulate matter continuous emissions monitoring systems at hazardous waste combustors.

Readers should note that only comments about new information discussed in this document will be considered. Issues related to the April 19, 1996, proposed rule and subsequent documents that are not directly affected by the documents or data referenced in this Notice of Data Availability are not open for further comment.

DATES: Written comments on these documents and this document must be submitted by January 29, 1998.

ADDRESSES: Commenters must send an original and two copies of their comments referencing Docket Number F–97–CS6A–FFFFF to: RCRA Docket Information Center, Office of Solid Waste (5305G), U.S. Environmental Protection Agency Headquarters (EPA, HQ), 401 M Street, SW, Washington, D.C. 20460. Comments may also be submitted electronically through the Internet to: rcra-

docket@epamail.epa.gov. Comments in electronic format should also be identified by the docket number F–97–CS6A–FFFFF. All electronic comments must be submitted as an ASCII file avoiding the use of special characters and any form of encryption. Commenters should not submit electronically any confidential business information (CBI). An original and two copies of the CBI must be submitted under separate cover to: RCRA CBI Document Control Officer, OSW (5305W), 401 M Street, SW, Washington D.C. 20460.

For other information regarding submitting comments electronically, viewing the comments received, and supporting information, please refer to the proposed rule (61 FR 17358 (April 19, 1996)). The RCRA Information Center is located at Crystal Gateway One, 1235 Jefferson Davis Highway, First Floor, Arlington, Virginia and is open for public inspection and copying of supporting information for RCRA rules from 9:00 a.m. to 4:00 p.m. Monday through Friday, except for Federal holidays. The public must make an appointment to view docket materials by calling (703) 603–9230. The public may copy a maximum of 100 pages from any regulatory document at no cost. Additional copies cost $0.15 per page.

FOR FURTHER INFORMATION CONTACT: For general information, call the RCRA Hotline at 1–800–424–9346 or TDD 1–800–553–7672 (hearing impaired) including directions on how to access some of the documents and data referred to in this notice electronically. Callers within the Washington Metropolitan Area must dial 703–412–9810 or TDD 703–412–3323 (hearing impaired). The RCRA Hotline is open Monday-Friday, 9:00 a.m. to 6:00 p.m., Eastern Time.

The documents referred to in this notice are available over the Internet. The documents can be accessed by typing the following universal resource locator (URL):

http://www.epa.gov/epaoswer/hazwaste/combust/cems

This URL provides a home page through which all electronically available documents can be downloaded. The Technology Transfer Network (TTN) also provides a link to this page. CEMS information is available on TTN at the following URL:

http://ttnwww.rtpnc.epa.gov/html/emtic/cem.htm

The home page contains links to the files that are available electronically. The files are in an executable, compressed format to facilitate

downloading. Once extracted, each compressed file may result in more than one decompressed file. The reports are in Adobe Acrobat©, PDF format. The reader should note that figures, diagrams, and appendices may not be available electronically or may only be available in other formats.

For other information regarding the information contained in Sections I, II, IV, and V of this notice, contact Mr. Scott Postma, (5302W), Office of Solid Waste, 401 M Street, SW, Washington, D.C. 20460, phone (703) 308–6120, E-MAIL: postma.scott@epamail.epa.gov. For information regarding Section III of this notice, contact Mr. H. Scott Rauenzahn (5302W), Office of Solid Waste, 401 M Street, SW, Washington, D.C. 20460, phone (703) 308–8477, e-mail: rauenzahn.scott@epamail.epa.gov.

SUPPLEMENTARY INFORMATION: On April 19, 1996, EPA proposed revised standards (herein referred to as ''the proposed rule'') for hazardous waste combustors (HWCs, i.e., incinerators and cement and lightweight aggregate kilns that burn hazardous waste). See 61 FR 17358. Comments received from the public in response to the proposed rule are found in RCRA docket F–96–RCSP–FFFFF.

A previous notice of data availability (NODA), published on March 21, 1997, gave the public the opportunity to review the Agency's approach to demonstrating CEMS for HWCs. This previous NODA is herein referred to as ''the first CEMS NODA'' or ''CEMS NODA 1.'' See 62 FR 13776. Comments received from the public in response to the first CEMS NODA are found in RCRA docket F–97–CS3A–FFFFF.

Readers should note that a separate docket was established for this document. See the **ADDRESSES** section above for more information.

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PART 60—STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES

I. Introduction and Background

In the proposed rule, EPA proposed that continuous emissions monitoring systems (CEMS) be used for compliance with the HWC total mercury (Hg) and particulate matter (PM) standards. See 61 FR at 17426 and 17435. To require

CEMS for compliance the Agency, among other things, must determine that the CEMS are commercially available and have been demonstrated to meet certain performance specifications. To make these determinations, the Agency tested various Hg and PM CEMS being marketed in the U.S. and Europe. The first CEMS NODA described the approach EPA is using to demonstrate the feasibility of PM and Hg CEMS and requested comment on certain technical issues arising from this program. This testing is now complete. Today the Agency is providing notice of an opportunity to comment on the following documents resulting from these CEMS demonstration test program: DRAFT: Total Mercury CEMS Demonstration, Summary Table, dated December 1997; and DRAFT: Particulate Matter CEMS Demonstration, Volume I (with appendices), dated December 1997.

The remainder of this notice describes important information bearing upon how the reports' results relate to EPA's approach to demonstrating Hg and PM CEMS and how PM CEMS could be used for compliance. Many of these issues were raised by commenters in response to CEMS NODA 1 and the proposed rule. The reader is referred to the referenced documents for specific information regarding the Hg and PM CEMS demonstration test program and the comments cited here.

II. The Hg CEMS Demonstration Tests

EPA seeks comment on the document DRAFT: Total Mercury CEMS Demonstration, Summary Table, dated December 1997, provided in the above referenced docket for this NODA. This table summarizes results from the Hg CEMS demonstration tests EPA conducted.

In summary, the Agency found certain aspects of the testing program revealed substantial problems regarding the measurement of the Hg CEMS accuracy and precision. EPA found it difficult to dynamically spike known amounts of mercury (in the elemental and ionic form) and obtain manual method and Hg CEMS measurements that agree at the test source. As a result, the Agency now believes it has not sufficiently demonstrated the viability of Hg CEMS as a compliance tool at all hazardous waste combustors and should not require their use. Nonetheless, EPA still believes Hg CEMS can and will work at some sources but does not have sufficient confidence that all HWC conditions are conducive to proper operation of the Hg CEMS tested. Facilities should have the choice of using Hg CEMS if desired so long as the

permitting agency approves on a site-specific basis the Hg CEMS and its site-specific performance specifications. See a related issue in section V.A. of this NODA regarding the implementation of optional CEMS.

III. The PM CEMS Demonstration Tests

This section describes the report DRAFT: Particulate Matter CEMS Demonstration, Volume I (with appendices), dated December 1997, contained in the docket identified in the Addresses section, above. EPA issued previous notices asking vendors to participate in this program (see 61 FR 7232, February 27, 1996) and to allow the public to comment on the Agency's approach to demonstrating these monitors (see 62 FR 13775, March 21, 1997). Since this could represent the first time EPA requires PM CEMS for compliance at stationary sources, the technical discussion contained in this section is expected to have general applicability beyond sources that burn hazardous waste. In particular, EPA invites comment from all parties concerning the following documents attached to this notice: Method 5I for the determination of low level particulate emissions; Performance Specification 11 for PM CEMS; and Quality Assurance Requirements for PM CEMS.

A. PM Performance Specification (PS) 11 Levels

In CEMS NODA 1, the Agency stated it intended to loosen the proposed PM CEMS Performance Specification (PS) 11 to reflect what was achievable by the monitors during this demonstration test. The test was designed to be a reasonable worst case investigation of what performance (relative to the proposed PS11) the monitors could achieve. Many comments received in response to CEMS NODA 1 stated that the proposed performance specifications were not sufficiently stringent and opposed loosening the specification levels.

Concurrent with the Agency's invitation in CEMS NODA 1 to comment on our approach to demonstrate PM CEMS, EPA determined that much of the variability in the calibration curves resulted from inaccuracies in performing the manual method, Method 5 (M5). Since the fundamental approach in PS11 involves correlating manual method results to PM CEMS outputs, the PS11 statistical results reflected this variability in the manual method. Consequently, EPA undertook a systematic effort to identify and remove this error from the manual method measurement process. Manual method improvements were developed

and observed, and performance specification results for the PM CEMS improved as a result. (See a related discussion in section III.B, below, regarding these improvements to the manual method.)

1. Revised Specification Levels for the Correlation Coefficient, Confidence Interval, and Tolerance Interval

As a result of comments on CEMS NODA 1, EPA decided to accept a slightly modified version of the more stringent International Standards Organization (ISO) specification 10155 for PM CEMS. Four of the five PM CEMS tested during the PM CEMS demonstration tests were able to meet all three performance specifications (i.e., those for the correlation coefficient (r), confidence interval (CI), and Tolerance Interval (TI)) at all three of the emissions levels discussed in the May 2, 1997, NODA as alternatives to the proposed emissions standards (69 mg/dscm for cement kilns, 50 mg/dscm for light-weight aggregate kilns, and 34 mg/dscm for hazardous waste incinerators.) See 62 FR 24212 for a discussion of those alternative emissions standards. One technology, an extractive light-scattering technology, did not meet all the performance specification levels at all of the alternative standards.[1] Since EPA must show that at least one commercially available PM CEMS can meet the proposed performance specification, the fact that 4 of the 5 monitors were able to meet these performance levels under reasonable worst-case test conditions adequately shows that the modified specification levels are achievable. The revised performance specification levels are presented in Table 1, below.

TABLE 1: REVISED PERFORMANCE SPECIFICATIONS FOR PM CEMS

Correlation coefficient	Confidence interval	Tolerance interval
0.90	±10%	±25%

As previously stated, these performance levels are nearly identical to the ISO specification for PM CEMS. The only major difference between these and the ISO specification levels is the correlation coefficient, which is 0.95 in ISO 10155 and 0.90 in the modified PS11. This is acceptable since the correlation coefficient does not directly relate to measurement error while the confidence and tolerance intervals do.[2]

The revised PS11 also requires that a minimum of 15 runs be used for the calibration while the ISO specification requires only 9 runs. The ISO specification is also vague regarding the PM concentration ranges required for a calibration. The revised PS11 stipulates three ranges: 0 to 30, 30 to 60, and 60 to 100% of the facility's range of PM emissions.

2. Data Availability

EPA had proposed that PM CEMS be used at all times that hazardous waste is in the unit. See 61 FR at 17441. Commenters to the proposed rule did not view this favorably. They said this proposal is equivalent to a 100% data availability requirement for PM CEMS. Commenters stated that this requirement is not achievable since all mechanical devices fail at some point, often without warning. They said a data availability requirement in the 85, 90, or 95% range would be more acceptable. Commenters suggested that when the PM CEMS were not available, the PM-related operating parameter limits EPA proposed should be used in place of the PM CEMS.

EPA largely agrees with this comment. The PM CEMS demonstration tests show that a 100% data availability requirement is not achievable for all PM CEMS in all instances. The Agency also agrees that when PM CEMS are not operating, it is reasonable to provide for some back-up compliance system in lieu of requiring sources to either stop burning hazardous waste or have a back-up PM CEMS available. The PM APCD operating parameters proposed in the event there is no PM CEMS requirement are a good starting point for identifying such a back-up system. See the discussion later in this section for more information on this issue.

Based on these demonstration tests and the comments received, EPA concludes that a 95% data availability requirement is achievable for most PM CEMS. Therefore, EPA intends that PM CEMS be used 95% of the time for compliance. However, there are useful technologies that cannot meet this 95% data availability requirement. This data availability requirement should be relaxed in certain instances. For instance, beta-gages did not meet the 95% data availability requirement during the PM CEMS tests. EPA believes beta-gages, with their relatively superior

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[1] This technology did meet 10 of the 14 specification comparisons.

[2] The correlation coefficient is defined as the ratio S_{xy} divided by the square root of the quantity S_{xx}

times S_{yy}. S_{xy} is a measurement of error as x relates to y, while S_{xx} and S_{yy} are a reflection of the range of the data set. As a result, the correlation coefficient is not as useful a tool to evaluate measurement error as the correlation and tolerance intervals. This is particularly true as the correlation coefficient approaches 1.

performance and ability to measure PM emissions at truly wet stacks (*i.e.,* those with entrained water droplets in the stack gas), will be useful at some sources for compliance. Therefore, EPA will consider an 85% data availability requirement for beta-gage technology PM CEMS.[3] The Agency anticipates other case-by-case determinations will be made in the future as more is learned about the performance, benefits, and data availability limitations of other PM CEMS technologies.

Finally, EPA believes that increasing the amount of PM data available will enable sources to improve their understanding and better define the relationship between operating parameters and emission levels. EPA is aware of two relevant examples which are described here. The first one is an ongoing cooperative effort with industry, regulatory agencies, and the local public. This effort is focused on a venturi scrubber-controlled lime kiln at a pulp and paper plant where testing is being conducted to evaluate the feasibility of a predictive emission monitoring system (PEMS). Following preliminary measurements and an experimentally designed test matrix, 595 Method 5 runs were performed over a wide variety of process and scrubber operating conditions, and PM emission levels. A correlation coefficient above 0.9 was obtained in correlating PM emission levels with 54 operating parameters. In comparison, use of PM CEMS represents a powerful tool for accumulating much data at a cost that is far less than performing hundreds of Method 5 runs. As a result, PM CEMS allow for a cost-effective way to implement a PM PEMS model than making hundreds of Method 5 measurements.

The second example directly relates to the first. The Electric Power Research Institute (EPRI) has already produced a means to characterize and correlate PM emissions with operating conditions at coal-fired utility boilers. PM emissions from utility boilers are similar to HWCs in that their emissions are affected by a complexity of variations from a number of fuel and feed characteristics, combustor operations, and electrostatic precipitator (ESP) operations. As in the lime kiln case mentioned above, use of

PM CEMS represents a more powerful tool for accumulating and correlating vast amounts of PM emission data with PM-related operating parameters at a cost that is far less than performing a large number of Method 5 runs.

These two examples, therefore, lead EPA to believe that a PM CEMS requirement will allow HWC facilities to better define what PM APCD operating parameter limits correspond to a given PM emissions concentration. As a result, the Agency encourages HWC facilities to use PM CEMS data to better define what operating parameters correspond to compliance with a facility's PM CEMS limit. The site-specific limit is discussed further in section IV.B. of this notice.

3. Data Quality Objectives: New Procedure 2 to Appendix F of 40 CFR Part 60

EPA intends to expand the ISO specification to include certain data quality objectives. For example, PM CEMS routinely and automatically check and correct their raw outputs to compensate for phenomena such as "fogging" of the optics and drift of the measurement signal. A large and sudden auto correction is indicative of the need to perform maintenance on the PM CEMS. To address this concern, EPA intends to include certain data quality objectives such as: The (PM CEMS internal) calibration drift not exceed 8% during any drift check; the (PM CEMS internal) calibration drift not exceed more than 4% per day for five consecutive days; and the automated (PM CEMS internal) calibration drift adjustment not exceed 2% for five consecutive days.

These data quality criteria would appear in a new Procedure 2 of Appendix F to 40 CFR part 60. Just as Procedure 1 of Appendix F deals with data quality objectives for gaseous CEMS for other CAA rules (CEMS such as NO_X and SO_X), Procedure 2 would address data quality objectives for PM CEMS. Procedure 2 would also include the following data quality objectives: treatment of "flagged data;" PM CEMS automatic zero and calibration span requirements; conduct of the Absolute Calibration Audit and the quality of the standards used for these audits; sample volume audit requirements for extractive systems; relative calibration audit (RCA) requirements; the treatment of audit failures; how manual method paired data outliers (see the CEMS NODA 1, 62 FR at 13780) are handled; definition of "out-of-control" situations; and how facilities are to respond to these "out-of-control" situations. See Procedure 2 (which appears at the end of this notice) and the draft final PM

CEMS Demonstration Test Report for more information regarding these requirements and Procedure 2.

B. Manual Method Accuracy

One outgrowth of these PM CEMS demonstration tests is that EPA has made significant improvements in making Method 5 particulate measurements. As previously mentioned, the calibration process for PM CEMS involves correlating PM CEMS outputs to manual method results. High variability in the manual method results will negatively affect the PS11 calibration statistics. Therefore, one important way to improve PS11 statistics is to improve the way manual method measurements are made. These improvements involve the use of a new Method 5I (M5i) for low level PM emissions. M5i consists of the following improvements: improved sample collection; elimination of possible contamination; and improved sample analysis. Each will be discussed in the following paragraphs. M5i will be instrumental in correlating PM CEMS outputs to manual method results. EPA also expects this new method will be preferred in all cases where low level (*i.e.,* below 45 mg/dscm [~0.02 gr/dscf]) measurements are required. In practice, this means that M5i is expected to become the standard method for most HWCs and many other MACT sources. EPA expects many of the improvements in M5i can and will be implemented whenever Method 5 (collectively, including Method 5, 5A, ..., 5H) is used to make particulate measurements.

M5i is almost identical to the traditional M5. Differences are discussed below. We also present a comparison of the precision of M5i (which fully implements these improvements) and the traditional M5 (which largely does not use these improvements) and discuss the need for and handling of paired M5 data.

1. Modification of the Filter Recovery Process

One way M5i differs from the traditional M5 is through the use of a light-weight and integrated filter and filter assembly that can be tared and weighed together. This improves M5 by eliminating the filter recovery step. The filter recovery step can be a significant source of measurement error at some sources. In some cases as the filter dries, the filter adheres itself to the filter assembly. Recovery of the filter then involves scraping the filter off the filter assembly leaving some of the filter (and sample) on the filter assembly or otherwise losing it to the environment. In other cases, the filter recovery

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[3] One of the beta gage PM CEMS experienced a 74% data availability during the PM CEMS demonstration test program. Much of the additional downtime was because no U.S.-based technicians were fully trained to service this instrument during this program and parts and personnel had to be brought to the U.S. Once EPA requires a new technology, such as PM CEMS, the market for that new technology is expected to mature in the US similar to how one exists overseas. As a result, data availability will be better than what was experienced here.

process can lead to the loss of sample to the environment as light-weight particles are lost to the air during handling. It can also lead to contamination of the sample in cases where fugitive dust from the environment lands on the filter during the recovery step. Simplifying the recovery step through the use of a light-weight, integrated filter and assembly addresses these concerns and thereby improves the reliability of making PM measurements.

One consequence of this improvement, though, is that the filter used M5i is smaller than that used in the traditional M5 (47 mm compared to approximately 90 to 100 mm in the traditional M5). This smaller filter can plug at higher emissions levels. For this reason, this aspect of M5i may not be implementable at sources with emissions above 45 mg/dscm (that is, total train catches exceeding 50 mg).

2. Improved Sample Collection

Another important improvement to M5 is to the sample collection process itself. These improvements include: ensuring that the nozzle is 90° to the direction of flow at each traverse location; and using Pesticide Grade (*i.e.*, low residue) acetone for probe rinse. Each is discussed in the following paragraphs. These improvements to the sample collection process may also be implemented over time into other versions of Method 5.

Test crews routinely check the "level" of the probe only once during sampling—prior to or at the beginning of the sampling process itself. As the traverse progresses, the probe can become "unlevel," *i.e.*, it is no longer at a right (90°) angle to the direction flow in the stack gas. As the angle of the probe departs from 90°, inconsistent amounts of sample are collected and thereby causes error in M5 measurements. This can be corrected by applying a level to the sample probe and checking the level continuously throughout the traverse. Ensuring that the probe angle is constant and level throughout the traverse eliminates this potential source of measurement error.

