ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 52

[IL212–1b;FRL–7098–9]

Approval and Promulgation of Implementation Plans; Illinois

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: The EPA is proposing to approve revisions to volatile organic compound (VOC) rules for Formel Industries, Incorporated (Formel). This flexographic printing facility is located in Cook County, Illinois. The revisions, submitted on March 21, 2001, consist of an adjusted standard from the Flexographic Printing Rule, 35 IAC 218.401(a), (b), and (c). The adjusted standard conditions include participation in the market-based emissions trading system, daily record keeping of inks and VOC content, conducting trials of compliant inks, and reviewing alternate control technologies. The Illinois Pollution Control Board approved this adjusted standard because the Board considers this to be the Reasonably Achievable Control Technology for Formel.

DATES: The EPA must receive written comments by January 11, 2002.

ADDRESSES: You should mail written comments to: J. Elmer Bortzer, Chief, Regulation Development Section, Air Programs Branch (AR–18J), U.S. Environmental Protection Agency, Region 5, 77 West Jackson Boulevard, Chicago, IL 60604.

You may inspect copies of Illinois's submittal at: Regulation Development Section, Air Programs Branch (AR–18J), U.S. Environmental Protection Agency, Region 5, 77 West Jackson Boulevard, Chicago, Illinois 60604.

FOR FURTHER INFORMATION CONTACT: Matt Rau, Environmental Engineer, Regulation Development Section, Air Programs Branch (AR–18J), U.S. Environmental Protection Agency, Region 5, 77 West Jackson Boulevard, Chicago, IL 60604, Telephone: (312) 886–6524.

SUPPLEMENTARY INFORMATION: Throughout this document wherever "we," "us," or "our" are used we mean the EPA.

Table of Contents

I. What Actions Are the EPA Taking Today?

The EPA is proposing to approve revisions to VOC rules for Formel of Cook County, Illinois. The revisions consist of an adjusted standard from the Flexographic Printing Rule, 35 IAC 218.401(a), (b), and (c). The adjusted standard conditions include participation in a market-based emissions trading system, daily record keeping of inks and VOC content, conducting trials of compliant inks, and reviewing alternate control technologies.

The market-based trading system will allow Formel to buy emissions allotments from companies which can reduce their VOC emissions at a lower cost than Formel can. The total VOC emissions of all participants meets the desired reductions for the non-attainment area. Limiting VOC emissions will help to reduce ozone because VOC can chemically react in the atmosphere to form ozone.

II. Where Can I Find More Information About This Proposal and the Corresponding Direct Final Rule?

For additional information see the direct final rule published in the rules section of this **Federal Register**.

List of Subjects in 40 CFR Part 52

Environmental protection, Air pollution control, Intergovernmental relations, Reporting and recordkeeping requirements, Volatile organic compounds.

Dated: October 25, 2001.

David A. Ullrich,

Deputy Regional Administrator, Region 5.

[FR Doc. 01–30582 Filed 12–11–01; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 52

[KS 0140–1140; FRL–7116–4]

Approval and Promulgation of Implementation Plans; State of Kansas

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: EPA proposes to approve the State Implementation Plan (SIP) revision submitted by the state of Kansas for the purpose of controlling volatile organic compound (VOC) emissions from commercial bakery ovens in Johnson and Wyandotte Counties, Kansas. In the final rules section of the **Federal Register**, EPA is approving the state's SIP revision as a direct final rule without prior proposal because the Agency views this as a noncontroversial revision amendment and anticipates no relevant adverse comments to this action. A detailed rationale for the approval is set forth in the direct final rule. If no relevant adverse comments are received in response to this action, no further activity is contemplated in relation to this action. If EPA receives relevant 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 action. EPA will not institute a second comment period on this action. Any parties interested in commenting on this action should do so at this time. Please note that if EPA receives adverse comment on part of this rule and if that part can be severed from the remainder of the rule, EPA may adopt as final those parts of the rule that are not the subject of an adverse comment.

DATES: Comments on this proposed action must be received in writing by January 11, 2002.

ADDRESSES: Comments may be mailed to Lynn M. Slugantz, Environmental Protection Agency, Air Planning and Development Branch, 901 North 5th Street, Kansas City, Kansas 66101.

FOR FURTHER INFORMATION CONTACT: Lynn M. Slugantz at (913) 551–7883.

SUPPLEMENTARY INFORMATION: See the information provided in the direct final rule which is located in the rules section of the **Federal Register**.

Dated: November 28, 2001.

William Rice,

Acting Regional Administrator, Region 7.

[FR Doc. 01–30580 Filed 12–11–01; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 60

[AD–FRL–7114–7]

Amendments to Standards of Performance for New Stationary Sources; Monitoring Requirements

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule; amendments and request for public comment.

SUMMARY: This proposal is a supplement to proposals previously published in the **Federal Register**. Today's action proposes revisions to previously proposed Performance Specification 11

(PS–11): Specifications and Test Procedures for Particulate Matter Continuous Emission Monitoring Systems at Stationary Sources and Procedure 2: Quality Assurance Requirements for Particulate Matter Continuous Emission Monitoring Systems at Stationary Sources. We are seeking public comment on these proposed revisions.

DATES: *Comments.* You must submit comments so that they are received on or before January 11, 2002.

Public Hearing. If a public hearing has been requested, and anyone contacts us requesting to speak at a public hearing by December 26, 2001, a public hearing will be held on January 28, 2002 beginning at 9:00 a.m. If you are interested in attending the hearing, you must call the contact person listed below (*see* **FOR FURTHER INFORMATION CONTACT**). If a hearing is held rebuttal and supplementary information may be submitted to the docket for 30 days following the hearing.

Request to Speak at Hearing. If you wish to present oral testimony at the public hearing, you must call the contact person listed below (*see* **FOR FURTHER INFORMATION CONTACT**) by January 11, 2002.

ADDRESSES: *Comments.* Submit your written comments (in duplicate if possible) to: Air and Radiation Docket and Information Center (LE–131), Attention: Docket No. A–2001–10, Room M–1500, U. S. Environmental Protection Agency, 401 M Street, SW, Washington, D.C. 20460. We request that you send a separate copy of your comments to the contact person listed below (*see* **FOR FURTHER INFORMATION CONTACT**).

Public Hearing. If anyone contacts us requesting a public hearing, it will be held at the Emission Measurement Center, Research Triangle Park, North Carolina. If you are interested in attending the hearing or presenting oral testimony, you must contact the person listed below (*see* **FOR FURTHER INFORMATION CONTACT**).

Docket. A docket, No. A–2001–10, containing information relevant to this rulemaking, is available for your use between 8:30 a.m. and 5:30 p.m., Monday through Friday, excluding legal holidays. You can find the docket at EPA's Air Docket Section, Room M=–1500, First Floor, Waterside Mall, 401 M Street, SW, Washington, D.C. 20460. You may be charged a reasonable fee for copying.

Comments. You may submit your comments by electronic mail (e-mail) to: *a-and-r-docket@epa.gov and bivins.dan@epa.gov.* You must submit e-mail comments either as an ASCII file avoiding the use of special characters and any form of encryption or as an attachment in WordPerfect© version 5.1, 6.1 or Corel 8 file format. You must note the docket number: (A–2001–10) on all comments and data submitted in electronic form. Do not submit confidential business information (CBI) by e-mail. Electronic comments may be filed online at many Federal Depository Libraries.

Worldwide Web (WWW). In addition to being available in the docket, you can find an electronic copy of this supplemental proposal on the WWW through the Technology Transfer Network (TTN). Following signature, we will post a copy of the supplemental proposal on the Emission Measurement Center's TTN web site at http://www.epa.gov/ttn/emc under Monitoring. We are only accepting comment of the items in this supplemental proposal. The TTN provides information and technology exchange in various areas of air pollution control. If you need more information regarding the TTN, call the TTN HELP line at (919) 541–5384.

FOR FURTHER INFORMATION CONTACT: For information concerning the supplemental proposal, contact Mr. Daniel G. Bivins, Emission Measurement Center (MD–19), Emissions, Monitoring, and Analysis Division, U. S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541–5244.

SUPPLEMENTARY INFORMATION: *Outline.* We provided the following outline to aid in reading the preamble to the supplemental proposal.

I. Introduction

PS–11, Specifications and Test Procedures for Particulate Matter Continuous Emission Monitoring Systems at Stationary Sources, and Procedure 2, Quality Assurance Requirements for Particulate Matter Continuous Emission Monitoring Systems at Stationary Sources, were first published in the **Federal Register** on April 19, 1996 (61 FR 17358) as part of the proposed Hazardous Waste Combustion MACT standard. PS–11 and Procedure 2 were published again on December 30, 1997 (62 FR 67788) for public comment on revisions made to these procedures. Since then, we have continued to learn about the capabilities and performance of PM CEMS through performing and witnessing field evaluations and through discussions with our European counterparts.

Additional experience with the procedures of PS–11 and Procedure 2 led us to propose these further revisions to the December 30, 1997, proposed versions. Today's supplemental proposal provides you an opportunity to comment on the additional revisions made to PS–11 and Procedure 2. Note, we are only accepting comments on the revisions discussed in this supplemental proposal, not the entire contents of PS–11 and Procedure 2, because we have already provided a full opportunity for comment on everything but the changes being proposed today. The changes proposed in today's notice build upon our previous proposal, are largely in response to comments received on that proposal, and further reflect relevant new information obtained subsequently. Because we are seeking comment on only these changes, we believe that 30 days provides sufficient opportunity for the public to assess and comment on today's reproposal.

II. Summary of Changes

A major, non-technical change to PS–11 and Procedure 2 is the presentation, which is now in plain language. We believe this change makes the specifications more understandable. Also, a minor amount of reorganization was done to accommodate the plain language changes. The technical changes are presented in paragraphs A and B. We believe these changes make PS–11 and Procedure 2 more user friendly and applicable to all source categories. These changes also fill the gaps that existed in the earlier proposal.

A. Changes to PS–11

1. Sampling Time for Batch CEMS

Section 6.2.3 of the previous proposal stated:

> Sampling time no less than 35 percent of the averaging period for the applicable

standard or no less than 35 percent of the response time.

In this proposal, the sampling time is being revised in sections 13.3(2)(ii) and 13.3(2)(i) as follows:

Your PM CEMS sampling time must be no less than 30 percent of the cycle time.

The cycle time must be no longer than 15 minutes. This proposed change to the previous version was made to be consistent with the CEMS cycle time requirement in 40 CFR 60.13 (d)(2).

2. Paired Trains for Reference Method (RM) Sampling

Section 8.4.3 of the previous proposal stated:

Use of paired trains is recommended.

The use of paired trains for the RM sampling is being revised in Section 8.6(1)(i) as follows:

You must use paired RM trains when collecting manual PM data.

Originally, we only recommended the use of paired trains for the RM. Now, we are proposing to require paired trains. Paired trains will help ensure the validity of the RM data and eliminate the possibility that correlation problems are the result of bad RM data. We have witnessed testing and obtained results where the paired trains failed the precision criteria. In these cases, it must be assumed that at least one RM sample was incorrect. Several of you commented that we need to specify how much error is acceptable in the RM measurement and to specify when to eliminate imprecise RM data. Therefore, we needed to require paired trains along with setting precision limits for the RM data.

3. Reference Method for Particulate Sampling

Section 8.4.2 of the previous proposal referenced the use of Method 5I. The RM for particulate sampling is being revised in Section 8.6(1) to require the RM specified in the applicable regulation.

In the 1997 draft PS–11, we specified Method 5I as the correlation RM. This was an oversight on our part. Many of you commented that other PM methods should be included. We intend that the RM used to correlate the PM CEMS be that method designated in the applicable regulation. Methods 5 and 17 are applicable RMs. The applicable regulation specifies the RM which in turn designates what is included as PM. This is important for dealing with condensible PM.

4. Condensible Particulate

In the previous proposal, condensible particulate was not specifically addressed. Now, in Section 8.1(1) and 8.1(1)(ii), we are making the following additions:

You must select a PM CEMS that is appropriate for the flue gas conditions at your source.

If condensible PM is an issue, your PM CEMS must maintain the sample gas temperature at the same temperature as the RM filter.

Many of you commented that we needed to address the issue of condensible particulate. Some suggested that the RM filter temperature should be set to match the PM CEMS temperature. Since the RM designates what is considered particulate matter for a source category, we believe that the PM CEMS temperature must be maintained at the temperature of the RM filter. For example, if Method 5 at 248°F ± 25°F is the designated RM and condensible PM is an issue, your PM CEMS must report the PM concentration at 248°F ± 25°F. Some PM CEMS models may not be applicable for sources where condensible PM is an issue.

5. Maximum PM Concentration During Initial Correlation Test

Section 8.4.5 of the 1997 proposal stated:

Vary the process or PM control device as much as the process allows. If it is not possible or practical to obtain PM measurements at the standard, it is recommended that at least six measurement sets be performed at the maximum PM emission level achievable. * * *

The PM concentrations to be included in the initial correlation test are being revised in Section 8.6(4) as follows:

You must attempt to make the simultaneous PM CEMS and RM measurements at three different levels of PM concentrations over the full range of operations identified during the Correlation Test Planning Period. You must attempt to obtain the different levels of PM mass concentration by varying process or PM control device conditions as identified during your PM CEMS Shakedown period and Correlation Test Planning Period.

Many of you commented that causing PM emissions to be twice the emission standard was not acceptable procedure for generating PM CEMS correlation data. Some of you wanted to collect data over longer periods to cover the full operating range of PM concentration. Others of you wanted us to develop methods for generating PM at different concentration levels. Therefore, what we are proposing is to require a Correlation Test Planning Period during which your PM CEMS measures PM and records the monitor's readings that occur during the full range of operating conditions. During the Correlation Test Planning Period, we believe that you can establish the process and control device settings that cause higher and lower PM CEMS responses. The range of PM CEMS readings recorded during this period establishes the levels of PM concentration that you must include in your PM CEMS correlation data set. We are no longer proposing to require you to exceed your emission limit in order to correlate your PM CEMS.

6. Levels of PM Concentration for the Correlation Test

In the previous proposal, Section 8.4.5 listed the following three levels of PM concentrations to be included in the correlation test:

At least three of the minimum 15 measured data points must lie within each of the following levels:

Level 1: 0 to 30 percent of the maximum PM concentration.

Level 2: 30 to 60 percent of the maximum PM concentration.

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

In Sections 8.6(4)(iii),(iv) and 8.6(5), we are proposing to revise these levels as follows:

At least 20 percent of the minimum 15 measured data points you use must be contained in each of the following levels as determined by your PM CEMS during the Correlation Test Planning Period:

- Level 1: From no PM (zero concentration) emissions to 50 percent of the maximum PM concentration;
- Level 2: 25 to 75 percent of the maximum PM concentration; and
- Level 3: 50 to 100 percent of the maximum PM concentration.

Although the above levels overlap, you may only apply individual run data in one level.

If you cannot obtain three distinct levels of PM concentration during normal operations, you must perform correlation testing at whatever range of PM concentrations your PM CEMS recorded during the Correlation Test Planning Period. To ensure that the range of data for your PM CEMS's correlation is maximized, you must follow one or more of the steps in paragraphs (i) through (iv).

Many of you commented that the PM concentration levels in the 1997 draft PS–11 were too rigid and narrowly defined. You wanted flexibility because adjusting your air pollution control device is not an exact science and not always repeatable. Therefore, to provide flexibility, we have expanded the levels and allowed overlap between the levels. Also, we recognized that you may have a source that does not have much variability in the PM emissions. We propose to allow you to collect data over a narrow range of PM concentrations if that narrow range is supported by the data collected during the Correlation Test Planning Period. Also, we have included suggestions to expand the range of correlation data. You are encouraged to try to expand the correlation data set because, if you exceed the highest PM CEMS response used in the correlation data by 125 percent when you are monitoring emissions, you will need to collect additional data to add to the correlation data set.

7. Extrapolation of the PM CEMS Correlation Relation

In the previous proposal, extrapolation of the PM CEMS correlation relation was not specifically addressed. Now, in Section 8.8, we are proposing to make the following addition:

Data you collect during the correlation testing should be representative of the full range of normal operating conditions at your source as observed during the Correlation Test Planning Period. But, this may in some situations consist of data over a narrow range of PM concentration and PM CEMS response that is well below your source's PM emission limit. Even so, you must use this data to develop the correlation.

If your source later generates three consecutive hourly averages greater than 125 percent of the highest PM CEMS response (e.g., milliamp reading) used for the correlation curve, you must arrange to collect additional correlation data at the higher PM CEMS response, unless we, the State and or local enforcement agency determine that repeating the condition is not advisable.

In this event, you must conduct three additional test runs at the higher response, and revise the correlation equation within 30 days after the occurrence of the three consecutive hourly averages. You must use that new data along with the previous data to calculate a revised correlation equation.

Since we recognize that your source's PM emissions may not have much variability, we propose to allow you to collect correlation data over a narrow range of PM concentrations. But, if three consecutive hourly average PM CEMS readings are greater than 125 percent of the highest PM CEMS reading in your correlation, we are requiring you to collect data at higher readings and add the new data to the correlation data set. Extrapolating the correlation relation and its confidence and/or tolerance bounds beyond the data set will necessarily result in decreased precision in the PM concentration reported by the PM CEMS. For example, if your PM CEMS responses ranged from 4.5 to 5.5 millamps (mA) during your correlation test, your correlation can only be used to report PM emission concentrations up to readings of 6.88 mA. If you have three consecutive hourly average PM CEMS readings greater than 6.88 mA, you are required to collect data at the higher readings and add the new data to the correlation data set. We are requiring you to calculate a new correlation, including an examination of both polynomial and linear forms of the relationship. We are requiring that you complete the testing and correlation development within 30 days of the occurrence. If the reason for exceeding the 125 percent limit for more than three hours was due to a serious failure of the air pollution control system, obviously, we will not make you repeat that operating condition for correlation test purposes.

8. Pretest Preparations—Shakedown Period and Correlation Test Planning Period

As we have stated, a Shakedown period and Correlation Test Planning Period did not exist in the previously proposed version of PS–11. We are now proposing to revise PS–11 in Sections 8.4(1) and 8.4(2) to include requirements for operating your PM CEMS over a shakedown period and over a Correlation Test Planning Period.

Some of you commented that we should prescribe the methods to obtain a range of PM concentrations. We are not proposing to do this. Also, some of you noted that we did not define the maximum PM concentration for the three PM concentration levels. To assist you in planning to conduct the correlation testing, we are proposing to institute a shakedown period and a Correlation Test Planning Period. The shakedown period is similar to a burn-in period, where you and your instrument technicians become familiar with the operation of your PM CEMS. For some of you, the shakedown period will be long, for others, it will be shorter. We considered specifying an amount of time for the shakedown period, but we decided to give you the flexibility to decide when you were comfortable with the operation of your PM CEMS. Following the shakedown period, we envision a period when you operate your PM CEMS in its normal manner and record the monitor's responses. During this Correlation Test Planning Period, you need to establish the relationship between your process operation, air pollution control device operation and PM emissions. Again, we considered specifying an amount of time for the Correlation Test Planning Period, but we decided to give you the flexibility to decide when you understood the operation of your process and air pollution control device sufficiently to reproduce a range of PM concentrations. However, your shakedown period and Correlation Test Planning Period must not extend beyond the date when you are required to report PM emissions with your PM CEMS. You should use the knowledge gained during the Correlation Test Planning Period to operate your process in the manner necessary to obtain the different PM CEMS response levels during the correlation test. For example, if your PM CEMS had 15-minute average responses between 5.5 and 12 mA during the Correlation Test Planning Period, you would operate your process to obtain correlation data points that cover 5.5 to 12 mA output from your PM CEMS.

