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40 CFR Part 60

Performance Specification 18—Specifications and Test Procedures for Gaseous HCl Continuous Emission Monitoring Systems at Stationary Sources; Proposed Rule

## ENVIRONMENTAL PROTECTION AGENCY

### 40 CFR Part 60

[EPA-HQ-OAR-2013-0696; FRL-9909-79-OAR]

RIN 2060-5689

### Performance Specification 18—Specifications and Test Procedures for Gaseous HCl Continuous Emission Monitoring Systems at Stationary Sources

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Proposed rule.

**SUMMARY:** The Environmental Protection Agency (EPA) is proposing performance specifications and test procedures for hydrogen chloride continuous emission monitoring systems to provide sources and regulatory agencies with criteria and test procedures for evaluating the acceptability of hydrogen chloride continuous emission monitoring systems. The proposed specification (Performance Specification 18) includes requirements for initial acceptance including instrument accuracy and stability assessments. This action also proposes quality assurance procedures for hydrogen chloride continuous emission monitoring systems used for compliance determination at stationary sources. The quality assurance procedures (Procedure 6) specify the minimum quality assurance requirements necessary for the control and assessment of the quality of continuous emission monitoring systems data submitted to the EPA.

This action would establish consistent requirements for ensuring and assessing the quality of data measured by hydrogen chloride continuous emission monitoring systems. The affected systems are those used for determining compliance with emission standards for hydrogen chloride on a continuous basis as specified in an applicable permit or regulation. The affected industries and their North American Industry Classification System codes are listed in the **SUPPLEMENTARY INFORMATION** section of this preamble.

**DATES:** *Comments.* Comments must be received on or before June 13, 2014.

*Public Hearing.* The EPA will hold a public hearing on this rule if requested. Requests for a hearing must be made by May 27, 2014. Requests for a hearing should be made to Ms. Candace Sorrell via email at [sorrell.candace@epa.gov](mailto:sorrell.candace@epa.gov) or by phone at (919) 541-1064. If a hearing is requested, it will be held on May 28, 2014 at the EPA facility in Research Triangle Park, NC.

**ADDRESSES:** *Comments.* Submit your comments, identified by Docket ID No. EPA-HQ-OAR-2013-0696, by one of the following methods:

- <http://www.regulations.gov>: Follow the online instructions for submitting comments.
- *Email:* [a-and-r-docket@epa.gov](mailto:a-and-r-docket@epa.gov), Attention Docket ID Number EPA-HQ-OAR-2013-0696.
- *Fax:* (202) 566-9744, Attention Docket ID No. EPA-HQ-OAR-2013-0696.
- *Mail:* U.S. Postal Service, send comments to: EPA Docket Center, William J. Clinton (WJC) West Building, Attention Docket ID Number EPA-HQ-OAR-2013-0696, U.S. Environmental Protection Agency, Mail code: 28221T, 1200 Pennsylvania Ave. NW., Washington, DC 20460. Please include a total of two copies.
- *Hand Delivery:* U.S. Environmental Protection Agency, WJC West Building (Air Docket), Room 3334, 1301 Constitution Ave. NW., Washington, DC, 20004, Attention Docket ID Number EPA-HQ-OAR-2013-0696. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

*Instructions.* Direct your comments to Docket ID Number EPA-HQ-OAR-2013-0696. The EPA's policy is that all comments received will be included in the public docket without change and may be made available online at <http://www.regulations.gov>, including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through <http://www.regulations.gov> or email. The <http://www.regulations.gov> Web site is an "anonymous access" system, which means the EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an email comment directly to the EPA without going through <http://www.regulations.gov>, your email address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, the EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD-ROM you submit. If the EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, the EPA may not

be able to consider your comment. Electronic files should not include special characters or any form of encryption and be free of any defects or viruses. For additional information about the EPA's public docket, visit the EPA Docket Center homepage at: <http://www.epa.gov/epahome/dockets>.

*Docket:* The EPA has established a docket for this rulemaking under Docket ID Number EPA-HQ-OAR-2013-0696. All documents in the docket are listed in the [regulations.gov](http://www.regulations.gov) index. Although listed in the index, some information is not publicly available, e.g., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy. Publicly available docket materials are available either electronically in [regulations.gov](http://www.regulations.gov) or in hard copy at the EPA Docket Center, WJC West Building, Room 3334, 1301 Constitution Ave. NW., Washington, DC 20004. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the EPA Docket Center is (202) 566-1742.