Finally, residue contained in the acetone used for the probe rinse is another source of sampling error. Acetone is used for the probe rinse since it is a solvent that evaporates readily at room temperatures and thereby allows rapid weighing of the specimen following sampling. The standard M5 procedures require that acetone residue blank levels be determined and that reagent-grade acetone in glass bottles with no more than 0.001% residue be used for probe rinses. Acetone comes in

many grades, including reagent grade, depending on how the purchaser intends to use the acetone. Some grades of acetone contain higher levels of residue. This residue remains after the acetone evaporates and contaminates the probe rinse, making the "catch" during the probe rinse greater than what it really is. Acetone blanks above 0.001% are not allowed by M5, so the acetone itself must have a concentration of residue no more than this requirement for the blanks. M5 also requires that the acetone be stored in glass containers because acetone from metal containers generally have a high residue blank level. Test crews routinely use reagent-grade acetone purchased in small, glass containers since large quantity purchases create a fire safety and storage issue. Though ordered with the intent of meeting specifications, acetone suppliers often store bulk, reagent grade acetone in metal containers and transfer this acetone to glass containers only to ship the small quantities sold. This means that the residue concentrations found in reagent grade acetone are often higher than what is allowed by M5. The unallowable amount of residue from high blank levels would have a negative effect on the accuracy and precision of M5 results. This can be avoided by requiring low-residue, Pesticide grade acetone.

3. Elimination of Contamination

In a general sense, eliminating contamination in the filter handling processes will eliminate potential sources of error. Contamination can be avoided by: using a portable desiccator for use in transporting and holding the filters to and on the stack; using glass plugs on the filter assemblies to keep them "pure" prior to and after sampling; covering the desiccant with a 0.1 micron screen to eliminate potential external contamination of filter housing during transport; and handling the filter assemblies with powder free latex gloves. As previously discussed, contamination in the M5 process will make measured PM levels appear to be higher than what they truly are. Each of these steps to eliminate contamination of the sample will ensure that fugitive particulate from the environment does not contaminate, thereby inadvertently causing a positive bias to the measured PM levels.

4. Improved Sample Analysis

Finally, improved sample analysis will help eliminate error in the Method 5 measurement process. Specific steps to improve M5 sample analysis include: Elimination of all sources of static

charge (such as those on the operator, beakers, liners, and balance); use of light weight Teflon beaker liners for gravimetric analysis of the probe rinse; maintaining the laboratory area at a humidity level of 30% or less; and putting a covered desiccant container in the balance weighing chamber. Each is discussed in the following paragraphs.

High, varying levels of static charge typically produce variations in repeated weighing of susceptible materials such as glass filter holder assemblies and Teflon beakers (probe rinse catches). The need for maintaining a relatively dry atmosphere in the analytical room further exaggerates the negative effect of static charge on the weighing process. To control and minimize the consequences of static charge, EPA found it was necessary to preclude any and all aspects of static electricity. This entailed using: (1) A static-free mat on the floor area under the desiccator and balance; (2) a small charge-neutralizer in the desiccator; (3) another small charge-neutralizer in the weighing chamber of the balance; and (4) a static dissipator aerosol spray to prevent static buildup on the Teflon beakers. EPA found it was not possible to consistently reproduce the same weight results (that is, within 0.5 mg) until all four measures were done.

The particulate, filter assembly, and filter are often hydrophilic in nature, i.e., they tend to adsorb water from the air. The amount of water these materials adsorb depends on the amount of water in the air. The moisture content of air is often quantified in terms of the relative atmospheric humidity, or what percentage the actual water concentration of the air is relative to the saturation concentration. The higher the relative humidity of the air, the more water is adsorbed. The converse is also true. As a result, if the relative humidity in the analysis room is high, the amount of water adsorbed onto the particulate, filter, and assembly becomes variable and it becomes increasingly difficult to obtain a stable measurement. Ensuring that the relative humidity in the analysis room remains at a constant, low level will ensure that the amount of water adsorbed by these materials remains relatively small and constant. EPA found that maintaining the relative humidity of the room to below 30% will control this source of error.[4]

To further control and minimize the adverse affects of humidity on reproducing results in the weighing

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[4] As humidity levels decrease, static charge tends to increase. The elimination of static charge, previously discussed, will aid at eliminating this problem.

process, a small covered desiccant container was placed in the balance's weighing chamber. This ensures that the humidity level in the weighing chamber is consistent with the humidity level in the desiccator. The desiccant in the weighing chamber dries fugitive air entering the chamber from the room, preventing the adsorption of room air humidity on the materials being weighed.

5. Comparison of M5 and M5i Method Precision

M5i has been validated against Method 5.[5] It is also important to quantify the improvements to M5 just discussed. This can be done by comparing the precision of both methods at each of the three proposed PM standards: 34, 50, and 69 mg/dscm for hazardous waste burning incinerators, LWAKs, and cement kilns, respectively. Precision at the standards is important since measurements at the standard deal with compliance determinations at facilities. The best estimate of the standard deviation is presented to represent this precision.

For M5i, the results presented are the best estimate of the standard deviation at each of the three proposed emissions standards. These results are calculated directly from the data obtained during the PM CEMS demonstration tests. The *relative standard deviation* (e.g., the best estimate of the standard deviation at an emissions concentration, divided by that emissions concentration) for M5i is in all cases less than 5%.

Historical data from Method 5 was derived from PM concentrations ranging from 80 to 255 mg/dscm. This data indicates that the *relative standard deviation* for M5 is constant at 10%. Therefore, if one were to multiple the emissions standard by 10%, one can derive the best estimate of the standard deviation at the three proposed emissions standards.

Table 2, below, illustrates this comparison and shows that M5i is an improvement to M5.

TABLE 2: COMPARISON OF METHOD 5 AND METHOD 5i STANDARD DEVIATIONS

Proposed PM emissions standard (mg/dscm) at 7% oxygen	Best estimate of the standard deviation (mg/dscm)	
	Method 5	Method 5i
34	3.4	1.67
50	5.0	2.24

[5] Only the filter, extraction, and weighing steps were tested.

TABLE 2: COMPARISON OF METHOD 5 AND METHOD 5i STANDARD DEVIATIONS—Continued

Proposed PM emissions standard (mg/dscm) at 7% oxygen	Best estimate of the standard deviation (mg/dscm)	
	Method 5	Method 5i
69	6.9	2.85

6. Paired Data

Throughout most of the PM CEMS demonstration tests, EPA used two simultaneous Method 5i sampling trains. These two simultaneous trains are called "paired trains" and the paired train data are called "paired data." The average of the paired data from the two trains was considered the method result. If the "paired data" differed by more than 30% from the method result, EPA eliminated the method result from the calculation of the calibration.

EPA's experience is that, despite the efforts just discussed to control method variability, intangibles which are unknown or unquantifiable can cause variability in M5 (and M5i) measurements. Since it is important that highly accurate M5 measurements be obtained for calibrating PM CEMS, these intangibles must be identified in some way and data affected by these intangibles must be eliminated from the PM CEMS calibration. The fact that two simultaneously run M5 (or M5i) measurements do not agree is ample evidence that something in the sample collection and analysis process was not consistent.

Comments received during the comment period for CEMS NODA 1 stated that this process would not be allowed if a facility were doing a calibration for compliance. To address this concern, EPA has incorporated this outlier procedure in the new Procedure 2 and M5i. Having this procedure in the regulations will allow facilities to exclude this type of erroneous data from their PM CEMS calibrations. Please note that this procedure applies *only* if paired data are obtained. Single measurements obtained at different times *are not* paired data. Single runs *cannot* be eliminated by comparing these results to other single measurements.

EPA strongly encourages facilities to use paired data during their calibrations. Beyond the ability to eliminate paired data outliers from the PM CEMS calibration, using the average of two runs as the method result has a moderating affect on the calibration statistics EPA calculated and used to base the PS11 revised in today's notice.

This moderating effect improves the PS11 criteria relative to what they would be if paired data were not used. Some facilities may find it difficult to obtain a suitable calibration using only single M5 measurements. However, while we encourage using paired data, we are not requiring paired data for PM CEMS calibrations. This choice can be left to the facilities to determine what makes the most economic and technical sense at their site.

C. Transferability of These Demonstration Test Results to Other HWC Sources

EPA believes this demonstration test program adequately shows that PM CEMS will meet PS11 at most hazardous waste incinerators, cement kilns, and light-weight aggregate kilns. These tests were conducted at a *reasonable worst-case facility* for performance relative to the proposed performance specifications[6]. Therefore, a PM CEMS should pass the performance measures described in the revised draft PS11 at most HWC sources. The paragraphs below discuss specific aspects of PM CEMS and their applicability to each HWC source category.

For cement kilns, in-situ light scattering PM CEMS are operationally very similar to continuous opacity monitors (COMs), a technology employed at these sources for many years. Light-scattering PM CEMS differ from COMs only in the way they obtain and interpret the light from the source. As shown in the LaFarge tests,[7] though, an informed decision is required to determine what type of in-situ light-scattering PM CEMS is best suited for these sources. One PM CEMS used at LaFarge was built with a heated air purge system to blow cement kiln dust away from and out of the optics of the monitor while the other was not. The monitor with the heated air purge performed very well over the course of the tests, though improvements to the Method 5 measurements and a routine cleaning of the optics could have improved performance. The PM CEMS without the heated air purge suffered operational difficulty. In addition, PM from cement kilns is mostly process dust (*i.e.*, raw material). As such, its physical properties are not significantly affected by changes in waste or fuel feeds. Accordingly, in-situ light-scattering PM CEMS will pass performance specifications at cement kilns if an informed decision is made to

[6] For more on EPA's rationale that this is a reasonable worst-case test, see CEMS NODA 1 and the PM CEMS Demonstration Test report sited here.

[7] See section 2.6.7 of the PM CEMS Demonstration Test Report.

purchase a monitor that is designed to address the dusty environment at these facilities.

EPA believes that LWAKs are very similar to cement kilns relative to the applicability of PM CEMS, and therefore the conclusions drawn in the preceding paragraph also apply to LWAKs.

For incinerators, there are certain unique situations which must be discussed: incinerators with truly wet stacks; incinerators with waste heat boilers; and mobile incinerators.

As was the case with cement kilns, HWC incinerators with truly wet stacks (*i.e.*, those with entrained water droplets in the stack gas) need to make an informed choice regarding what PM CEMS technology they elect to use. In-situ light-scattering PM CEMS are likely to have operational difficulty since the water droplets entrained in the stack gas will be mistaken for particulate. This is a readily accepted source of error and means that in-situ light-scattering PM CEMS are not a practical choice for these sources. Beta-gage and certain other light-scattering PM CEMS, however, are designed with extractive reheat systems which heat up the extracted gas to above the water condensation temperature. Incinerator groups are currently working to test these types of systems to gain first-hand experience and data regarding the use of PM CEMS at facilities with truly wet stacks. EPA encourages these tests since they will result in valuable data which can be communicated to personnel at incinerators with truly wet stacks to assist their PM CEMS purchasing decisions.

Incinerators equipped with waste heat boilers (WHBs) downstream of the combustion chamber(s) also require special consideration. Like boilers, these incinerators blow soot periodically to clean the boiler tubes. PM emissions will increase and the physical properties (pertinent to PS11) of the PM may change during periods of soot blowing. To help address the impact of soot-blowing, sources would be required to include soot-blowing episodes during a minimum of three calibration runs. This will ensure that calibration captures the higher emissions that can occur during soot-blowing, thus minimizing the need to extrapolate the calibration curve beyond measured values. In addition, including soot-blowing during calibration runs will enable the source to determine whether any change in the physical properties of the PM during soot-blowing has adversely affected the calibration (*i.e.*, as evidenced by an inability to meet PS 11 when the soot-blowing runs are included).

EPA requests comment on this approach to address the special problems that soot-blowing may cause. In particular, EPA seeks the following information:

—How many incinerators are currently equipped with WHBs? Are sources likely to remove WHBs to facilitate compliance with the MACT standards (*e.g.*, D/F)?
—The normal frequency and duration of soot-blowing. Under what conditions does the frequency and duration of soot-blowing change? How often does this change(s) occur?
—How do PM emissions for runs that include episodes of soot blowing compare to runs without soot blowing?
—How does the effect of the APCS, waste and fuel types, and other relevant factors impact changes to the PM concentrations and physical properties when one compares PM during soot-blowing and PM at other times.

The reader should note that EPA intends to promulgate MACT standards for hazardous waste boilers as part of Phase II of the HWC rulemaking. EPA intends to address the applicability of PM CEMS to boilers then. If because of unforeseen reasons EPA provides a PM CEMS waiver for incinerators with WHBs, EPA would readdress the applicability of PM CEMS to hazardous waste incinerators with waste heat boilers in Phase II.

Finally, another class of hazardous waste incinerators are used at Superfund sites during the clean-up process. These mobile incinerators have small, limited waste processing capacity and are often trucked to the site as needed. EPA is concerned that the variability of the feed to mobile incinerators is beyond what was experienced at the DuPont facility. As such, a unique calibration might be required for every clean-up site, which is unnecessarily burdensome. Given the PM CEMS implementation schedule discussed in section IV.A., below, implementing PM CEMS at these incinerators may not be feasible, and EPA is considering whether to waive the PM CEMS requirement for Superfund mobile incinerators.

If the PM CEMS requirement is waived for certain facilities, the other, traditional operating parameters discussed in this NODA would be used instead to document compliance.

IV. PM CEMS: Implementation and Compliance [8]

A. PM CEMS Compliance Schedule

Many comments received in response to the proposed rule stated that facility personnel are not familiar with the operation and maintenance characteristics of PM CEMS, or how to control their operating conditions to ensure compliance using PM CEMS. For this and reasons explained in section IV.B., EPA plans to allow a 12-month phase-in period before PM CEMS would be used as a compliance parameter. This section describes this compliance schedule.

Prior to the date PM CEMS would be used for compliance (*i.e.,* during the 12-month phase-in period), limits on key PM-related and other key operating parameters (e.g., metals feedrate) would be used to ensure compliance with the MACT standards for PM, SVM, and LVM. This one year phase-in period has four key milestones: The Compliance Date; the performance Test Date; the Certification of Compliance (CoC) date; and the Certification of PM CEMS performance date. By the Compliance Date,[9] facilities would determine, using engineering judgment, the operating parameter limits necessary to ensure compliance with the standards. These initial operating parameter limits would be specified in a Precertification of Compliance (Pre-CoC) that would be submitted to the permitting authority by the Compliance Date. By the Test Date, which is nominally no later than six months after the Compliance Date, facilities would have to conduct a performance test to document compliance with the MACT emissions standards and identify operating parameter limits based on levels achieved during the test. Results of the performance tests and these revised operating parameter limits would be submitted to the permitting authority in a Certification of Compliance (CoC) nominally no more than nine months after the Compliance Date. The operating parameter limits in the CoC would be used as surrogate compliance measures to ensure that the efficiency of

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[8] The reader should note that HWCs are currently regulated under RCRA. Sources with a different regulatory history are likely to have a different compliance regime than the one described here. One should not assume that the compliance and implementation scheme described here will necessarily be applied to sources with a different regulatory history.

[9] The Clean Air Act states that the Compliance Date can be no more than three years after the effective date of the rule (i.e., date of publication in the **Federal Register**), unless a source obtains an (up to) one-year time extension of the Compliance Date.

the PM control device was maintained at performance test levels until the one-year anniversary date of the Compliance Date. Beginning at that time, facilities would start using the PM CEMS and cease using the operating parameters as their primary operating parameter for PM control.

During this phase-in year, there are important PM CEMS-related activities being performed. For instance, the PM CEMS, like all other equipment necessary for compliance with the MACT standards, must be installed by the Compliance Date. Like all other tests for the rule, the PM CEMS calibrations and initial certifications (see section 8.3 of PS11 and section 4 of Procedure 2) must also be performed by the Test Date.

As discussed in the PM CEMS Demonstration Test Report, the mathematical characteristics of a light-scattering PM CEMS calibration curve can be difficult to determine. For this reason, a second calibration would be required within 9 months of the Compliance Date if a light-scattering PM CEMS is used. After this second calibration is performed the source would compare the two calibrations separately to determine which mathematical model best represents the data. This information (*i.e.,* the analysis of which mathematical model is best suited for the calibration at this source and the calibration comprised of all valid calibration data obtained) would be included in a Certification of PM CEMS Performance (CoP) submitted within 12 months after the Compliance Date. (A CoP for beta-gage CEMS would also be submitted at this time, but would certify performance based on a single calibration.)

This CoP would also include (for all types of CEMS) the analysis of CEMS data to identify an achievable CEMS-based PM operating parameter limit. See section IV.B., below, for more information regarding the PM CEMS operating parameter limit. On the one-year anniversary of the Compliance Date, facilities would also cease using the PM control device operating parameter limits (such as pressure drop across a fabric filter or total power input to an ESP) and start using the PM CEMS operating parameter limit as their primary compliance parameter for the PM control device.

A source using a light-scattering PM CEMS would be required to perform a third calibration of the PM CEMS within 12 months of the Compliance Date. The third calibration would verify that the mathematical model selected by comparing the first two calibrations is correct. If not, to the approach must be modified based on the new data. If the model needed to be revised, the source would be required to recalculate the PM CEMS operating parameter limit considering the 12 months of data following the Compliance Date. If the model did not need to be revised, the source could elect to recalculate the PM CEMS operating parameter limit considering the full 12 months of CEMS recordings. (We request comment on whether all sources required to perform a third calibration should be required to recalculate the PM CEMS operating limit even if the calibration curve model did not need to be revised.) The results of the third calibration,[10] reassessment of the calibration model, and recalculation of the PM CEMS operating parameter limit would be submitted in a second CoP. This second CoP would

be provided to the permitting authority within 15 months of the Compliance Date. Note that this second CoP would not be required if a source uses a beta-gage type PM CEMS that needs only one calibration. A source using a PM CEMS that requires only one calibration (*i.e.,* a beta-gage) would have the option, however, of submitting a second CoP if it wants to update the PM CEMS operating parameter limit based on a full year of data.

Table 3 summarizes how PM CEMS would be implemented for compliance. Following this implementation schedule, facilities would be required to document compliance with the MACT PM standard during periodic performance testing. As discussed in section IV.F. below, a source would have the option of using the PM CEMS or the manual method for this determination. In addition, sources would be required to recalculate their PM CEMS operating parameter limit based on the previous year of CEMS data recorded when the source operated within the operating parameter limits established during the new performance test. This recalculation of the PM CEMS operating parameter limit is necessary since the new performance test is likely to result in numerically different PM-related APCD operating parameters than resulted from the previous test.[11] Facilities would submit the revised operating parameter limits, including the revised PM CEMS operating parameter limit, in a CoC describing the results of the new performance test.

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[10] This would involve the verification that the mathematical model used for the calibration is correct, a recalculation of the "master" calibration comprised of all three calibration curves, and a revised site-specific PM CEMS operating parameter limit (this time, using the first 12 months of data).

[11] If the PM concentration and operating parameter limits resulting from the subsequent performance test are more stringent than those from the previous test, the facility would have the option of not recalculating their PM CEMS operating parameter limit and continue to operate under the older, more stringent limit.