9. Verification of the Initial Correlation

In the previous proposal, Section 8.5 contained the following requirement regarding verification testing of the initial correlation:

For CEMS with measurement technologies insensitive to changes in PM properties, only one initial correlation test is required. For CEMS with measurement technologies sensitive to PM property changes, at least three correlation tests are required. The second correlation test result is compared to the first to determine the best correlation model. The two data sets are combined to calculate the correlation equation. The third correlation result is compared to the result from the first two. If this third correlation result confirms the findings of the original two correlations, the data from all three tests are combined to calculate the correlation equation for the PM CEMS. If the third correlation finds some other fit, then additional correlation tests are required until the best fit correlation can be determined. The final correlation equation is calculated from the composite of all the correlation data collected.

We are proposing to eliminate the need to conduct multiple correlation tests in this revised PS–11.

In the 1997 draft PS–11, we envisioned a scenario where some types of PM CEMS would need to verify that the PM CEMS correlation relation remained constant over short periods of time. Whereas, some other types of PM CEMS would only undergo a single correlation test. We have since abandoned that process. You are now responsible for purchasing a PM CEMS that is appropriate for your source's PM characteristics and your source's operation. If your flue gas and PM characteristics are variable, you must select a PM CEMS that can respond appropriately to those variations.

10. Correlation Criteria

We are proposing a minor revision to the correlation criteria. In the previous proposal (Section 13.2), the correlation coefficient was to be greater than or equal to 0.90. In today's revised PS–11 (Section 13.2(1)), the correlation coefficient must be greater than or equal to 0.85.

We have relaxed the correlation coefficient criterion but have retained the confidence interval and tolerance interval criteria to reflect the performance and reliability of PM CEMS during recent field evaluations and through discussions with our European counterparts.

11. PM CEMS Equipment—Diagnostic Checks

In the previous proposal, no requirements existed for diagnostic checks. In Section 6.2(2)of today's proposal, the following diagnostic checks are required:

Your PM CEMS must also be capable of performing automatic diagnostic checks and sending instrument status signals (flags) to the data recorder.

We learned during our field evaluations that recording diagnostic check failures provided valuable information about the operation and maintenance needs (e.g., dirty window check and low battery power) of the PM CEMS.

12. PM CEMS Equipment—Sample Volume Check

The previous proposal contained no requirement for a sample volume check. Section 6.2(3) of the revised PS–11 contains the following requirement:

If your PM CEMS is an extractive type that measures the sample volume and uses the measured sample volume as part of calculating the output value, your PM CEMS must check the sample volume to verify the sample volume measuring equipment. You must do this sample volume check at the normal sampling rate of your PM CEMS.

For some types of PM CEMS, the measured sample volume is part of the calculated output response. Therefore, a check that ensures the proper operation of the equipment that measures the sample volume is as important as the daily zero and upscale drift check of the sample measurement. We are requiring a daily sample volume check. The sample volume check is not the same as the sample volume audit found in Procedure 2. The sample volume check confirms the proper operation of the sample volume measurement equipment. The sample volume audit evaluates the accuracy of the sample volume measured value.

13. PM CEMS Equipment—Appropriate Measurement Range and Automatic Range Switching

In Section 6.1.1.5 of the previous proposal, the monitor was to be spanned as follows:

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.

We are proposing to revise PS–11 in Sections 6.3, 6.4, 8.1(2), and 8.4(3) as follows:

Your PM CEMS must be initially set up to measure over the expected range of your source's PM emission concentrations during routine operations. This will allow your PM CEMS to detect and record significant high PM concentrations encountered during the Correlation Test Planning Period. You may change the measurement range to a more appropriate range during the Correlation Test Planning Period based on your findings.

Your PM CEMS may be equipped to perform automatic range switching so that it is operating in a range most sensitive to the detected concentrations. If your PM CEMS does automatic range switching, you must appropriately configure the data recorder to handle situations of data values being recorded in multiple ranges during range switching intervals.

Therefore, you must select a PM CEMS that is capable of measuring the full range of PM concentrations expected from your source from normal levels through the emission limit concentration.

You must set the response range of your PM CEMS such that its output is within 50 to 60 percent of its maximum output (*e.g.,* 12 to 13.6 mA on a 4 to 20 mA output) when your source is operating at the conditions that were previously observed to produce the highest PM CEMS output. But, the response range must be set such that no 15-minute average equals your PM CEMS maximum output (*e.g.,* 20 mA). In some cases, you may desire to set the response range of your PM CEMS such that its output is 50 to 60 percent of its maximum output (*e.g.,* 12 to 13.6 mA on a 4 to 20 mA output) when your source is operating at its PM emission limit. You may do this by perturbing operation of the air pollution control equipment or bypassing part of the flue gas around the control equipment in order to create PM emissions at the emission limit.

The determination of the instrument span as stated in the 1997 draft PS–11 was inadequate. We are now providing a clearer specification for the PM CEMS measurement range. During our field evaluations, we found that setting the measurement range such that the response to the highest PM concentration was about 12–14 mA gave enough sensitivity to measure the lower PM concentrations and ensure that short-term spikes were adequately represented. If the range is set such that brief spikes are within the measurement range, normal readings would likely be near the detection limit of the monitor.

14. PM CEMS Equipment—Isokinetic Sampling

The previous proposal contained no requirement for isokinetic sampling. Section 6.1(3) of today's revised PS–11 contains the following addition for isokinetic sampling:

If your PM CEMS is an extractive type and your source's flue gas volumetric flow rate varies by more than 10 percent from nominal, your PM CEMS must maintain an isokinetic sampling rate (within 10 percent of true isokinetic). If your extractive type PM CEMS does not maintain an isokinetic sampling rate, you must use actual site-specific data to prove to us, the State and/or local enforcement agency that isokinetic sampling is not necessary.

A few of you expressed concern about extractive PM CEMS not sampling isokinetically during all sampling conditions. During one of our field evaluations, our extractive PM CEMS response was lower than expected when the monitor was sampling about 130 percent isokinetic. During an industry field evaluation, an extractive beta gauge PM CEMS was deliberately made to sample about 65 percent isokinetic. Sampling under-isokinetic caused the monitor's response to read higher than during isokinetic sampling. Therefore, we are proposing to require that extractive type PM CEMS sample isokinetically at all stack gas volumetric flow rates unless you can provide site-specific data that shows isokinetic sampling is not necessary.

15. PM CEMS Measurement Location in Relation to Air Pollution Control By-Pass

The previous proposal contained no requirement for the measurement location in relation to the air pollution control by-pass. Section 8.2(4) of the revised PS–11 contains the following requirement:

If you plan to achieve higher emissions, for correlation test purposes, by adjusting the performance of the air pollution control device (per Section 8.6(5)(i)) or by installing a means to bypass part the of flue gas around the control device, you must locate your PM CEMS measurement (and manual RM measurement) location well downstream of the control device or bypass (e.g., downstream of the induced draft fan), in order to minimize PM stratification that may be created in these cases.

Additionally, we are adding the following guidance in section 2.4(2) related to the PM CEMS installation location:

If you suspect that PM stratification may vary at the selected installation location, we recommend you perform a PM profile test to determine the magnitude of the variability in PM stratification. If the PM stratification varies by more than 10 percent, you must either choose another installation location or eliminate the stratification condition.

Some of you commented that guidance should be given regarding the sampling location of the PM CEMS and the RM. Based on our and industry's field evaluations, we found that the measurement location played an important role in the success or failure of the initial correlation and the stability of the correlation. During one of our studies, we found that, when we were perturbing the air pollution control device, the particulate concentration was stratified because we were not far enough downstream from the mixing point for the particulate to become evenly dispersed. Therefore, we are providing guidance for locating the PM CEMS in relation to an air pollution control by-pass, if used. Obviously, the 8 duct diameters and 2 duct diameters criteria is ideal, but we recognize that a location meeting those criteria is not always available or accessible. Therefore, we recommend that you select a measurement location that minimizes problems due to flow disturbances, cyclonic flow, and stratification. The main induced draft (ID) fan can provide mixing and blending of the gas stream components; therefore, locating the PM CEMS downstream of the ID fan can reduce stratification. Also, because changing PM stratification will adversely affect the correlation, we are recommending that you perform a PM profile test at the PM CEMS installation location to determine the magnitude of any variation in PM stratification. Our and industry's PM stratification test results showed that when the PM stratification varied by more than 10 percent, an accurate correlation could not be maintained.

16. Pretest Preparations—Preliminary RM Testing

The previous proposal contained norequirement for preliminary testing. Section 8.4(4) of the revised PS–11 contains the following addition:

We recommend that you perform preliminary manual RM testing after the Correlation Test Planning Period. During this preliminary testing, you would measure the PM emission concentration corresponding to the highest PM CEMS response observed during the full range of normal operation, or when perturbing or bypassing the control equipment.

Based on what we and industry experienced during field evaluations, we believe some preliminary testing can help improve the performance of the initial correlation test. For example, we observed that preliminary testing (1) helped set the proper PM CEMS measurement range, (2) provided guidance when perturbing the air pollution control device, and (3) helped understand what process operating conditions produced what PM emission concentration. Therefore, we are recommending that you do some preliminary test runs before starting the initial correlation test.

17. Reference Method Data—Precision and Bias

The previous proposal contained no requirement for precision and bias in the RM data. Section 8.6(1)(ii) and (iii) of the revised PS–11 contains the following additions for precision and bias:

During all paired train testing, you must eliminate from the data set used to develop a PM CEMS correlation any pair of data that do not meet the precision criteria specified in Procedure 2, paragraph 10.1(3).

You must test the valid data set for bias according to Procedure 2, Section 10.1(4)(i). You may not use biased data in developing your PM CEMS correlation. You must identify and correct the source of the bias before repeating the manual testing program. Therefore, we strongly recommend that as soon as results from several test runs become available, you immediately examine the data set for evidence of bias so that you can take any necessary corrective action before continuing the testing. This examination would require you to determine the RM particulate concentration results on-site.

Some of you commented that PS–11 needed to specify what RM data should not be included in the correlation data set. We have included criteria for precision of the paired RM measurements and bias between the paired RM measurements found in the entire RM data set. You will find the criteria in Procedure 2.

18. Calculation of Confidence Interval and Tolerance Interval as a Percent of the Emission Limit

In today's proposed revised PS–11, we made a change in the PM concentration levels needed for your PM CEMS correlation. Because of this change, you may collect PM concentration data that is below the emission limit. Therefore, we need to define the PM CEMS response where you calculate both the confidence interval and tolerance interval as a percent of the emission limit for evaluating the performance of the correlation.

Previously, you were instructed to calculate the PM CEMS response at the emission limit and then to calculate the confidence interval and tolerance interval of the correlation curve at that PM CEMS response. This was an appropriate procedure when you collected PM concentration data at twice the emission limit. However, if your PM concentration data does not extend up to the emission limit, calculating the confidence interval and tolerance interval of the correlation curve at the emission limit is not statistically relevant.

In the previous proposed version of PS–11, the confidence interval and tolerance interval were calculated at the emission limit which was approximately the median value of the PM CEMS response. The confidence interval and tolerance interval are smallest at the median value of the PM CEMS response. Therefore, we are stipulating in today's revised PS–11 that you calculate the confidence interval and tolerance interval at the median value of the PM CEMS responses you obtained during the correlation test.

B. Changes to Procedure 2

1. Definition of Calibration vs. Correlation

In the previous proposal, Section 2.3 defined calibration relation as follows:

The relationship between a CEMS response and measured PM concentrations by the RM which is defined by a mathematical equation.

In today's revision to Procedure 2, this definition is not included. The PS–11 definition was changed from calibration to correlation as follows:

"Correlation" means the primary mathematical relationship for correlating output from your PM CEMS (typically expressed in some units, e.g., such as response to a milliamp electrical signal) to a particulate concentration, as determined by the RM. The correlation is expressed in the same units that your PM CEMS use to measures the PM concentration.

A few of you commented that "calibrating" the PM CEMS to the manual method data was confusing language. Therefore, we now refer to the process as "correlation."

2. Response Correlation Audit (RCA) Data Points

In the previous proposal, Section 5.1.1 contained the following requirement for the RCA data points:

If it is not 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.

Section 10.3(5)(ii) of Procedure 2 is revised as follows:

All 12 data points must lie within the PM CEMS output range examined during the PM CEMS correlation tests.

With this revision, we have clarified where the data points for the RCA must be.

3. Absolute Calibration Audit (ACA) Audit Point Ranges

Section 5.1.2 of the previous proposal contained the following ACA audit points:

Audit point 1—0 to 20 percent of span value
Audit point 2—40 to 60 percent of span value
Audit point 3—80 to 100 percent of span value.

The ACA audit points are revised as follows in Section 10.3(2):

Audit point 1—0 to 20 percent of measurement range
Audit point 2—40 to 60 percent of measurement range
Audit point 3—70 to 100 percent of measurement range.

We removed the word span from PS–11 and Procedure 2. The audit points now reference the measurement range instead of span value. Also, we expanded the third audit point range.

4. ACA Performance Requirement

Section 5.2.3(2) of the previously proposed version had the following ACA requirement:

± 15 percent of the average audit value or 7.5% of the applicable standard, whichever is greater.

The ACA performance criterion are revised in Section 10.4(3) as follows:

Your PM CEMS is out of control if results exceed ± 10 percent of the average audit value or 7.5 percent of the applicable standard, whichever is greater.

We are reducing the performance criterion for the ACA. Based on the results of our field evaluations, our PM CEMS were capable of meeting the ± 10 percent ACA criterion. The 15 percent limit was a holdover from the cylinder gas audit criterion.

5. Relative Response Audit (RRA)

The previous proposed version of Procedure 2 did not include a relative response audit (RRA). We are revising Procedure 2 in Sections 10.3 and 10.3(4) by adding the following:

You must conduct an RRA once every four calendar quarters. If you schedule an RCA for one of the four calendar quarters in the year, the RCA would take the place of the RRA.

You must conduct the RRA by collecting three simultaneous RM PM concentration measurements and PM CEMS measurements at the as-found source operating conditions and PM concentration. Paired trains for the RM sampling are not required but are recommended to avoid failing the test due to imprecise and inaccurate RM results.

Procedure 2 did not specify the frequency for a relative correlation audit (RCA). Many of you commented that the RCA could be done once every 3 to 5 years. One of you commented that 18 months was appropriate between checks of the correlation's stability. We believe that the length of time between checks of the correlation's stability could be source dependent, and therefore, can be specified in the applicable regulation. However, based on our and industry's field evaluations, we observed that the correlations may not be stable for periods of 3 to 5 years. We believe that PM CEMS should be correlated more often than every 5 years. Therefore, we propose a brief, three test run, confirmation of the correlation that would be done on an annual basis. We identify this check as a relative response audit.

6. Sample Volume Audit (SVA)

Section 5.1.4 of the previous proposal contained the following SVA requirement:

For applicable units with a sampling system, an audit of the equipment to determine sample volume 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.

In the 1997 draft Procedure 2, we left the procedure for conducting the SVA to the manufacturer. Based on our experiences, we decided to specify a procedure to conduct the SVA. This way, all SVAs will be done in a consistent manner, and the results can be compared.

7. Routine System Checks

The previous proposal of Procedure 2 contained no provisions specific to routine system checks. Section 10.2 of today's revised Procedure 2 contains the following addition of routine system checks:

You must perform routine checks to assure proper operation of system electronics and optics, light and radiation sources and detectors, electric or electro-mechanical systems, and general stability of the system calibration. Necessary components of the routine system checks will depend upon design details of your PM CEMS.

A few of you commented that the daily drift check specifications were not adequately defined to prohibit the sale of poor quality instruments. Therefore, we have clarified that the routine (daily) checks must include the entire measurement system. This language is similar to that in the new PS–1 (or ASTM D6216) for opacity monitors.

8. Treatment of Flagged Data

Section 6.4 of the previous proposal treated flagged data as follows:

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.

We are proposing to revise Procedure 2 by eliminating the specification to treat all flagged data as invalid. In the 1997 version, Procedure 2 stipulated that all flagged data was considered invalid. However, if the PM CEMS sends an alarm flag that the battery is low, or the protective lenses are getting dirty, or the vacuum is getting high, the data collected is still valid; it should not be automatically treated as invalid. During our field test, we occasionally got flags from the PM CEMS, but the data was not invalid just because we got a flag. If Procedure 2 is not changed, all data flags would produce invalid data. Therefore, a revision is needed.

In this revision, we are removing the requirement that all flagged data is automatically treated as invalid and stipulating that data must be investigated to determine its validity.

9. Alternative Calibration Relation Approaches

Section 6.5 of the previous proposal contained the following allowance for 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 RM 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.

Today's revised Procedure 2 contains no allowance. In Section 12.3(4) of PS–11, the following statement is made:

You may petition the Administrator for alternative solutions or sampling recommendations if the regression analysis presented in Section 12.3, paragraphs (1) through (3) does not achieve satisfactory correlation, confidence or tolerance intervals.

The alternative correlation approaches did not belong in Procedure 2 and were therefore moved to PS–11.

10. Arrangement of Paired Trains

In the previous proposal, arrangement of the paired trains was not specified. Section 10.1 of revised Procedure 2 contains stipulations for the arrangement of the paired trains including specific probe arrangements.

11. Precision of RM Data

In the previous proposal, precision of the RM data was not specified. Section 10.1(3) of revised Procedure 2 contains the precision specification.

Some of you commented that we needed to specify what level of imprecision in the RM data should exclude the data from the correlation data set. We therefore, propose to include criteria for precision of the paired RM measurements. Experience shows that with good operating practices and strict quality control the RSDs can be met at concentrations as low as about 1 mg/dscm.

12. Bias of RM Data

In the previous proposal, a provision to eliminate biased RM data was not specified. Section 10.1(4) of revised Procedure 2 proposes a bias specification. Systematic bias can exist between two sampling systems even when precision requirements are met. We have included these requirements for bias between the paired RM measurements found in the entire RM data set. We believe the precision and bias checks will ensure that only high quality RM data is used to develop your PM CEMS correlation relation.

13. Sample Volume Check

In the previous proposal, a sample volume check was not specified. Section 10.2(5) of revised Procedure 2 proposes to specify requirements for checking the sample volume.

A check that ensures the proper operation of the equipment that measures the sample volume is important. We are now proposing to require a daily sample volume check.

14. Sample Volume Check Performance Criteria

Since a sample volume check was not specified in the previous proposal, performance criteria for the sample volume check was not specified. Section 10.4(2) of revised Procedure 2 proposes the following performance criteria for the sample volume check:

> Your PM CEMS is out of control if sample volume check error exceeds 10 percent for five consecutive daily periods, or exceeds 20 percent for any one day.

Since we added a daily sample volume check, we included these performance specifications. These criteria are consistent with the daily zero and upscale drift check criteria (i.e., 2 times the SVA limit for five consecutive days or 4 times the SVA limit for any single day).

15. Relative Response Audit Performance Criterion

Since a relative response audit was not specified in the previous proposal, performance criteria for the RRA was not specified. Section 10.4(6) of revised Procedure 2 provides the following performance criteria for the RRA:

> At least two of the three sets of PM CEMS and RM measurements must fall within the same specified area on a graph of the correlation regression line as required for the RCA. If your PM CEMS fails to meet this RRA criterion, it is considered out of control.