**FOR FURTHER INFORMATION CONTACT:** For questions about this proposed action, contact Ms. Candace Sorrell, Office of Air Quality Planning and Standards, Air Quality Assessment Division (AQAD), Measurement Technology Group, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27709; telephone number: (919) 541-1064; fax number: (919) 541-0516; email address: [sorrell.candace@epa.gov](mailto:sorrell.candace@epa.gov).

#### **SUPPLEMENTARY INFORMATION:**

*Organization of this Document.* The information in this preamble is organized as follows:

- I. General Information
  - A. Does this action apply to me?
  - B. Where can I get a copy of this document and other related information?
  - C. What should I consider as I prepare my comments for the EPA?
- II. Background
- III. Summary of Proposed Performance Specification 18
  - A. What is the purpose of PS-18?
  - B. Who must comply with PS-18?
  - C. When must I comply with PS-18?
  - D. What are the basic requirements of PS-18?
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- IV. Summary of Proposed Procedure 6
  - A. What is the purpose of Procedure 6?
  - B. Who must comply with Procedure 6?
  - C. When must I comply with Procedure 6?
  - D. What are the basic requirements of Procedure 6?

- E. What are the reporting and recordkeeping requirements for Procedure 6?
- V. Rationale for Selecting the Proposed Requirements of Performance Specification 18 and Procedure 6
  - A. What information did we use to develop PS-18 and Procedure 6?
  - B. How did we select the requirements for PS-18 and Procedure 6?
  - C. Solicitation for Comment
- VI. Statutory and Executive Order Reviews
  - A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review
  - B. Paperwork Reduction Act
  - C. Regulatory Flexibility Act
  - D. Unfunded Mandates Reform Act
  - E. Executive Order 13132: Federalism

- F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments
- G. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks
- H. Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use
- I. National Technology Transfer and Advancement Act
- J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

performance specification 18 (PS-18) and the quality assurance (QA) requirements of Procedure 6 for gaseous hydrogen chloride (HCl) continuous emission monitoring systems (CEMS) are those entities that are required to install a new CEMS, relocate an existing CEMS, or replace an existing CEMS under any applicable subpart of 40 CFR parts 60, 61 or 63. Table 1 of this preamble lists the current federal rules by subpart and the corresponding source categories to which the proposed PS-18 and Procedure 6 potentially would apply.

**I. General Information**

*A. Does this action apply to me?*

The major entities that would potentially be affected by the proposed

**TABLE 1—SOURCE CATEGORIES THAT WOULD BE SUBJECT TO PS-18 AND PROCEDURE 6**

Subpart(s)	Source category
<b>40 CFR part 60</b>	
Subpart F .....	Portland Cement Plants.
Subpart Da .....	Fossil Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units.
<b>40 CFR part 63</b>	
Subpart LLL .....	Portland Cement Manufacturing Industry.
Subpart UUUUU .....	Coal- and Oil-fired Electric Utility Steam Generating Units.

The requirements of the proposed PS-18 and Procedure 6 may also apply to stationary sources located in a state, district, reservation or territory that adopts PS-18 or Procedure 6 in its implementation plan.

Should PS-18 and Procedure 6 ultimately be finalized, we plan to amend 40 CFR part 63 subpart UUUUU, National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-fired Electric Utility Steam Generating

Units to offer PS-18 and Procedure 6 as an alternative to PS-15 for continuous monitoring of HCl. Note, however, that the alternative test method approval process of 63.7(f) is already available, even without any regulatory amendment, as a way for affected facilities to request approval to use PS-18/Procedure 6 in lieu of PS-15.

With regard to 40 CFR part 63, Subpart LLL which affects Portland cement manufacturing facilities and

includes HCl monitoring requirements, should PS-18 and Procedure 6 be finalized, no amendments will be needed as Subpart LLL already allows for use of any promulgated performance specification for HCl CEMS in 40 CFR part 60, Appendix B.

Table 2 lists the corresponding North American Industry Classification System (NAICS) codes for the source categories listed in Table 1 of this preamble.

**TABLE 2—NAICS FOR POTENTIALLY REGULATED ENTITIES**

Industry	NAICS Codes
Fossil Fuel-Fired Electric Utility Steam Generating Units .....	327310
Portland Cement Manufacturing Plants .....	<sup>a</sup> 921150 327310

<sup>a</sup> Industry in Indian Country.