TABLE 3: PM CEMS COMPLIANCE SCHEDULE

By this date	These PM CEMS activities would be performed
Compliance date	PM CEMS installed
	Precertification of Compliance (Pre-CoC) submitted that establishes PM APCD (and other) operating parameter limits to ensure compliance with the SVM and LVM (and possibly D/F) standards based on engineering judgment.
CD + 6 months (the "Test Date")	PM CEMS calibration tests performed during MACT performance test.
	Method 5i used to demonstrate compliance with the manual method-based PM standard.
CD + 9 months	Certification of Compliance (CoC) submitted that establishes PM APCD (and other) operating parameter limits to ensure compliance with the SVM and LVM (and possibly D/F) standards based on what levels were determined to correspond to compliance with the standard during the Performance Test. (These limits supersede those identified in the Pre-CoC.)
	A second calibration of light-scattering PM CEMS is performed.
CD + 12 months	Source identifies calibration curve, calculates the PM CEMS operating parameter limit (through 9 months), recommends alternative PM control device operating parameters and their numerical limits, and submits a Certification of PM CEMS Performance (CoP).
	Source ceases using PM control device operating parameters as the primary mode of compliance for PM and starts using the PM CEMS. The operating parameters defined in the CoC are used for compliance only when the PM CEMS is unavailable.
	Source reports initial calibration (composite of all calibrations through 9 months), PM CEMS-based limit, and revised operating parameter limits (for use during CEMS malfunctions) to permitting authority.
	A third calibration of light-scattering PM CEMS is performed.
CD + 15 months	Sources using light-scattering PM CEMS revise the calibration curve if necessary based on the third calibration, recalculate the PM CEMS operating parameter limit (through 12-months), update the PM control device operating parameter limits for use during CEMS malfunctions, and submit a second CoP documenting this information.
	The source starts using the revised operating parameters reported in the CoP during periods when the PM CEMS is unavailable unless those alternatives have been disapproved by the permitting authority.

B. PM CEMS Operating Parameter Limit

EPA proposed using site-specific limits on key operating parameters of the PM control device (*e.g.*, pressure drop across a fabric filter) to ensure that the device maintained its collection efficiency at performance test levels. These limits, in combination with other operating parameter limits (e.g., metals feedrate controls) would ensure compliance with the semivolatile metal (SVM) and low volatile metal (LVM) MACT standards. See 61 FR 17376 and 17430 (April 19, 1996). These operating parameter limits on the PM control device would also ensure compliance with the MACT PM standard [12], and possibly the MACT dioxin and furan (D/F) and mercury (Hg) standards if the source uses activated carbon injection to control these HAPs. [13] The availability

of PM CEMS allows the Agency to improve upon this approach through the use of PM CEMS as the sole PM control device operating parameter [14]. PM CEMS are a more sensitive and accurate operating parameter than the conventional PM-related operating parameters now used.

This section describes how PM CEMS would be implemented as an operating parameter for the SVM, LVM, PM, and possibly D/F and Hg standards. The reader should note that the proposed MACT standard for PM is and will continue to be a manual methods-based standard. The reader is referred to section IV.F., below, for options a facility could choose to use PM CEMS as a direct indicator of compliance with the MACT PM standard.

1. Introduction

The PM CEMS operating parameter limit would be determined using the PM CEMS data obtained during normal operations from the Compliance Date to the time when the calculation of the operating parameter limit is performed. Although the PM CEMS would be used as an operating parameter limit here, an approach to establishing this limit could be very similar to how EPA establishes national standards from CEMS data. The municipal waste combustor rule published on February 11, 1991, has an example of how this is done [15].

EPA notes that even though the PM CEMS operating parameter limit and the manual methods-based PM standard are both in units of particulate concentration, it is likely that the PM CEMS operating parameter limits will have a different numerical value than the manual methods-based MACT PM standards. This is because the MACT PM standards would be based on manual methods testing with no fixed averaging period. PM CEMS operating parameter limits would have both a fixed averaging period and a calculated

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[12] The Agency has proposed a MACT PM standard as a surrogate to control emissions of non-enumerated metals HAPs (*i.e.*, metal HAPs other than those for which specific standards have been proposed—Hg, SVM, and LVM). Those non-enumerated HAPs are Sb, Co, Mn, Ni, and Se.

[13] The Agency proposed that the site-specific PM limit be a compliance parameter for the D/F standard irrespective of whether activated carbon injection was used as a control device. This requirement was grounded upon EPA's initial view that a significant amount of D/F (and other heavy organic compounds) are adsorbed onto particulate. As a result, PM needed to be controlled to ensure continuous compliance with the D/F standard. The Agency is now considering comments that significant D/F may not be adsorbed onto PM. Cement and lightweight kiln PM, in particular, is

generally process dust (*i.e.*, processed raw material). This process dust has little affinity for adsorbing D/F. However, EPA's ultimate decision on whether to limit PM on a site-specific basic does not depend on whether there is a need to control PM at all HWCs for D/F control. A site-specific PM limit is still needed to ensure compliance with the SVM and LVM standards at all HWCs. Sources that use activated carbon injection, howver, would be expected to have a significant amount of D/F on the PM.

[14] Note that the MACT standard for PM would continue to be a manual methods-based standard. See subsection IV.F., below, for options facilities could have to use PM CEMS for direct compliance with this PM standard.

[15] The methods used for establishing CEMS standards in the February 1991 MWC rule are described in Appendices A and B of EPA document number EPA–450/3–91–004, dated December 1990. This document can also be found in the Air Docket, located in the Mall area of EPA Headquarters, 401 M Street, SW, Washington, DC 20460. It is part of docket number A–89–08–V–B–3.

numerical limit. As discussed in section 4, below, the numerical value of a limit or standard is a function of the averaging period. Since it is likely that the PM MACT standard and the PM CEMS operating parameter would have different averaging periods, one would expect the numerical value of the PM CEMS operating parameter limit that indicates compliance with the MACT standards would differ from the numerical value of the MACT PM standard.

2. Data Excluded From Calculating the PM CEMS Operating Parameter Limit

Before calculating the PM CEMS operating parameter limit, the PM CEMS data set must be screened to remove PM CEMS data recorded when the PM CEMS was not available or the source was out of compliance with the operating parameter limits established during the CoC.

First, the facility must remove from the data set all PM CEMS data accumulated while the PM CEMS was not available or not performing acceptably as defined by the regulations. Examples of the data not included in the calculation of the PM CEMS operating parameter limit include data obtained when the PM CEMS was ''out-of-control'' as defined in Procedure 2 and PS11, periods when the PM CEMS was not analyzing stack gas (as would happen during calibrations, maintenance, etc.), and periods when the facility was not in operation.

Next, the facility would further screen the data to exclude times when the facility was not operated in accordance with the operating parameter limits resulting from the performance test and reported in the CoC [16]. Note that the CoC operating parameter limits would supersede the Pre-CoC operating parameter limits for this screening purpose. Although the Pre-CoC operating parameter limits may be less stringent than the CoC limits and were valid limits prior to submitting the CoC, the CoC limits are based on performance testing and as such show what operating parameter levels reflect compliance with the standards. The facility must also remove any data collected during periods of PM APCS upset irrespective of whether the operating parameter limits were exceeded. [17]

3. Determining the Normality of the Data

To calculate the PM CEMS operating parameter limit, the CEMS recordings [18] must be averaged over an appropriate averaging period. (See the discussion in the following section.) Accordingly, sources would be required to identify the mathematical model that best fits the screened CEMS data for purposes of averaging the data. For example, a log- or exponential fit may better represent a ''normal'' fit relative to an arithmetic model. To identify which mathematical model represents the best fit, facilities would calculate the Shapiro-Wilk Normality test statistic (W) at the 95% confidence level using the data obtained from the PM CEMS [19]. The mathematical model with a Shapiro-Wilk test statistic closest to one (1) would be the model used for averaging at the facility. This mathematical model would be used for all PM CEMS emissions averaging at the facility.

4. Averaging Periods for the PM CEMS Operating Parameter Limit

Fundamental to any emissions control parameter is the way averaging affects an emissions standard or limit. At a fixed numerical value, a standard or limit is more stringent as the averaging period decreases and less stringent as the averaging period increases because of emissions variability. In the proposed rule, EPA said that an appropriate averaging period for PM CEMS would be the length of time it takes to make three Method 5 runs. The Agency still believes this is an appropriate point of departure for the averaging period for the PM CEMS operating parameter limit.

We proposed a 2 hour averaging period for PM CEMS, reasoning that it would take 40 minutes to accumulate enough PM sample to meet Method 5 requirements for sample ''catch.'' See 61 FR at 17379. Commenters argued, however, that although it takes 40 minutes to accumulate enough sample, test crews routinely sample for one hour. In addition, comments received in response to CEMS NODA 1 said the sampling time for a Method 5 run can

vary from 1 to 8 hours. Basing the averaging period for the PM CEMS operating parameter limit on the length of time it takes to perform three Method 5 runs would result in an averaging period in the range of 3 to 24 hours [20]. This is still being evaluated.

5. Options for Calculating the PM CEMS Operating Parameter Limit

As discussed above, the stringency of the standard is a function of two variables—its numerical limit and the averaging period. Equally stringent standards would have a higher numerical limit at shorter averaging period and a lower numerical limit at a longer averaging period. Thus, to calculate the PM CEMS operating parameter limit, one of these two variables must be held constant—either the numerical limit or the averaging period. This section discusses two options for calculating an achievable PM CEMS operating parameter limit by defining the averaging period. EPA investigated ways to define the numerical limit and allow facilities to calculate the averaging period associated with that numerical limit, but found these alternatives often resulted in trial-and-error type calculations and might result in all facilities having different limits and averaging periods. We believe these alternatives are too labor intensive and confusing—both for facilities and the enforcement authority—and rejected this approach. Based on comments and further analysis, the Agency will prescribe one methodology in the final rule.

a. Using Rank Statistics to Calculate the PM CEMS-based Operating Parameter Limit at One, Fixed Averaging Period. Under this approach, the Agency would establish an averaging period common to all sources and each source would calculate its PM CEMS operating parameter limit using rank statistics. (As discussed above, EPA is considering selecting an averaging period from within the range of three to 24 hours.) The averaging period would be the same for all facilities but the numerical value of the PM CEMS operating parameter limit would differ from facility-to-facility based on the historical data obtained at each facility.

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[16] For simplicity, EPA proposes to exclude data from all periods in which the facility operated outside of the operating envelope defined in the CoC irrespective of whether the parameter in question affects PM control. Defining what operating parameters are or are not related to PM control would force another layer of complexity in this step.

[17] Episodes of high PM emissions caused by periodic, routine maintenance cycles (e.g., ESP

rapping; soot-blowing for waste heat boiler equipped incinerators, etc.) would not be considered upset conditions. We request information on how to objectively distinguish between high PM emissions attributable to PM control device upset conditions versus normal emissions variability.

[18] The light-scattering CEMS provide instantaneous data, recorded every minute as one-minute block averages. Beta-gage CEMS have sampling periods longer than 1 minute.

[19] Note that batch CEMS, such as beta-gages, may have sampling periods longer than 1 minute. In this case, the test statistic would be performed using the batch results.

[20] Three to 24 hours is within the range of CEMS averaging periods EPA typically promulgates. From a broader perspective, averaging periods vary from regulation to regulation depending on the analysis of issues pertaining to the technical, policy, and regulatory history of each particular situation. Therefore, other source categories may or may not have the same averaging period as the one established for PM CEMS at HWC, depending on the outcome of this analysis of issues.

Using the rank statistics option to calculate the limit would involve the following steps. First, the facility would take the screened PM CEMS data (*i.e.*, after non-compliance data has been removed) and calculate rolling averages sequentially from the Compliance Date [21] using the best-fit mathematical model and the averaging period EPA promulgates. The facility would then take the resulting rolling averages and sort them in order from lowest to highest. The facility's PM CEMS operating parameter limit would be the 95th percentile highest PM CEMS rolling average, by rank, experienced during the period the PM CEMS data was accumulated. The 95th percentile is proposed here because it is the percentile level EPA historically uses for these types of calculations. EPA could promulgate some other percentile level, the 90th or 99th for example, if another percentile level is achievable and better represents good PM control.

This rank statistics option is easier to implement, relative to the other options. It also would result in a PM CEMS operating parameter limit that is in the range of actual emissions experienced by the facility (i.e., as opposed to statistically projected emissions) and demonstrated by the facility to be achievable over time. Since the limit for all sources would be based on an averaging period that would be fixed in the rulemaking, the limit would be easier to enforce as well.

b. The Traditional Standard Setting Approach. Another approach the Agency is considering to determine the PM CEMS operating parameter limit is to use the way EPA has established CEMS-based standards in the past. This approach involves calculating the average and standard deviation of the data set and projecting an emissions level associated with the data. As discussed in the MWC rule, EPA calculated ''continuous compliance levels'' for each source using the equation, below.
where: $y = \bar{x} + K*5$

y = the continuous compliance level;
''x-bar'' = the sample average
k = a constant associated with the averaging period and one exceedance per year; and
s = the sample standard deviation.

This option has some benefits and weaknesses. As discussed, it reflects a procedure EPA has previously used to

establish CEMS-based standards. It would also result in every facility having the same averaging period and thus making it easier to track and enforce. However, more complicated statistics are involved. EPA also compares emissions from more than one facility when it uses this approach to set standards and would be unable to oversee the application of this approach on a site-specific basis. As a result, this approach may be unworkable as a way to establish a PM CEMS operating parameter limit.

6. Consideration of a Variance Procedure to Project a Higher PM CEMS Operating Parameter Limit

As discussed previously in today's notice, the PM CEMS operating parameter limit would be based on CEMS recordings during the nine months after the Compliance Date during those periods of time that the source was operating within the operating parameter limits established during the performance test (*i.e.*, the operating parameter limits established in the Certification of Compliance (CoC)). Comments received in response to the proposed rule questioned the need to establish PM-related operating parameters based on the performance test if: (1) PM emissions measured using manual methods during the performance test were well below the PM MACT standard; and (2) emissions of HAPs (*i.e.*, SVM, LVM, and possibly Hg, and D/F) for which PM would be used as an operating parameter limit were well below their MACT standards. Commenters were concerned that, although their sources may readily achieve the MACT PM standard, it may be difficult [22] or expensive to ensure that performance test PM levels are representative of the full range of levels achieved during operations. The same situation could occur with the PM CEMS operating parameter limit just discussed. Infrequent exceedances of the PM CEMS operating parameter limit might or might not be an indication that the SVM, LVM, Hg, D/F, or PM MACT emission standards have been exceeded. Accordingly, commenters recommended that the rule allow sources to project higher PM-related operating parameters based on how much performance test emissions for these HAPs were below their MACT standards.

EPA agrees in theory that establishing the PM CEMS operating parameter limit considering performance test operations

(i.e., historical CEMS data when the source operated within the CoC operating parameter limits) could result in an overly conservative operating parameter for PM control at sources with low PM and low HAPs that require PM control to ensure compliance. To address the concerns expressed in the comments received on the proposed rule, the Agency is considering a variance procedure to establish an higher projected PM CEMS operating parameter limit.

The variance procedure would allow facilities with very low concentrations of PM and HAPs requiring PM control for compliance to increase their PM CEMS operating parameter limit (derived from operations within the CoC operating parameter limits). The factor used to increase the PM CEMS operating parameter limit could be defined as the ratio of the MACT standards for which PM control is required to assure compliance, to the performance test levels of those HAPs. To ensure that the source is still be in compliance with the MACT PM standard, the same ratio would be calculated for the PM standard to the unadjusted PM CEMS operating parameter limit. This approach is based on the principle that, at a facility which has experienced no changes in facility operations, the ratio of emissions of HAPs which require PM control to ensure compliance to the PM concentration in the stack is either constant or decreases as PM increases. In addition, revised (*i.e.*, less stringent) traditional operating parameter limits for the PM control devices corresponding to the higher projected PM CEMS operating parameter limit could be established based on historical operating data at levels near the higher projected PM CEMS operating parameter limit.

For illustration, an example follows. Assume that a hazardous waste incinerator has low metals in the feed and uses a HEPA filter for PM control. Further assume that: This incinerator's measured metals emissions during the performance test were 10 µg/dscm and 7 µg/dscm for SVM and LVM, respectively; that the PM concentration measured during the performance test was 5 µg/dscm; for simplicity that PM control is not required to assure compliance with the D/F and Hg standards; the unadjusted PM CEMS operating parameter limit is 15 mg/dscm; and from the HWC NODA published on May 2, 1997, that the promulgated standards are 100 µg/dscm, 55 µg/dscm, and 34 mg/dscm for SVM, LVM, and PM, respectively. The ratio of the standard to the measured levels are 10 and 7.8 for SVM and LVM. For PM,

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[21] For simplicity, we believe it is best for facilities to ignore periods when the CEMS recorded data which was screened out and calculate the rolling averages as if the remaining data occurred sequentially. EPA specifically requests comment on this approach.

[22] For example, some PM control devices are so over-designed that it is difficult to force them to operate at elevated PM levels for the duration of a performance test.

the ratio is 6.8. The unadjusted PM CEMS operating parameter limit would be increased by a factor of 6.8 since the ratio calculated for PM has the lowest numerical value.

a. HAPs for which PM control is necessary to ensure compliance. PM would be used as an operating parameter limit for semivolatile metals (SVM), low volatility metals (LVM), and if activated carbon is used, dioxin and furan (D/F) and mercury (Hg). See 61 FR 17422 and 17430 (April 19, 1996). Although the Agency is reconsidering whether PM is an appropriate operating parameter to ensure compliance with the D/F standard in some cases,[23] PM would be an appropriate operating parameter if activated carbon injection were used to control D/F or mercury. This is because D/F and mercury adsorb onto the activated carbon, and as PM emissions increase, emissions of activated carbon with adsorbed D/F and mercury increase.

b. Projecting a higher PM CEMS operating parameter limit considering the ratio of the standard to the measured level of a HAP. The variance would be based on the principle that, as PM emissions increase, the ratio of emissions of each HAP for which PM is an operating parameter limit (*i.e.*, SVM, LVM, and possibly D/F and Hg) to PM emissions either is constant or decreases. Thus, the PM CEMS operating parameter limit derived from operations within the CoC operating parameter limits could be increased without exceeding the MACT standards for those HAPs by a factor considering the ratio of the standard for each of those HAPs to the performance test level of each HAP.

LVM are generally not volatilized in the combustion chamber and thus are evenly distributed over all sizes of particulates. Thus, as PM emissions increase, the ratio of LVM emissions to PM emissions will be constant.

SVM are generally volatilized during combustion and condense preferentially on small particulates prior to (or in) the PM control device. Thus for many PM control devices, as PM emissions increase, the ratio of larger particulates to smaller particulates increases, and the ratio of SVM emissions to total particulate emissions decreases (*i.e.*, because the larger particulates have a lower concentration of SVM). For emission control trains where PM particle size may remain constant with an increase in PM emissions, the ratio

of SVM emissions to PM emissions would remain constant.

D/F and Hg are adsorbed onto the surface of carbonaceous particulates (e.g., activated carbon). Smaller particulates have a larger surface area per mass of particulate than larger particulates, and thus D/F and Hg concentrations would be higher for smaller particulates. Thus, similar to SVM, as PM emissions increase and the ratio of larger particulates to smaller particulates increases, the ratio of D/F and Hg emissions to total particulate emissions should decrease (i.e., because the larger particulates have a lower concentration of D/F and Hg).