Since we added a relative response audit, we included this performance specification. We believe that if 67 percent of the test runs (i.e., 2 out of 3) are within the 25 percent tolerance interval (which should include 75 percent of all future data points), then your PM CEMS correlation is still applicable and accurate. We believe the RRA is a cost effective means to ensure that your PM CEMS correlation remains applicable without the need to complete a costly RCA on an annual basis.

16. What To Do in the Event of a Failed RRA

No provision was included in the previous proposal. Now, Section 10.5(1)(ii) proposes:

If your PM CEMS failed an RRA, you must take corrective action until your PM CEMS passes the RRA criteria. If the RRA criteria cannot be achieved, you must perform an RCA.

Since we added the RRA, we need to tell you what to do if your PM CEMS fails to meet the performance criterion. We believe that if 2 out of the 3 test runs do not fall within the 25 percent tolerance interval, then your PM CEMS correlation may no longer be applicable. If your PM CEMS fails to meet the performance specification, we believe you should take corrective actions to correct any problems and repeat the RRA. However, if the RRA criteria cannot be attained, we believe you then need to conduct a full RCA using paired RM trains that meet the precision and bias criteria.

17. What To Do in the Event of a Failed RCA

No provision for a failed RCA was included in the previous version. Now, Section 10.6 proposes to include provisions you must follow if your PM CEMS fails the RCA.

The 1997 draft Procedure 2 did not tell you what to do if your PM CEMS failed to meet the RCA performance criterion. We believe the proposed steps are appropriate. Once your PM CEMS new correlation is developed, you start reporting PM emissions using the new equation. If a new correlation is developed according to step (2), the old correlation data is abandoned. In Germany and Denmark, when any additional RM testing is done, the new data is continually added to the correlation data set and a new correlation relation is calculated each time. However, they do not maintain the correlation performance criteria (i.e., confidence interval and tolerance interval limits) like we do, and therefore we chose not to follow the process used in Germany and Denmark.

III. Administrative Requirements

A. Docket

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

B. Executive Order 12866, Regulatory Planning and Review

Under Executive Order 12866 (58 FR 51735, October 4, 1993), we are required to judge whether a regulatory action is ‘‘significant’’ and therefore subject to Office of Management and Budget (OMB) review and the requirements of this Executive Order. The Order defines ‘‘significant regulatory action’’ as one that is likely to result in a rule that may: (1) Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs, or the rights and obligation of recipients thereof; or (4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, we have determined that this rule is not ‘‘significant’’ because none of the listed criteria apply to this action. Consequently, this action was not submitted to OMB for review under Executive Order 12866.

C. Regulatory Flexibility

The Regulatory Flexibility Act (RFA) generally requires that we conduct a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements unless we certify that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small not-for-profit enterprises, and small governmental jurisdictions. This proposed rule would not have a significant impact on a substantial number of small entities because no additional cost will be incurred by such entities because of the changes specified by the proposed rule. The requirements of the supplemental proposal reaffirm and clarify previously proposed performance specifications for continuous particulate matter emission monitoring systems. Therefore, I certify that this action will not have a significant economic impact on a substantial number of small entities.

D. Executive Order 13132, Federalism

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires that we develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.''

''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.'' Under Section 6 of Executive Order 13132, we may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the State and local governments, or we consult with State and local officials early in the process of developing the proposed regulation. We also may not issue a regulation that has federalism implications and that preempts State law unless we consult with State and local officials early in the process of developing the proposed regulation.

This proposed rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. This proposed rule is a revision to a previously proposed rule governing the specifications, test procedures, and quality assurance requirements to be used by owners or operators of stationary sources for particulate matter continuous emission monitoring systems. Thus, the requirements of section 6 of the Executive Order do not apply to this proposed rule.

E. Paperwork Reduction Act

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

F. Unfunded Mandates Act

Under Section 202 of the Unfunded Mandates Reform Act of 1995 (''Unfunded Mandates Act''), we must prepare a budgetary impact statement to accompany any proposed rule, or any final rule for which a notice of proposed rulemaking was published, 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 in any one year. Under Section 205, if a budgetary impact statement is required under Section 202, we must select the least costly, most cost-effective, or least burdensome alternative that achieves the objective of the rule, unless we explain why this alternative is not selected or the selection of this alternative is inconsistent with law. Section 203 requires us to establish a plan for informing and advising any small governments that may be significantly or uniquely impacted by the rule. Section 204 requires us to develop a process to allow elected state, local, and tribal government officials to provide input in the development of any proposal containing a significant Federal intergovernmental mandate.

We have determined that this proposed rule 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 in any one year. Rules establishing performance specifications and quality assurance requirements impose no costs independent from national emission standards which require their use, and such costs are fully reflected in the regulatory impact assessment for those emission standards. We have also determined that this proposed rule does not significantly or uniquely impact small governments. Therefore, the requirements of the Unfunded Mandates Act do not apply to this action.

G. National Technology Transfer and Advancement Act

The National Technology Transfer and Advancement Act of 1995 (NTTAA), § 12(d), Public Law 104–113, generally requires federal agencies and departments to use voluntary consensus standards instead of government-unique standards in their regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., material specifications, test method, sampling and analytical procedures, business practices, etc.) that are developed or adopted by one or more voluntary consensus standards bodies. Examples of organizations generally regarded as voluntary consensus standards bodies include the American Society for Testing and Materials (ASTM), the National Fire Protection Association (NFPA), and the Society of Automotive Engineers (SAE). The NTTAA requires Federal agencies like us to provide Congress, through OMB, with explanations when an agency decides not to use available and applicable voluntary consensus standards.

During this rulemaking, we searched for voluntary consensus standards that might be applicable. An International Organization for Standardization (ISO) standard, number 10155, Stationary source emissions—Automated monitoring of mass concentrations of particles—Performance characteristics, test methods and specifications, was applicable. ISO 10155 was followed for our first field evaluation of PM CEMS; however it was found to be inadequate to fulfill the performance specification needs for our compliance monitoring. Examples of areas where we believed ISO 10155 was inadequate are:

(1) The number of test runs for a correlation test, 9, was insufficient for a comprehensive statistical evaluation of the PM CEMS correlation.

(2) The PM concentration ranges required for a correlation test were too vague.

(3) The measurement location for the PM CEMS and RM were vague.

(4) Accuracy and precision criteria are not established for the RM.

(5) The correlation coefficient limit of greater than 0.95 was too stringent for most of the PM CEMS correlations we

evaluated. Also, ISO 10155 lacks quality assurance and quality control procedures. ISO 10155 was used as the starting point for development of PS–11.

H. Executive Order 13045, Protection of Children From Environmental Health Risks and Safety Risks

Executive Order 13045 (62 FR 19885, April 23, 1997) applies to any rule that we determine (1) is ''economically significant'' as defined under Executive Order 12866, and (2) addresses an environmental health or safety risk that we believe may have a disproportionate effect on children. If the regulatory action meets both criteria, we must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by us.

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

I. Executive Order 13175 (Consultation and Coordination With Indian Tribal Governments)

Executive Order 13175, entitled ''Consultation and Coordination with Indian Tribal Governments'' (65 FR 67249, November 6, 2000), requires EPA to develop an accountable process to ensure ''meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications.'' ''Policies that have tribal implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on one or more Indian tribes, on the relationship between the Federal government and the Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes.''

This proposed rule does not have tribal implications. It will not have substantial direct effects on tribal governments, on the relationship between the Federal government and Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes, as specified in Executive Order 13175. This proposed rule revises an existing proposed regulation which details the performance and design specifications for continuous emission monitoring systems. Thus, Executive Order 13175 does not apply to this rule.

J. Executive Order 13211, Energy Effects

This rule is not subject to Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use (66 FR 28355 (May 22, 2001)) because it is not a significant regulatory action under Executive Order 12866.

List of Subjects in 40 CFR Part 60

Environmental protection, Air Pollution Control, Continuous emission monitoring; Performance specification; Particulate matter.

Dated: November 29, 2001.

Christine Todd Whitman,

Administrator.

We propose that 40 CFR, part 60 be amended as follows:

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

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

2. Appendix B of Part 60 is amended by adding Performance Specification 11 to read as follows:

Appendix B of Part 60—Performance Specifications

* * * * *

Performance Specification 11—Specifications and Test

Procedures for Particulate Matter Continuous Emission Monitoring Systems at Stationary Sources

1.0 What Are the Purpose and Applicability of Performance Specification 11?

The purpose of Performance Specification 11 (PS–11) is to establish the initial installation and performance procedures that are required for evaluating the acceptability of a particulate matter (PM) continuous emissions monitoring system (CEMS). The intent of PS–11 is not to evaluate the ongoing performance of your PM CEMS over an extended period of time, nor does it identify specific calibration techniques and auxiliary procedures to assess CEMS performance. You will find procedures for evaluating the ongoing performance of your PM CEMS in Procedure 2 of Appendix F—Quality Assurance Requirements for Particulate Matter Continuous Monitoring Systems Used at Stationary Sources.

1.1 How does PS–11 apply to my PM CEMS? PS–11 applies to your PM CEMS if you are required by any provision of Title 40 of the CFR to install and operate PM CEMS.

1.2 When must I comply with PS–11? You must comply with PS–11 when directed by the applicable rule that required you to install and operate a PM CEMS. Also, you may be required to show compliance with PS–11 if changes at your source result in conditions which are unrepresentative of the previous correlation (e.g., changes in emission control system, significant changes in concentration of PM emitted, or feed inputs to the device).

1.3 What other monitoring is needed? To report your PM emissions in units of the emission standard, you may need to monitor additional parameters to correct the PM concentration reported by your PM CEMS. Your CEMS may include the components listed in paragraphs (1) through (3):

(1) A diluent monitor (i.e., O_2, CO_2, or other CEMS specified in the applicable regulation) which must meet its own performance specifications found in this appendix,

(2) Auxiliary monitoring equipment to allow measurement, determination, or input of the flue gas temperature, pressure, moisture content, and/or dry volume of stack effluent sampled, and

(3) An automatic sampling system.

The performance of your PM CEMS and the establishment of its correlation to manual measurements must be determined in units of mass concentration as measured by your PM CEMS (e.g., mg/acm or mg/dscm).

2.0 What Are the Basic Requirements of PS–11?

PS–11 requires you to perform initial installation and calibration procedures that confirm the acceptability of your CEMS when it is installed and placed into operation. You must develop a site specific correlation of your PM CEMS response against manual gravimetric RM measurements (including those made using EPA RMs 5 or 17).

2.1 What types of PM CEMS technologies are covered? Several different types of PM CEMS technologies (*e.g.,* light scattering, Beta attenuation, etc.) can be designed with in-situ or extractive sample gas handling systems. Each PM CEMS technology and sample gas handling technologies have certain site specific advantages. You must select and install a PM CEMS that is appropriate for the flue gas conditions at your source.

2.2 How is PS–11 different from other performance specifications? PS–11 is based on a technique of correlating PM CEMS response relative to emissions determined by the RM. This technique is called ''the correlation.'' This differs from CEMS used to measure gaseous pollutants which have available calibration gases of known concentration.

(1) Since the type and characteristics of PM vary from source to source, a single PM correlation, applicable to all sources, is not possible. When conducting the initial correlation test of your PM CEMS response to PM emissions determined by the RM, you must pay close attention to accuracy and details. Your PM CEMS must be operating properly. You must perform the manual method testing accurately, with attention to eliminating site-specific systemic errors. You must coordinate the timing of the manual method testing with the sampling cycle of your PM CEMS.

(2) You must complete a minimum of 15 manual PM tests. You must perform the manual testing over the full range of PM CEMS responses observed during the Correlation Test Planning Period.

2.3 How is the correlation data handled? You must carefully review your manual method data and your PM CEMS responses to include only valid, high quality data. For the correlation, you must reduce and present the manual method data in terms of the measurement conditions reported by your PM CEMS. Then, you must correlate the manual method and PM CEMS data in terms of the output as received from the monitor (e.g., milliamps). At the median PM CEMS response, you must calculate the confidence interval and tolerance interval as a percentage of the applicable PM concentration emission limit and compare the confidence interval and tolerance interval percentages to the acceptance criteria. Also, you must calculate the correlation coefficient, independent of the applicable PM limit, and compare the correlation coefficient to the acceptance criterion.

Situations may arise where you will need two or more correlations. If you need multiple correlations, you need to collect sufficient data for each correlation.

2.4 How do I design my PM CEMS correlation program? When planning your PM CEMS correlation effort, you must address each of the items in paragraphs (1) through (8) to enhance the probability of success. You will find each of these elements further described in this performance specification or the applicable RM procedure.

(1) What type of PM CEMS should I select? You must select a PM CEMS that is most appropriate for your source with technical consideration for potential factors such as interferences, site specific configurations, installation location, flue gas conditions, PM concentration range and other PM characteristics. You can find guidance on which technology is best suited for specific situations in our report ''Current Knowledge of Particulate Matter (PM) Continuous Emission Monitoring'' (*see* references, section 16.5).

(2) Where should I install my PM CEMS? Your PM CEMS must be installed in a location that is most representative of PM emissions as determined by the RM such that the correlation between PM CEMS response and emissions determined by the RM will meet these performance specifications. Care must be taken in selecting a location and measurement point with minimum problems due to flow disturbances, cyclonic flow, and varying PM stratification. You should refer to Method 1 of this part for guidance (also see section 8.2). If you suspect that PM stratification may vary at the selected installation location, we recommend you perform a PM profile test to determine the magnitude of the variability in PM stratification. If the PM stratification varies by more than 10 percent, you must either choose another installation location or eliminate the stratification condition.

(3) How should I record my CEMS data? You must ensure that your data logger and PM CEMS have been properly programmed to accept and transfer status signals of valid monitor operation (e.g., flags for internal calibration, suspect data, or maintenance periods). You need to ensure that your PM CEMS and data logger are set up to collect and record all normal emission levels and excursions.

(4) How should I record CEMS maintenance and performance data? You must maintain a logbook for documenting CEMS maintenance and performance.

(5) What CEMS data should I review? You must review drift data daily to document proper operation. You must also ensure that any audit material is appropriate to the typical operating range of your PM CEMS.

(6) How long should I operate my PM CEMS before doing the initial correlation test? You must allow sufficient time for your PM CEMS to operate in a ''shakedown'' mode for you to become familiar with your PM CEMS.

(i) You must observe PM CEMS response over time during normal and varying process conditions. This will assure that your PM CEMS has been properly set up to operate at a range which is compatible with the concentrations and characteristics of PM emissions. You may use this information in establishing the operating conditions necessary to perform the correlations of PM CEMS data to manual method measurements over a wide operating range.

(ii) You must establish what type of process changes will influence flue gas PM concentration and resulting PM CEMS signal on a definable and repeatable basis. You may find the ''shakedown'' period useful to make adjustments to your planned approach for operating your PM CEMS at your source. For instance, you may change the measurement range or batch sampling period to something other than those you initially planned to use.

(7) How should I do the manual method testing? You must perform the manual method testing in accordance with specific rule requirements, coordinated closely with PM CEMS and process operations and then scrutinize the data according to the precision and bias criteria specified in Procedure 2, paragraph 10.1. You must use paired trains for the manual method testing. You must perform the manual method testing over a suitable PM concentration range as defined during the Correlation Test Planning Period. Since the manual testing for this correlation test is not for compliance reporting purposes, you may conduct the RM test runs for less than the typical 1-hour.

(8) What do I do with the manual RM data and PM CEMS data? You must complete each of the activities in paragraphs (i) through (v).

(i) Screen the manual RM data for validity (*e.g.,* isokinetics, leak checks), and quality assurance (*e.g.,* proper management to program goals) and quality control, (*e.g.,* outlier identification).

(ii) Screen your PM CEMS data for validity (*e.g.,* daily drift check requirements) and quality assurance (*e.g.,* flagged data).

(iii) Convert the manual test data into the same units of PM concentration as reported by your PM CEMS.

(iv) Calculate the polynomial and linear correlations and select the best fit correlation as specified in section 12.3.

(v) Calculate the results for the correlation coefficient, confidence interval, and tolerance interval for the complete set of CEMS/RM correlation data for comparison with the data acceptance criteria specified in section 13.2.

3.0 What Special Definitions Apply to PS–11?

3.1 ''Appropriate Measurement Range of your PM CEMS'' means a measurement range that is capable of recording readings over the complete range of your source's PM emission concentrations during routine operations. The appropriate range is determined during the Pretest Preparations as specified in section 8.4.

3.2 ''Appropriate Data Range for PM CEMS Correlation'' means the data range that reflects the full range of your source's PM emission concentrations recorded by your PM CEMS during the Correlation Test Planning Period or other normal operations as defined in the applicable regulations.

3.3 ''Batch Sampling'' means that gas is sampled on an intermittent basis and concentrated on a collection media before intermittent analysis and follow up reporting. Beta gauge PM CEMS are an example of batch sampling devices.

3.4 ''Confidence Interval (CI)'' means the statistical term for predicting, with 95 percent confidence, the bounds in which one would predict the correlation line to lie. Equations for calculating CI are provided in section 12.3(1)(ii), Equation 11–10, for the polynomial correlation and section 12.3(3)(ii), Equation 11–33, for the linear correlation. The CI as a percent of the emission limit value is calculated at the median PM CEMS response value.

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

3.6 ''Correlation'' means the primary mathematical relationship for correlating output from your PM CEMS (typically expressed in some arbitrary units, such as response to a milliamp electrical signal) to a particulate concentration, as determined by the RM. The correlation is expressed in the same units that your PM CEMS measures the PM concentration.

3.7 ''Correlation Coefficient (r)'' means a quantitative measure of association between your PM CEMS outputs and the RM measurements. Equations for calculating the r value are provided in section 12.3(1)(iv), Equation 11–22, for the polynomial correlation and section 12.3(3)(iv), Equation 11–36, for the linear correlation.

3.8 ''Cycle Time'' means the time required to complete one sampling, measurement, and reporting cycle. For a batch sampling PM CEMS, the cycle time would start when sample gas is first extracted from the stack/duct and end when the measurement of that batch sample is complete and a new result for that batch sample is produced on the data recorder.

3.9 ''Data Recorder'' means the portion of your CEMS that provides a permanent record of the monitor output in terms of response and status (flags). The data recorder may also provide automatic data reduction and CEMS control capabilities. (See section 6.6)

3.10 ''Diluent Monitor and Other Auxiliary Data Monitor(s) (if applicable)'' means that portion of your CEMS that provides the diluent gas concentration (such as O_2 or CO_2, as specified by the applicable regulations), temperature, pressure, and/or moisture content, and generates an output proportional to the diluent gas concentration or gas property.

3.11 ''Drift Check'' means a check of the difference in your PM CEMS output readings from the established reference value of a reference standard or procedure after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place. The procedures used to determine drift will be specific to the operating practices of your specific PM CEMS. A drift check includes both a zero drift check and an upscale drift check.

3.12 ''Flagged Data'' means data marked by your CEMS indicating that the response value(s) from one or more CEMS subsystems is suspect, invalid, or that your PM CEMS is not in source measurement operating mode.

3.13 ''Linear Correlation'' means a first order mathematical relationship between your PM CEMS and manual method PM concentration that is linear in form ($y = b_0 + b_1x$).

3.14 ''Paired Trains'' means two simultaneously conducted RM trains. (See section 8.6(1) and Procedure 2.)

3.15 ''Path CEMS'' means a CEMS that measures PM mass concentrations along a path across the stack or duct cross section.

3.16 ''Point CEMS'' means a CEMS that measures particulate matter mass concentrations either at a single point, or over a small fixed volume or path.

3.17 ''Polynomial Correlation'' means a second order equation used to define the relationship between your PM CEMS output and manual method PM concentration ($y = b_0 + b_1x + b_2x^2$).