Tables 1 and 2 are not intended to be exhaustive, but rather they provide a guide for readers regarding entities potentially affected by this action. If you have any questions regarding the potential applicability of the proposed PS-18 and test procedures (Procedure 6) to a particular entity, consult the person listed in the **FOR FURTHER INFORMATION CONTACT** section.

*B. Where can I get a copy of this document and other related information?*

In addition to being available in the docket, an electronic copy of this action is available on the Internet through the EPA's Technology Transfer Network (TTN) Web site, a forum for information and technology exchange in various areas of air pollution control. Following

signature by the EPA Administrator, the EPA will post a copy of this proposed action on the TTN's policy and guidance page for newly proposed or promulgated rules at: <http://www.epa.gov/ttn/oarpg/t3pfpr.html>. Following publication in the **Federal Register**, the EPA will post the signed proposal and key technical documents

on the project Web site: <http://www.epa.gov/ttn/emc/proposed.html>.

*C. What should I consider as I prepare my comments for the EPA?*

#### 1. Submitting CBI

Do not submit information containing CBI to the EPA through <http://www.regulations.gov> or email. Clearly mark the part or all of the information that you claim to be CBI. For CBI information on a disk or CD-ROM that you will mail to the EPA, mark the outside of the disk or CD-ROM as CBI and then identify electronically within the disk or CD-ROM the specific information that is claimed as CBI. In addition to one complete version of the comments that includes information claimed as CBI, you must submit a copy of the comments that does not contain the information claimed as CBI for inclusion in the public docket. If you submit a CD-ROM or disk that does not contain CBI, mark the outside of the disk or CD-ROM clearly that it does not contain CBI. Information not marked as CBI will be included in the public docket and the EPA's electronic public docket without prior notice. Information marked as CBI will not be disclosed except in accordance with procedures set forth in 40 Code of Federal Regulations (CFR) part 2. Send or deliver information identified as CBI only to the following address: Roberto Morales, OAQPS Document Control Officer (C404-02), OAQPS, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, Attention Docket ID Number EPA-HQ-OAR-2013-0696.

#### 2. Tips for Preparing Your Comments

When submitting comments, remember to:

- Identify the rulemaking by docket number and other identifying information (subject heading, **Federal Register** date and page number).
- Follow directions. Respond to specific questions and organize comments by a section number.
- Explain why you agree or disagree; suggest alternatives and substitute language for your requested changes.
- Describe any assumptions and provide any technical information and/or data that you used.
- If you estimate potential costs or burdens, explain how you arrived at your estimate in sufficient detail to allow for it to be reproduced.
- Provide specific examples to illustrate your concerns and suggest alternatives.
- Explain your views as clearly as possible, avoiding the use of profanity

or personal threats or character assassination.

- Make sure to submit your comments by the comment period deadline.

## II. Background

The EPA recently promulgated the Portland Cement Maximum Achievable Control Technology (MACT) rule (75 FR 54970, September 9, 2010; 78 FR 10006, February 12, 2013) and the Mercury and Air Toxics Standards (MATS) rule (77 FR 9303, February 16, 2012; 78 FR 24075, April 24, 2013). Both rules specify the use of extractive Fourier Transform Infrared Spectroscopy (FTIR) and PS-15 when affected facilities opt or are required to continuously measure HCl emissions. To facilitate use of alternative technologies to FTIR and aid in measuring the low levels of HCl specified in those rules the EPA has developed and is proposing these new specifications and quality control (QC) procedures (PS-18 and Procedure 6) for HCl CEMS as an alternative to the use of PS-15.

Multiple technologies are available for HCl emissions monitoring. The goals of the proposed PS-18 and Procedure 6 are (1) to allow for the use of different HCl CEMS sampling and analytical technologies as long as the required performance criteria set out in the performance specification (PS) are met; and (2) to establish consistent requirements for ensuring and assessing the quality of data measured by HCl CEMS.

## III. Summary of Proposed Performance Specification 18

### A. What is the purpose of PS-18?

Proposed PS-18 establishes the criteria to evaluate acceptable performance of HCl CEMS at the time of installation or soon after and when regulations require reevaluation of HCl CEMS performance.

### B. Who must comply with PS-18?

You may comply with PS-18 as an alternative to other HCl CEMS performance specifications (*e.g.*, PS-15) allowed under an applicable subpart if you use CEMS to monitor HCl emissions from controlled and uncontrolled emission sources subject to HCl CEMS requirements under a part 60, 61 or 63 regulation.