The PM CEMS operating parameter limit derived from performance test operations (i.e., calculated from historical CEMS data when the source operated within the regulations) could be increased without exceeding (theoretically) the MACT standards for SVM, LVM, and possibly D/F and Hg by the ratio of the standard for each of those HAPs to the performance test level of each HAP. It would be reasonably conservative, however, to project the higher PM operating parameter limit by the ratio of some fraction of the standard for those HAPs to the performance test level of each HAP. This fraction of the standard would need to allow for adequate flexibility for sources with low PM and HAPs for which PM control is required while ensuring that the standards are being met continuously. A specific percentage of the standard within the range of reasonable values— 50% to 100%— could be selected and would be appropriate given the uncertainty of projecting a PM operating limit that is a primary compliance measure for several MACT emissions standards. EPA believes choosing 75% of the standard as the basis for calculating the ratio is a reasonable balance of these issues. The percentage that would be appropriate is a point of interest for the Agency.

Given that the PM CEMS operating parameter limit is a compliance measure for SVM, LVM, and possibly D/F and Hg the allowable higher projected PM CEMS operating parameter limit would be the lowest of the values projected for each of these standards. For example, if the projected PM CEMS operating parameter limit based on the ratio of 75% of the SVM standard to the SVM performance test level was lower than the PM CEMS operating parameter limit projections for LVM (and possibly D/F and Hg), then the SVM-projected PM CEMS operating parameter limit would be used to ensure that the SVM standard was not exceeded at the higher projected PM operating parameter limit.

The Agency is concerned, however, about increasing the PM CEMS operating parameter limit itself by the ratios discussed above. This is because the limit would be established at the upper end of the range of actual CEMS readings, or perhaps at levels that statistically exceed what would be expected. See above discussion of options for calculating the PM CEMS operating parameter limit. It may be more appropriate to project the higher limit using the following options.

Under option 1, the ratio determined above would be applied to the average PM emissions over time determined by the PM CEMS instead of applying the ratio directly to the unadjusted PM CEMS limit itself. The product of the ratio and the average PM emissions would then be subtracted from the average emissions to determine the correction to the PM CEMS operating parameter limit. This correction would then be added to the PM CEMS operating parameter limit to determine the revised PM CEMS operating parameter limit. Using the example described above and assuming average PM CEMS emissions are 2 mg/dscm, the lowest ratio (6.8 for PM) would be multiplied by the average PM emissions ($2 \times 6.8 = 13.6$) and the average emissions would be subtracted from this product (13.6–2). This difference (11.6) would be added to the PM CEMS operating parameter limit to obtain the revised PM CEMS operating parameter limit.

Under option 2, the PM CEMS recordings during the performance test would be analyzed to calculate a PM CEMS operating parameter limit and that limit would be increased by the factor defined by the ratio discussed above (e.g., 6.8 in the first example). This approach would ensure that infrequent high PM episodes that occurred over months of CEMS operations would not be driving a PM CEMS limit that was then projected further upward using the factors discussed above (unless those high PM episodes actually occurred during the performance test). Given the truncated emissions database (i.e., the performance test) for calculating the higher projected limit under this option, however, the limit may in fact be lower than the limit normally calculated from the full CEMS emissions database (i.e., without attempted to project a higher limit). In this case, the limit which is numerically higher would be used.

The Agency requests information on which approach would be more appropriate for projecting a higher PM CEMS operating parameter limit.

c. Ensuring that the higher projected PM CEMS operating parameter limit

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[23] The Agency is considering comments that significant D/F may not be adsorbed on emitted PM in all cases. Cement and lightweight kiln PM, in particular, is generally process dust (i.e., raw material) that has little affinity for absorbing D/F.

does not exceed the MACT PM standard. The PM CEMS operating parameter limit would also be used to ensure compliance with the MACT PM standard. We reiterate that the PM CEMS operating parameter limit is not a measure of the emissions standard— the emissions standard is defined in the rule as being measured by using manual methods—it is instead an operating parameter limit used to ensure compliance with the applicable standards. As discussed in section 1, above, it is likely that due to several factors the PM CEMS operating parameter would have a different numerical value that the MACT PM standard.

One reason for different numerical values is the use of different techniques (i.e., one is manual methods based while the other is CEMS-based) to determine a PM emissions value. The use of a manual method test to determine a value is only a limited-time (e.g., 3 to 24 hours every five years) measure of emissions, whereas a CEMS is a continuous measure of emissions (e.g., ~1 minute readings all the time). Although the manual method will likely be a measure of ''high-end'' PM emissions during performance testing, it may not account for all potential variability during normal operations. The use of a CEMS to monitor PM emissions is a way to continuously measure the variability of (both low and high) PM emissions, inherent in any engineered system.

Additionally, different values may be a result of the different averaging periods stated for manual methods-based PM standard and the PM CEMS operating parameter limit. See section 4, above, for a discussion of the interrelationship between a numerical value of a limit or standard and the averaging period. Having a PM CEMS operating parameter limit with a different, possibly higher, numerical limit is permissible and does not negate the value of the PM CEMS operating parameter, provided there is reasonable correlation between the operating parameter and the MACT PM standard. This section explains how EPA would ensure that the numerically larger, revised PM CEMS operating parameter limit would not violate the national PM standard.

Ensuring that the higher projected PM CEMS operating parameter limit does not exceed the MACT PM standard is complicated by the fact that the PM operating parameter limit would be CEMS-based while the MACT PM standard would be manual method-based. Nonetheless, compliance with the MACT PM standard can be ensured

by limiting the increase in the PM CEMS operating parameter limit (i.e., the projected PM CEMS operating parameter limit divided by the limit prior to projection) to the ratio of the MACT PM standard to the performance test PM level on a manual method basis. Given that projections rather than measured values would be used to ensure compliance with a standard, it may be prudent to limit the increase in the projected PM CEMS operating parameter limit to the ratio of 75% of the MACT PM standard to the performance test PM level. A conservative factor of 75% is within the range of reasonable values the Agency could have selected—50% to 100%. Regarding the specific percentage EPA chooses, the reader is referred to the previous discussion regarding the percentage EPA chooses for the HAP standards that require PM control to ensure compliance.

Using the example from above and making the same assumptions, the ratios would be calculated using 75 μ/dscm, 41μ/dscm, and 26 mg/dscm in the numerator for SVM, LVM, and PM. These values are 75% of the standards for incinerators EPA discussed in the May 2, 1997, HWC NODA. The resulting rations would be 7.5, 5.9, and 5.1. Since the ratio calculated for PM is the lowest, ratio used to determine the revised PM CEMS operating parameter limit would be 5.1.

d. Establishing Revised Operating Parameter Limits for the PM Control Device Corresponding to the Higher Projected PM CEMS Operating Parameter Limit. Ideally, PM control device operating parameter limits (e.g, pressure drop across a fabric filter) should be established to ensure compliance with the higher projected PM CEMS operating parameter limit for compliance purposes while the CEMS is malfunctioning. Absent these revised (i.e., less stringent) operating parameter limits, the source would be required to: (1) Comply with the more stringent operating parameter limits established during the performance test that correspond to the original PM CEMS operating parameter limit; or (2) ensure that a back-up CEMS is always available.

The Agency is considering an approach to establish revised operating parameter limits for the PM control device corresponding to operations at the higher projected PM CEMS operating parameter limit. Under this approach, the source would analyze the historical operating parameter values during those periods of time that PM emissions were close to the higher projected PM CEMS operating

parameter limit. Issues that must be addressed, include: (1) What range of PM CEMS operating parameter limit values should be considered to develop the database for PM control device operating parameter values; and (2) how should the database be analyzed to identify appropriate limits.

It may be appropriate to establish the revised PM control device operating parameter limits based on the 90th percentile of values that occur when PM levels are within 75% of the higher projected PM CEMS operating parameter limit. This would help ensure that a significant data set was available for evaluation and that the limits were not based on the most lenient values recorded. This is important because the higher projected PM CEMS operating parameter limit is likely to be well beyond the calibration curve. [24]

Based on further analysis, the Agency may consider other approaches to define an appropriate data set of PM control device operating limits and identify appropriate limits (e.g., considering a different percentage of the historical data and/or basing the limit on a different percentile of data). Alternatively, the Agency may conclude that these approaches to revise the performance test-based operating parameter limits would be too complicated or difficult for regulatory officials to oversee, or that it would be difficult to confirm compliance with the standards. In this event, sources would be required to continue to comply with the PM control device operating parameter limits established during the performance test when the CEMS malfunctions even though the PM CEMS operating parameter limit has been projected upward under procedures discussed above.

e. Implementing the Variance. Sources requesting the variance to project a higher PM CEMS operating parameter limit would include the request with the Certification of PM CEMS Performance (CoP) that would be submitted within 12 months after the Compliance Date. The variance request must include documentation of the analyses described above to identify the higher projected PM CEMS operating parameter limit and the revised, PM control device operating parameters associated with the higher projected PM

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[24] A source would be allowed to operate infrequently at levels approaching a higher, projected PM CEMS operating parameter limit that is beyond the calibration curve. If, however, a source operates for prolonged periods at levels above the calibration curve, it must perform Method 5 tests at those higher concentrations and include those higher PM levels in the POM CEMS calibration. See discussion on extrapolating PM CEMS calibration data elsewhere in today's notice.

operating parameter limit. Sources would be allowed to comply with the higher projected PM CEMS operating parameter limit immediately upon submitting the CoP. Regulatory officials would have three months to review the variance request, however, and to notify the source of intent to disapprove the higher projected PM CEMS operating parameter limit (or the associated revised PM control device operating parameter limits for use during CEMS malfunctions). In such cases, the regulatory officials would provide the basis of their initial decision and provide the source with an opportunity to present, within 30 calendar days, additional information before final action on the variance.

7. EPA's PM CEMS Testing Program to Identify a CEMS-Based Emission Level Achievable by MACT-Controlled Sources

The Agency is undertaking an additional PM CEMS testing program to identify CEMS-based emission levels that are achievable by hazardous waste combustors (i.e., hazardous waste burning incinerators, cement kilns, and lightweight aggregate kilns) using MACT control. The testing is scheduled to begin in December 1997 and results should be analyzed by December 1998. The Agency is working with representatives of the regulated community to identify one source in each of the three source categories that is using MACT control and that would be likely to define the most achievable level (i.e., considering average PM emissions and emissions variability) for MACT-controlled sources.

Although these test results will not be used as part of the final rule, the data will be valuable to permitting authorities and the regulated community as a PM CEMS emission benchmark that is achievable using MACT controls. Permitting authorities could use the data to identify sources that appear to have established an anomalously high CEMS-based PM operating parameter limit, and as a framework within which to review Certifications of Performance in a cost-effective manner. Likewise, sources wanting to ensure that their facility is operating in a manner representative of MACT control could use this information to see if their CEMS-based PM operating parameter limits are below the levels that MACT sources show are achievable using MACT control.

C. RCA Test Frequency

In the proposed rule, EPA said that facilities would be required to perform relative calibration audits (RCAs) on their PM CEMS every 18 months. This testing interval would be relaxed to 30 months for small on-site incinerators. These time intervals coincided with the proposed Performance Test intervals. If these tests can be performed at the same time as the performance tests, cost savings can be realized by the facility relative to what the costs would be if the tests were not conducted at the same time. As a result of the analysis of comments on the performance test frequency, the Agency is considering requiring all facilities to conduct comprehensive performance tests every five (5) years. Therefore, we prefer that RCA tests be performed every five years.

One of the goals of the PM CEMS Demonstration Test program was to quantitatively define what RCA frequency is appropriate for PM CEMS. Unfortunately, variability in the manual method masks any error that can be identified as being caused by drift in the PM CEMS over time. Therefore, we are unable to use the PM CEMS data from the demonstration tests to extrapolate to an appropriate re-test frequency [25].

Lacking these long-term data, it is important to look at what is done in other countries to qualitatively determine this RCA test frequency. The United Kingdom (UK) requires that retesting be conducted at least every year, and in Germany testing is required every 3 to 5 years. The RCA test frequency could therefore reasonably be between one and five years. The UK, though, heavily relies on manual methods testing—so much so that they believe using gas bottles is cost prohibitive for gaseous (e.g., NO_x and SO_x) CEMS testing and rely on manual methods testing instead. EPA is inclined to believe that the German's longer retest frequency is more consistent with our regulatory framework.

D. Extrapolating PM CEMS Calibration Data

One-minute or batch PM CEMS readings during the course of operations are likely to occasionally exceed the highest M5i calibration point during the course of PM CEMS use. This is because the manual method results used to derive the calibration are (nominally) one hour block averages of emissions over the sampling period while the PM CEMS readings are averages of emissions on the order of minutes. See section 4, above, regarding the interrelationship the numerical limits of

a standard or limit and its associated averaging period. In addition, emissions variability within the sampling period of M5 is not likely to represent the full range of emissions variability over all periods of PM CEMS operation. Therefore, a system is needed to allow the extrapolation of data beyond the calibration curve.

The revised calibration and implementation scheme described in today's notice (i.e., multiple calibrations (for light-scattering PM CEMS) over the full range of emissions at the facility) will result in a calibration from which some reasonable and limited extrapolation is reasonable. Therefore, the Agency proposes to allow the calibration curve to be used for measurements up to 25% more than the maximum M5 [26] measurement observed during the calibration. (This will be referred to as the "125% point.") Beyond this point (125% of the highest M5 measurement) EPA is concerned that extrapolating the calibration data might lead to false compliance determinations. Therefore, some environmentally conservative approach must be employed.

Note that the ability to extrapolate beyond the calibration curve in no way would mitigate the facility's requirement to calibrate over its full range of PM emissions. If a facility experiences continuous periods of PM emissions beyond the calibration curve, it would be obligated to perform tests to capture these data into the calibration curve. For example, a facility may determine that it occasionally has several continuous hours of PM CEMS readings which are greater than the 125% point. Several continuous hours are enough time to conduct a M5 test, so the facility would be obligated to conduct M5 tests at this emissions level and include these data in the calibration curve used at the facility. EPA requests comment on how long a period of sustained operations at emissions levels greater than the 125% point would be necessary to require these additional calibration data points.

1. Extrapolating Light-Scattering PM CEMS Calibration Data

If it is necessary to extrapolate beyond the 125% point, an environmentally conservative approach would consist of determining the slope of the calibration curve at the 125% point and have the calibration continue with a slope equal to or greater than the slope of the curve at the 125% point. For example if the

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[25] In fact as method accuracy improved, the PM CEMS calibration statistics got *better* over time. Extrapolating this data would lead to erroneous conclusion that no retesting is ever needed, since the PM CEMS calibration keeps getting better.

[26] In this context, M5 is meant to refer to all the methods (Method 5, Method 5A, . . ., Method 5I) used to calibrate PM CEMS.

curve is a log-normal relation, the slope of the curve at the 125% point would be positive, but less than the slope of a straight line that would also describe the correlation between method results and PM CEMS outputs. Therefore, *if a log-normal relationship best describes the calibration curve*, facilities should extrapolate beyond the 125% point using a *straight line* beyond the 125% point. The slope of the straight line would be the slope of the log-normal curve, taken from the points on the calibration curve associated with the lowest M5 measurement and the 125% point.

If the calibration curve is best described by a straight line arithmetic fit, then extrapolating beyond this 125% point would depend on the slope of any *quadratic* fit of the data. If the quadratic curve slopes *negative at higher values of PM CEMS outputs*, then the straight line defined by the calibration would be used to extrapolate beyond the 125% point. If the quadratic fit slopes *positive at higher values of PM CEMS outputs*, then the quadratic fit would be used beyond the 125% point.

Finally, if the calibration curve is a quadratic fit, then the quadratic fit can be used to extrapolate all data [27].

2. Extrapolation of Beta-gage Calibration Data

For Beta-gage PM CEMS, extrapolating beyond the 125% point would involve continuing the straight line defined by its linear calibration equation. Beta-gage PM CEMS apparently are not sensitive to particle changes in the physical characteristics of particulate, as the light-scattering PM CEMS are. Therefore, a straight-line fit best represents the calibration for beta-gage PM CEMS at all times.

E. Need to Calibrate to Twice the Emissions Standard

One issue raised by commenters during the comment period for the proposed rule was EPA's proposal that facilities calibrate the PM CEMS to twice the emissions limit. Commenters raised concerns that facilities might not be able to emit PM at a concentration equal to twice the standard. They also said this aspect of the proposal in essence asks facilities to violate the emission standard and could lead to an enforcement action against the facility.

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[27] **Note:** If the slope of the quadratic fit is ever less than zero for values of PM CEMS output above what was measured by the manual method (that is, it ever has a negative slope), this indicates that the correlation between M5 measurements and PM CEMS output *is not represented by a quadratic fit* and that another mathematical model should be used.

Commenters also had concerns that facility personnel may not be sufficiently familiar with the various process and APCD factors to acceptably calibrate the PM CEMS over the full range of operations experienced at the facility. Each of these points are discussed in the following paragraphs.

EPA agrees that it would be difficult for many facilities to emit PM at any prescribed level. Many facilities have redundancies in their PM APCDs to such an extent that emitting to the emissions limit may be problematic. However to have accurate PM CEMS measurements, facilities need to calibrate the PM CEMS over the full range of emissions experienced at the facility. As a result, it would be necessary to require facilities to calibrate the PM CEMS *over the full range of operations, including PM emissions.* This would eliminate the prescriptive nature of how high the calibration needs to be while still addressing the issue that the site-specific calibration of PM CEMS covers the broad range of PM emissions experienced at the facility.

EPA does not agree, however, that this approach could cause facilities to violate the manual method MACT PM standard. The PM standard would be defined as the average of three manual method measurements. Any single run above the standard would not be a violation by itself. Average emissions over the calibration would be below the standard for a source equipped with MACT controls. Therefore, we expect that sources would be able to calibrate PM CEMS at levels higher than the PM emissions standard and still remain in compliance with the standard. If this is not practical, however, EPA may consider a waiver of the manual method PM standard during periods of calibrating (and performing RCA tests of) the PM CEMS. The need to obtain and audit an accurate calibration at and above the PM standard may override any concerns about high short-term PM emissions. EPA would want to limit the frequency and duration of calibration runs that exceed the standard, however. We request comment regarding how such limits could be implemented. One way this could occur is to require that sources request in the performance test plan approval to exceed the standard during calibration. Approval to exceed the standard would only be required if the average of all PM CEMS calibration runs is greater than the PM standard.

The revised draft PS 11 states that different PM levels should be obtained by varying process conditions or, alternatively, by adjusting the APC system. It is relatively silent in

presenting a well-defined protocol with guidelines on how EPA expects calibration tests to be performed. This is because individual sources should know best how to vary their PM emissions. For instance, inserting a throttle plate in lieu of one (or several) bags in a baghouse and varying the opening of the throttle plate(s) is likely an effective way to vary PM concentration for the calibration at a facility equipped with a baghouse. Varying power to an ESP and simulating various failure modes (such as lowering the temperature in the ESP to cause condensation on the plates) is likely vary PM sufficiently for the calibration at sources equipped with an ESP.

The experience gained during the PM CEMS Demonstration tests suggests that one can obtain a suitable range of emissions by varying process conditions that affect inlet PM loading to the last in a series of PM APCDs and adjusting the performance of that last APCD. Exactly how this is accomplished at a given facility will vary and depend on the waste fed to the unit, how the facility is designed and operated, and in what order the APCDs are configured. Therefore, the language in the revised PS11 is adequate. More prescriptive language may not work in most cases.