3.18 ''Reference Method (RM)'' means the method defined in the applicable regulations but commonly is those methods collectively known as Methods 5 and 17 (for particulate), found in Appendix A of 40 CFR Part 60. Only the front half and dry filter catch portions of the RM can be correlated to your PM CEMS output.

3.19 ''Reference Standard'' means a reference material or procedure that produces a known and unchanging response when presented to the pollutant monitor portion of your CEMS. You must use these standards to evaluate the overall operation of your PM CEMS but not to develop a PM CEMS correlation.

3.20 ''Response Time'' means the time interval between the start of a step change in the system input and the time when the pollutant monitor output reaches 95 percent of the final value. (See sections 6.5 and 13.3 for procedures and acceptance criteria.)

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

3.22 ''Sample Volume Check'' means a check of the difference between your PM CEMS sample volume reading and the sample volume reference value.

3.23 ''Tolerance Interval (TI)'' means the interval with upper and lower limits, within a specified percentage of the future data population are contained with a given level of confidence as defined by the respective tolerance interval equations in section 12 of this performance specification. The TI is calculated as a percent of the emission limit value at the median PM CEMS response value.

3.24 ''Upscale Check Value'' means the expected response to a reference standard or procedure used to check the upscale response of your PM CEMS.

3.25 ''Upscale Drift (UD) Check'' means a check of the difference between your PM CEMS output reading and the upscale check value.

3.26 ''Zero Check Value'' means the expected response to a reference standard or procedure used to check the response of your PM CEMS to particulate free or low particulate concentration situations.

3.27 ''Zero Drift (ZD) Check'' means a check of the difference between your PM CEMS output reading and the zero check value.

3.28 ''Zero Point Correlation Value'' means a value added to PM CEMS correlation data to represent low or near zero PM concentration data. (See section 8.6 for rationale and procedures.)

4.0 Are There Any Potential Interferences for My PM CEMS?

Yes, condensible water droplets or condensible acid gas aerosols (i.e., those with condensation temperatures above those specified by the method) at the measurement location can be interferences for your PM CEMS if the necessary precautions are not met.

4.1 Where are interferences likely to occur? Interferences may develop if your CEMS is installed downstream of a wet air pollution control system or any other conditions that produce flue gases which, at your PM CEMS measurement point, normally or occasionally contain entrained water droplets or condensible salts before release to the atmosphere.

4.2 How do I deal with interferences? Your PM CEMS must extract and heat a representative sample of the flue gas for measurement to simulate results produced by the RM for conditions such as those described in section 4.1. Independent of your PM CEMS measurement technology and extractive technique, you must have a configuration simulating the RM to assure that:

(1) no formation of new particulate or deposition of particulate occurs in sample delivery from the stack or duct; and

(2) no condensate accumulates in the sample flow measurement apparatus.

4.3 What PM CEMS measurement technologies can I use? You must use a PM CEMS measurement technology that is free of interferences from any condensible constituent in the flue gas and in stack or duct flue gas conditions which normally or occasionally contain entrained water droplets or condensible salts.

5.0 What Do I Need To Know To Ensure the Safety of Persons Using PS–11?

People using the procedures required under PS–11 may be exposed to hazardous materials, operations, site conditions, and equipment. This performance specification does not purport to address all of the safety issues associated with its use. It is your responsibility to establish appropriate safety and health practices and determine the applicable regulatory limitations before performing these procedures. You must consult your CEMS users' manual and materials recommended by the RM for specific precautions to be taken.

6.0 What Equipment and Supplies Do I Need?

The different types of PM CEMS use different operating principles. You must select an appropriate PM CEMS based on your site specific configurations, flue gas conditions, and PM characteristics.

(1) Your PM CEMS must sample the stack effluent continuously or intermittently for batch sampling PM CEMS.

(2) You must ensure that the averaging time, the number of measurements in an average, the minimum data availability, and the averaging procedure for your CEMS conforms with those specified in the applicable emission regulation.

(3) Your PM CEMS must include the minimum equipment described in sections 6.1 through 6.7.

6.1 What equipment is needed for my PM CEMS's sample interface? Your PM CEMS's sample interface must be capable of delivering a representative sample of the flue gas to your PM CEMS. This subsystem may be required to heat the sample gas to avoid particulate deposition or moisture condensation, provide dilution air, perform other gas conditioning to prepare the sample for analysis, or measure the sample volume/flowrate.

(1) If your PM CEMS is installed downstream of a wet air pollution control system such that the flue gases normally or occasionally contain entrained water droplets, your PM CEMS must have equipment to extract and heat a representative sample of the flue gas for measurement so that the pollutant monitor portion of your CEMS measures only dry particulate. Heating must be sufficient to raise the temperature of the extracted flue gas to above the water condensation temperature and must be maintained at all times and at all points in the sample line from where the flue gas is extracted to, including the pollutant monitor and any sample flow measurement devices.

(2) You must consider the measured conditions of the sample gas stream to ensure that manual test data is converted into appropriately consistent units of PM concentration for the correlation calculations. Additionally, you must identify what, if any, additional auxiliary data continuous monitoring and handling systems are necessary in the conversion of your PM CEMS response into units of the PM standard.

(3) If your PM CEMS is an extractive type and your source's flue gas volumetric flow rate varies by more than 10 percent from nominal, your PM CEMS must maintain an isokinetic sampling rate (within 10 percent of true isokinetic). If your extractive type PM CEMS does not maintain an isokinetic

sampling rate, you must use actual site-specific data to prove to us, the State and/or local enforcement agency that isokinetic sampling is not necessary.

6.2 What type of equipment is needed for my PM CEMS? Your PM CEMS must be capable of providing an electronic output proportional to the PM concentration.

(1) Your PM CEMS must be able to perform zero and upscale drift checks. You may perform these checks manually, but performing these checks automatically is preferred.

(2) Your PM CEMS must also be capable of performing automatic diagnostic checks and sending instrument status signals (flags) to the data recorder.

(3) If your PM CEMS is an extractive type that measures the sample volume and uses the measured sample volume as part of calculating the output value, your PM CEMS must check the sample volume to verify the sample volume measuring equipment. You must do this sample volume check at the normal sampling rate of your PM CEMS.

6.3 What is the appropriate measurement range for my PM CEMS? Your PM CEMS must be initially set up to measure over the expected range of your source's PM emission concentrations during routine operations. This will allow your PM CEMS to detect and record significant high PM concentrations encountered during the Correlation Test Planning Period. You may change the measurement range to a more appropriate range during the Correlation Test Planning Period based on your findings.

6.4 What if my PM CEMS does automatic range switching? Your PM CEMS may be equipped to perform automatic range switching so that it is operating in a range most sensitive to the detected concentrations. If your PM CEMS does automatic range switching, you must appropriately configure the data recorder to adequately handle the recording of data values being recorded in multiple ranges during range switching intervals.

6.5 What averaging time and sample intervals should be used? Your CEMS must sample the stack effluent such that the averaging time, the number of measurements in an average, the minimum sampling time, and the averaging procedure for reporting and determining compliance conform with those specified in the applicable regulation. Your PM CEMS must be designed to meet the specified response time and cycle time established in this Performance Specification. (*See* section 13.3.)

6.6 What type of equipment is needed for my data recorder? Your CEMS data recorder must be able to accept and record electronic signals from all the monitors.

(1) Your data recorder must record the signals from your PM CEMS that are proportional to particulate mass concentrations. If your PM CEMS uses multiple ranges, your data recorder must identify what range the measurement was made in and provide range adjusted results.

(2) Your data recorder must accept and record monitor status signals (flagged data).

(3) Your data recorder must accept signals from auxiliary data monitors, as appropriate.

6.7 What other equipment and supplies might I need? You may need other supporting equipment as defined by the applicable RM(s) (see section 7) or as specified by your CEMS manufacturer.

7.0 What Reagents and Standards Do I Need?

7.1 You will need reference-audit rods, -audit wedges, foils, optical filters or other technology-appropriate reference media that are provided by your PM CEMS manufacturer. You must use these reference media for the quarterly QA/QC audits and for daily drift checks (i.e., to measure drift or response) of your PM CEMS. These need not be certified but must be documented by the manufacturer to give results that are consistent, repeatable and reliable.

7.2 You may need other reagents and standards required by the applicable RM(s).

8.0 What Performance Specification Test Procedure Do I Follow?

You must complete each of the activities in sections 8.1 through 8.8 for your performance specification test.

8.1 What is the appropriate equipment selection and setup? You must select a PM CEMS that is most appropriate for your source, giving consideration to potential factors such as flue gas conditions, interferences, site specific configuration, installation location, PM concentration range and other PM characteristics. Your PM CEMS must meet the equipment specifications of section 6.1.

(1) You must select a PM CEMS that is appropriate for the flue gas conditions at your source. If your source contains entrained water droplets, your PM CEMS will require a sample delivery and conditioning system that is capable of extracting and heating a representative sample.

(i) Your PM CEMS must maintain the sample at a temperature sufficient to prevent moisture condensation in the sample line before analysis of PM.

(ii) If condensible PM is an issue, your PM CEMS must maintain the sample gas temperature at the same temperature as the RM filter.

(iii) Your PM CEMS must avoid condensation in the sample flow rate measurement lines.

(2) Some PM CEMS do not have a wide measurement range capability. Therefore, you must select a PM CEMS that is capable of measuring the full range of PM concentrations expected from your source from normal levels through the emission limit concentration.

(3) Some PM CEMS are sensitive to particle size changes, water droplets in the gas stream, particle charge, and stack gas velocity changes, etc. Therefore, you must select a PM CEMS appropriate for your source's PM characteristics.

(4) You must set up your CEMS to operate in accordance with the manufacturer's recommendations.

(5) You must consult your PM CEMS vendor to obtain basic recommendations on the instrument capabilities and setup configuration. You are ultimately responsible for setup and operation of your PM CEMS.

8.2 Where do I install my PM CEMS? You must install your PM CEMS at an accessible location downstream of all pollution control equipment. You must perform your PM CEMS concentration measurements from a location considered most representative, or be able to provide data that can be corrected to be representative of the total PM emissions as determined by the manual RM.

(1) Your site specific correlation developed during the initial correlation testing must relate specific PM CEMS responses to integrated particulate concentrations.

(2) We may require you to relocate your CEMS if the cause of failure to meet the correlation criteria is determined to be the measurement location and a satisfactory correction technique cannot be established.

(3) You must select a measurement location that minimizes problems due to flow disturbances, cyclonic flow, and varying PM stratification (refer to Method 1 for guidance).

(4) If you plan to achieve higher emissions, for correlation test purposes, by adjusting the performance of the air pollution control device (per section 8.6(5)(i)) or by installing a means to bypass part of the flue gas around the control device, you must locate your PM CEMS measurement (and manual RM measurement) location well downstream of the control device or bypass (e.g., downstream of the induced draft fan), in order to minimize PM stratification that may be created in these cases.

8.3 How do I select the manual RM measurement location and traverse points? You must follow EPA Method 1 for identifying manual RM traverse points. Ideally, you should perform your manual measurements at locations where the 8 and 2 flow disturbance criteria are met. Where necessary, you may conduct testing at a location that is 2 diameters downstream and 0.5 diameters upstream of flow disturbances. If your location does not meet the minimum downstream and upstream requirements, you must obtain approval from us to test at your location.

8.4 What are my pretest preparation steps? You must install your CEMS and prepare the RM test site according to the specifications in sections 8.2 and 8.3. You must prepare your CEMS for operation according to the manufacturer's written instructions.

(1) After completing the initial field installation, you must operate your PM CEMS according to the manufacturer's instructions for a shakedown period. Except during times of instrument zero and upscale drift checks, your CEMS must analyze the effluent gas for PM and produce a permanent record of your PM CEMS output.

(i) You must conduct daily checks (zero and upscale drift and sample volume, as appropriate); and, when any check exceeds the daily specification (see section 13.1), make adjustments and perform any necessary maintenance to ensure reliable operation. Your data recorder must reflect these checks and adjustments.

(ii) If the shakedown period is interrupted because of source breakdown, you must continue the shakedown period following resumption of source operation. If the shakedown period is interrupted because of monitor failure, you must continue the shakedown period when the monitor becomes operational.

(iii) The objective of the shakedown period is for you to become familiar with your PM CEMS and its routine operation for providing reliable data.

(iv) Therefore, you must continue the shakedown until you are confident that your PM CEMS is operating within the manufacturer's specifications.

(2) After completing the shakedown period, you must operate your CEMS over a Correlation Test Planning Period of sufficient duration to identify the full range of operating conditions and PM emissions to be used in your PM CEMS correlation test. During the Correlation Test Planning Period you must produce a permanent record of 15-minute average PM CEMS responses.

(i) During the Correlation Test Planning Period you must operate the process and air pollution control equipment in their normal set of operating conditions.

(ii) Your data recorder must record PM CEMS response during the full range of routine process operating conditions.

(iii) You must establish the relationships between operating conditions and PM CEMS response, especially those conditions that produce the highest PM CEMS response over 15-minute averaging periods, and the lowest PM CEMS response as well. The objective of this is for you to be able to reproduce the conditions for purposes of the actual correlation testing discussed in section 8.6.

(iv) You must set the response range of your PM CEMS for the subsequent correlation testing.

(3) You must set the response range of your PM CEMS such that its output is within 50 to 60 percent of its maximum output (*e.g.,* 12 to 13.6 mA on a 4 to 20 mA output) when your source is operating at the conditions that were previously observed to produce the highest PM CEMS output. But, the response range must be set such that no 15-minute average equals your PM CEMS maximum output (*e.g.,* 20 mA). In some cases, you may desire to set the response range of your PM CEMS such that its output is 50 to 60 percent of its maximum output (*e.g.,* 12 to 13.6 mA on a 4 to 20 mA output) when your source is operating at its PM emission limit. You may do this by perturbing operation of the air pollution control equipment or bypassing part of the flue gas around the control equipment in order to create PM emissions at the emission limit.

(4) We recommend that you perform preliminary manual RM testing after the Correlation Test Planning Period. During this preliminary testing, you would measure the PM emission concentration corresponding to the highest PM CEMS response observed during the full range of normal operation, or when perturbing or bypassing the control equipment.

(5) During the last seven days of the Correlation Test Planning Period, and after the monitor response range has been set, you must perform the 7-day zero and upscale drift test (see section 8.5).

(6) You cannot change the response range of the monitor once the response range has been set, and the drift test successfully completed.

8.5 How do I perform the 7-day drift test? You must check the zero (or low level value between 0 and 20 percent of the response range of the instrument) and upscale (between 50 and 100 percent of the instrument's response range) drift. You must perform this check at least once daily over 7 consecutive days. Your PM CEMS must quantify and record the zero and upscale measurements and the time of the measurements. If you make automatic or manual adjustments to your PM CEMS zero and upscale settings, you must conduct the drift test immediately before these adjustments, or conduct it in such a way that you can determine the amount of drift. You will find the calculation procedures for drift in section 12.1 and the acceptance criteria for allowable drift in section 13.1.

(1) What is the purpose of 7-day drift tests? The 7-day drift tests validate the internal performance of your PM CEMS. Another purpose of the 7-day drift measurements is to verify that your CEMS response remains consistent with the responses recorded during the development of the initial correlation and to determine whether your PM CEMS is out of control during day to day operation as specified in section 13.1.

(2) How do I do the 7-day drift testing? You must determine the magnitude of the drift once each day, at 24-hour intervals), for 7 consecutive days while your source is operating normally.

(i) You must conduct the 7-day drift test at the two points specified in section 8.5. You may perform the 7-day drift tests automatically or manually by introducing to your PM CEMS suitable reference standards (these need not be certified) or procedures.

(ii) You must record your PM CEMS zero and upscale response and evaluate them against the zero check value and upscale check value.

(iii) You must conduct the 7-day drift test near the end of the Correlation Test Planning Period. A valid 7-day drift test must be completed before attempting the correlation test.

8.6 How do I conduct my PM CEMS correlation test? You must conduct the correlation test according to the procedure given in paragraphs (2) through (6) while your source is operating at the conditions you observed and documented during the Correlation Test Planning Period discussed in section 8.4(2). If you need multiple correlations, you must conduct sufficient testing and collect at least 15 pairs of RM and PM CEMS data for calculating each separate correlation.

(1) You must use the RM for particulate matter (usually Methods 5, 5i, or 17) that is prescribed by the applicable regulations. You may need to perform other RMs or performance specifications (*e.g.,* Method 3 for oxygen, Method 4 for moisture, etc.) depending on the units in which your PM CEMS reports PM concentration.

Note: You may use test runs that are shorter than 60 minutes in duration (*e.g.,* 20 or 30 minutes). You may perform your PM CEMS correlation tests during new source performance standards performance tests or other compliance tests subject to the Clean Air Act or other statutes, such as the Resource Conservation and Recovery Act. In these cases, your RM results obtained during the PM CEMS correlation test may be used to determine compliance as long as your source and the test conditions are consistent with the applicable regulations.

(i) You must use paired RM trains when collecting manual PM data. You use results of the paired trains to identify and screen the RM data for imprecision and bias.

(ii) During all paired train testing, you must eliminate from the data set used to develop a PM CEMS correlation any pair of data that do not meet the precision criteria specified in Procedure 2, paragraph 10.1(3).

(iii) You must test the valid data set for bias according to Procedure 2, section 10.1(4)(i). You may not use biased data in developing your PM CEMS correlation. You must identify and correct the source of the bias before repeating the manual testing program.

(iv) You must correct the RM results to units consistent with the results of your PM CEMS measurements. For example, if your PM CEMS measures and reports PM emissions in the units of mass per actual volume of stack gas, you must correct your RM results to those units (*e.g.,* mg/acm). If your PM CEMS extracts and heats the sample gas to eliminate water droplets, then measures and reports PM emissions under those actual conditions, you must correct your RM results to those same conditions (*e.g.,* mg/acm at 160°C).

(2) During each test run, you must coordinate process operations, RM sampling, and PM CEMS operations. For example, you must assure that: (1) The process is operating at the targeted conditions, (2) both RM trains are sampling simultaneously, and (3) your PM CEMS and data logger are properly operating.

(i) You must coordinate the start and stop times of each run between the RM sampling and PM CEMS operation. For a batch sampling PM CEMS, you must start the RM at the same time as your PM CEMS sampling.

(ii) You must note the times for port changes on the data sheets so that you can adjust your PM CEMS data accordingly, if necessary.

(iii) You must properly align the time periods for your PM CEMS and your RM measurements to account for your PM CEMS response time.

(3) You must conduct a minimum of 15 valid runs each consisting of simultaneous PM CEMS and RM measurements sets.

(i) You may conduct more than 15 sets of CEMS and RM measurement sets. If you choose this option, you may reject certain test results so long as the total number of valid test results you use to determine the correlation is greater than or equal to 15.

(ii) You must report all data, including the rejected data.

(iii) If you reject data, the basis for rejecting data must be explicitly stated in: (1) The RM, (2) this Performance Specification or Procedure 2, or (3) your QA plan.

(iv) If you use more than 15 runs for the correlation test, each emissions concentration level described in section 8.6(4) must contain no fewer than 20 percent of the total number of runs.

(4) Simultaneous PM CEMS and RM measurements must be performed in a

manner to ensure that the range of data for your PM CEMS's correlation is maximized. The range of data must be identified during the Correlation Test Planning Period. You must first attempt to maximize your correlation range by following paragraphs (i) through (iv). If you cannot obtain the three levels as described in (i) through (iv), then you must use the procedure in section (5).