### C. When must I comply with PS-18?

If you are the owner or operator of existing facilities required to install HCl CEMS in compliance with an associated rule, regulation or permit, you must comply with PS-18 if you choose and have these specifications approved as an

alternative to other PS required under an applicable subpart [*e.g.*, PS-15]. Equipment and supplies for HCl CEMS will vary depending on the measurement technology and equipment vendors. If you are the owner or operator of affected HCl CEMS at new stationary sources, you must comply with either the HCl CEMS PS [*e.g.*, PS-15] required by the associated rule or permit or PS-18 as an approved alternative when you install and place into operation the affected HCl CEMS.

### D. What are the basic requirements of PS-18?

The proposed PS-18 would require owners and operators subject to HCl CEMS requirements to: (1) Select an HCl CEMS that satisfies basic equipment control criteria; (2) install your HCl CEMS according to the manufacturer's specifications and the requirements set out in PS-18; (3) verify that the instrument is functioning properly; (4) calibrate and standardize your equipment; and (5) perform PS-18 procedures that demonstrate initial performance requirements for the HCl CEMS. A summary of the basic requirements is presented below.

#### 1. HCl CEMS Equipment Selection

As noted in section III.C, PS-18 equipment and supplies for HCl CEMS can and will vary depending on the measurement technology and equipment vendors you select. The proposed PS-18 describes the typical key equipment and supply components found in one or more types of HCl CEMS. Extractive HCl CEMS typically include a sample extraction system, sample conditioning module, HCl analyzer, diluent analyzer, system controller, data recorder, reference gas system and moisture measurement system. Hydrogen chloride integrated path-CEMS (HCl IP-CEMS) typically include source temperature and pressure monitors and an optical transmitter and receiver with or without optics to generate longer measurement paths in the emission stream.

The proposed PS-18 defines the differing HCl CEMS equipment components and specifies design/operation basic criteria for the differing equipment components. For example, (1) for reference gas systems, PS-18 specifies that, for extractive CEMS, the system must be designed to be able to introduce reference gas flow sufficient to flood the sampling probe and prevent entry of gas from the effluent stream; and (2) for sample conditioning that, you must operate the module in such a way as to keep the particle-free gas sample above the modules, PS-18

specifies dew point temperature of its components. For HCl IP-CEMS, you must operate and qualify equipment to measure source gas temperature and pressure.

## 2. CEMS Measurement Location Specifications and Pretest Preparation

After you have selected the appropriate HCl CEMS for your operations, the proposed PS-18 requires that you install the system according to the manufacturer's specifications and as specified under section 8.0 of PS-18. The proposed PS-18 requires that you install the CEMS at an accessible location where the pollutant concentration or emission rate measurements are directly representative of the HCl emissions or can be corrected to be representative of the emissions from the affected facility.

With regards to HCl CEMS emissions measurement location, the proposed PS-18 specifies that it should be (1) at least two equivalent diameters downstream of the nearest control device, point of pollution generation or other point at which a change of pollutant concentration may occur; and (2) at least half an equivalent diameter (calculated according to Method 1 in Appendix A-1 to part 60) upstream from the effluent exhaust. We are soliciting comment on alternative measurement location requirements in this preamble (see section V.C of this preamble).

## 3. HCl CEMS Measurement Range

After installation, the proposed PS-18 recommends that you check, record and document the continuous emissions measurement range of the HCl CEMS to verify that the instrument is functioning correctly. Performance Specification 18 requires that the data collection device output range include zero and the upper limit of the measurement range.

## 4. HCl CEMS Performance Requirements and Procedures

After you have installed, set up, verified, and calibrated your HCl CEMS, the proposed PS-18 requires that you follow specified performance tests and procedures for the initial demonstration of your HCl CEMS and subsequent performance evaluations of your HCl CEMS. In general, the proposed PS-18 requires that: (1) Technology used to measure gaseous HCl provides a distinct response (DR) and addresses any appropriate interference correction(s); (2) the relative accuracy (RA) be established against a reference method (RM); and (3) dynamic spiking (DS) into the CEMS using a National Institute of Standards and Technology (NIST)

traceable standard may be required to demonstrate initial performance at sources with emissions near the detection level of the CEMS and for ongoing QA tests. Specific proposed PS-18 test procedures are outlined below.

- *Interference Test.* You must test to detect analyzer responses to interferences not adequately accounted for in the calibration procedure that may cause measurement bias. The combined interference response for the analyzer used for the test must not be greater than  $\pm 3.0$  percent of the equivalent HCl concentration used for the interference test.