Finally, EPA, will be working with industry representatives to develop approaches to better describe how calibration tests should be performed at individual HWC facilities. EPA expects to provide this information in a technical implementation guide.

F. Allowing PM CEMS to be Used In-lieu of Method 5 Tests

Although the PM CEMS would be required only as an operating parameter, EPA intends to allow facilities to voluntarily elect to use the PM CEMS for compliance with manual methods-based PM standards. Using the PM CEMS for compliance is expected to provide a cost savings to the facility since the facility would not have to conduct periodic Method 5 tests to document compliance with PM standards. Instead a facility could elect to use the PM CEMS measurements during these periodic tests. This would be acceptable if the facility uses the block average of the PM CEMS readings during the M29 tests for the SVM and LVM standards as the particulate ''method result.''

G. Waivers from the PM CEMS Requirements

In the proposed rule, EPA requested comment on waiving the PM and Hg CEMS requirement for small, on-site incinerators. See 61 FR at 17439. Upon

further consideration, EPA has identified other classes of incinerators where a PM CEMS requirement may be impractical. If the PM CEMS requirement is waived for a given source, the facility would have to comply with operating parameter limits to assure compliance for PM. Of course, a facility could always elect to use a PM CEMS for compliance even if a waiver procedure is promulgated for that facility.

1. Waiver of PM and Hg CEMS Requirements for Small On-site Incinerators

EPA is considering whether to waive the PM and Hg CEMS requirements for small, on-site incinerators (SOSI). See the proposed rule, 61 FR at 17439. If a waiver is promulgated, a SOSI would be required to use existing operating parameters in lieu of a PM CEMS to document compliance with the PM, SVM, and LVM standards.

2. PM CEMS Waiver for Sources With Short Life-Spans

Given the PM CEMS compliance schedule discussed in section IV.A, above, facilities with short, fixed life-spans raise several issues. For instance, certain government-run incinerators are constructed for the purposes of destroying waste that is too hazardous to transport off-site. These incinerators often have short life spans (ranging from months to a few years) and are constructed to fulfill the requirements of a consent decree, memorandum of understanding (MOU), or other legally binding enforcement agreement. For example the Department of Defense (DoD), acting under a MOU with EPA, may construct an incinerator to destroy nerve-gas agents that are too hazardous to transport. When this activity is complete, the MOU would obligate DoD to dismantle and destroy the incinerator.

It does not seem practical to mandate that these facilities use PM CEMS if they will be in service for less than, or slightly longer than, the implementation schedule just discussed. Therefore, EPA is considering a waiver of the PM CEMS requirement for HWCs operating under a legally binding agreement that ensures the source will stop burning hazardous waste within three years of the Compliance Date.

EPA could likewise grant a waiver from the PM CEMS requirement for facilities with short life-spans that lack the legally binding agreement discussed above. However, EPA is concerned that without a legally binding agreement to cease operations, the Agency lacks certainty that operations will cease by a

prescribed date. For this reason, EPA would consider a waiver for other facilities that plan to cease operations within the first year of compliance with the HWC regulations, that is, prior to the need to use PM CEMS as the operating parameter for PM control. Facilities that operate after the first year would need to have PM CEMS installed, calibrated, meet data availability requirements, determine the PM CEMS operating parameter limit, and use the PM CEMS as the primary operating parameter for PM control.

3. Other Sources

As discussed in section III.C. of this NODA, EPA may be unable to determine whether the results of the PM CEMS demonstration test can be transferred to two classes of incinerators: Those with waste heat boilers and mobile incinerators. See section III.C. for more information.

V. Other Issues Concerning CEMS and Test Methods for HWCs

A. Performance Specifications for Optional CEMS

In the proposed rule, EPA proposed other performance specifications for multi-metals, hydrochloric acid (HCl), and chlorine gas (Cl_2) CEMS. These performance specifications were proposed as PS10, 13, and 14, respectively. Based on what EPA has learned during the course of demonstrating PM and Hg CEMS, EPA expects not to promulgate the draft performance specifications (PS) for these CEMS at the time of the HWC final rule. As discussed in section II of today's notice, EPA does not plan to promulgate a PS for total mercury (Hg) CEMS either. The Agency has not tested MM and Cl_2 CEMS to determine what performance is achievable by the CEMS. Hg CEMS have not been demonstrated as a compliance tool for universal application to all HWCs. EPA has tested HCl CEMS in preparation for the medical waste incinerator rulemaking but did not require the use of HCl CEMS in that rulemaking (see discussion starting at 62 FR 48360, September 15, 1997) and does not believe requiring HCl CEMS for the HWC rulemaking is appropriate either (see 61 FR at 17433).

Instead, EPA will consider enabling sources to demonstrate these CEMS on a site-specific basis and to develop performance levels for the CEMS as part of the demonstration. The Agency's only concern is that the CEMS be proven to be a better and more reliable indicator of compliance for the HAP or standard than the requirements specified in the regulations. This approach is now being

used to demonstrate a multi-metals CEMS at the Von Roll incinerator in East Liverpool, Ohio.

EPA intends to accumulate the CEMS demonstration results and experience and will share that information with permitting authorities and sources wishing to document compliance with CEMS. Since the HCl CEMS have been demonstrated by EPA, we believe the HCl CEMS performance specification could more easily be used as a point of departure for implementing HCl CEMS at a given facility.

B. Stack Sampling Test Methods

Another question is whether EPA should simplify the task of determining the appropriate manual method tests to be used for compliance. Currently, stack sampling and analysis methods for HWCs are (with a few exceptions) located in RCRA's SW–846 for compliance with the BIF and incinerator rules, and in 40 CFR part 60, Appendix A for compliance with the NSPS and other air rules. Facilities could be required to perform two identical tests, one for compliance with MACT or RCRA and one for compliance with other air rules, using identical test methods simply because one method is an ''SW–846'' method and the other an ''air method.''

Stack test methods HWCs use for compliance should be found in one place to facilitate compliance. EPA intends to reference 40 CFR part 60, Appendix A, when it requires a specific stack-sampling test method. A few SW–846 methods do not have equivalents in 40 CFR part 60, Appendix A, namely the VOST and semi-VOST methods. In these few cases, EPA would continue to refer to these SW–846 methods as well.

This discussion only affects stack sampling methods and has no affect on feedstream sampling and analysis.

Dated: December 19, 1997.

Matt Hale,

Acting Director, Office of Solid Waste.

Appendix I—Method 5i

Method 5I—Determination of Low Level Particulate Matter Emissions From Stationary Sources

1. Applicability and Principal

1.1 Applicability. This method applies to the determination of low level particulate matter (PM) emissions from stationary sources and facilities performing calibrations or calibration audits of particulate matter continuous emission monitors as specified in the regulations. The method is effective for total train catches of 50 mg or less. The minimum detection limit for this method can be determined by repeatedly collecting and analyzing blank samples. A blank sample is a sample of blank air collected and analyzed

in the normal manner. The limit of detection can be calculated by collecting and analyzing seven blank samples and then calculating an estimate of the sample standard deviation of these blanks. The limit of detection would be three times the estimated sample standard deviation.

1.2   Principal. The PM is withdrawn isokinetically from the source and collected on a 47 mm glass fiber filter maintained at a temperature of 120° ±14°C (248° ±25°F). The PM mass, which includes any material that condenses at or above the filtration temperature, is determined gravimetrically after the removal of uncombined water.

2. Apparatus

2.1   Sampling Train. The sampling train configuration is the same as shown in Method 5, Figure 5–1. The sampling train consists of the following components: Pitot Tube, Probe liner Differential Pressure Gauge, Filter Heating System, Condenser, Metering System, Barometer, and Gas Density Determination Equipment. Same as Method 5, Sections 2.1.2 to 2.1.4, 2.1.6 and 2.1.7 to 2.1.10, respectively.

2.1.1   Probe Nozzle. Same as Method 5, Sections 2.1.1 with the exception that it is constructed of Borosilicate or quartz glass tubing with sharp, tapered leading edge.

2.1.2   Filter Holder. The filter holder for this sampling train is constructed of Borosilicate or quartz glass front cover designed to hold a 47 mm glass fiber filter, with a stainless steel filter support, a silicone rubber or Viton O-ring and Teflon tape seal. The holder design will provide a positive seal against leakage from the outside or around the filter. The filter holder assembly fits into a stainless steel filter holder and attaches immediately at the outlet of the probe (or cyclone, if used). The tare weight of the filter, Borosilicate or quartz glass, stainless steel filter support, silicone rubber or Viton O-ring and Teflon tape seal will not exceed 31 grams. The filter holder is designed to use a 47 mm glass fiber filter meeting the criteria in section 3.1.1 of Method 5. Figure 5I–1 presents a schematic of the filter holder system. These units are commercially available.

2.1.3   Glass Plugs and Clamps. Once the filter holder has been assembled, desiccated and tared it is critical that the filter be isolated from any external sources of contamination. This can be accomplished by covering the leak-free ground glass or O-ring socket on the front half glass filter cover with a Borosilicate or quartz ground glass plug. The plug shall be secured in place with the appropriate sized laboratory impinger clamp or any system that can ensure a leak-free fitting. It is beneficial to place the glass plug on the inlet socket as soon as the unit is assembled, however do not tare the assembly with the plug in place, as this will increase the tare weight introducing additional error into the final weighings.

2.2   Sample Recovery. Is the same as Method 5 for: Glass Sample Storage Containers, Graduated Cylinder and/or Balance, Plastic Storage Containers, Funnel and Rubber Policeman (Method 5 sections 2.2.3, 2.2.5—2.2.8, respectively) with the following exceptions:

2.2.1   Probe-Liner and Probe-Nozzle Brushes. Teflon® and nylon bristle brushes with stainless steel wire handles, should be used to clean the probe. The probe brush shall have extensions (at least as long as the probe) of Nylon, Teflon®, or similarly inert material. The brushes shall be properly sized and shaped to brush out the probe liner and nozzle.

2.2.2   Wash Bottles—Two. Teflon® wash bottles are recommended however, polyethylene wash bottles may be used at the option of the tester. It is recommended that acetone not be stored in polyethylene bottles for longer than a month.

2.2.3   Sample Holder: A portable carrying case with clean compartments of sufficient size to accommodate each filter assembly. The filters shall be able to lay flat with the stainless steel filter support placed down in the compartment. This system should have an air tight seal to prevent contamination to the filters during transport to and from the field. It is recommended that desiccant be used in this case. The desiccant, if used, is housed in a container that is capped with a 0.1 micron screen to ensure that no dust particles can contaminate the outside of the filter housings during transport.

2.3   Analysis. The same as Method 5 for sections 2.3.2–2.3.7 with the following exception:

2.3.1   Teflon® Liner: Teflon liners are used for the analysis of the probe and nozzle particulate catch. The liners are washed with soap (Alconox or similar low residue laboratory soap) and water. Each liner is then rinsed with DI Water followed by an acetone (low residue) rinse. The static charge on the liners is removed using an anti-static rinse and then the liners are oven dried and desiccated.

3. Reagents

3.1   Sampling. The reagents used in sampling are the same as Method 5 for: Silica Gel, Water, Crushed Ice, Sample Recovery Reagents, and Desiccant (sections 3.1.2–3.1.5, 3.2–3.3.2) with the following exceptions:

3.1.1   Filters. 47 mm Glass fiber filters, without organic binder, exhibiting at least 99.95 percent efficiency (<0.05 percent penetration) on 0.3-micron dioctyl phthalate smoke particles. The filter efficiency test shall be conducted in accordance with ASTM Standard Method D2986–71 (Reapproved 1978) (incorporated by reference—see §60.17). Test data from the supplier's quality control program are sufficient for this purpose. In sources containing SO_2 or SO_3, the filter material must be of a type that is unreactive to SO_2 or SO_3. Citation 10 in the Bibliography for Method 5, may be used to select the appropriate filter.

3.1.2   Stopcock Grease. Stopcock grease cannot be used with this sampling train. It is recommended that the sampling train be configured with glass joints, using o-ring seals or screw-on connectors with Teflon® sleeves, or similar.

3.1.3   Acetone. Pesticide grade or equivalent low residue type Acetone is used for the recovery of particulate matter from the probe and nozzle.

3.1.4   Latex Gloves. Disposable, powder free, latex surgical gloves are used for all handling of the filter housings at all times.

4. Procedure

4.1   Sampling. The complexity of this method is such that, in order to obtain reliable results, testers should be trained and experienced with the test procedures. The sampling procedures are the same as Method 5 for: Preliminary Determinations, Leak-Check Procedures, Particulate Train Operation (sections 4.1.2, 4.1.4, 4.1.5 respectively) with the following exceptions:

4.1.1   Pretest Preparation. Is the same as Method 5, section 4.1.1 with the following exception: Label filter supports prior to loading filters into the holder assembly. This can be accomplished with a diamond scribe. As an alternative, label the shipping container compartments (glass or plastic) and keep the filter holder assemblies in these compartments at all times except during sampling and weighing. Using the powder free latex surgical gloves (surgical gloves must be used at all times when handling the filter holder assemblies). Place the Viton® O-ring on the back of the filter housing in the O-ring grove. Place a 47mm glass fiber filter on the O-ring with the face down. Place a stainless steel filter holder against the back of the filter. Carefully wrap ¼ inch wide Teflon® tape one time around the outside of the filter holder overlapping the stainless steel filter support by approximately ⅛ inch. Gently brush the Teflon® tape down on the back of the stainless steel filter support. Desiccate the filter holder assemblies at 20±5.6° C (68±10° F) and ambient pressure for at least 24 hours and weigh at intervals of at least 6 hours to a constant weight, i.e., 0.5 mg change from previous weighing; record results to the nearest 0.1 mg. During each weighing the filter holder assemblies must not be exposed to the laboratory atmosphere for a period greater than 2 minutes and a relative humidity above 30 percent. Alternatively (unless otherwise specified by the Administrator), the filters holder assemblies may be oven dried at 105° C (220° F) for 2 to 3 hours, desiccated for 2 hours, and weighed.

4.1.2   Same as Method 5, section 4.1.2.

4.1.3   Preparation of Collection Train. Is the same as Method 5, section 4.1.3 with the following exception: During preparation and assembly of the sampling train, keep all openings where contamination can occur covered until just prior to assembly or until sampling is about to begin. Using clean disposable powder free latex surgical gloves, place a labeled (identified) and weighed filter holder assembly in the stainless holder for the assembly. Then place this whole unit in the Method 5 hot box and attach it to the probe using clean standard connectors. Do not use any stopcock grease.

4.2   Sample Recovery. Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Allow the probe to cool. When the probe can be safely handled, wipe off all external particulate matter near the tip of the probe nozzle and place a cap over it to prevent losing or gaining particulate matter. Do not cap off the probe tip tightly while the sampling train is cooling down as this would create a vacuum in the filter holder, thus drawing water from the impingers into the filter holder. Before

moving the sample train to the cleanup site, remove the probe from the sample train and cap the open outlet of the probe. Be careful not to lose any condensate that might be present. Cap the filter inlet using a standard ground glass plug and secure the cap with an impinger clamp. Remove the umbilical cord from the last impinger and cap the impinger. If a flexible line is used between the first impinger or condenser and the filter holder, disconnect the line at the filter holder and let any condensed water or liquid drain into the impingers or condenser. Transfer the probe and filter-impinger assembly to the cleanup area. This area should be clean and protected from the wind so that the chances of contaminating or losing the sample will be minimized. Save a portion of the acetone used for cleanup of the probe and nozzle as a blank. Take 200 ml of this acetone directly from the wash bottle being used and place it in a glass sample container labeled ''acetone blank.'' Inspect the train prior to and during disassembly and note any abnormal conditions. Treat the samples as follows:

Container No. 1. Carefully remove the filter holder assembly from the Method 5 hot box and place it in the transport case. Use a pair of clean disposable powder free latex surgical gloves to handle the filter holder assembly. If the transport case is being used to identify and track the filter holder assemblies the entire transport container will need to be of sufficient size and shape to fit in the desiccator at the laboratory. It is important to ensure that the assemblies have cooled sufficiently to prevent the surgical gloves from melting on the filter holder assembly.

Container No. 2. Same as Method 5 Container No. 2 with the exception that it is recommended that only glass sample containers be used for collection of the sample from the probe and nozzle to minimize the potential for background contamination.

Container No. 3. Same as Method 5 Container No. 3.

4.3 Analysis. Same as Method 5 section 4.3 with the following exceptions:

Container No. 1. Same as Method 5 Section 4.3 Container No. 1 with the following exception: Use disposable powder free latex surgical gloves to remove each of the filter holder assemblies from the desiccator or transport container.

Container No. 2. Same as Method 5 Section 4.3 Container No. 2 with the following exception: It is recommended that the contents of Container 2 be transferred to a 250 ml beaker with a Teflon liner or similar container that has a minimal tare weight prior to bringing to dryness.

Container No. 3. Same as Method 5 Section 4.3 Container No. 3.

4.4 Quality Control Procedures. The Quality Control Procedures used in sampling are the same as Method 5 for: Meter Orifice Check and Calibrated Critical Orifice (sections 4.4.1—4.4.2).

5. Calibration.

The Calibration Procedures used are the same as Method 5: Probe Nozzle, Pitot Tube, Metering System, Probe Heater Calibration, Temperature Gauges, Leak Check of Metering System Shown in Method 5 Figure 5–1, Barometer (sections 5.1—5.7).

6. Calculations

The Calculations used are the same as Method 5 for: Nomenclature, Average Dry Gas Meter Temperature and Average Orifice Pressure Drop, Dry Gas Volume, Volume of Water Vapor, Acetone Blank Concentration, Total Particulate Weight, Particulate Concentration, Conversion Factors, Isokinetic Variation, Acceptable Results, Stack Gas Velocity and Volumetric Flow Rate (sections 6.1—6.13).

7. Alternative Procedures

The Alternative Procedures used are the same as Method 5 for: Dry Gas Meter as a Calibration Standard, Critical Orifices As Calibration Standards, (sections 7.1—7.2).

8. Bibliography

The Bibliography used is the same as Method 5.