(i) You must attempt to obtain the three different levels of PM mass concentration by varying process or PM control device conditions, or bypassing part of the flue gas around the control equipment.

(ii) The three PM concentration levels you use in the correlation tests must be distributed over the complete operating range experienced by your source.

(iii) At least 20 percent of the minimum 15 measured data points you use must be contained in each of the following levels as determined by your PM CEMS during the Correlation Test Planning Period:

- *Level 1:* From no PM (zero concentration) emissions to 50 percent of the maximum PM concentration;
- *Level 2:* 25 to 75 percent of the maximum PM concentration; and
- *Level 3:* 50 to 100 percent of the maximum PM concentration.

(iv) Although the above levels overlap, you may only apply individual run data to one level.

(5) If you cannot obtain three distinct levels of PM concentration as described, you must perform correlation testing at whatever range of PM concentrations your PM CEMS recorded during the Correlation Test Planning Period. To ensure that the range of data for your PM CEMS's correlation is maximized, you must follow one or more of the steps in paragraphs (i) through (iii).

(i) If you have an extractive PM CEMS, introduce zero air or filtered ambient air into your PM CEMS sample line to obtain instrument response for a particulate free flue gas.

(ii) To obtain zero point data, perform manual RM measurements when the flue gas is free of particulate emissions or contains very low PM concentration (*e.g.*, when your process is not operating but the fans are operating or your source is combusting only natural gas).

(iii) If none of the steps in paragraphs (ii) or (iii) are possible, you must assume what the monitor response should be when no PM is in the flue gas (*e.g.,* 4 mA = 0 mg/acm).

8.7 What do I do with my PM CEMS initial correlation test data? You must calculate and report the results of the correlation testing as cited in section 12. You must include all data sheets, calculations, charts (records of PM CEMS responses), process data records including PM control equipment operating parameters, and manufacturer's reference media certifications necessary to confirm that your PM CEMS met the performance specifications. In addition, you must:

(1) Determine the integrated (arithmetic average) PM CEMS output over each RM test period.

(2) adjust your PM CEMS outputs and RM test data to the same clock time (considering response time of your PM CEMS). (3) confirm that the RM results are consistent with your PM CEMS response in terms of, where applicable, moisture, temperature, pressure, and diluent concentrations.

(4) determine whether any of the RM test results do not meet the test method criteria or the precision and bias criteria in Procedure 2; and

(5) calculate the correlation coefficient, confidence interval, and tolerance interval for the complete set of CEMS/RM correlation data using the procedures in section 12.0.

8.8 What is the limitation on the range of my PM CEMS correlation? Data you collect during the correlation testing should be representative of the full range of normal operating conditions at your source as observed during the Correlation Test Planning Period. You must use these data to develop the correlation, even though this may in some situations consist of data over a narrow range of PM concentration and PM CEMS response that are well below your source's PM emission limit.

(1) If your source later generates three consecutive hourly averages greater than 125 percent of the highest PM CEMS response (*e.g.,* mA reading) used for the correlation curve, you must collect additional correlation data at the higher PM CEMS response unless we, the State and or local enforcement agency determine that repeating the condition is not appropriate. In doing so, you must conduct three additional test runs at the higher response and revise the correlation equation within 30 days after the occurrence of the three consecutive hourly averages. You must use resulting new data along with the previous data to calculate a revised correlation equation.

9.0 What Quality Control Measures Are Required?

Quality control components are presented in 40 CFR part 60, Appendix F, Procedure 2.

10.0 What Calibration and Standardization Procedures Must I Perform? [Reserved]

11.0 What Analytical Procedures Apply to This Procedure?

Specific analytical procedures are outlined in the applicable RM(s).

12.0 What Calculations and Data Analysis Are Needed?

You must determine the primary relationship for correlating output from your PM CEMS to a particulate concentration, typically in units of mg/m³ of flue gas, using the calculations and data analysis process in sections 12.2 and 12.3. You develop the correlation by performing an appropriate regression analysis between your PM CEMS response and your RM data.

12.1 How do I calculate upscale drift and zero drift? To establish reliability of your PM CEMS by achieving specific drift check requirements, you must determine the difference in your PM CEMS output readings from the established reference values (zero and upscale check values) after a stated period of operation during which you performed no unscheduled maintenance, repair, or adjustment.

(1) Calculate the Upscale Drift (UD) using Equation 11–1:

$$UD = \frac{|R_{CEM} - R_V|}{R_V} \times 100 \qquad \text{(Eq. 11-1)}$$

Where:

UD = The upscale (high level) drift of your PM CEMS in percent,

R_{CEM} = The measured PM CEMS response of the upscale reference standard, and

R_V = The pre-established numerical value of the upscale reference standard.

(2) Calculate the Zero Drift (ZD) using Equation 11–2:

$$ZD = \frac{|R_{CEM} - R_L|}{R_V} \times 100 \qquad \text{(Eq. 11-2)}$$

Where:

ZD = The zero (low level) drift of your PM CEMS in percent.

R_{CEM} = The measured PM CEMS response of the zero reference standard, and

R_L = The pre-established numerical value of the zero reference standard.

R_V = The pre-established numerical value of the upscale reference standard.

(3) Summarize the results on a data sheet similar to that shown in Table 11–3 (see section 18).

12.2 How do I prepare my regression analysis? You must couple the measured PM concentration, y, in the appropriate units, with an average PM CEMS response, x, over corresponding time periods. You must complete your PM CEMS correlation calculations using data deemed acceptable by quality control procedures identified in 40 CFR 60 Appendix F, Procedure 2.

(1) You must evaluate all flagged or suspect data produced during measurement periods and determine whether they should be excluded from your PM CEMS's average.

(2) You must adjust the RM PM concentrations to the units of your PM CEMS measurement conditions. The conditions of your PM CEMS measurement are monitor specific. You must obtain from your PM CEMS's vendor the unit of measure for your PM CEMS.

(i) If your sample gas contains entrained water droplets, you must calculate moisture by one of the following methods, as further clarified in subsections (ii) and (iii) below: (1) determined from the impinger analysis, or (2) calculated from a psychrometric chart based on assumed saturation conditions.

(ii) If your PM CEMS measures PM at non-actual conditions (e.g., dry standard conditions), you must use the lower of the two calculated moisture values.

(iii) If your PM CEMS measures PM at an actual stack condition, you must use the measured moisture content from impingers and not moisture calculated based on saturated conditions when adjusting your RM PM data to PM CEMS conditions.

12.3 How do I determine my PM CEMS correlation? To predict PM concentration from PM CEMS responses, you must use the calculation method of least squares presented in paragraphs (1) through (4). This method minimizes the vertical segments from the data points to the fitted correlation. You must investigate the correlations in the order they are presented: polynomial (i.e., second order), logarithmic, and linear (i.e., first order). Finally, your correlation must meet the criteria presented in section 13.

(1) Calculate the coefficients of the polynomial correlation and confidence and tolerance intervals using Equations 11–3 through 11–23.

(i) Calculate the polynomial correlation of Equation 11–3 using Equations 11–4 through 11–9. A least-squares polynomial regression provides the best fit coefficients b_0, b_1, and b_2 for your PM CEMS correlation:

$$\hat{y} = b_0 + b_1 x + b_2 x^2 \qquad \text{(Eq. 11-3)}$$

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

$$S_1 = \sum_{i=1}^{n} (x_1),\ S_2 = \sum_{i=1}^{n} (x_1^2),\ S_3 = \sum_{i=1}^{n} (x_1^3),\ S_4 = \sum_{i=1}^{n} (x_1^4), \qquad \text{(Eq. 11-4)}$$

$$S_5 = \sum_{i=1}^{n} y_1,\ S_6 = \sum_{i=1}^{n} (x_i y_i),\ S_7 = \sum_{i=1}^{n} (x_1^2 y_i). \qquad \text{(Eq. 11-5)}$$

The solutions to b_0, b_1, and b_2 are:

$$b_0 = \frac{(S_5 \cdot S_2 \cdot S_4 + S_1 \cdot S_3 \cdot S_7 + S_2 \cdot S_6 \cdot S_3 - S_7 \cdot S_2 \cdot S_2 - S_3 \cdot S_3 \cdot S_5 - S_4 \cdot S_6 \cdot S_1)}{\det A} \qquad \text{(Eq. 11-6)}$$

$$B_1 = \frac{(n \cdot S_6 \cdot S_4 + S_5 \cdot S_3 \cdot S_2 + S_2 \cdot S_1 \cdot S_7 - S_2 \cdot S_6 \cdot S_2 - S_7 \cdot S_3 \cdot n - S_4 \cdot S_1 \cdot S_5)}{\det A} \qquad \text{(Eq. 11-7)}$$

$$b_2 = \frac{(n \cdot S_2 \cdot S_7 + S_1 \cdot S_6 \cdot S_2 + S_5 \cdot S_1 \cdot S_3 - S_2 \cdot S_2 \cdot S_5 - S_3 \cdot S_6 \cdot n - S_7 \cdot S_1 \cdot S_1)}{\det A} \qquad \text{(Eq. 11-8)}$$

Where:

$$\det A = n \cdot S_2 \cdot S_4 - S_2 \cdot S_2 + \cdot S_1 \cdot S_3 \cdot S_2 - S_3 \cdot S_3 \cdot n + S_2 \cdot S_1 \cdot S_3 - S_4 \cdot S_1 \cdot S_1 \qquad \text{(Eq. 11-9)}$$

(ii) Calculate the two-sided 95 percent confidence interval given by Equation 11–10 for the polynomial regression using Equations 11–11 through 11–16. For any positive value of x, the two-sided confidence interval is given by:

$$(y_{c-lower}, y_{c-upper}) = \hat{y} \pm t_f \cdot S_p \sqrt{\Delta} \qquad \text{(Eq. 11-10)}$$

Where:

$f = n - 3$,

Use the t factors listed in Table 1.

Equation 11–10 is simplified to:

$$(y_{c-lower}, y_{c-upper}) = \hat{y} \pm CI \qquad \text{(Eq. 11-11)}$$

Calculate the confidence interval percent (CI %) by Equation 11–12:

$$CI\% = \frac{CI}{EL} \cdot 100\% \qquad \text{(Eq. 11-12)}$$

Where:

CI = The confidence interval at the median x value

EL = PM emission limit, as described in section 13.2.

Determine the scatter or deviation of y values about the polynomial regression curve (correlation) S_P using Equations 11–13 through 11–16:

$$S_p = \sqrt{\frac{1}{n-3} \sum_{i=1}^{n} (\hat{y}_i - y_i)^2}, \text{ and} \qquad \text{(Eq. 11-13)}$$

$$\Delta = C_0 + 2C_1x + (2C_2 + C_3)x^2 + 2C_4x^3 + C_5x^4. \qquad \text{(Eq. 11-14)}$$

Calculate the C coefficients using Equation 11–15.

$$C_0 = \frac{(S_2 \cdot S_4 - S_3^2)}{D}, C_1 = \frac{(S_3 \cdot S_2 - S_1 \cdot S_4)}{D}, C_2 = \frac{(S_1 \cdot S_3 - S_2^2)}{D}, C_3 = \frac{(nS_4 - S_2^2)}{D}, C_4 = \frac{(S_1 \cdot S_2 - nS_3)}{D} C_5 = \frac{(nS_2 - S_1^2)}{D} \qquad \text{(Eq. 11-15)}$$

Where:

$$D = n(S_2 \cdot S_4 - S_3^2) + S_1(S_3 \cdot S_2 - S_1 \cdot S_4) + S_2(S_1 \cdot S_3 - S_2^2) \qquad \text{(Eq. 11-16)}$$

(iii) Calculate the two-sided tolerance interval given by Equation 11–17 for the polynomial regression using Equations 11–18 through 11–21. For any positive value of x, the two-sided tolerance interval is given by:

$$(y_{t-lower}, y_{t-upper}) = \hat{y} \pm k_T \cdot S_p, \qquad \text{(Eq. 11-17)}$$

Where:

$$k_T = u_{n'} \cdot v_f \qquad \text{(Eq. 11–18)}$$

with f=n − 3, and

$$n' = \frac{1}{\Delta} \qquad \text{(Eq. 11-19)}$$

with $n' \geq 2$.

Use the v_f and $u_{n'}$, values in Table 1.

Equation 11–17 is simplified to:

$$(y_{t-lower}, y_{t-upper}) = \hat{y} \pm TI \qquad \text{(Eq. 11-20)}$$

Calculate the tolerance interval percent (TI %) using Equation 11–21:

$$TI\% = \frac{TI}{EL} \cdot 100\% \qquad \text{(Eq. 11-21)}$$

where:

TI = The tolerance interval at the median x value

EL = PM emission limit, as described in section 13.2.

(iv) Calculate the polynomial correlation coefficient, r, from:

$$r = \sqrt{1 - \frac{S_p^2}{S_y^2}} \qquad \text{(Eq. 11-22)}$$

Where:

$$S_y = \sqrt{\frac{\sum_{i=1}^{n}(y_1 - \bar{y})^2}{n-1}} \qquad \text{(Eq. 11-23)}$$

(v) Any correlation you develop must predict an increased PM concentration with an increased PM CEMS response within the extrapolated range. The sign of the polynomial slope must not change within the extrapolated range of PM CEMS responses. To meet this criterion, the polynomial minimum or maximum must exist outside the expanded data range. The minimum or maximum is the point where the slope of the polynomial curve equals zero. You must calculate the minimum or maximum using Equation 11–24.

$$\text{maximum or minimum} = -\frac{b_1}{2b_2} \qquad \text{(Eq. 11-24)}$$

If $b_2 > 0$, your polynomial curve has a minimum. The minimum must exist outside and below the range of PM CEMS responses collected during the correlation period.

$$-\frac{b_1}{2b_2} < x_i \qquad \text{(Eq. 11-25)}$$

If the relationship in Equation 11–25 is true and the correlation criteria described in section 13.2 are within the acceptable limits, you must proceed to the linear analysis presented in section 12.3(3).

If $b_2 < 0$ your polynomial curve has a maximum. The maximum must be above 125 percent of the highest PM CEMS response during the correlation test.

$$-\frac{b_1}{2b_2} > \text{Highest Extrapolated CEMS Response Point} \qquad \text{(Eq. 11-26)}$$

If the relationship in Equation 11–26 is true and the correlation criteria described in section 13.2 are within the acceptable limits, you must proceed to the linear analysis presented in section 12.3(3).

(2) If the minimum or maximum for the polynomial correlation exists outside the range of PM CEMS responses during the correlation test or the polynomial correlation criteria are not satisfactory, you must also investigate the logarithmic correlation. Perform a logarithmic transformation of each average PM CEMS response (x values). You can use any number greater than 1 for the base of the logarithm, since the same correlation coefficient will result. You must apply all the procedures and equations outlined in the linear model in section 12.3(3) after logarithmic transformation of the x values has occurred.

You must evaluate the logarithmic correlation at the criteria presented in section 13.2. If all acceptance criteria are achieved, you discontinue further analysis and report all PM CEMS responses using the logarithmic curve.

(3) If the minimum or maximum as defined in Equation 11–24 exists inside the range of PM CEMS responses obtain during the correlation test, you must not use the polynomial correlation, and you must perform the following linear regression. Your

PM CEMS data appear on the x axis, and the RM data appear on the y axis.

(i) Calculate the linear regression, which gives the predicted mass emission $\hat{y}$ based on your PM CEMS response x, given by Equation 11–27, using Equations 11–28 through 11–32.

$$\hat{y} = b_0 + b_1 x \qquad \text{(Eq. 11-27)}$$

Where:

$$b_1 = \frac{S_{xy}}{S_{xx}} \qquad \text{(Eq. 11-28)}$$

and

$$b_0 = \bar{y} - b_1 \cdot \bar{x} \qquad \text{(Eq. 11-29)}$$

Calculate the mean values of the x and y data sets using Equation 11–30

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i, \bar{y} = \frac{1}{n} = \sum_{i=1}^{n} y_i \qquad \text{(Eq. 11-30)}$$

where x_i and y_i are the absolute values of the individual measurements and n is the number of data points. Calculate the values of S_{xx}, S_{yy}, and S_{xy} using Equation 11–31,

$$S_{xx} = \sum_{i=1}^{n}\left(x_1 - \bar{x}\right)^2, S_{yy} = \sum_{i=1}^{n}\left(y_1 - \bar{y}\right)^2, S_{xy} = \sum_{i=1}^{n}\left(x_1 - \bar{x}\right)\left(y_i - \bar{y}\right) \qquad \text{(Eq. 11-31)}$$

and then calculate the scatter or deviation of y values about the regression line (correlation), S_L, using Equation 11–32.

$$S_L = \sqrt{\frac{1}{n-2}\sum_{i=1}^{n}\left(\hat{y}_i - y_i\right)^2} \qquad \text{(Eq. 11-32)}$$

(ii) Calculate the two-sided $_{100\ (1-a)\%}$ confidence interval, $y_{c\text{-lower}}$ $y_{c\text{-upper}}$, for the predicted concentration $\hat{y}$ at point x, using Equation 11–33. Then, calculate the confidence interval as a percent of the emission limit at the median x value.

$$\left(y_{c-lower}, y_{c-upper}\right) = \hat{y} \pm t_{f,1-a/2} \cdot S_L \sqrt{\frac{1}{n} + \frac{\left(x-\bar{x}\right)^2}{S_{xx}}}, \text{ with } f = n-2 \qquad \text{(Eq. 11-33)}$$

(iii) Calculate the two-sided tolerance interval, $y_{t\text{-lower}}$ $y_{t\text{-upper}}$, for a future observation at point x, given by Equation 11–34 for the linear regression using Equations 11–35 and 11–36.

$$\left(y_{t-lower}, y_{t-upper}\right) = \hat{y} \pm k_t \cdot s_L \qquad \text{(Eq. 11-34)}$$

$$k_T = u_{n'} \cdot v_f \text{ and } f = n-2 \qquad \text{(Eq. 11-35)}$$

$$n' = \frac{n}{1 + \frac{n \cdot \left(x-\bar{x}\right)^2}{S_{xx}}}, n' \geq 2 \qquad \text{(Eq. 11-36)}$$

Determine the tolerance factor $u_{n'}$ for 75 percent by first calculating n′ and rounding to the nearest whole number. If the calculated $u_{n'}$ is less than 2, n′ = 2. Use the $u_{n'}$ values as a function on n′ and the v and t factors from Table 1. Then, calculate the tolerance interval as a percent of the emission limit at the median x value.

(iv) Calculate the linear correlation coefficient, r, using Equation 11–37.

$$r = \sqrt{1 - \frac{S_L^2}{S_y^2}} \qquad \text{(Eq. 11-37)}$$

Where:

S_y was defined by Equation 11–23.

(v) After calculating the polynomial, logarithmic (if needed), and linear correlations, you must determine which correlation produces the best fit to the correlation data. This test to determine if the fit using a polynomial correlation offers a statistically significant improvement over the linear correlation is shown in Equation 11–38. The test is based on the values of deviation, S, calculated in the two formulations:

S_P is the deviation from the polynomial regression, calculated in Equation 11–13, and

S_L denotes the deviation from the linear regression, calculated in Equation 11–32.

$$\frac{(n-2) \cdot s_L^2 - (n-3) \cdot s_P^2}{s_P^2} > F_{1,f} \qquad \text{(Eq. 11-38)}$$

Where:

df = 1, n − 3

f = n − 3

Put the values for S_P and S_L into Equation 11–38 and compare the result to $F_{1,f}$. Use the values of $F_{1,f}$ at the 95 percent confidence level in Table 2.