- *Beam Intensity Test for Integrated Patch CEMS (IP-CEMS).* For IP-CEMS, you must establish the light attenuation tolerance of your system and demonstrate that the HCl response is independent of the beam intensity. The percent difference during the attenuated light calibration check must not be more than  $\pm 3.0$  percent of the measured concentration with no attenuation used for the test.

- *Temperature Measurement Verification Procedure for IP-CEMS.* You must perform a temperature verification test as part of initial installation and verification procedures for an IP-CEMS. Temperature measurement must agree with a NIST traceable calibrated temperature measuring device within  $2.8$  °C ( $5.0$  °F).

- *Pressure Measurement Verification Test for IP-CEMS.* You must conduct a pressure measurement verification test if you have an IP-CEMS. Your pressure monitor must agree with a NIST traceable calibrated measurement device within  $\pm 5$  percent or  $\leq 0.12$  kilopascals ( $0.5$  inches of water column), whichever is greater. For stack pressure verification, you should select a gauge or monitor that conforms to the design requirements of American Society of Mechanical Engineers (ASME) standard B40.100-2010, "Pressure Gauges and Gauge Attachments" (incorporated by reference, see § 60.17).

- *Level of Detection (LOD) Determination.* You must determine the minimum amount of HCl that can be detected above the background in an HCl-free representative gas matrix (the LOD). If you choose to perform the LOD determination test in a controlled environment, you must verify the LOD during the initial field certification test using the DS test procedure (included in Appendix A of the PS). You must make three independent DS measurements at no more than five times the LOD for the detection level verification. If you cannot detect the DS HCl at the estimated LOD, you must increase the

spike concentration incrementally until you establish a field verified detection level where the HCl measurement is a minimum of three times the noise for zero HCl concentration. The field verified detection level would replace the controlled environment LOD and would become the site- or installation-specific LOD.

- *Response Time (RT) Determination.* You must determine the average upscale and downscale response time as the response time for the system (the RT). This is the time it takes for the measurement system, while operating normally, to respond to a known step change in gas concentration (from a low- or zero-level to high-level gas concentration or vice versa). Stable RT measurements are made when measured HCl concentration is within five percent of the spike gas concentration (*i.e.*, the measurements must meet the  $\pm 5$  percent calibration error requirement; see below).

- *Calibration Error (CE) Test.* The CE test is the mean difference between the HCl calibration gas value and the CEMS response at each calibration point expressed as a percentage of the span. The CE of your HCl CEMS must be less than five percent.

- *Seven-Day Calibration Drift (CD) Test.* Prior to conducting an RA test on your HCl CEMS, you must perform a 7-day CD test. The purpose of the 7-day CD test is to verify the ability of the CEMS to maintain calibration for each of seven, 24-hour periods. The zero-level and high-level drift for each day must be less than five percent of the span value. You must pass each day's drift checks for seven days to meet this requirement and each drift check must be recorded and reported for the 7-day drift check test.

- *RA Test.* You must determine the RA for your HCl CEMS. As noted above, the RA must be established against an RM. The RA is the absolute mean difference between the gas concentration determined by the CEMS and the value determined by the RM, plus the 2.5 percent error confidence coefficient of a series of tests divided by the average of the RM or the applicable emission standard.

## E. What are the reporting and recordkeeping requirements for PS-18?

The proposed PS-18 specifies requirements to record and report supporting data for test procedures and calculations set out in PS-18. For example, for systems that use a gas blender and/or liquid evaporative calibrator to deliver HCl gas standards, PS-18 requires that you record and report supporting data for these devices,

including liquid feed calibrations, liquid standard(s) concentration, feed rate and gas flow calibrations for all diluent and HCl gas flows. The proposed PS-18 also requires that you record and report summaries (in tabular form) of the results of CD tests, linearity tests, RT tests, CE tests, RA tests and optional spike recovery procedures. Additionally, the proposed PS-18 requires that you record and report supporting dilution system data and LOD and system limitation verification data for installed HCl CEMS.

#### IV. Summary of Proposed Procedure 6

##### A. What is the purpose of Procedure 6?

This proposed procedure specifies the minimum QA requirements necessary for the control and assessment of the quality of CEMS data submitted to the EPA. The proposed Procedure 6 would have two distinct and important purposes. First, the procedure would assess the quality of the HCl CEMS data produced by estimating accuracy. Second, the procedure would assist in the control and improvement of the quality of the CEMS data by implementing QC policies and corrective actions. Both of these purposes work together to ensure that data quality is acceptable.