BILLING CODE 6560–50–P

Cap Filter Housing

Viton O-ring

Backhalf Filter Housing

Stainless Filter Support

Fronthalf Filter Housing

EXPLODED VIEW
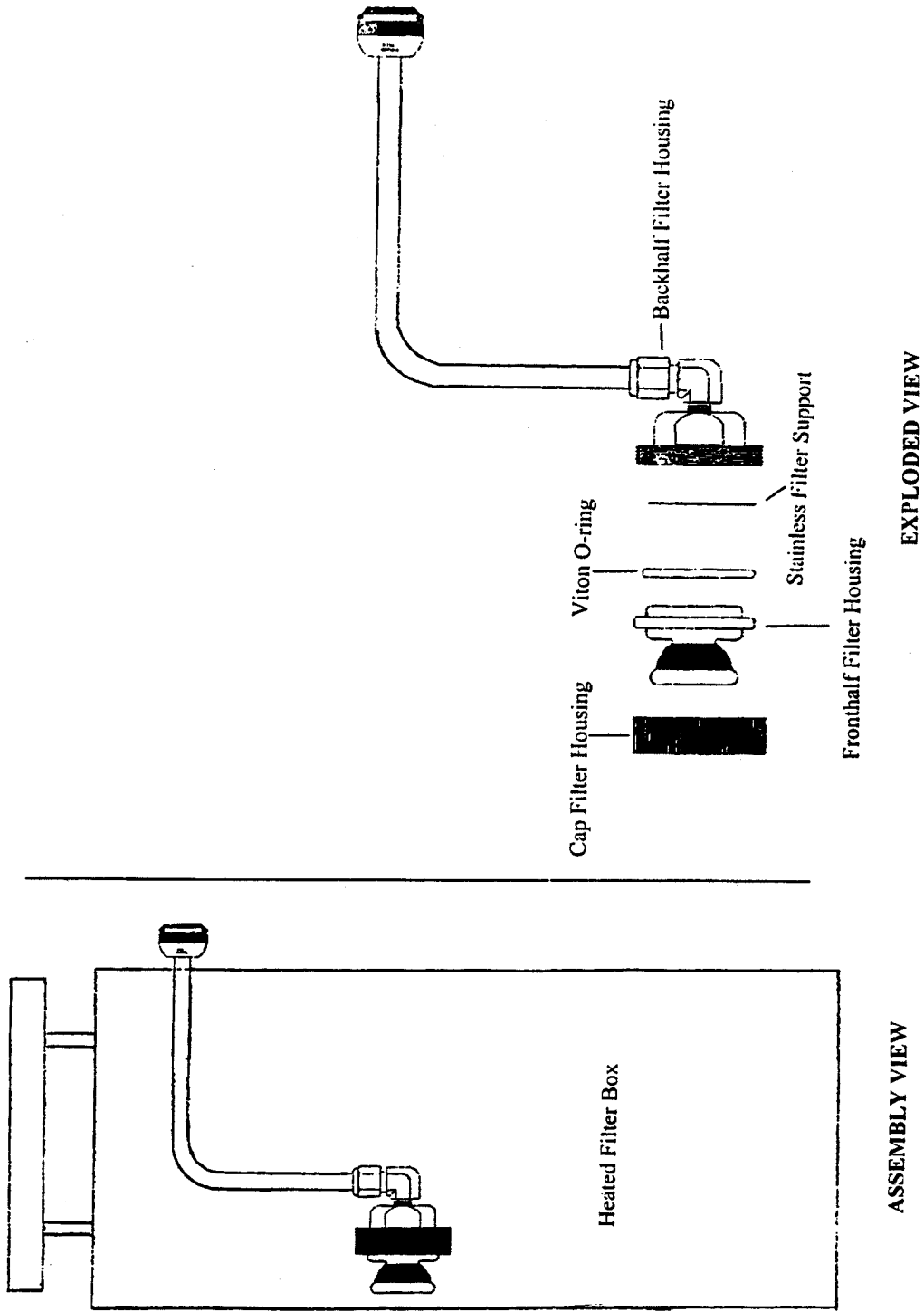
Heated Filter Box

ASSEMBLY VIEW

Figure 5I-1. Method 5i Filter Housing Configuration.

Appendix II—Performance Specification 11

PERFORMANCE SPECIFICATION 11—Specifications and test procedures for particulate matter continuous emission monitoring systems in stationary sources.

211.0 Scope and Application

1.1 Analyte. Particulate matter as defined and determined by the Reference Method—Method 5 or Method 5I.

1.2 Applicability.

1.2.1 This specification is for evaluating the acceptability of particulate matter (PM) continuous emission monitoring systems (CEMS) at the time of or soon after installation and whenever specified in the regulations. The CEMS may include, for certain stationary sources, (a) a diluent monitor (i.e., O_2, CO, or other CEMS specified in the applicable regulation), which must meet its own performance specifications found in this appendix, (b) auxiliary monitoring equipment to allow measurement, determination, or input of the gas temperature, pressure, moisture content, and/or dry volume of stack effluent sampled, and (c) an automatic sampling system.

This performance specification requires site specific calibration of the PM CEMS response against manual gravimetric Reference Method measurements. Procedures for extrapolating results beyond the range of particulate mass loadings used to develop the calibration are found in the applicable regulations. A new calibration may be required if conditions at the facility change and result in conditions which are unrepresentative of the previous calibration (i.e., changes in emission control system, concentration of PM emitted, or feed inputs to the device). Since the validity of the calibration may be affected by changes in the physical properties of the particulate (such as density, index of refraction, and size distribution), the limitations of the CEMS used should be evaluated with respect to these possible changes on a site specific basis.

1.2.2 This specification is not designed to evaluate the installed CEMS performance over an extended period of time nor does it identify specific calibration techniques and auxiliary procedures to assess CEMS performance. The source owner or operator, however, is responsible to properly calibrate, maintain, and operate the CEMS. The Administrator may require, under Section 114 of the Act, the operator to conduct CEMS performance evaluations at other times besides the initial test to evaluate the CEMS performance. See Appendix F to Part 60—Procedure 2, Quality Assurance Requirements For Particulate Matter Continuous Emission Monitoring Systems Used For Compliance Determination.

2.0 Summary of Performance Specification.

Procedures for establishing the CEMS calibration are outlined in this performance specification. CEMS installation and measurement location specifications, equipment specifications, performance specifications, and data reduction procedures are also included. Conformance of the CEMS with the Performance Specifications is determined.

3.0 Definitions

3.1 Batch Sampling means the technique of sampling the stack effluent continuously and concentrating the pollutant in some capture medium. The capture medium is moved periodically for analysis after sufficient time has elapsed to concentrate the pollutant to levels detectable by the analyzer. Continuous sampling is ensured by sampling (either on a different part of the capture medium or a different capture medium) while analysis is being performed on a previous sample.

3.2 Calibration Drift (CD) means the difference in the CEMS output readings from the established reference value after a stated period of operation during which no unscheduled maintenance, repair, or manual adjustment took place.

3.3 Calibration means the site-specific correlation between the CEMS output and the PM mass concentration measured by the Reference Method.

3.4 Calibration Standard means a reference material that produces a known and unchanging response when presented to the pollutant analyzer portion of the CEMS, and used to calibrate the drift or response of the analyzer.

3.5 Centroidal Area means a concentric area that is geometrically similar to the stack or duct cross section and is no greater than 1 percent of the stack or duct cross sectional area.

3.6 Confidence Interval means the interval defined by equations 13 and 23 of this performance specification with upper and lower limits within which the CEMS response calibration relation lies with a given level of confidence.

3.7 Continuous Emission Monitoring System (CEMS) means the total equipment required for the determination of particulate matter mass concentration in units of the emission standard. The sample interface, pollutant analyzer, diluent analyzer, other auxiliary data monitor(s) and data recorder are the major subsystems of the CEMS.

3.8 Correlation coefficient means that portion of the statistical evaluation that measures how well the CEMS and Reference Method calibration relation data fit the regression line as defined by equation 16 of this performance specification.

3.9 Data Recorder means that portion of the CEMS that provides a permanent record of the analyzer output and the final PM concentration result in units of the emission standard. The data recorder may provide automatic data reduction and CEMS control capabilities.

3.10 Diluent Analyzer and Other Auxiliary Data Monitor(s) (if applicable) means that portion of the CEMS that sense or otherwise provide the diluent gas (such as O_2 or CO, as specified by the applicable regulations), temperature, pressure, and/or moisture content, and generates an output proportional to the diluent gas concentration or data property.

3.11 Linear Calibration means a CEMS response which is linear relative to the measured PM concentration produced by the Reference Method.

3.12 Path CEMS means a CEMS that measures particulate matter mass concentrations along a path across the stack or duct cross section which is representative of results of the cross-sectional PM concentrations produced by the Reference Method.

3.13 Point CEMS means a CEMS that measures particulate matter mass concentrations either at a single point, or over a small fixed volume or path, which is representative of the cross-sectional PM concentrations produced by the Reference Method.

3.14 Pollutant Analyzer means that portion of the CEMS that senses the particulate matter concentration and generates a proportional output.

3.15 Quadratic Calibration Relation means a CEMS response which has a second order equation to define its relationship to the measured PM concentration produced by the Reference Method.

3.16 Reference Method. The Reference Method for particulate measurements is those methods collectively known as Method 5, found in Appendix A of 40 CFR Part 60. Unless other variants are specified in the regulations, Method 5 shall be used for total train catches exceeding 50 mg (i.e., emissions concentrations of more than 45 mg/dscm). Method 5I shall be used for total train catches of less than or equal to 50 mg (i.e., emissions concentrations of 45 mg/dscm or less). If variants other than Method 5I are used, care should be taken to follow the general procedures described in Method 5I to aid in the elimination of measurement error. Other Reference Methods may be applicable, such as Method 1, 3, or 4. Methods other than Method 5 are referred to in this specification individually by name.

3.17 Representative Results means the results consistent with the acceptance criteria found in section 13.2 of this specification.

3.18 Response Time means the time interval between the start of a step change in the system input and the time when the pollutant analyzer output reaches 95 percent of the final value.

3.19 Sample Interface means that portion of the CEMS used for one or more of the following: sample acquisition, sample delivery, sample conditioning, or protection of the monitor from the effects of the stack effluent.

3.20 Span Value means the upper limit of the CEMS measurement range. The span value shall be documented by the CEMS manufacturer with laboratory data.

3.21 Tolerance Interval means the interval with upper and lower limits within which are contained a specified percentage of the population with a given level of confidence as defined by equation 14 of this performance specification.

3.22 Zero Drift (ZD) means the difference in the CEMS output readings for zero input after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

4.0 Interferences

In the Reference Method a representative sample of particulate is collected on a filter maintained at a temperature in the range

specified by the method, and includes any material that deposits in sample delivery and condenses at or above this filtration temperature after removal of any combined water. Consequently, condensible water droplets or condensible acid gas aerosols (i.e., those with condensation temperatures above those specified by the method) at the measurement location can be interferences for PM CEMS if the necessary precautions are not systematically met. Interferences may develop for CEMS installed downstream of a wet air pollution control system or any other conditions that produce flue gases which are normally or occasionally saturated with water or acid gases prior to release to the atmosphere. For such conditions, the CEMS must extract and heat a representative sample of the flue gas for measurement to simulate results produced by the Reference Method. Independent of the CEMS measurement technology and extractive technique, a configuration simulating the Reference Method is required to assure that: (1) there is no formation or deposition of particulate in sample delivery from the stack or duct; and (2) the pollutant analyzer portion of the CEMS measures only native particulate. Performance of a CEMS design configured to eliminate interferences with condensible water and/or acid gases must be documented by the CEMS manufacturer (see Section 6.1.3 of this performance specification for specific equipment heating requirements). In-situ CEMS measurement technologies that are not free of interferences from any condensible constituent in the flue gas are prohibited in stack or duct flue gas conditions which are normally or occasionally saturated with water or acid gases.

5.0 Safety

The procedures required under this performance specification may involve hazardous materials, operations, site conditions, and equipment. This performance specification does not purport to address all of the safety problems associated with these procedures. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicable regulatory limitations prior to performing these procedures. The CEMS users' manual and materials recommended by the Reference Method should be consulted for specific precautions to be taken.

6.0 Equipment and Supplies

6.1 CEMS Equipment Specifications
6.1.1 Data Recorder Scale. The CEMS data recorder output range must include zero and a high level value. The high level value is chosen by the source owner or operator and is defined as follows:
6.1.1.1 For a CEMS installed to measure emissions as required with an applicable regulation, the high level value between 1.5 times the emission standard and the span value specified in the applicable regulation is adequate.
6.1.1.2 Alternative high-level values may be used, provided the source can measure emissions throughout the full range of emissions concentrations experienced by the facility.

6.1.1.3 The data recorder output must be established so that the high level value would read between 90 and 100 percent of the data recorder full scale. (This scale requirement may only be applicable to analog data recorders.) The zero and high level calibration gas, filter, or other appropriate media values should be used to establish the data recorder scale.
6.1.1.4 The high level value must be equal to the span value. If a lower high level value is used, the CEMS must have the capability of providing multiple outputs with different high level values (one of which is equal to the span value) or be capable of automatically changing the high level value as required (up to the span value) such that the measured value does not exceed 95 percent of the high level value.
6.1.1.5 Span. The span of the instrument shall be sufficient to determine the highest concentration of pollutant at the facility. The span value shall be documented by the CEMS manufacturer with laboratory data.
6.1.2 The CEMS design should also allow daily determination and recording of calibration drift at the zero and high-level values. If this is not possible or practical, the design must allow these determinations and recordings to be conducted at a low-level (zero to 20 percent of the high-level value) and at a value between 50 and 100 percent of the high-level value. In special cases, the Administrator may approve a single-point calibration drift determination.
6.1.3 Specification for Saturated Flue Gas. For a CEMS installed downstream of a wet air pollution control system such that the flue gases are normally or occasionally saturated with water, then the CEMS must have equipment to extract and heat a representative sample of the flue gas for measurement so that the pollutant analyzer portion of the CEMS measures only dry particulate. Heating shall be sufficient to raise the temperature of the extracted flue gas to above the water condensation temperature and shall be maintained at all times and at all points in the sample line from where the flue gas is extracted to and including the pollutant analyzer. Performance of a CEMS design configured in this manner must be documented by the CEMS manufacturer.
6.2 Sampling and Response Time. The CEMS shall sample the stack effluent continuously or intermittently for batch sampling CEMS. Averaging time, the number of measurements in an average, the minimum sampling time, and the averaging procedure for reporting and determining compliance shall conform with those specified in the applicable emission regulation.
6.2.1 Response Time. The response time of the CEMS should not exceed 2 minutes to achieve 95 percent of the final stable value (except for Batch CEMS: see 6.2.2). The response time shall be documented and provided by the CEMS manufacturer. Any changes in the response time following installation shall be documented and maintained by the facility.
6.2.2 Response Time for Batch CEMS. The response time requirement of Section 6.2.1 does not apply to batch CEMS. Instead it is required that the response time, which is the equivalent to the cycle time, be no

longer than one tenth of the averaging period for the applicable standard or no longer than fifteen minutes, whichever is greater. In addition, the delay between the end of the sampling time and reporting of the sample analysis shall be no greater than three minutes. Any changes in the response time following installation shall be documented and maintained by the owner or operator.
6.2.3 Sampling Time for Batch CEMS. Sampling is required to be continuous except during brief pauses when the collected pollutant on the capture media is being moved for analysis and the next capture medium starts sampling. In addition, the sampling time should be no less than thirty-five percent of the averaging period for the applicable standard or no less than thirty-five percent of the response time.
6.3 Other equipment and supplies, as needed by the applicable Reference Method(s) (see Section 8.4.2 of this Performance Specification) or as specified by the CEMS manufacturer, may be required.

7.0 Reagents and Standards

7.1 Reference Gases, Optical filters, or other technology-appropriate reference media. As specified by the CEMS manufacturer for internal calibration (i.e., to adjust drift or response) of the CEMS. These need not be certified but shall be documented by the manufacturer to give results consistent with this performance specification.
7.2 Reagents and Standards. May be required as needed by the applicable Reference Method(s) (see Section 8.4.2) of this performance specification).

8.0 Performance Specification Test Procedure

8.1 Installation and Measurement Location Specifications.
8.1.1 CEMS Installation. Install the CEMS at an accessible location downstream of all pollution control equipment where the particulate matter mass concentrations measurements are representative or can be corrected to be representative of the total emissions as determined by the Reference Method from the affected facility or at the measurement location cross section. It is important to select a representative measurement point(s) or path(s) for monitoring in location(s) that the CEMS will pass the calibration test (see Section 8.4). If the cause of failure to meet the calibration relation 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 calibration requirements are listed below.
8.1.2 Measurement Location. It is suggested that the measurement location be: (1) at least eight equivalent diameters downstream from the nearest flow disturbance, such as a control device, point of pollutant generation, bend, expansion, contraction in the stack/duct, point of discharge, or other point at which a change of pollutant concentration or gas streamlines may occur; and (2) at least two equivalent

diameter upstream from the effluent exhaust or a flow disturbance.

8.1.2.1 Point CEMS. It is suggested that the measurement point be: (1) no less than 30% of the stack or duct diameter from the stack or duct wall; or (2) within or centrally located over the centroidal area of the stack or duct cross section.

8.1.2.2 Path CEMS. It is suggested that the effective measurement path be : (1) totally within the inner area bounded by a line 30 percent of the stack/duct diameter from the stack or duct wall; (2) have at least 70 percent of the path within the inner 50 percent of the stack or duct cross sectional area; or (3) be centrally located over any part of the centroidal area.

8.1.3 Reference Method Measurement Location and Traverse Points.

8.1.3.1 Select, as appropriate: (1) an accessible Reference Method measurement point at least eight equivalent diameters downstream from the nearest flow disturbance, such as a control device, point of pollutant generation, bend, expansion, contraction in the stack or duct discharge point, or other point at which a change of pollutant concentration or gas flow direction may occur; and (2) at least two equivalent diameters upstream from the flow disturbance, such as the effluent exhaust. 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 Reference Method locations need not be the same so long as the Reference Method is placed at a location specified by the method and the CEMS output is representative of pollutant emissions determined by the Reference Method.

8.1.3.2 Select traverse points that assure acquisition of representative samples over the stack or duct cross section. Selection of traverse points to determine the representativeness of the measurement location should be made according to 40 CFR part 60, Appendix A, Method 1, Section 2.2 and 2.3.

8.2 Pretest Preparation. Install the CEMS, prepare the Reference Method test site according to the specifications in Section 8.1, and prepare the CEMS for operation according to the manufacturer's written instructions.

8.3 Calibration Drift Test Procedure.

8.3.1 CD test Period. While the affected facility is operating more than 50 percent of normal load, or as specified in an applicable Subpart, determine the magnitude of the CD once each day (at 24-hour intervals) for 7 consecutive days according to the procedure given in Sections 8.3.2 and 8.3.3.

8.3.2 The purpose of the CD measurement is to verify the ability of the CEMS to conform to the established CEMS calibration used for determining the emission concentration or emission rate. Therefore, if periodic automatic or manual adjustments are made to the CEMS zero and calibration settings, conduct the CD test immediately before these adjustments, or conduct it in such a way that the CD can be determined.

8.3.3 Conduct the CD test at the two points specified in Section 6.1.2. Introduce to

the CEMS the reference gases, optical filters, or other suitable calibration reference media (these need not be certified). Record the CEMS response and subtract this value from the reference value.

8.4 Calibration Test Procedure

8.4.1 Calibration Test Period. Conduct the calibration test according to the procedure given in Sections 8.4.2 through 8.4.7 while the affected facility is operating at more than 50 percent of normal load or as specified in an applicable Subpart. The calibration test may be conducted during the CD test period.

8.4.2 Reference Methods. Unless otherwise specified in an applicable Subpart of the regulations, Method 3B, 4, and 5I, or other approved alternatives, are the Reference Methods for diluent (O_2), moisture, and PM, respectively. Method 5 should be used instead of Method 5I if PM emissions exceed 45 mg/dscm (0.02 gr/dscf).

8.4.3 Sampling Strategy for Reference Method tests. Conduct the Reference Method 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. Conduct the diluent (if applicable), moisture, (if needed), and PM measurements simultaneously. In order to correlate the CEMS and Reference Method data properly, make sure the time from the CEMS data recorder and the time instrument used for the Reference Method agree and note the beginning and end of each Reference Method test period of each run (including the exact time of day) on the CEMS chart recordings or other permanent record of output. Make two sample traverses for a total of at least 60 minutes, sampling for an equal time at each traverse point (see Section 8.1.3.2 for discussion of traverse points). The use of paired Method 5I (or Method 5 as appropriate) trains (that is, simultaneously traversing across two 90°-opposed axes) is recommended to improve and assure data quality.

Note: At times, CEMS calibration tests may be conducted during new source performance standards, performance tests or other compliance tests subject to the Clean Air Act or other statutes, such as the Resource Conservation and Recovery Act. In these cases, Reference Method results obtained during CEMS calibration test may be used to determine compliance as long as the source and test conditions are consistent with the applicable regulations.