If the relationship in Equation 11–38 is true, the polynomial regression gives a better fit at the 95 percent confidence level. Evaluate the criteria described in section 13.2 for the polynomial regression. If the criteria are within the acceptable limits, you report all PM CEMS response values using the polynomial curve.

If the relationship in Equation 11–38 is false, the linear regression gives a better fit at the 95 percent confidence level. Evaluate the criteria described in section 13.2 for the linear regression. If the criteria are within the acceptable limits, you must report all PM CEMS response values using the linear regression.

(4) You may petition the Administrator for alternative solutions or sampling recommendations if the regression analysis presented in paragraphs (1) through (3) does not achieve acceptable correlation, confidence or tolerance intervals.

13.0 What Are the Performance Criteria for My PM CEMS?

You evaluate your PM CEMS based on the 7-day drift check, the accuracy of the correlation, and the sampling periods and cycle/response time.

13.1 What Is the 7-day Drift Check performance specification? Your daily PM CEMS internal drift checks must demonstrate that you PM CEMS does not drift or deviate from the value of the reference light, optical filter, Beta attenuation signal, or other technology-suitable vendor-provided reference standard by more than 2 percent of the upscale value. If your CEMS includes diluent and/or auxiliary monitors (for temperature, pressure, and/or moisture) that are employed as a necessary part of this performance specification, you must determine the calibration drift separately for each ancillary monitor in terms of its respective output (see the appropriate Performance Specification for the diluent CEMS specification). None of the calibration drifts may exceed their separate specification.

13.2 What are the correlation performance specifications? Your PM CEMS correlation must meet each of the minimum specifications in paragraphs (1), (2), and (3). Before confidence and tolerance interval percentage calculations are made, you must convert the emission limit to the appropriate units of your PM CEMS measurement conditions using the average of oxygen and designated gas property (*e.g.,* temperature, pressure, and moisture) values experienced during the correlation test.

(1) The correlation coefficient, r, must be greater than or equal to 0.85.

(2) The confidence interval (95 percent) at the median PM CEMS reading from the correlation test must be within 10 percent of the PM emission limit value specified in the applicable regulation.

(3) The tolerance interval at the median PM CEMS reading from the correlation test must have 95 percent confidence that 75 percent of all possible values are within 25 percent of the PM emission limit value specified in the applicable regulation.

13.3 What are the sampling periods and cycle/response time? You must document and maintain the response time and any changes in the response time following installation.

(1) The response time for your PM CEMS must not exceed 2 minutes to achieve 95 percent of the final stable value.

(2) If you have a batch sampling PM CEMS, you must evaluate the limits presented in paragraphs (i) and (ii).

(i) Your PM CEMS's response time, which is the equivalent to the cycle time, must be no longer than 15 minutes. In addition, the delay between the end of the sampling time and reporting of the sample analysis must be no greater than 3 minutes. You must document any changes in the response time following installation.

(ii) Your PM CEMS's sampling time must be no less than 30 percent of the cycle time. If you have a batch sampling PM CEMS, sampling must be continuous except during pauses when the collected pollutant on the capture media is being analyzed and the next capture medium starts collecting sample.

13.4 What PM compliance monitoring must I do? You must report your CEMS measurements in the units of the standard expressed in the regulations (*e.g.,* mg/dscm @ 7 percent oxygen, lb/mmBtu, etc.). You may need to install auxiliary data monitoring equipment to convert the units reported by your PM CEMS into units of the PM emission standard.

14.0 Pollution Prevention. [Reserved]

15.0 Waste Management. [Reserved]

16.0 Which References Are Relevant To This Performance Specification?

16.1 Technical Guidance Document: Compliance Assurance Monitoring. U.S. Environmental Protection Agency Office of Air Quality Planning and Standards Emission Measurement Center. August 1998.

16.2 40 CFR part 60, Appendix B, ''Performance Specification 2—Specifications and Test Procedures for SO_2 and NO_X, Continuous Emission Monitoring Systems in Stationary Sources.''

16.3 40 CFR part 60, Appendix B, ''Performance Specification 1—Specification and Test Procedures for Opacity Continuous Emission Monitoring Systems in Stationary Sources.

16.4 40 CFR part 60, Appendix A, ''Method 1—Sample and Velocity Traverses for Stationary Sources.''

16.5 ''Current Knowledge of Particulate Matter (PM) Continuous Emission Monitoring,'' U.S. Environmental Protection Agency, EPA–454/R–00–039, September 2000.

16.6 40 CFR part 266, Appendix IX, Section 2, ''Performance Specifications for Continuous Emission Monitoring Systems.''

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

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

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

17.0 What Reference tables and validation data are relevant to PS–11? The information in Tables 1 and 2. Use Table 3 to record your 7-day drift test data.

TABLE 1.—FACTORS FOR CALCULATION OF CONFIDENCE AND TOLERANCE INTERVALS

f or n′	t_f	v_f	$u_{n'}$ (75)
2	4.303	4.415	1.433
3	3.182	2.920	1.340
4	2.776	2.372	1.295
5	2.571	2.089	1.266
6	2.447	1.915	1.247
7	2.365	1.797	1.233
8	2.306	1.711	1.223
9	2.262	1.645	1.214
10	2.228	1.593	1.208
11	2.201	1.551	1.203
12	2.179	1.515	1.199
13	2.160	1.485	1.195
14	2.145	1.460	1.192
15	2.131	1.437	1.189
16	2.120	1.418	1.187
17	2.110	1.400	1.185
18	2.101	1.385	1.183
19	2.093	1.370	1.181
20	2.086	1.358	1.179
21	2.080	1.346	1.178
22	2.074	1.335	1.177
23	2.069	1.326	1.175
24	2.064	1.317	1.174
25	2.060	1.308	1.173
26	2.056	1.301	1.172
27	2.052	1.294	1.172
28	2.048	1.287	1.171
29	2.045	1.281	1.171
30	2.042	1.274	1.170
31	2.040	1.269	1.169
32	2.037	1.264	1.169
33	2.035	1.258	1.168
34	2.032	1.253	1.168
35	2.030	1.248	1.167
36	2.028	1.244	1.167
37	2.026	1.240	1.166
38	2.025	1.236	1.166
39	2.023	1.232	1.165

TABLE 1.—FACTORS FOR CALCULATION OF CONFIDENCE AND TOLERANCE INTERVALS—Continued

f or n′	t_f	v_f	$u_{n'}$ (75)
40	2.021	1.228	1.165
41	2.020	1.225	1.165
42	2.018	1.222	1.164
43	2.017	1.219	1.164
44	2.015	1.216	1.163
45	2.014	1.213	1.163
46	2.013	1.210	1.163
47	2.012	1.207	1.163
48	2.011	1.205	1.162
49	2.010	1.202	1.162
50	2.009	1.199	1.162
51	2.008	1.197	1.162
52	2.007	1.194	1.162
53	2.006	1.191	1.161
54	2.005	1.189	1.161
55	2.005	1.186	1.161
56	2.004	1.183	1.161
57	2.003	1.181	1.161
58	2.002	1.178	1.160
59	2.001	1.176	1.160
60	2.000	1.173	1.160
61	2.000	1.170	1.160
62	1.999	1.168	1.160
63	1.999	1.165	1.159

TABLE 2.—VALUES FOR F_f

f	F_{1f}	f	F_{1f}
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 3.—7-DAY DRIFT TEST DATA

Zero drift day #	Date and time	Zero check value (R_L)	PM CEMS response (R_{CEMS})	Difference ($R_{CEMS} - R_L$)	Zero drift ($R_{CEMS} - R_L$)/R_V
1					
2					
3					
4					
5					
6					
7					

Upscale drift day #	Date and time	Upscale check value (R_V)	PM CEMS response (R_{CEMS})	Difference ($R_{CEMS} - R_V$)	Upscale drift ($R_{CEMS} - R_V$)/R_V
1					
2					
3					
4					
5					
6					
7					

18.0 Are There Example Calculations I Can Use for Following PS–11?

The following table is the data set for a hypothetical monitor and its initial PM CEMS correlation. These PM CEMS measurement conditions are at actual stack conditions. The source emission limit is 34 mg/dscm at 7 percent O_2. X is the CEMS arbitrary unit measurements and Y is the corresponding Method 5 concentration at actual stack conditions. The following series of example calculations provide an illustration of how data are used to determine the correlation coefficient, confidence interval, and tolerance interval for PS–11 treatment. You may use this example to check any spreadsheets that you build.

Run number	PM CEMS response X	Reference method (mg/acm) Y
1	2	3
2	6	5
3	10	4
4	18	8
5	24	12
6	30	14
7	34	16
8	36	15
9	40	17
10	48	18
11	52	17
12	60	19
13	70	18
14	80	21
15	90	23

18.1 Calculate the polynomial correlation. Count the number of simultaneous CEMS and Reference Method samples:

n = 15

The following calculations are necessary for the matrix solution to the polynomial least squares regression analysis.

$$S_1 = \sum_{i=1}^{n}\left(x_i\right) = (2+6+10+\ldots+70+80+90) = 600$$

$$S_2 = \sum_{i=1}^{n}\left(x_i^2\right) = (2^2+6^2+10^2+\ldots+70^2+80^2+90^2) = 34{,}000$$

$$S_3 = \sum_{i=1}^{n}\left(x_i^3\right) = (2^3+6^3+10^3+\ldots+70^3+80^3+90^3) = 2{,}249{,}040$$

$$S_4 = \sum_{i=1}^{n}\left(x_i^4\right) = (2^4+6^4+10^4+\ldots+70^4+80^4+90^4) = 1.63\cdot 10^8$$

$$S_5 = \sum_{i=1}^{n}\left(y_i\right) = (3+5+4+\ldots+18+21+23) = 210$$

$$S_6 = \sum_{i=1}^{n}\left(x_i \cdot y_i\right) = (2\cdot 3)+\ldots+(80\cdot 21)+(90\cdot 23) = 10{,}590$$

$$S_7 = \sum_{i=1}^{n}\left(x_1^2 \cdot y_i\right) = \left(2^2\cdot 3\right)+\left(6_2\cdot 5\right)+\ldots+\left(80^2\cdot 21\right)+\left(90^2\cdot 23\right) = 652{,}572$$

$$A = \begin{bmatrix} n & S_1 & S_2 \\ S_1 & S_2 & S_3 \\ S_2 & S_3 & S_4 \end{bmatrix} = \begin{bmatrix} 15 & 600 & 34{,}000 \\ 600 & 34{,}000 & 2{,}249{,}040 \\ 34{,}000 & 2{,}249{,}040 & 1.630\cdot 10^8 \end{bmatrix}.$$

The determinant of the above matrix is determined by the cross product:

$$\det A = +n\cdot S_2\cdot S_4 - \cdot S_2\cdot S_2\cdot S_2 + S_1\cdot S_3\cdot S_2 - S_3\cdot S_3\cdot n + S_2\cdot S_1\cdot S_3 - S_4\cdot S_1\cdot S_1$$

$$\det A = \begin{matrix} +15\cdot 34{,}000\cdot\left(1.630\cdot 10^8\right) - 34{,}000\cdot 34{,}000\cdot 34{,}000 \\ +600\cdot 2{,}249{,}040\cdot 34{,}000 - 2{,}249{,}040\cdot 2{,}249{,}040\cdot 15 \\ +34{,}000\cdot 600\cdot 2{,}249{,}040 - \left(1.630\cdot 10^8\right)\cdot 600\cdot 600 \end{matrix} = 1.033\cdot 10^{12}$$

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

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

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

$$b_0 = \frac{\begin{array}{c} +210 \cdot 34{,}000 \cdot \left(1.630 \cdot 10^8\right) + 600 \cdot 2{,}249{,}040 \cdot 652{,}572 \\ +34{,}000 \cdot 10{,}590 \cdot 2{,}249{,}040 - \cdot 652{,}572 \cdot 34{,}\ 000 \cdot 34{,}000 \\ -2{,}249{,}040 \cdot 2{,}249{,}040 \cdot 210 - \left(1.630 \cdot 10^8\right) \cdot 10{,}590 \cdot 600 \end{array}}{1.033 \cdot 10^{12}}$$

$$b_0 = \frac{\begin{array}{c} +1.164 \cdot 10^{15} + 8.806 \cdot 10^{14} + 8.098 \cdot 10^{14} \\ -7.544 \cdot 10^{14} - 1.062 \cdot 10^{15} - 1.036 \cdot 10^{15} \end{array}}{1.033 \cdot 10^{12}} = 1.846$$

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

$$b_1 = \frac{\begin{array}{c} +15 \cdot 10{,}590 \cdot 1.63 \cdot 10^8 + 210 \cdot 2{,}249{,}040 \cdot 34{,}000 + 34{,}000 \cdot 600 \cdot 652{,}572 \\ -34{,}000 \cdot 10{,}590 \cdot 34{,}000 - 652{,}572 \cdot 2{,}249{,}040 \cdot 15 - 1.63 \cdot 10^8 \cdot 600 \cdot 210 \end{array}}{1.033 \cdot 10^{12}}$$

$$b_1 = \frac{2.589 \cdot 10^{13} + 1.606 \cdot 10^{13} + 1.331 \cdot 10^{13} - 1.224 \cdot 10^{13} - 2.201 \cdot 10^{13} - 2.504 \cdot 10^{13}}{1.033 \cdot 10^{13}} = 0.4530$$

$$b_2 = \frac{\left(n \cdot S_2 \cdot S_7 + \cdot S_1 \cdot S_6 \cdot S_2 + S_5 \cdot S_1 \cdot S_3 - S_2 \cdot S_2 \cdot S_5 - S_3 \cdot S_6 \cdot n - S_7 \cdot S_1 \cdot S_1\right)}{\det A}$$

$$b_2 = \frac{\begin{array}{c} +15 \cdot 34{,}000 \cdot 652{,}572 + 600 \cdot 10{,}590 \cdot 34{,}000 + 210 \cdot 600 \cdot 2{,}249{,}040 \\ -34{,}000 \cdot 34{,}000 - 2{,}249{,}040 \cdot 10{,}590 \cdot 15 - 652{,}572 \cdot 600 \cdot 600 \end{array}}{1.033 \cdot 10^{12}}$$

$$b_2 = \frac{3.328 \cdot 10^{11} + 2.160 \cdot 10^{11} + 2.834 \cdot 10^{11} - 2.428 \cdot 10^{11} - 3.573 \cdot 10^{11} - 2.349 \cdot 10^{11}}{1.033 \cdot 10^{12}} = -0.00263$$

Note: More significant figures are necessary for correct calculation of b_0, b_1, and b_2.

The general equation for a polynomial equation is written:

Substitute the slopes and intercept calculated above:

$$\hat{y} = b_0 + b_1 x + b_2 x^2$$

$$\hat{y} = 1.846 + 0.4530x - 0.00263x^2$$

The scatter or deviation of y values with respect to y correlation equation S_P is determined:

$$s_p = \sqrt{\frac{1}{n-3} \sum_{i=1}^{n} \left(\hat{y}_i - y_i\right)^2}$$

Y-predict, ŷ, is calculated on a run by run basis using the observed PM concentrations, x, and the polynomial correlation equation.

$\hat{y}$ for Run l where x = 2

$$\hat{y} = 1.846 + 0.4529 \cdot 2 - 0.00263 \cdot 2^2 = 2.742$$

$$s_p = \sqrt{\frac{1}{15-3} \sum_{i=1}^{n} \left((2.742-3)^2 + \ldots + (21.30-23)^2\right)} = 1.434$$

The C coefficients below are necessary for confidence interval calculations:

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

$$\begin{aligned} &+15\left(34{,}000 \cdot 1.63 \cdot 10^8 - 2{,}249{,}040^2\right) \\ D = &+600\left(2{,}249{,}040 \cdot 34{,}000 - 600 \cdot 1.63 \cdot 10^8\right) = 1.033 \cdot 10^{12} \\ &+34{,}000\left(600 \cdot 2{,}249{,}040 - 34{,}000^2\right) \end{aligned}$$

$$C_0 = \frac{\left(S_2 \cdot S_4 - S_3^2\right)}{D} = \frac{\left(34{,}000 \cdot 1.63 \cdot 10^8 - 2{,}249{,}040^2\right)}{1.033 \cdot 10^{12}} = 0.4681$$

$$C_1 = \frac{\left(S_3 \cdot S_2 - S_1 \cdot S_4\right)}{D} = \frac{\left(2{,}249{,}040 \cdot 34{,}000 - 600 \cdot 1.63 \cdot 10^8\right)}{1.033 \cdot 10^{12}} = -0.02064$$

$$C_2 = \frac{\left(S_1 \cdot S_3 - S_2^2\right)}{D} = \frac{\left(600 \cdot 2{,}249{,}040 - 34{,}000^2\right)}{1.033 \cdot 10^{12}} = 1.872 \cdot 10^{-4}$$

$$C_3 = \frac{\left(n \cdot S_4 - S_2^2\right)}{D} = \frac{\left(15 \cdot 1.63 \cdot 10^8 - 34{,}000^2\right)}{1.033 \cdot 10^8} = 0.001247$$

$$C_4 = \frac{\left(S_1 \cdot S_2 - n \cdot S_3\right)}{D} = \frac{\left(600 \cdot 34{,}000 - 15 \cdot 2{,}249{,}040\right)}{1.033 \cdot 10^{12}} = -1.291 \cdot 10^{-5}$$

$$C_5 = \frac{\left(n \cdot S_2 - S_1^2\right)}{D} = \frac{\left(15 \cdot 34{,}000 - 600^2\right)}{1.033 \cdot 10^{12}} = 1.452 \cdot 10^{-7}$$

Delta, Δ, is calculated on a run by run basis using the observed PM concentrations, x.

Δ for Run 1 where x = 2

$$\Delta = C_0 + 2C_1 x + \left(2C_2 + C_3\right)x^2 + 2C_4 x^3 + C_5 x^4$$

$$\Delta = \begin{matrix} 0.4681 + 2\ (-0.02064)\ 2 + \left(2 \cdot 1.872 \cdot 10^{-4} + 0.001247\right)\ 2^2 \\ +2\ \left(-1.291 \cdot 10^{-5}\right) \cdot 2^3 + 1.452 \cdot 10^{-7} 2^4 \end{matrix} = 0.3918$$

18.2 Calculate the polynomial confidence interval. Each ŷ has an associated tolerance and confidence intervals. Acceptance criteria are based on the percent of the interval over the emission limit (see section 13.2).

Recall: Source Emission limit is 34 mg/dscm @7 percent O_2. The example PM CEMS conditions of measurement are equal to the stack conditions.