##### B. Who must comply with Procedure 6?

Under the proposed Procedure 6, if you are responsible for one or more CEMS used for HCl compliance monitoring, you would be required to meet the minimum requirements of Procedure 6 and are encouraged to develop and implement a more extensive QA program or to continue such programs where they already exist. The proposed Procedure 6 would apply to any HCl CEMS that is subject to PS-18. That is, if you are required under an applicable subpart to parts 60, 61, or 63 to install and operate an HCl CEMS and you choose to comply with PS-18, you would be subject to both PS-18 and Procedure 6.

##### C. When must I comply with Procedure 6?

If you are the owner or operator of an affected HCl CEMS, you must comply with Procedure 6 when you install and place into operation an HCl CEMS that is subject to PS-18 or when an existing HCl CEMS becomes subject to PS-18.

##### D. What are the basic requirements of Procedure 6?

Requirements are based on proposed PS-18. Procedure 6 includes requirements for: (1) QC plan; (2) daily quality, calibration and measurement standardization procedures; and (3) data

accuracy assessment. A summary of the proposed basic requirements is presented below.

##### 1. Quality Control Plan

The proposed Procedure 6 requires that you develop and implement a QC plan that includes written procedures and manufacturer's information describing in detail complete, step-by-step measures that ensure quality data. The QC plan must cover procedures and operations for specified activities (e.g., CD checks of HCl CEMS, HCl IP-CEMS emission source temperature and pressure accuracy). Records of these written procedures must be maintained and available for inspection by enforcement agencies. The proposed Procedure 6 requires either revising the QC plan or modifying or replacing the CEMS when quality control failures occur for two consecutive quarters.

##### 2. Daily Quality Requirements, Calibration and Measurement Procedures

- *CD Assessment.* You are required to check, record and quantify the CD at two concentration values at least once daily in accordance with the method prescribed by the manufacturer. The HCl CEMS calibration must, at a minimum, be adjusted whenever the daily zero (or low-level) CD or daily high-level CD exceeds two times the drift limits of the applicable performance specification (e.g., PS-18).

- *Beam Intensity Requirement for HCl IP-CEMS.* You must check, record and quantify the beam intensity of your IP-CEMS at least once daily according to manufacturer's specifications and procedures. If the HCl CEMS is out-of-control (the beam intensity falls outside of the operation range determined by section 11.2 of the proposed PS-18 of part 60), you must take the necessary corrective action and verify that the issue has been corrected (i.e., by documenting and reporting the results of the quality control check procedure following corrective action showing the CEMS to be operating within specifications).

- *CEMS Data Status During Out-of-Control Period.* Procedure 6 requires that CEMS data obtained during out-of-control periods not be used when calculating compliance with an emissions limit or counted toward meeting minimum data availability requirements under an applicable regulation or permit.

##### 3. Data Accuracy Assessment

Procedure 6 requires a weekly "above span linearity" challenge of the monitoring system with a certified

calibration value greater than your highest expected hourly concentration. The "above span" reference gas must be introduced to the measurement system at the probe. You must record and report the results of this procedure as you would for a daily calibration. The "above span linearity" challenge must fall within 10 percent of the certified value of the reference gas.

- *Temperature and Pressure Accuracy Assessment.* Procedure 6 requires temperature and pressure accuracy verification for HCl IP-CEMS. The accuracy of the temperature and pressure measurement systems in each HCl IP-CEMS and stack pressure readings used with IP-CEMS data need to be verified and recorded at least once each calendar quarter (according to procedures in section 11.3 of the proposed PS-18). Procedure 6 also requires that measurement instruments or devices used to conduct verification of temperature or pressure measurement have an accuracy that is traceable to NIST. If the temperature and pressure verification exceeds criteria specified in the procedure that indicates that the HCl IP-CEMS is out-of-control, you need to take the necessary corrective action to eliminate the problem and verify that it has been corrected by repeating the failed verification (i.e., by documenting and reporting the results of the audit following corrective action showing the CEMS to be operating within specifications).