8.4.4 Number of Runs in a Calibration Relation Test. Conduct a minimum of 15 runs each consisting of simultaneous CEMS and Reference Method measurements sets.

Note: More than 15 sets of CEMS and Reference Method measurement sets may be performed. If this option is chosen, certain test results may be rejected so long as the total number of test results used to determine the calibration relation is greater than or equal to 15. However, all data must be reported, including the rejected data. The basis for rejecting data must be explicitly stated in: (1) The Reference Method, this Performance Specification, or Procedure 2; or (2) the site's QA plan approved by the Administrator.

8.4.5 Structure of Tests. CEMS calibration tests shall be carried out by making

simultaneous CEMS and Reference Method measurement sets at three (or more) different levels of PM mass concentrations over the full range of operations experienced by the facility, including emissions. Three (or more) sets of measurements shall be obtained at each level. The different levels of PM mass concentration should be obtained by varying process or PM control device conditions as much as the process allows. If it is not possible or practical to obtain PM measurement at the standard, it is recommended that at least six measurement sets be performed at the maximum PM emission level achievable to produce the most accurate and representative results. This will help obtain the smallest confidence and tolerance intervals at the maximum emission level. Irrespective of the extent of the range, the three PM concentration levels developed in the calibration tests must be distributed over the complete operating range experienced by the facility, and at least three of the minimum 15 measured data points must lie within each of the following levels:

• Level 1: 0 to 30% of the maximum PM concentration;

• Level 2: 30 to 60% of the maximum PM concentration; and

• Level 3: 60 to 100% of the maximum PM concentration.

8.4.6 Correlation of Reference Method and CEMS Data. If necessary, adjust the CEMS outputs and Reference Method test data to the same time. Determine the integrated (arithmetic average) CEMS output over each Reference Method 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. Adjust the Reference Method results to ensure they are on the same basis as the CEMS measurements. Depending on the particular CEMS measurement conditions, the CEMS and Method 5I (or Method 5 where applicable) correlations are based on either:

(a) Actual in-stack conditions and actual PM concentrations for in-situ CEMS in mg/acm (*i.e.*, account for the in-stack temperature, pressure, and moisture),

(b) Actual CEMS measurement conditions for extractive CEMS in mg/acm (i.e., account for the elevated temperature of the extracted flue gas if heated), or

(c) Dry standard conditions and corresponding PM concentrations in mg/dscm (i.e., do not correct the Reference Method results if the CEMS outputs are on the same temperature and moisture basis as the Reference Method). Calculate the appropriate PM concentrations as specified by CEMS manufacturer using the applicable equations in Section 12.0.

8.4.7 Calculate the correlation coefficient, confidence interval, and tolerance interval for the complete set of CEMS/RM data according to the procedures in Section 12.0.

8.5 Number of Calibration Tests

Because of the need to develop a calibration curve representative of the facility/APC system, the following strategy will ensure that the calibration curve facilities develop adequately corresponds to measured PM concentrations:

Perform the initial calibration test and develop a correlation within the time period

specified in the applicable regulation. For CEMS with measurement technologies insensitive to changes in PM properties (e.g., Beta-gage), this would be the only calibration test required.

For CEMS with measurement technologies sensitive to PM property changes (*e.g.*, Light-scattering), perform a second calibration within the time period specified in the applicable regulation. Compare the results of the two calibrations to determine what type of mathematical model (*e.g.*, arithmetic, log-normal, or quadratic) best correlates with measured PM concentrations. The calibration for the facility is a composite of both sets of calibration data. Perform a third calibration test within the time period specified in the applicable regulation. Compare the third calibration to the first two. If this calibration relation confirms the findings of the original two calibrations, then this is the last calibration test to be performed. The final calibration relation for the facility is a composite of all three sets of calibration data. If the third calibration shows some fit other than the one originally determined best correlates CEMS response to PM emission concentrations, then a fourth calibration test must be performed within the time period specified in the applicable regulation. This process of performing additional calibration test continues until the facility can determine what fit best correlates CEMS output to PM concentrations. The final calibration is a composite of all calibration data obtained.

8.6 Reporting. At a minimum, (check with the appropriate regional office, State, or Local agency for additional requirements, if any), summarize in tabular form the results of the CD tests and the calibration tests, as appropriate. Include all data sheets, calculations, charts (records of CEMS responses), process data records including PM control equipment operating parameters, and manufacturer's reference calibration media certifications necessary to confirm that the performance of the CEMS met the performance specifications.

9.0 Quality Control. [Reserved]

10.0 Calibration and Standardization. [Reserved]

11.0 Analytical Procedure.

Sample collection and analysis are concurrent for this Performance Specification (see Section 8.0). Refer to the Reference Method for specific analytical procedures.

12.0 Calculations and Data Analysis.

Summarize the results on a data sheet similar to that shown in Table III (in Section 18.0).

12.1 Calibration and Zero Drift

12.1.1 Calibration Drift. Calculate the CD according to:

$$CD = \frac{(R_{CEM} - R_V)}{R_V} \times 100, \qquad (1)$$

where:

CD=the calibration drift of the CEMS in percent

R_{CEM}=the CEMS response; and

R_V=the reference value of the high level calibration standard.

12.1.2 Calculate the ZD according to:

$$ZD = \frac{(R_{CEM} - R_V)}{R_{EM}} \times 100, \qquad (2)$$

where:

ZD=the zero drift of the CEMS in percent.

12.2 Calibration Evaluation

12.2.1 Treatment of Reference Method Data. All data from the Reference Method and CEMS must be on the same basis. Correct the Reference Method data for moisture, temperature, and pressure to the same units as the CEMS using the equations below. Depending on the particular CEMS measurement conditions, the CEMS and Reference Method correlation is based on either:

(a) Actual in-stack conditions and actual PM concentrations for in-situ monitors

expressed in mg/acm (i.e., to account for the in-stack temperature and moisture),

(b) Elevated CEMS temperature conditions and corresponding PM concentrations in mg/acm at the analyzer (i.e., to account for the increased temperature, relative to in-stack levels, in extracted sample gas temperature), or

(c) Dry standard conditions and corresponding PM concentrations in mg/dscm (i.e., to account for the moisture condensed in drying the extracted sample before measuring gas volume, analogous to the Reference Method).

Calculate the respective PM concentrations using the equations, below.

Refer to the Results produced from the CFR Method 5, Section 6.9, Equation 5–6; Particulate Concentration Calculation in dry standard units.

$$C_s = (0.001 \mathrm{g/mg}) \left(\frac{m_n}{V_{m(std)}} \right) \qquad (4)$$

where:

C_s=Concentration in mg/dscm

m_n=Total amount of particulate matter collected, mg.

$V_{m(std)}$=Volume of gas sample as measured by dry gas meter, corrected to standard condition, dscm.

12.2.2 Conversion of Reference Method Particulate Concentrations to Other Units where:

C=Concentration at actual stack conditions (mg/Acm),

C_s=Concentration at mg/dscm,

C_s@7%=Concentration at mg/dscm at 7% O_2,

t_s=Average stack gas temperature °F,

P=Absolute stack pressure (in Hg),

B_{ws}=Water Vapor in the gas stream, proportion by volume, and

O_2=Stack Gas Oxygen Content.

(a) From dry standard concentration conditions to actual in stack conditions (as applicable).

$$C = (C_s) \frac{528°R}{(460 + t_s)} \frac{P}{29.92 \, \mathrm{inHg}} (1 - B_{ws}) \qquad (5)$$

(b) From dry standard concentration conditions to dry standard concentration at 7%O_2.

$$C_{S@7\%} = C_S \frac{(20.9 - 7)}{20.9 - O_2} \qquad (6)$$

(c) From actual stack conditions to dry standard concentration.

$$C_{S@7\%} = C \frac{(t_s + 460)}{528°R} \frac{29.92 \, \mathrm{inHg}}{P} \frac{1}{(1 - B_{ws})} \qquad (7)$$

12.2.3   Linear Calibration. A linear calibration (i.e., linear correlation) shall be calculated from the calibration data by performing a linear least squares regression. The CEMS data appear on the x axis, and the Reference Method data appear on the y axis. Whether this fit is used depends on the outcome of the calculations described in section 12.2.5 of this performance specification.

12.2.3.1   Linear Regression. The linear regression, which gives the predicted mass emission, $\hat{y}$, based on the CEMS response x, is given by the equation:

$$\hat{y} = m \cdot x + b \qquad (7)$$

where:

$$m = \frac{S_{xy}}{S_{xx}} \qquad (8)$$

and

$$b = \overline{y} - m \cdot \overline{x} \qquad (9)$$

The mean values of the x and y data sets are given by

$$\overline{x} = \frac{1}{n} \sum_{i=1}^{n} x_i, \overline{y} = \frac{1}{n} \sum_{i=1}^{n} y_i \qquad (10)$$

where x_i and y_i are the absolute values of the individual measurements and n is the number of data points. The values S_{xx}, S_{yy}, and S_{xy} are given by

$$S_{xx} = \sum_{i=1}^{n} \left(x_i - \overline{x}\right)^2, S_{yy} = \sum_{i=1}^{n} \left(y_i - \overline{y}\right)^2, S_{xy} = \sum_{i=1}^{n} \left(x_i - \overline{x}\right) \cdot \left(y_i - \overline{y}\right) \qquad (11)$$

from which the scatter of y values about the regression line (calibration) s_L can be determined:

$$S_L = \sqrt{\frac{S_{yy}}{n-2}\left(1 - \frac{S_{xy}^2}{S_{xx} \cdot S_{yy}}\right)} \qquad (12)$$

12.2.3.2   Confidence Interval. The two-sided confidence interval, y_c, for the predicted concentration $\hat{y}$ at point x is given by the equation:

$$y_c = \hat{y} \pm t_f \cdot s_L \sqrt{\frac{1}{n} + \frac{(x - \overline{x})^2}{S_{xx}}}, \text{with } f = n - 2 \qquad (13)$$

12.2.3.3   Tolerance Interval. The two-sided tolerance interval y_t for the regression line is given by the equation:

$$y_T = \hat{y} \pm k_T \cdot s_L \qquad (14)$$

at the point x with $k_T = u_n'$ and $f = n - 2$, where

$$n' = \frac{n}{1 + \dfrac{n \cdot (x - \bar{x})^2}{S_{xx}}}, n' \geq 2. \qquad (15)$$

The tolerance factor $u_n\bullet$ for 75% of the population is given in Table I as a function of n'. The factor v_f as a function of f is also given in Table I as well as the t-factor at the 95% confidence level.

12.2.3.4 Correlation Coefficient. The correlation coefficient r may be calculated from

$$r = m\sqrt{\frac{S_{xx}}{S_{yy}}}. \qquad (16)$$

12.2.4 Quadratic Calibration Relation. In some cases, a quadratic regression will provide a better fit to the calibration data than a linear regression. The CEMS data appear on the x axis, and the Reference Method data appear on the y axis. A test to determine whether the quadratic regression gives a better fit to the data than a linear regression must be performed. The relation with the best fit must be used.

12.2.4.1 Quadratic Regression. A least-squares quadratic regression gives the best fit coefficients b_0, b_1, and b_2 for the calibration relation:

$$\hat{y} = b_0 + b_1 x + b_2 x^2 \qquad (17)$$

The coefficients b_0, b_1, and b_2 are determined from the solution to the matrix equation Ab=B

where:

$$A = \begin{bmatrix} n & S_1 & S_2 \\ S_1 & S_2 & S_3 \\ S_2 & S_3 & S_4 \end{bmatrix}, \qquad b = \begin{bmatrix} b_0 \\ b_1 \\ b_2 \end{bmatrix}, \qquad B = \begin{bmatrix} S_5 \\ S_6 \\ S_7 \end{bmatrix}.$$

and

$$S_1 = \sum_{i=1}^{n}(x_i), S_2 = \sum_{i=1}^{n}(x_i^2), S_3 = \sum_{i=1}^{n}(x_i^3), S_4 = \sum_{i=1}^{n}(x_i^4), \qquad (18)$$

$$S_5 = \sum_{i=1}^{n} y_i, S_6 = \sum_{i=1}^{n}(x_i y_i), S_7 = \sum_{i=1}^{n}(x_i^2 y_i).$$

The solutions to b_0, b_1, and b_2 are:

$$b_0 = \left(S_5 \cdot S_2 \cdot S_4 + S_1 \cdot S_3 \cdot S_7 + S_2 \cdot S_6 \cdot S_3 - S_7 \cdot S_2 \cdot S_2 - S_3 \cdot S_3 \cdot S_5 - S_4 \cdot S_6 \cdot S_1\right)/\det A \qquad (19)$$

$$b_1 = \left(n \cdot S_6 \cdot S_4 + S_5 \cdot S_3 \cdot S_2 + S_2 \cdot S_1 \cdot S_7 - S_2 \cdot S_6 \cdot S_2 - S_7 \cdot S_3 \cdot n - S_4 \cdot S_1 \cdot S_5\right)/\det A \qquad (20)$$

$$b_2 = \left(n \cdot S_2 \cdot S_7 + S_1 \cdot S_6 \cdot S_2 + S_5 \cdot S_1 \cdot S_3 - S_2 \cdot S_2 \cdot S_5 - S_3 \cdot S_6 \cdot n - S_7 \cdot S_1 \cdot S_1\right)/\det A \qquad (21)$$

where:

$$\det A = n \cdot S_2 \cdot S_4 + S_1 \cdot S_3 \cdot S_2 + S_2 \cdot S_1 \cdot S_3 - S_2 \cdot S_2 \cdot S_2 - S_3 \cdot S_3 \cdot S_2 - S_4 \cdot S_1 \cdot S_1 \qquad (22)$$

12.2.4.2 Confidence Interval. For any positive value of x, the confidence interval is given by:

$$y_{CI} = \hat{y} \pm t_f \cdot s_Q \sqrt{\Delta} \qquad (23)$$

where:

$$\bar{(} \qquad (24)$$

$$C \qquad (25)$$

$f = n - 3$,

t_f is given in Table I,

The *C* coefficients are given below:

$$C_0 = \left(S_2 \cdot S_4 - S_3^2\right)/D, \ C_1 = \left(S_3 \cdot S_2 - S_1 \cdot S_4\right)/D, \ C_2 = \left(S_1 \cdot S_3 - S_2^2\right)/D,$$

$$C_3 = \left(nS_4 - S_2^2\right)/D, \ C_4 = \left(S_1 \cdot S_2 - nS_3\right)/D, \ C_5 = \left(nS_2 - S_1^2\right)/D. \qquad (26)$$

where

$$D = n\left(S_2 \cdot S_4 - S_3^2\right) + S_1\left(S_3 \cdot S_2 - S_1 \cdot S_4\right) + S_2\left(S_1 \cdot S_3 - S_2^2\right). \qquad (27)$$

12.2.4.3   Tolerance Interval. For any positive value of x, the tolerance interval is given by:

$$y_{TI} = \hat{y} \pm k_T \cdot s_Q, \qquad (28)$$

where:

$$k_T = u_{n'} \cdot v_f \ \text{with} \ f = n\text{-}3, \ \text{and} \qquad (29)$$

$$n' = 1/\Delta \ \text{with} \ n' \geq 2. \qquad (30)$$

The v_f and $u_{n'}$ factors can also be found in Table I.

12.2.5   Test to Determine Best Regression Fit. The test to determine if the fit using a quadratic regression is better than the fit using a linear regression is based on the values of *s* calculated in the two formulations. If s_L denotes the value of *s* from the linear regression and s_Q the value of *s* from the quadratic regression, then the quadratic regression gives a better fit at the 95% confidence level if the following relationship is fulfilled:

$$\frac{(n-2)\cdot s_L^2 - (n-3)\cdot s_Q^2}{s_Q^2} > F_f \qquad (31)$$

with $f = n\text{-}3$ and the value of F_f at the 95% confidence level as a function of *f* taken from Table II below.

12.2.6   Alternative Mathematical Approaches to the Calibration. Other non-linear relations may provide a better fit to the calibration data than linear or quadratic relations because of the monitor's response to some measurable property indicative of the PM concentration. These approaches may serve as alternative approaches for defining the mathematical relation between the CEMS response and the Reference Method. The basis for developing such alternative approaches must be explicitly included in the calibration relation test report with supporting data demonstrating a better fit than linear and quadratic relations and is subject to approval by the Administrator.

13.0   Method Performance

13.1   Calibration Drift Performance Specification. The CEMS internal calibration must not drift or deviate from the value of the reference light, optical filter, Beta attenuation signal, or other technology-suitable calibration reference media by more than 2 percent of the span value. If the CEMS includes diluent and/or auxiliary monitors (for temperature, pressure, and/or moisture) that are employed as a necessary part of this performance specification, the CD must then be determined separately for each in terms of its respective output (see the appropriate Performance Specification for the diluent CEMS specification). None of the CDS may exceed the specification.

13.2   Calibration Relation Performance Specifications. The CEMS calibration relation must meet each of the following minimum specifications for all three criteria.

Criterion A. The correlation coefficient shall be greater than or equal to 0.90.

Criterion B. The confidence interval (95%) at the emission limit shall be within 10% of the emission limit value specified in the regulations.

Criterion C. The tolerance interval at the emission limit shall have 95% confidence that 75% of all possible values are within 25% of the emission limit value specified in the regulations.

13.3   PM Compliance Monitoring. The CEMS measurements shall be reported to the Agency in the units of the standard expressed in the regulations (*i.e.,* mg/dscm,

14.0   Pollution Prevention. [Reserved]

15.0   Waste Management. [Reserved]

16.0   Alternative Procedures. [Reserved]

17.0   References

1. 40 CFR part 60, Appendix B, ''Performance Specification 2—Specifications and Test Procedures for SO_2 and NO_x, Continuous Emission Monitoring Systems in Stationary Sources.''

2. 40 CFR part 60, Appendix B, ''Performance Specification I—Specification and Test Procedures for Opacity Continuous Emission Monitoring Systems in Stationary Sources.

3. 40 CFR part 60, Appendix A, ''Method 1—Sample and Velocity Traverses for Stationary Sources.''

4. 40 CFR part 266, Appendix IX, Section 2, ''Performance Specifications for Continuous Emission Monitoring Systems.''

5. ISO 10155, ''Stationary Source Emissions—Automated Monitoring of Mass Concentrations of Particles: Performance Characteristics, Test Procedures, and Specifications,'' dated 1995, American National Standards Institute, New York City.