Convert 34 mg/dscm @7 percent O_2 into units of actual PM concentration:

where:

$C_{s@7\%}$ = 34 mg/dscm @ 7 percent O_2

ts = 292 °F, average temperature during initial PM CEMS Correlation

B_{ws} = 20, average percent moisture during initial PM CEMS Correlation

P = 30 in Hg , average absolute stack pressure during initial PM CEMS Correlation

$$C_{acm} = \left(C_s\right) \cdot \frac{528^0 R}{\left(460 + t_{sp}\right)} \cdot \frac{P}{29.92 inHg} \cdot \left(1 - \frac{B_{ws}}{100}\right)$$

$$C_{acm} = (34) \frac{528^0 R}{(460 + 292)} \cdot \frac{30}{29.92 inHg} \cdot \left(1 - \frac{20}{100}\right) = 19.149 mg/acm$$

Using the polynomial correlation equation, calculate the predicted CEMS response at the median x value (=36).

$$\hat{y} = 1.846 + 0.4530x - 0.00263x^2$$

$$\hat{y} = 1.846 + 0.4530\ (36) - 0.00263\ (36)^2$$

$$\hat{y} = 14.746$$

Calculate Δ at the median x value:

$$\Delta = C_0 + 2C_1x + (2C_2 + C_3)x^2 + 2C_4x^3 + C_5x^4$$

$$\Delta = \begin{matrix} 0.4681 + 2\ (-0.02064)\cdot 36 \\ + \left(2\cdot 1.872\cdot 10^{-4} + 0.001247\right) 36^2 \\ + 2\ \left(-1.291\cdot 10^{-5}\right)\cdot 36^3 + 1.452\cdot 10^{-7} 36^4 \end{matrix} = 0.0948$$

Table 1 lists statistical values as a function of sample size and degrees of freedom.

$$f = n - 3,$$

$$t_f = 2.179$$

Substitute values into the following equation for confidence interval calculation:

$$\left(y_{c-lower}, y_{c-upper}\right) = \hat{y} \pm t_f \cdot s_p \sqrt{\Delta}$$

$$\left(y_{c-lower}, y_{c-upper}\right) = 14.746 \pm 2.179 \cdot 1.434 \sqrt{0.0948}$$

$$\left(y_{c-lower}, y_{c-upper}\right) = 14.746 \pm 0.9621 = (13.784,\ 15.708)$$

$$CI\% = \frac{CI}{EL} \cdot 100\%$$

$$CI\% = \frac{0.9621}{19.149} \cdot 100\% = 5.02\%$$

18.3 The polynomial tolerance interval is calculated through a series of simple calculations and references to Table 1.

$$k_T = u_{n'} \cdot v_f$$

From Table 1 $u_{n'} = 1.203$

$$v_f = 1.5153$$

$$n' = \frac{1}{\Delta}$$

$$n' = \frac{1}{0.0948} = 10.549$$

$$k_T = 1.203 \cdot 1.5153 = 1.8229$$

$$\left(y_{t-lower}, y_{t-upper}\right) = \hat{y} \pm k_T \cdot s_p$$

$$\left(y_{t-lower}, y_{t-upper}\right) = 14.746 \pm 1.8229 \cdot 1.434$$

$$\left(y_{t-lower}, y_{t-upper}\right) = 14.746 \pm 2.6140 = (12.1320,\ 17.3600)$$

$$TI\% = \frac{TI}{EL} \cdot 100\%$$

$$TI\% = \frac{2.6140}{19.149} \cdot 100\% = 13.65\%$$

18.4 Calculate the polynomial correlation coefficient. Correlation, r, is the statistical measure of association between x and y. A value of r near 1 indicates a strong, polynomial relationship, while a value near 0 indicates a poor relationship.

Quantify scatter of y values with respect to the average y:

$$\bar{y} = \frac{1}{n}\sum_{i=1}^{n} y_i = \frac{1}{15}(3+5+4+\ \ldots\ +18+21+23) = 14$$

$$S_y = \sqrt{\frac{\sum_{i=1}^{n}(y_i - \bar{y})^2}{n-1}}$$

$$S_y = \sqrt{\frac{\sum_{i=1}^{n}\left((3-14)^2 + \ldots + (23-14)^2\right)}{15-1}} = 6.279$$

Recall the scatter of y values with respect to y correlation equation:

$$S_p = 1.434$$

$$r = \sqrt{1 - \frac{S_p^2}{S_y^2}} = \sqrt{1 - \frac{1.434^2}{6.279^2}} = 0.9726$$

18.5 What is the acceptability of the polynomial correlation? To meet the criteria, the polynomial minimum or maximum must exist outside the expanded data range. Since $b_2 < 0$, the polynomial curve has a maximum. The maximum occurs where y is:

$$y = -\frac{b_1}{2b_2}$$

$$y = -\frac{0.4530}{2\cdot(-0.002632)} = 86.06$$

The extrapolation of the correlation curve is limited to 125 percent above the highest measured PM CEMS response.

Maximum CEMS response = 90

$$\text{Extrapolated PM CEMS range} = 90\cdot 125\% = 112.5$$

The maximum must occur above the highest extrapolation of correlated range.

$$86.06\ (\text{maximum}) < 112.5$$

In this example data set the polynomial correlation equation predicts that: As the PM CEMS responses increase above 86.06 the PM concentration will decrease. If the source emission limit was outside the extrapolated range a violation would be impossible. This is not acceptable, therefore proceed to the linear analysis.

18.6 Calculate the linear correlation.

Recall the number of simultaneous PM CEMS and RM samples from the table above:

n = 15

Calculate the average RM concentration, x:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i = \frac{1}{15}(2+6+10+\ldots+70+80+90) = 40$$

Calculate the deviations:

$$S_{xx} = \sum_{i=1}^{n}(x_i - \bar{x})^2 = (2-40)^2 + (6-40)^2 + \ldots + (80-40)^2 + (90-40)^2 = 10,000$$

Recall the average PM CEMS Response $\bar{y} = 14$

$$S_{yy} = \sum_{i=1}^{n}(y_1 - \bar{y})^2 = (3-14)^2 + (5-14)^2 +\ \ldots\ + (21-14)^2 + (23-14)^2 = 552$$

$$S_{xy} = \sum_{i=1}^{n}(x_1 - \bar{x})(y_i - \bar{y}) = (2-40)\cdot(3-14) +\ \ldots\ + (90-40)\cdot(23-14) = 2{,}190$$

Calculate the slope (b_1):

$$b_1 = \frac{S_{xy}}{S_{xx}} = \frac{2{,}190}{10{,}000} = 0.2190$$

and the y-intercept (b_0):

$$b_0 = \bar{y} - b_1\bar{x} = 14 - 0.2190\cdot(40) = 5.240$$

These values substituted into the general equation of a line yield the linear correlation for the above data set:

$$\hat{y} = 5.240 + (0.2190)\cdot x$$

The linear deviation is calculated below: Y-predict, $\hat{y}$, is calculated on a run by run basis using the observed PM concentrations, x, and the linear correlation equation: for

$\hat{y}$ for Run 1 where x = 2

$$\hat{y} = 5.240 + (0.2190) \cdot 2 = 5.678$$

$$s_L = \sqrt{\frac{1}{n-2} \sum_{i=1}^{n} (\hat{y}_i - y_i)^2}$$

$$s_L = \sqrt{\frac{1}{15-2} \sum_{i=1}^{n} \left((5.678-3)^2 + \ldots + (24.95-23)^2 \right)} = 2.360$$

18.7 Calculate the linear confidence interval. Recall from the polynomial interval investigations the emission limit at actual stack conditions:

$$C_{acm} = 19.149 \text{mg} / \text{acm}$$

Using the linear correlation equation, calculate the predicted PM CEMS response at the median x value ($\tilde{x}$= 36)

$$\hat{y} = 5.240 + (0.2190)x = 13.124$$

Calculate the confidence interval using the reference values for t_f in Table 1.

$$t_{13,0.975} = 2.160$$

$$(y_{c-lower}, y_{c-upper}) = \hat{y} \pm t_{f,1-\alpha/2} \cdot S_L \sqrt{\frac{1}{n} + \frac{(x-\bar{x})^2}{S_{xx}}} \text{, with } f = n-2$$

$$(y_{c-lower}, y_{c-upper}) = 13.124 \pm 2.160 \cdot 2.360 \sqrt{\frac{1}{15} + \frac{(36-40^2)}{10{,}000}}$$

$$(y_{c-lower}, y_{c-upper}) = 13.124 \pm (2.160) \cdot (2.360) \cdot (0.2613)$$

$$(y_{c-lower}, y_{c-upper}) = 13.124 \pm 1.332$$

$$= (11.792,\ 14.456)$$

Confidence interval percent is calculated from:

$$CI\% = \frac{CI}{EL} \cdot 100\% = \frac{1.332}{19.149} \cdot 100\% = 6.96\%$$

18.8 Calculate the linear tolerance interval. Recall the median x and predicted PM CEMS result as above.

$$y = 13.124$$
$$x = 36$$

Calculate n′:

$$n' = \frac{n}{1 + \frac{n \cdot (x-\bar{x})^2}{S_{xx}}} = \frac{15}{1 + \frac{15 \cdot (36-40)^2}{10{,}000}} = 14.6$$

Reference the values of v_f and $u_{n'}$, from Table 1.

$$v_f = 1.4854$$
$$u_{n'} = 1.189$$

An intermediate calculation is necessary for the tolerance interval:

$$k_T = (1.189)(1.4854) = 1.766$$

$$(y_{t-lower}, y_{t-upper}) = \hat{y} \pm k_T \cdot S_L$$

$$(y_{t-lower}, y_{t-upper}) = 13.124 \pm 1.766 \cdot 2.360$$

$$(y_{t-lower}, y_{t-upper}) = 13.124 \pm 4.168 = (8.956,\ 17.292)$$

Tolerance interval percent

$$TI\% = \frac{TI}{EL} \cdot 100\% = \frac{4.168}{19.149} \cdot 100\% = 21.77\%$$

18.9 Calculate the linear correlation coefficient

Where:

Sy = 6.279 (Defined in the Polynomial Correlation)

$$r = \sqrt{1 - \frac{S_L^2}{S_y^2}} = \sqrt{1 - \frac{2.360^2}{6.279^2}} = 0.9267$$

The linear correlation meets the acceptance criteria. All PM CEMS responses should be reported using the linear correlation equation.

18.10 Determine the best correlation fit. For example purposes only, assume that the maximum calculated in the polynomial correlation had existed outside the extrapolated range of CEMS responses.

A statistical test determines if the fit using a polynomial regression offers a statistically significant improvement over the linear regression based on their values of deviation, S, calculated in the two formulations.

S_Q is the deviation from the polynomial regression.

S_L denotes the deviation from the linear regression.

$$\frac{(n-2) \cdot s_L^2 - (n-3) \cdot s_Q^2}{s_Q^2} > F_{1,f}$$

When:

f = n − 3

Reference values of $F_{1,f}$ at the 95 percent confidence level in Table 2.

$$F_{1,f} = 4750$$

$$\frac{(15-2) \cdot 2.360^2 - (15-3) \cdot 1.434^2}{1.434^2} > 4.750$$

$$23.210 > 4.750$$

The polynomial regression gives a better fit at the 95 percent confidence level.

Correlation type	Linear acceptance criteria	Polynomial acceptance criteria
Correlation Coefficient (r)	0.9321	0.9726
Confidence Interval (CI)	6.96%	5.02%
Tolerance Interval (TI)	21.77%	13.65%

3. Appendix F of Part 60 is amended by adding Procedure 2 to read as follows:

Appendix F to Part 60—Quality Assurance Procedures

* * * * *

Procedure 2—Quality Assurance Requirements for Particulate Matter Continuous Emission Monitoring Systems at Stationary Sources

1.0 What Are the Purpose and Applicability of Procedure 2?

The purpose of Procedure 2 is to establish the minimum requirements for evaluating the effectiveness of quality control (QC) and quality assurance (QA) procedures and the quality of data produced by your particulate matter (PM) continuous emission monitoring system (CEMS). Procedure 2 applies to PM CEMS used for continuously determining compliance with emission standards or operating permit limits as specified in an applicable regulation or permit. Other QC procedures may apply to diluent (e.g.,O_2) monitors and other auxiliary monitoring equipment included with your CEMS to facilitate PM measurement or determination of PM concentration in units specified in an applicable regulation.

1.1 What measurement parameter does Procedure 2 address? Procedure 2 covers the instrumental measurement of PM as defined by your source's applicable RM (no CAS number assigned).

1.2 For what types of devices must I comply with Procedure 2? You must comply with Procedure 2 for the total equipment that:

(1) We require you to install and operate on a continuous basis under the applicable regulation, and

(2) You use to monitor the PM mass concentration associated with the operation of a process or emission control device.

1.3 What are the data quality objectives of Procedure 2? The overall data quality objective (DQO) of Procedure 2 is the generation of valid, representative data that can be transferred into useful information for determining PM CEMS concentrations averaged over a prescribed interval. Procedure 2 is also closely associated with Performance Specification 11 (PS–11).

(1) Procedure 2 specifies the minimum requirements for controlling and assessing the quality of PM CEMS data submitted to us or the delegated permitting authority.

(2) You must meet these minimum requirements if you are responsible for one or more PM CEMS used for compliance monitoring. We encourage you to develop and implement a more extensive QA program or to continue such programs where they already exist.

1.4 What is the intent of the QA/QC Procedures found in Procedure 2? Procedure 2 is intended to establish the minimum QA/QC requirements for PM CEMS, and is presented in general terms to allow you to develop a program that is most effective for your circumstances. You may adopt QA/QC procedures which go beyond these minimum requirements to ensure compliance with applicable regulations.

1.5 When must I comply with Procedure 2? You must comply with Procedure 2 immediately following successful completion of the initial correlation test of PS–11.

2.0 What Are the Basic Requirements of Procedure 2?

Procedure 2 requires you to perform periodic evaluations of PM CEMS performance and to develop and implement QA/QC programs to ensure that PM CEMS data quality is maintained.

2.1 What Are the Basic Functions of Procedure 2?

(1) Assessment of the quality of your PM CEMS data by estimating measurement accuracy, and

(2) Control and improvement of the quality of your PM CEMS data by implementing QC requirements and corrective actions.

(3) When the assessment function in paragraph (1) indicates that the data quality is inadequate, the corrective actions in paragraph (2) must be taken until the data quality is acceptable, and

(4) Assessment of the precision and bias of data gathered using manual RM procedures used to compare PM CEMS instrument response, assuring the quality of the RM data, and

(5) Provides requirements for daily instrument zero and upscale drift checks and sample volume checks as well as routine response correlation audits, absolute correlation audits, sample volume audits, and relative response audits.

3.0 What Special Definitions Apply to Procedure 2?

The definitions in Procedure 2 include those provided in Performance Specification 11 (PS–11) of Appendix B, with the following additions:

3.1 "Absolute Correlation Audit (ACA)" means an evaluation of your PM CEMS response to a series of reference standards covering the full measurement range of the instrument (*e.g.,* 4 mA to 20 mA).

3.2 ''Correlation Range'' means the range of PM CEMS response used in the complete set of correlation test data.

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

3.4 ''Drift Check'' means a determination of the difference in your PM CEMS output readings from the established reference value of a reference standard or procedure after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place. The procedures used to determine drift will be specific to the operating practices of your specific PM CEMS. A drift check includes both a zero drift check and an upscale drift check.

3.5 ''Flagged Data'' means data marked by your CEMS indicating that the response value(s) from one or more CEMS subsystems is suspect, invalid, or that your PM CEMS is not in source measurement operating mode.

3.6 ''PM CEMS Correlation'' means the site-specific relationship (*i.e.*, a regression equation) between the output from your PM CEMS (*e.g.*, mA) and the particulate concentration, as determined by the RM. The PM CEMS correlation is expressed in the units that your PM CEMS measures the PM concentration [(*e.g.*, milligrams/actual cubic meter (mg/acm)]. You must derive this relation from response data from the PM CEMS and simultaneously gathered manual RM data. You must gather these data over the full range of source operating conditions and PM concentrations recorded during the Correlation Test Planning Period. You must develop the correlation by performing the steps presented in sections 12.2 and 12.3 of PS–11.

3.7 ''Reference Method Sampling Location'' means the location in your source's exhaust duct from which you collect manual Reference Method data for developing your PM CEMS correlation and for performing relative response audits (RRAs) and relative correlation audits (RCAs).

3.8 ''Reference Standard'' means a reference material or procedure that produces a known and unchanging response when presented to the pollutant monitor portion of your CEMS. You must use these standards to evaluate the overall operation of your PM CEMS but not to develop a PM CEMS correlation.

3.9 ''Response Correlation Audit (RCA)'' means the series of tests you conduct to assure the continued validity of your PM CEMS correlation.

3.10 ''Relative Response Audit (RRA)'' means the brief series of tests you conduct between the full RCA to assure the continued validity of your PM CEMS correlation.

3.11 ''Sample Volume Audit (SVA)'' means an evaluation of your PM CEMS measurement of sample volume if your PM CEMS determines PM concentration based on a measure of particulate mass in an extracted sample volume and an independent determination of sample volume.

3.12 ''Sample Volume Check'' means a determination of the difference between your PM CEMS sample volume reading and the sample volume reference value.

3.13 ''Upscale Check Value'' means the expected response to a reference standard or procedure used to check the upscale response of your PM CEMS.

3.14 ''Upscale Drift (UD) Check'' means a determination of the difference between your PM CEMS output reading and the upscale check value.

3.15 ''Zero Check Value'' means the expected response to a reference standard or procedure used to check the response of your PM CEMS to particulate free or low particulate concentration situations.

3.16 ''Zero Drift (ZD) Check'' means a determination of the difference between your CEMS output reading and the zero check value.

4.0 Interferences. [Reserved]

5.0 What Do I Need To Know To Ensure the Safety of Persons Using Procedure 2?

People using Procedure 2 may be exposed to hazardous materials, operations, and equipment. Procedure 2 does not purport to address all of the safety issues associated with its use. It is your responsibility to establish appropriate safety and health practices and determine the applicable regulatory limitations before performing this procedure. You must consult your CEMS users manual for specific precautions to be taken with regard to your PM CEMS procedures.

6.0 What Equipment and Supplies Do I Need? [Reserved]

7.0 What Reagents and Standards Do I Need?

You will need reference standards or procedures to perform the zero drift check, the upscale drift check, and the sample volume check.

7.1 What is the reference standard value for the zero drift check? You must use a zero check value that is no greater than 20 percent of the PM CEMS's response range. You must obtain documentation on the zero check value from your PM CEMS manufacturer.

7.2 What is the reference standard value for the upscale drift check? You must use an upscale check value that produces a response between 50 and 100 percent of the PM CEMS's response range. For a PM CEMS that produces output over a range of 4 mA to 20 mA, the upscale check value must produce a response in the range of 12 mA to 20 mA. You must obtain documentation on the upscale check value from your PM CEMS manufacturer.

7.3 What is the reference standard value for the sample volume check? You must use a reference standard value or procedure that produces a sample volume value equivalent to the normal sampling rate. You must obtain documentation on the sample volume value from your PM CEMS manufacturer.

8.0 What Sample Collection, Preservation, Storage, and Transport Are Relevant to This Procedure? [Reserved]

9.0 What Quality Control Measures Are Required by This Procedure for My PM CEMS?

You must develop and implement a QC program for your PM CEMS. Your QC program must, at a minimum, include written procedures which describe in detail complete, step-by-step procedures and operations for the activities in paragraphs (1) through (7).

(1) Procedures for performing drift checks including both zero drift and upscale drift and the sample volume check (see sections 10.2(1), (2), and (5)).

(2) Methods for adjustment of PM CEMS based upon response of checks.

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

(4) Data recording, calculations, and reporting.

(5) Response Correlation Audit and Relative Response Audit procedures including sampling and analysis methods, sampling strategy, and structuring test conditions over the prescribed range of PM concentrations.

(6) Procedures for performing Absolute Correlation Audits and Sample Volume Audits and methods for adjusting your PM CEMS response based upon ACA and SVA results.

(7) Program of corrective action for malfunctioning PM CEMS, including flagged data periods.

9.1 What QA/QC documentation must I have? You are required to keep the QA/QC written procedures on record and available for inspection by us, the State and or local enforcement agency for the life of your CEMS or until you are no longer subject to the requirements of this procedure.