- *Concentration Accuracy Auditing Requirements.* Procedure 6 requires that the accuracy of each HCl CEMS be audited at least once each calendar quarter by a relative accuracy test audit (RATA), DS audit (DSA), a cylinder gas audit (CGA) or other acceptable alternative approved by the Administrator. Hydrogen chloride audit gases are required to be NIST certified or NIST-traceable. Procedure 6 also requires a RATA to be conducted at least once every four calendar quarters unless the affected facility is off-line. Procedure 6 would require the analysis of RM audit samples, if they are available, concurrently with RM tests as specified in the general provisions of the applicable part (i.e., based on the part [i.e., part 60, 61, or 63] that contains the subpart that requires the owner or operator to install and operate an HCl CEMS).

- *Excessive Audit Inaccuracy.* Procedure 6 requires corrective actions to eliminate problem(s) when the CEMS is out-of-control. The procedure also requires that you verify that you have eliminated the problem(s) by documenting and reporting the results of the audit following corrective action

showing the CEMS to be operating within specifications. For purposes of excessive audit inaccuracy, a CEMS is considered out-of-control when (1) RA is greater than 20 percent of the RM when  $RM_{avg}$  is used in the denominator to determine RA or greater than 15 percent when the equivalent emission standard value in parts per million by volume wet (ppmvw) is used in the denominator to determine RA; (2) the RA of the DSA is greater than 15 percent if the average spike value is used to determine RA or greater than 20 percent of the applicable emission standard if the emission standard is used to determine RA; or (3) the error determined by the CGA is greater than five percent of span. Procedure 6 proposes that CEMS data collected during out-of-control periods not be used in calculating compliance with emission limits nor be counted towards meeting minimum data availability requirements under an applicable regulation or permit.

- *Criteria for Acceptable QC Procedures.* In situations where a CEMS experiences excessive audit inaccuracies for two consecutive quarters, the proposed procedure requires that you revise your QC procedures, or modify or replace your CEMS.

- *Criteria for Optional QA Test Frequency.* The proposed Procedure 6 specifies that, if a CEMS is determined to be in-control for eight consecutive quarters that include a minimum of two RATA, you may revise your auditing procedures to use CGA or DSA each quarter for eight subsequent quarters. Under this scenario, you would only be required to perform a RATA that meets the acceptance criteria once every two years. If a CEMS fails a RATA, CGA, or DSA, you would need to revert to the original auditing schedule until the audit results meet in-control criteria to start re-qualifying for the optional QA test frequency again.

- *Calculations for CEMS Data Accuracy.* The proposed Procedure 6 specifies RA, CGA accuracy and DSA accuracy calculation requirements.

*E. What are the reporting and recordkeeping requirements for Procedure 6?*

The proposed Procedure 6 would require that if you own or operate an affected HCl CEMS, you must report for each CEMS the accuracy and CD assessment results as a Data Assessment Report (DAR) (an example of a DAR format is provided in Procedure 6; section 9.0, Figure 1). At a minimum, the DAR must contain source owner and operator information; identification and

location of monitors in the CEMS; manufacturer and model number of each monitor in the CEMS; assessment of CEMS data accuracy; and date of assessment. The DAR is required to be submitted with the report of emissions required under the applicable regulation or permit that requires continuous emission monitoring.

#### **V. Rationale for Selecting the Proposed Requirements of Performance Specification 18 and Procedure 6**

*A. What information did we use to develop PS-18 and Procedure 6?*

To develop proposed PS-18 and Procedure 6, we considered the requirements of emission standards promulgated under 40 CFR parts 60, 61 and 63; state agency requirements for CEMS; manufacturer and vendor recommendations; and current operational and design practices in the industry. As part of this consideration, the EPA's Office of Air Quality Planning and Standards (OAQPS) gathered information from instrument and gas vendors, affected facilities, testers and regulatory bodies with experience performing continuous measurements of HCl from stationary sources.

Concurrent with the EPA's OAQPS' information gathering efforts, the EPA's Office of Research and Development (ORD) conducted research to establish additional data to support the new performance specification and QA test procedures. As part of the EPA's ORD's research efforts, they evaluated commercial HCl CEMS under controlled and representative emission environments, the suitability of candidate RMs and the status and quality of available gas standards. The ORD focused their testing research on interference tests, LOD tests, 7-day drift, linearity, RATAs and DS.

*B. How did we select the requirements for PS-18 and Procedure 6?*

Generally, the basic requirements proposed under PS-18 and Procedure 6 for calibration error, calibration drift, RATA, and cylinder gas audit agreement are consistent with other CEMS performance specifications. The proposed LOD requirements are based on an adequate safety margin so that equipment can measure quantitatively at the compliance limit. The proposed DS requirements are consistent with other RM recovery requirements (e.g., EPA Method 320, EPA Method 18). The above-span calibration and linearity requirements proposed are based on the PS-12 precedent used for mercury CEMS.