6. G. Box, W. Hunter, J. Hunter, *Statistics for Experimenters* (Wiley, New York, 1978).

7. M. Spiegel, *Mathematical Handbook of Formulas and Tables* (McGraw-Hill, New York, 1968).

18.0   Reference Tables, Example Calculations, Diagrams, Flowcharts, and Validation Data.

18.1   Reference Tables

TABLE I: FACTORS FOR CALCULATION OF CONFIDENCE AND TOLERANCE INTERVALS

f	t_{n-2}	v_{n-2}	n'	$u_{n'}(75)$
7	2.365	1.7972	7	1.233

TABLE I: FACTORS FOR CALCULATION OF CONFIDENCE AND TOLERANCE INTERVALS—Continued

f	t_{n-2}	v_{n-2}	n'	$u_{n'}(75)$
8	2.306	1.7110	8	1.223
9	2.262	1.6452	9	1.214
10	2.228	1.5931	10	1.208
11	2.201	1.5506	11	1.203
12	2.179	1.5153	12	1.199
13	2.160	1.4854	13	1.195
14	2.145	1.4597	14	1.192
15	2.131	1.4373	15	1.189
16	2.120	1.4176	16	1.187
17	2.110	1.4001	17	1.185
18	2.101	1.3845	18	1.183
19	2.093	1.3704	19	1.181
20	2.086	1.3576	20	1.179
21	2.080	1.3460	21	1.178
22	2.074	1.3353	22	1.177
23	2.069	1.3255	23	1.175
24	2.064	1.3165	24	1.174
25	2.060	1.3081	25	1.173
30	2.042	1.2737	30	1.170
35	2.030	1.2482	35	1.167
40	2.021	1.2284	40	1.165
45	2.014	1.2125	45	1.163
50	2.009	1.1993	50	1.162

TABLE II: VALUES FOR F_f.

f	F_f	f	F_f
1	161.4	16	4.49
2	18.51	17	4.45
3	10.13	18	4.41
4	7.71	19	4.38
5	6.61	20	4.35
6	5.99	22	4.30
7	5.59	24	4.26
8	5.32	26	4.23
9	5.12	28	4.20
10	4.96	30	4.17
11	4.84	40	4.08
12	4.75	50	4.03
13	4.67	60	4.00
14	4.60	80	3.96
15	4.54	100	3.94

TABLE III: FIELD TEST DATA FOR CALIBRATION

Run No. (mg/Acm)	Date	CEMS PM response (arbitrary units)	M 5 Conc. (mg/dscm)	ave Ts (°F)	Bws	Abs P (in Hg)	O_2	M5 Conc
1								
2								
3								
4								
5								
6								

18.2 Example Calculations

18.2.1 Method 5 concentrations conversions

Example (a): CEMS measurement conditions were made at actual stack conditions, requiring that the Method 5 concentration must be converted from dry standard to actual stack conditions.

where:

C= Concentration at actual stack conditions (mg/Acm): is unknown

C_s= 38.66 mg/dscm

t_s= 291.7°F

P = 30.13 in Hg

O_2=Assumed to be 11.63% O_2

B_{ws}= .226

$$C = (38.66\,\text{mg/dscm})\frac{528°\,R}{(460+291.7°\,F)}\frac{30.13\,\text{inHg}}{29.92\,\text{inHg}}(1-.226)$$

C = 21.17 mg/Acm

Example (b) CEMS measurement conditions were made at the dry standard condition. Convert the concentration to units of the emission regulation (dry standard conditions at 7% O_2).

where:

$C_{s@7\%}$= Concentration at standard conditions @ 7% O_2; is unknown

O_2=Assumed to be 11.63% O_2

$$C_{s@7\%} = 38.66\,\text{mg/dscm}\frac{(20.9-7)}{(20.9-O_2)}$$

$C_{s@7\%}$=57.97 mg/dscm @ 7% O_2

Example (c): The emission regulation (dry standard conditions at 7% O_2) must be converted to actual stack conditions.

Using the Proposed Emission Limit: 50 mg/dscm @ 7% O_2

where:

$C_{s@7\%}$= 50 mg/dscm @ 7% O_2

t_s = 291.4°F, average temperature during initial calibration

B_{ws} = .201, average moisture during initial calibration

P = 30.08, average absolute stack pressure during initial calibration

$$C_{@7\%} = \left(C_{s@7\%}\right)\frac{528°\,R}{(460+291.4)}\frac{30.08}{29.92\,\text{inHg}}(1-.201)$$

O_2=Assumed to be 11.63% O_2

$C_{@7\%}$= 28.22 mg/Acm 7% O_2

$$C = 28.22\,\text{mg/Acm}\,@7\%\frac{20.9-O_2}{(20.9-7)}$$

C=18.82 mg/Acm

Example (d) The following table is the data set of a representative monitor and its initial calibration. These CEMS measurement conditions are at actual stack conditions. X is the CEMS arbitrary unit measurements and Y is the corresponding Method 5 concentration at actual stack conditions.

Run	x	y
1	18.48	10.93
2	21.85	11.19
3	27.10	13.80
4	31.54	16.70
5	32.33	16.61
6	8.35	2.64
7	15.83	6.65
8	11.95	6.01
9	8.43	3.02

Run	x	y
10	9.59	4.15
11	13.81	7.31
12	21.48	11.93
13	27.64	11.27
14	7.08	3.11
15	6.15	2.21
16	8.92	5.50
17	8.77	3.59
18	17.10	6.96
19	13.58	5.33
20	14.14	6.70
21	15.28	6.59
22	13.92	7.00
23	14.00	6.52
24	15.09	4.76
25	17.43	9.78
26	21.63	10.22
27	18.56	10.83

Run	x	y
28	48.53	18.81
29	82.25	29.01
30	83.04	28.88
31	21.20	8.98
32	60.00	22.38
33	32.08	15.94
34	43.05	20.19
35	30.51	13.77
36	12.45	3.84

where:

Sxx = 12338.81
Syy = 1690.99
Sxy = 4410.24
x__ave = 23.699
y__ave = 10.365
S_L = 1.836

$$\hat{y} = 0.357 \cdot x + 1.894$$

From equations 7,8, and 9, the line regression is

Correlation coefficient

From equation 16, the correlation coefficient is 0.966

Confidence interval

Using the Proposed Emission Limit: 50 mg/dscm @ 7% O_2 converted to actual conditions in example (c) C=18.82 mg/Acm. Calculate

CEMS response (x) using line regression calculated above.

where:

t_f = 2.032

$$y_c = \hat{y} \pm t_f \cdot s_L\sqrt{\frac{1}{n}+\frac{(x-\overline{x})^2}{S_{xx}}},\text{ with } f = n-2$$

=18.82 mg/Acm±1.0
Tolerance interval

where:

n' = 13
$v_f = 1.253$
$k_T = 1.498$

$$y_T = \hat{y} \pm k_T \cdot s_L$$

18.3   Diagrams [Reserved]
Y_T=18.82 mg/Acm±2.75
18.4   Flowcharts [Reserved]
18.5   Validation Data [Reserved]

Appendix III—Procedure 2

Procedure 2. Quality Assurance Requirements for Particulate Matter Continuous Emission Monitoring Systems Used for Compliance Determination

1.   Applicability and Principal

1.1   Applicability. Procedure 2 is used to evaluate the effectiveness of quality control (QC) and quality assurance (QA) procedures and the quality of data produced by any particulate matter (PM) 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 diluent (e.g., O_2) monitors and other auxiliary monitoring equipment for measurement, determination, or input of the gas temperature, pressure, moisture content, or sample volume .

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 2 applicability and the CEMS accuracy assessments are determined by individual regulations.

1.2   Principal. The QA procedure 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 general, and are specifically applicable to

PS 11, in appendix B of 40 CFR part 60. Procedure 2 also requires CEMS measurements of samples concurrent with reference method (RM) measurements.

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 Emissions Monitoring System means the total equipment required for the determination of a particulate matter mass concentration in units of the emission standard. The sample interface, pollutant analyzer, diluent analyzer, other auxiliary data monitor(s) and data recorder are the major subsystems of the CEMS.

2.2   Calibration Drift (CD) means the difference in the CEMS output readings from the established reference value after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

2.3   Calibration relation means the relationship between a CEMS response and measured PM concentrations by the reference method which is defined by a mathematical equation.

2.4   Calibration Standard means a reference material that produces a known and unchanging response when presented to the pollutant analyzer portion of the CEMS, and used to calibrate the drift or response of the analyzer.

2.5   Flagged data means data marked by the CEMS indicating that the response value is suspect or invalid.

2.6   Span Value means the upper limit of the CEMS measurement range. The span value shall be documented by the CEMS manufacturer with laboratory data.

2.7   Zero Drift (ZD) means the difference in the CEMS output readings for zero input after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

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. Internal-Calibration of CEMS relative to assessing CD.

2. CD determination and adjustment of CEMS.

3. Preventative maintenance of CEMS (including spare parts inventory and sampling probe integrity).

4. Data recording, calculations, and reporting.

5. Accuracy audit procedures including sampling and analysis methods, sampling strategy, and structuring test conditions over the prescribed range of PM concentrations.

6. Program of corrective action for malfunctioning CEMS, including flagged data periods.

As described in Section 5.2, whenever excessive inaccuracies occur, 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 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 drift or the daily span value exceeds two times the limits of PS 11 in appendix B of this regulation.

4.2   Recording Requirement for Automatic CD Adjusting Monitors. Monitors that automatically adjust the instrument responses 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 drift or the daily span value exceeds twice the PS 11 drift specification for five, consecutive, daily periods, the CEMS is out-of-control. If either the zero drift or the daily span value exceeds four times the PS 11 drift specification 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 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 the daily span value 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 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 calender quarter. Successive quarterly audits shall occur no closer than 2 months. The audits shall be conducted as follows:

5.1.1 Response Calibration Audit (RCA). The RCA must be conducted at the frequency specified in the applicable regulation. Conduct the RCA test according to the sampling strategy described in Section 8.4.3 and according to the structure of test described in Section 8.4.5, both of which are in PS 11 in appendix B, except that the minimum of runs required shall be 12 in the RCA instead of 15 as specified in PS 11. If it is not possible/practical to obtain three measured data points in all three PM concentration ranges as specified in Section 8.4.5 of PS 11, a minimum of three measured data points in any of the two ranges specified in Section 8.4.5 is acceptable, as long as at least all 12 data points lie within the range of the calibration relation test.

5.1.2 Absolute Calibration Audit (ACA). If applicable, an ACA shall be conducted each quarter except in the quarters when a RCA is conducted.

To conduct an ACA: (1) Challenge the CEMS with an audit standard or an equivalent audit reference to reproduce the monitor's measurement at three points within the following ranges:

Audit point	Audit range
1	0 to 20% of span value.
2	40 to 60% of span value and.
3	80 to 100% of span value.

Challenge the CEMS three times at each audit point, and use the average of the three responses in determining accuracy.

Use a separate audit standard or an equivalent audit reference for audit points 1, 2, and 3.

The monitor should be challenged at each audit point for a sufficient period of time to assure that the CEMS response has stabilized.

(2) Operate each monitor in the mode, manner and range specified by the manufacturer.

(3) Use only audit standards or equivalent audit references specified and provided by the manufacturer. Store, maintain, and use audit standards or equivalent audit references as specified by the manufacturer. When National Institute of Standards and Testing (NIST)-traceable audit standards become available for PM CEMS, their use will be required.

The difference between the actual known value of the audit standard or equivalent audit reference specified by the manufacturer and the response of the monitor is used to assess the accuracy of the CEMS.

5.1.3 Relative Accuracy Audit (RAA) [Reserved].

5.1.4 Sample Volume Audit (SVA). For applicable units with a sampling system, an audit of the equipment to determine sample volume (e.g., equipment measuring sampling flowrate for a known time) must be performed once a year. The SVA procedure specified by the manufacturer will be followed to assure that sample volume is accurately measured across the normal range of sample volumes made over the past year.

5.1.5 Other Alternative Audits. Other alternative audit procedures may be used as approved by the Administrator for the quarters when ACAs are to be conducted.

5.2 Excessive Audit Inaccuracy. If the audit results using the RCA, ACA, RAA, or SVA, do not meet 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 calibration relation test, ACA, RAA, or SVA to determine if the CEMS is operating within the specifications. A calibration relation test must always be used following an out-of-control period resulting from a RCA. 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 Definitions. The beginning of the out-of-control period is the time corresponding to the completion of an unsuccessful RCA, ACA, RAA, or SVA. The end of the out-of-control period is the time corresponding to the completion of the subsequent successful calibration test or audit.

5.2.2 CEMS Data Status During Out-Of-Control Period. During the period the monitor is out-of-control, the CEMS data may not be used in calculating emission compliance nor be counted towards meeting minimum data availability as required and described in the applicable subpart.

5.2.3 Criteria for Excessive Audit Inaccuracy. Unless specified otherwise in the applicable subpart, the criteria for excessive inaccuracy are:

(1) For the RCA, at least 75% of a minimum number of 12 sets of CEMS/reference method measurements from the test must fall within a specified area on a graph developed by the calibration relation regression line over the calibration range and the tolerance interval set at +/-25% of the emission limit. The specified area on a graph is (a) bounded by two lines parallel with the calibration regression line, and offset at a distance +/-25% of the numerical emission limit from the calibration regression line on the y-axis, and (b) traversing across the calibration range bounded by the lowest and the highest CEMS reading of the calibration test on the x-axis.

(2) For the ACA, +/-15 percent of the average audit value or 7.5% of the applicable standard, whichever is greater.

(3) For the SVA, +/-5 percent of the average sample volume audit value .

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 and Acceptability Determination

6.1 RCA Calculations and Determination of Acceptability.

6.1.1 RCA Calculations. Follow the equations described in Section 12 of appendix B, PS 11 to calculate results from the RCA tests. The reference method results from the RCA must be calculated in units consistent with the CEMS measurement approach in use (e.g., mg/m³ or mg/dscm).

6.1.2 Acceptability Determination of RCA Data. Plot each of the CEMS/reference method data from the RCA test on a figure based on the calibration relation regression line to determine if the appropriate criterion in Section 5.2.3 (1) is met.

6.2 ACA Accuracy Calculation. Use Equations 1 and 2 to calculate results from the ACA tests.

$$A = \frac{\left(R_{CEM} - R_V\right)}{R_V} \times 100, \qquad (1\text{-}1)$$

where:

A = Accuracy of the CEMS, percent.
R_{CEM} = Average CEMS response during audit.
R_V = Reference value of the audit calibration standard or the equivalent audit.

$$A = \frac{\left(R_{CEM} - R_V\right)}{R_{EM}} \times 100, \qquad (1\text{-}2)$$

where:

A = Accuracy of the CEMS, percent.
R_{CEM} = Average CEMS response.
R_V = Reference value of the audit calibration standard or the equivalent audit.
R_{EM} = the emission limit value.

6.3 SVA Accuracy Calculation. The appropriate SVA calculations will be provided by the CEMS manufacturer.

6.4 Treatment of Flagged Data. All flagged CEMS data are considered invalid; as such, these data may not be used in determining compliance nor be counted towards meeting minimum data availability as required and described in the applicable subpart.

6.5 Alternative Calibration Relation Approaches. Certain PM CEMS have technologies established on principles measuring PM concentration directly, whereas other technologies measure PM properties indirectly indicative of PM concentration. It has been shown empirically that a linear relationship can exist between these properties and PM concentration over a narrow range of concentrations, provided all variables remain essentially constant. However, if all variables affecting this relationship do not remain constant, then a linear relationship will probably not occur. Such is the case expected for facilities with PM emissions over a wide range of PM concentrations with certain process and air pollution control configurations. Other non-linear relations may provide a better fit to the calibration data than linear relations because the monitor's response is based on some measurable, and changing, property of the PM concentrations. These non-linear

approaches may serve as improved approaches for defining the mathematical relation between the CEMS response and reference method measured PM concentrations. The basis and advantage for developing and implementing such alternative approaches for determining compliance must be explicitly included in the calibration relation test report with supporting data demonstrating a better fit than a linear relation. Use of these alternative approaches is subject to approval by the Administrator.

6.6   Example Accuracy Calculation. Example calculations and illustration for the RCA are available in Citation 1. Example calculations for the ACA are available in Citation 3 of Appendix F—Procedure 1 and will be available in Citation 2.

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/ acceptability and date of assessment as determined by a RCA, ACA, RAA, or SVA described in Section 5 including the acceptability determination for the RCA, the A for the ACA or RAA or SVA, the RM results, the calibration audit standards or equivalent audit references, the CEMS responses, and the calculation 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. 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 will be shown later in Figure 1.

8.   *Bibliography*

To Be Determined

Figure 1—Example Format For Data Assessment Report: To Be Determined

[FR Doc. 97–33740 Filed 12–29–97; 8:45 am]
BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 85 and 89

[AMS—FRL–5939–6]

Control of Air Pollution: Emission Standards for New Nonroad Compression-Ignition Engines at or Above 37 Kilowatts; Preemption of State Regulation for Nonroad Engine and Vehicle Standards; Amendments to Rules

AGENCY: Environmental Protection Agency.

ACTION: Notice of proposed rulemaking.

SUMMARY: Today's action, consistent with an order and opinion from the U.S. Court of Appeals for the District of Columbia Circuit, proposes amendments to EPA's regulations setting emission standards for large (at or above 37 kilowatts) nonroad compression ignition engines and to EPA's regulations defining the scope of preemption of state and local nonroad emission standards and establishing procedures for EPA authorization of California nonroad emission standards. Specifically, EPA proposes to withdraw portions of an interpretive rule which set forth the Agency's position on the Clean Air Act regarding the status of certain internal combustion engines manufactured before the effective date of the final rulemaking promulgating EPA's definition of nonroad engine. Additionally, consistent with the DC Circuit opinion, EPA also is amending the remaining text of this interpretive rule, as well as EPA's regulations issued under section 209(e) of the Act regarding the Agency's California nonroad standards authorization process, to clarify that California must seek authorization from EPA prior to enforcing standards and other requirements relating to emissions from any nonroad vehicles or engines, and not just new nonroad vehicles and engines, which was the original language used in these regulations.

In the final rule section of today's **Federal Register**, EPA is issuing these amendments as a direct final rule without prior proposal, because EPA views the action as noncontroversial and anticipates no adverse comments. A detailed rationale for the amendments and for the decision to issue them as a direct final rule is set forth in the Preamble to the direct final rules. If no adverse comments are received in response to the direct final rule, no further activity is contemplated in relation to this proposed rule. If EPA receives adverse comments, the direct

final rule will be withdrawn, and all public comments received will be addressed in a subsequent final rule based on this proposed rule. Additionally, EPA will hold a public hearing on this proposed rule if one is requested.

DATES: Any party who wishes to submit comments must do so by March 2, 1998 unless a hearing is requested. Any party can request EPA to hold a public hearing on this action, but such request must be received by January 29, 1998. If a hearing is requested, it will take place on March 2, 1998, and interested parties will have an additional 30 days after the hearing (until March 30, 1998) to submit comments on any information presented at the hearing. Because no hearing will occur absent a request for one, interested parties should contact Robert M. Doyle at the number listed below after January 29, 1998 to determine whether a hearing will take place.

ADDRESSES: Written comments should be submitted (in duplicate if possible) to: Air Docket Section (6102), Attention: Docket No. A–91–24, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460, or hand-delivered to the Air Docket at the above address, in Room M–1500, Waterside Mall. A copy of written comments should also be submitted to Robert M. Doyle at the address below.

FOR FURTHER INFORMATION CONTACT: Robert M. Doyle, Attorney/Advisor, Engine Programs and Compliance Division (6403J), U.S. Environmental Protection Agency, 401 M. Street, SW, Washington, DC 20560, (202) 564–9258, FAX (202) 233–9596, E-Mail, Doyle.Robert@EPAMAIL.EPA.GOV.

SUPPLEMENTARY INFORMATION: For additional information, please see the direct final rule published in the rules section of today's **Federal Register**.

List of Subjects

40 CFR Part 85

Environmental protection, Administrative practice and procedure, Air pollution control, Federal preemption, Motor vehicle pollution, Nonroad engine and vehicle pollution, Reporting and recordkeeping requirements, State controls.

40 CFR Part 89

Environmental protection, Administrative practice and procedure, Air pollution control, Confidential business information, Imports, Incorporation by reference, Labeling, Nonroad source pollution, Reporting and recordkeeping requirements.