9.2 How do I know if I have acceptable QC procedures for my PM CEMS? Your QC procedures are inadequate or your PM CEMS is incapable of providing quality data if you fail two consecutive QC audits (i.e., out-of-control conditions resulting from the annual audits, quarterly audits or daily checks). Therefore, if you fail the same two consecutive audits, you must revise your QC procedures or modify or replace your PM CEMS to correct the deficiencies causing the excessive inaccuracies. (See section 10.4 for limits for excessive audit inaccuracy.)

10.0 What Calibration/Correlation and Standardization Procedures Must I Perform for My PM CEMS?

You must generate a site-specific correlation for each of your PM CEMS installation(s) relating response from your PM CEMS to results from simultaneous PM RM testing. PS–11 defines procedures for developing the correlation and defines a series of statistical parameters for assessing acceptability of the correlation. However, a critical component of your PM CEMS correlation process is assuring the accuracy and precision of RM data. The activities listed in sections 10.1 through 10.8 assure the quality of the correlation.

10.1 When must I use paired trains for Reference Method testing? You must use paired train RM testing to generate data used to develop your PM CEMS correlation and for RCA testing. Paired trains are not required for the RRA testing.

(1) How should the paired trains be arranged? Such tests should consist of sampling the flue gas using collocated probes and nozzle tips following the general equipment procedures described in EPA Method 301.

(2) Are other paired probe arrangements acceptable? Yes, you must follow the procedures described in paragraphs (i) and (ii).

(i) If collocation of the probes is not possible or practical, use of two single trains inserted through different sample ports at the same stack elevation is the preferred best alternative.

(ii) You can collect simultaneous RM data from different sampling locations if neither of the approaches described in (1) or 2(i) of this section is possible or practical. For this option, you must select sampling locations that minimize the potential for differences in measured PM concentration.

(3) How precise must my RM data be? The relative standard deviation (RSD) of paired data is the parameter used to quantify data precision. Use Equation 2–5 to calculate RSD for two simultaneously gathered data points (population relative standard deviation). Note that an alternate definition of standard deviation may be familiar to you but may not be used. The alternate definition is the default definition in many computer software packages. (i) The precision criterion for RM PM data is that RSD (as defined in Equation 2–5) for any data pair must be such that:

If the average PM concentration is * * *	Then the RSD must be * * *
> 10 mg/dscm	< 10 percent
< 1 mg/dscm	< 25 percent
Between 1 and 10 mg/dscm	< the percentage determined from the following equation: −(15/9) * mg/dscm + 26.667 (i.e., the linear interpolation between 25% at 1 mg/dscm and 10% at 10 mg/dscm.

(ii) You must eliminate pairs of manual method data exceeding the RSD criterion from the data set used to develop a PM CEMS correlation or to assess RCA.

(4) What other criteria must my RM data meet? The potential exists for bias in RM data due to problems with the sampling equipment, operator error, or sample recovery. Systematic errors of this nature can often be identified by cross plotting results from simultaneous dual train tests (i.e., Train A results on x-axis and Train B results on y-axis). Ideally, these data will generate a straight line correlation, passing through the origin, and with a slope of 1.0. To check your data for bias, you must complete the process described in section 10.1(4)(i)

(i) After removing data pairs that fail the precision requirements of section 10.1(3), you must perform a regression analysis of the data pairs and determine the slope of the straight line fit. The slope calculated in the regression analysis must fall between 0.93 and 1.07. Calculated slopes exceeding these criteria strongly suggest that one (or both) of the manual train data sets is/are biased. You may not use biased data in developing your PM CEMS correlation or for evaluating RCA. You must identify and correct the source of the bias before repeating the manual testing program.

10.2 What routine system checks must I perform on my PM CEMS? You must perform routine checks to assure proper operation of system electronics and optics, light and radiation sources and detectors, electric or electro-mechanical systems, and general stability of the system calibration. Necessary components of the routine system checks will depend upon design details of your PM CEMS. As a minimum, you must verify the system operating parameters listed in paragraphs (1) through (5) on a daily basis. Some PM CEMS may perform one or more of these functions automatically or as an integral portion of unit operations; other PM CEMS may perform one or more of these functions manually.

(1) You must check the zero drift to assure stability of your PM CEMS response to the zero check value. You must determine system output on the most sensitive measurement range when the PM CEMS is challenged with a zero reference standard or procedure. You must, at a minimum, adjust your PM CEMS whenever the daily zero drift exceeds 4 percent.

(2) You must check the upscale drift to assure stability of your PM CEMS response to the upscale check value. You must determine system output when the PM CEMS is challenged with a reference standard or procedure corresponding to the upscale check value. You must, at a minimum, adjust your PM CEMS whenever the daily upscale drift check exceeds 4 percent.

(3) For light scattering and extinction type PM CEMS, you must check the system optics to assure that system response has not been altered by the condition of optical components such as fogging of lens and performance of light monitoring devices. You must carefully adhere to the manufacturer's procedures and specifications.

(4) You must record data from your automatic drift adjusting PM CEMS before any adjustment is made. You must program a PM CEMS that automatically adjusts its response to the corrected calibration values (e.g., microprocessor control) to record the unadjusted concentration measured in the drift check before resetting the calibration, if performed, or to record the amount of adjustment.

(5) For extractive type PM CEMS that measures the sample volume and uses the measured sample volume as part of calculating the output value, you must check the sample volume to verify the sample volume measuring equipment. This sample volume check must be done at the normal sampling rate of your PM CEMS. You must adjust your PM CEMS sample volume measurement whenever the daily sample volume check error exceeds 10 percent.

10.3 What are the auditing requirements for my PM CEMS? You must subject your PM CEMS to an ACA and an SVA, as applicable, at least once each calender quarter. Successive quarterly audits must occur no closer than 2 months. You must conduct a RCA at the frequency specified in the applicable regulation or facility operating permit. You must conduct an RRA once every four calendar quarters. If you schedule an RCA for one of the four calendar quarters in the year, the RCA would take the place of the RRA.

(1) When do I need to run an ACA? You must run an ACA each quarter.

(2) How do I conduct an ACA? You must challenge your PM CEMS with an audit standard or an equivalent audit reference to reproduce the PM CEMS's measurement at three points within the following ranges:

Audit point	Audit range
1	0 to 20% of measurement range,
2	40 to 60% of measurement range, and
3	70 to 100% of measurement range.

(i) You must then challenge your PM CEMS three times at each audit point, and use the average of the three responses in determining accuracy at each audit point. Use a separate audit standard for audit points 1, 2, and 3. Challenge the PM CEMS at each audit point for a sufficient period of time to assure that your PM CEMS response has stabilized.

(ii) Operate your PM CEMS in the mode, manner and range specified by the manufacturer.

(iii) Use only audit standards specified and provided by the manufacturer. Store, maintain, and use audit standards as specified by the manufacturer.

(iv) Use the difference between the actual known value of the audit standard specified by the manufacturer and the response of your PM CEMS to assess the accuracy of your PM CEMS.

(3) When do I need to run a SVA? You must perform an audit of the measured sample volume (e.g., the sampling flow rate for a known time) once per quarter for applicable PM CEMS with an extractive sampling system. Also, you must perform and pass an SVA prior to initiation of any of the RM data collection runs for an RCA or RRA.

(i) How do I perform the SVA? You must perform the SVA by independently measuring the volume of sample gas extracted from the stack or duct over each batch cycle or time period with a calibrated device. You may make this measurement either at the inlet or outlet of your PM CEMS, so long as it measures the sample gas volume without including any dilution or recycle air. Compare the measured volume with the volume reported by your PM CEMS for the same cycle or time period to calculate sample volume accuracy.

(ii) How many measurements do I make for the SVA? You must make measurements during three sampling cycles for batch extractive monitors (e.g., Beta-gauge) or during three periods of at least 20 minutes for continuous extractive PM CEMS.

(iii) Do I need to take any precautions when doing the SVA? You may need to condense, collect and measure moisture from the sample gas prior to the calibrated measurement device (e.g., dry gas meter), and correct the results for moisture content. In any case, the volumes measured by the calibrated device and your PM CEMS must be on a consistent temperature, pressure, and moisture basis.

(4) How often must I conduct an RRA? You must conduct an RRA once every four calendar quarters.

(i) How do I conduct an RRA? You must conduct the RRA by collecting three simultaneous RM PM concentration measurements and PM CEMS measurements at the as-found source operating conditions and PM concentration.

(ii) Paired trains for the RM sampling are not required but are recommended to avoid failing the test due to imprecise and inaccurate RM results.

(5) When do I need to run an RCA? You must conduct an RCA at the frequency specified in the applicable regulation or facility operating permit.

(i) How do I conduct an RCA? You must conduct the RCA test according to the procedures described in PS–11 section 8.6, except that the minimum number of runs required is 12 in the RCA instead of 15 as specified in PS–11.

(ii) All 12 data points must lie within the PM CEMS output range examined during the PM CEMS correlation tests.

(6) What other alternative audits can I use? You can use other alternative audit procedures as approved by us, the State or local agency for the quarters when you would conduct ACAs.

10.4 What are my limits for excessive audit inaccuracy? Unless specified otherwise in the applicable subpart, the criteria for excessive inaccuracy are listed in paragraphs (1) through (6).

(1) What are the criteria for excessive zero or upscale drift? Your PM CEMS is out of control if either the zero drift check or upscale drift check exceeds 4 percent for five consecutive daily periods, or exceeds 8 percent for any one day.

(2) What are the criteria for excessive sample volume measurement error? Your PM CEMS is out of control if sample volume check error exceeds 10 percent for five consecutive daily periods, or exceeds 20 percent for any one day.

(3) What are the criteria for excessive absolute correlation audit error? Your PM CEMS is out of control if results exceed ± 10 percent of the average audit value or 7.5 percent of the applicable standard, whichever is greater.

(4) What is the criterion for excessive sample volume audit error? Your PM CEMS is considered out of control if results exceed ± 5 percent of the average sample volume audit value.

(5) What is the criterion to pass the relative correlation audit? At least 75 percent of a minimum number of 12 sets of PM CEMS and RM measurements must fall within a specified area on a graph of the correlation regression line. The specified area on the graph of the correlation regression line is two lines parallel with the correlation regression line, offset at a distance of ± 25 percent of the numerical emission limit value from the correlation regression line. If your PM CEMS fails to meet this RCA criterion, it is considered out of control.

(6) What is the criterion to pass the relative response audit? At least two of the three sets of PM CEMS and RM measurements must fall within the same specified area on a graph of the correlation regression line as required for the RCA. If your PM CEMS fails to meet this RRA criterion, it is considered out of control.

10.5 What do I do if my PM CEMS is out of control? You must take the actions listed in paragraphs (1) and (2) if your PM CEMS is out of control.

(1) You must take necessary corrective action to eliminate the problem and perform tests as appropriate to assure that the corrective action was successful.

(i) Following corrective action, you must repeat the previously failed audit to confirm that your PM CEMS is operating within the specifications.

(ii) If your PM CEMS failed an RRA, you must take corrective action until your PM CEMS passes the RRA criteria. If the RRA criteria cannot be achieved, you must perform an RCA.

(iii) If your PM CEMS failed an RCA, you must follow procedures defined in section 10.6.

(2) You must report both the audit showing your PM CEMS to be out of control and the results of the audit following corrective action showing your PM CEMS to be operating within specifications.

10.6 What do I do if my PM CEMS fails an RCA? After an RCA failure, you must take all applicable actions listed in paragraphs (1) and (2).

(1) Combine RCA data with data from the active PM CEMS correlation and perform the mathematical evaluations defined in PS–11 for development of a PM CEMS correlation including examination of alternate forms of the curve fit (*e.g.,* linear, polynomial, and logarithmic fits). If the expanded data base and revised correlation meet PS–11 statistical criteria, use the revised correlation.

(2) If the criteria in paragraph (1) of this section are not achieved, you must develop a new PM CEMS correlation based on revised data. The revised data set must consist of the test results from only the RCA. The new data must meet all requirements of PS–11 to develop a revised PM CEMS correlation. Your PM CEMS is considered to be back in controlled status when the revised correlation meets all statistical criteria of PS–11.

(3) If the actions in paragraphs (1) and (2) of this section do not result in an acceptable correlation, you must evaluate the cause(s)and comply with the actions listed in paragraphs (i) through (iv) within 90 days after the completion of the failed RCA.

(i) Completely inspect your PM CEMS for mechanical or operational problems. If you find a mechanical or operational problem, repair your PM CEMS and repeat the RCA.

(ii) You may need to relocate your PM CEMS to a more appropriate measurement location. If you relocate your PM CEMS, you must perform a new correlation test according to PS–11 procedures.

(iii) The characteristics of the PM or gas in your source's flue gas stream may have changed such that your PM CEMS measurement technology is no longer appropriate. If this is the case, you must install a PM CEMS with measurement technology that is appropriate for your source's flue gas characteristics. You must perform a new correlation test according to PS–11 procedures.

(iv) If the corrective actions in paragraphs (i) through (iii) were not successful, you must petition us, the State or local agency for approval of alternative criteria or an alternative for continuous PM monitoring.

10.7 When does the out of control period begin and end? The out of control period begins immediately after the last test run or check of an unsuccessful RCA, RRA, ACA, SVA, drift check, or sample volume check. The out of control period ends immediately after the last test run or check of the subsequent successful audit or drift check.

10.8 What happens to my PM CEMS data during out of control periods? During the period the PM CEMS is out of control, you may not use your PM CEMS data to calculate emission compliance or to meet minimum data availability requirements described in the applicable regulation.

10.9 What are the QA/QC reporting requirements for my PM CEMS? You must report the accuracy results from section 10 for your PM CEMS at the interval specified in the applicable regulation. Report the drift and accuracy information as a Data Assessment Report (DAR), and include one copy of this DAR for each quarterly audit with the report of emissions required under the applicable regulation. An example DAR is provided in Procedure 1, Appendix F of this Part.

10.10 What minimum information must I include in my DAR? As a minimum, you must include the information listed in paragraphs (1) through (5) in the DAR.

(1) Your name and address.

(2) Identification and location of monitors in your CEMS.

(3) Manufacturer and model number of each monitor in your CEMS.

(4) Assessment of PM CEMS data accuracy/acceptability, and date of assessment, as determined by an RCA, RRA, ACA, or SVA described in section 10, including the acceptability determination for the RCA or RRA, the accuracy for the ACA or SVA, the

RM results, the audit standards, your PM CEMS responses, and the calculation results as defined in section 12. If the accuracy audit results show your PM CEMS to be out of control, you must report both the audit results showing your PM CEMS to be out of control and the results of the audit following corrective action showing your PM CEMS to be operating within specifications.

(5) Summary of all corrective actions you took when you determined your PM CEMS to be out of control, as described in sections 10.5 and 10.6.

10.11 Where and how long must I retain the QA data that this procedure requires me to record for my PM CEMS? You must keep the records required by this procedure for your PM CEMS onsite and available for inspection by us, the State and or local enforcement agency for a period of 5 years.

11.0 What Analytical Procedures apply to This Procedure?

Sample collection and analysis are concurrent for this procedure. You must refer to the appropriate RM for the specific analytical procedures.

12.0 What Calculations and Data Analysis Must I Perform for My PM CEMS?

(1) How do I determine RCA and RRA acceptability? You must plot each of your PM CEMS/RM data from the RCA test or the RRA test on a figure based on your PM CEMS correlation line to determine if the criterion in paragraphs 10.4(5) or (6), respectively, is met.

(2) How do I calculate ACA Accuracy? You must use Equation 2–1 to calculate results from the ACA tests for each of the three audit points.

$$\text{ACA Accuracy} = \frac{\left|R_{CEM} - R_V\right|}{R_V} \times 100 \qquad \text{[Eq. 2-1]}$$

Where:

ACA Accuracy = The ACA accuracy at each audit point, in percent,
R_{CEM} = Your PM CEMS response to the reference standard, and
R_V = The reference standard value.

(3) How do I calculate daily upscale and zero drift? You must calculate the upscale drift (UD) according to Equation 2–2 and the zero drift (ZD) according to Equation 2–3.

$$UD = \frac{\left|R_{CEM} - R_V\right|}{R_V} \times 100 \qquad \text{[Eq. 2-2]}$$

Where:

UD = The upscale drift of your PM CEMS, in percent,
R_{CEM} = Your PM CEMS response to the upscale check value, and
R_V = The upscale check value.

$$ZD = \frac{\left|R_{CEM} - R_L\right|}{R_V} \times 100 \qquad \text{[Eq. 2-3]}$$

Where:

ZD = The zero (low level) drift of your PM CEMS, in percent,
R_{CEM} = Your PM CEMS response of the zero check value,
R_L = The zero check value, and
R_V = The upscale check value.

(4) How do I calculate SVA Accuracy? You must use Equation 2–4 to calculate accuracy, in percent, for each of the three SVA tests or the daily sample volume check:

$$\text{Accuracy} = \frac{\left(V_R - V_M\right)}{V_R} \times 100 \quad \text{[Eq. 2-4]}$$

Where:

V_M = Sample gas volume determined/reported by your PM CEMS (e.g., dscm) and
V_R = Sample gas volume measured by the independent calibrated reference device (e.g., dscm) for the SVA or the reference value for the daily sample volume check.

Note: You must calculate/correct the volume values above to the same basis of temperature, pressure and moisture contents. You must document all data and calculations.

(5) How do I calculate relative standard deviation (RSD)? You must use Equation 2–5 to calculate the RSD for two simultaneously gathered data points (population relative standard deviation).

$$RSD = 100 \times \frac{\left|\left(C_a - C_b\right)\right|}{\left(C_a + C_b\right)} \qquad \text{[Eq. 2-5]}$$

Where:

C_a and C_b = Concentration values, mg/dscm, determined from trains A and B, respectively.

13.0 *Method Performance.* [Reserved]

14.0 *Pollution Prevention.* [Reserved]

15.0 *Waste Management.* [Reserved]

16.0 *Which References Are Relevant to This Method?* [Reserved]

17.0 *What Tables, Diagrams, Flowcharts, and Validation Data Are Relevant to This Method?* [Reserved]

[FR Doc. 01–30367 Filed 12–11–01; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 62

[IA 0144–1144; FRL–7117–6]

Approval and Promulgation of State Plans for Designated Facilities and Pollutants; Control of Emissions From Hospital/Medical/Infectious Waste Incinerators; State of Iowa

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: EPA proposes to approve a revision to the state of Iowa's section 111(d) plan for controlling emissions from existing hospital/medical/infectious waste incinerators.

In the final rules section of the **Federal Register**, EPA is approving the state's submittal as a direct final rule without prior proposal because the Agency views this as noncontroversial and anticipates no relevant adverse comments to this action. A detailed rationale for the approval is set forth in the direct final rule. If no relevant adverse comments are received in response to this action, no further activity is contemplated in relation to this action. If EPA receives relevant 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 action. EPA will not institute a second comment period on this action. Any parties interested in commenting on this action should do so at this time. Please note that if EPA receives adverse comment on part of this rule and if that part can be severed from the remainder of the rule, EPA may adopt as final those parts of the rule that are not the subject of an adverse comment.

DATES: Comments on this proposed action must be received in writing by January 11, 2002.

ADDRESSES: Comments may be mailed to Wayne Kaiser, Environmental Protection Agency, Air Planning and Development Branch, 901 North 5th Street, Kansas City, Kansas 66101.

FOR FURTHER INFORMATION CONTACT: Wayne Kaiser at (913) 551–7603.

SUPPLEMENTARY INFORMATION: See the information provided in the direct final rule which is located in the rules section of the **Federal Register**.

Dated: December 2, 2001.

William Rice,

Acting Regional Administrator, Region 7.

[FR Doc. 01–30739 Filed 12–11–01; 8:45 am]

BILLING CODE 6560–50–P