During the development of the proposed PS-18 and Procedure 6, we evaluated all options and attempted to develop the most appropriate performance specifications and procedures based on available information, testing and feedback from vendors and industry regarding the use of HCl CEMS. Although we believe this proposal includes the most appropriate HCl CEMS performance specifications and procedures (for use as an alternative to PS-15 for HCl CEMS), we are soliciting comment on several issues provided in paragraph V.C of this preamble.

*C. Solicitation for Comment*

#### 1. Performance Specification 18 Topics

##### a. Integrated Path (IP-CEMS) Line Strength Factor

Calibration error procedures proposed for IP-CEMS in PS-18 require correcting for calibration cell path length, temperature, pressure, line strength factor (LSM) and, if necessary, the native source gas HCl concentration when you calculate the stack equivalent concentration of the HCl gas measured in your calibration cell. The proposed specification allows the use of the line LSM provided by the instrument manufacturer or an instrument-specific LSM experimentally determined using a heated gas cell at effective gas concentrations equivalent to between 50 and 150 percent of the emission limit. We are soliciting comment on approaches used by IP instrument vendors to determine LSM and data showing the effect of LSM on the accuracy of the stack equivalent concentration calculation.

##### b. Optical Measurement Path Length Determination

An IP-CEMS measures the gas concentration along an open optical path across the stack or duct cross section. Specifically, for IP-CEMS, measurement path is the distance of the optical path that passes through the source gas in the stack or duct correcting for ports, standoffs, and extensions or CEM-specific optical path length alterations. The optical measurement path length must be measured and not based on engineering diagrams. We are requesting information on procedures currently available to measure the optical path length for IP monitors that will result in an accuracy of at least  $\pm 1$  percent. (See PS-1 of Appendix B to Part 60 (Specifications and Test Procedures for Continuous Opacity Monitoring Systems in Stationary Sources); section 8.1.)

### c. Alternative CEMS Probe Placement Locations

Section 8.3 of the proposed PS-18 specifies HCl measurement location requirements downstream of the control device, point of pollution generation or other point at which a change of pollutant concentration may occur and upstream of the exhaust. We are seeking comment and supporting data on alternative probe placement locations such as in the breaching of the stack (*i.e.*, in the exhaust duct or pipe that leads from the stack) that pass the RATA requirements.

### 2. Appendix F Procedure 6 Topics

#### a. Effect of Temperature and Pressure on HCl Concentration Determination During DS Measurements

We provided options in Appendix F Procedure 6 for initial and ongoing quality control using DS for IP-CEMS. The procedure to perform DS is described in Appendix A of PS-18. For IP-CEMS, dynamic spiking is a standard addition procedure where you spike a known concentration of HCl gas into a calibration cell. You are required to assess the accurate recovery of HCl introduced into the measurement system in the presence of potential interference from the flue gas sample matrix. The measurement involves recording the combined optical signal from HCl in the calibration cell at ambient temperature and HCl in the stack at elevated temperature. The combination of HCl absorbance at two different temperatures would create hybrid spectra features of both temperatures. Based on our evaluation, we understand there can be as much as a 10 percent difference line shape/area used for IP measurements between instrument operating temperature near 20°C and typical stack temperatures up to 250°C. We are requesting comment on procedures that can be used to determine the concentration when IP calibration cells contain HCl at ambient temperature (approximately 20°C) or the need to heat the calibration cell to a specific temperature during DS measurements that include absorbance for both stack gas (HCl) at elevated temperature and ambient temperature calibration cell HCl.

#### b. Use of Dynamic Spiking

The proposed PS-18 and Procedure 6 require that you audit the accuracy of each HCl CEMS at least once each calendar quarter (except the quarter the RATA is conducted) by a DSA, a CGA or other acceptable alternative. Appendix A to the proposed PS-18 describes the procedure and

performance requirements for DS as a quality check for HCl CEMS. We are proposing this option as one of three alternatives to a RATA in three of the four quarterly QA checks required in Procedure 6. We are soliciting comment on our proposal and data on the use of periodic DS as an alternative to the use of a CGA.

#### c. Alternative QA for Low Level RM RATA Measurements

We are proposing a mandatory RATA with the appropriate RM during initial demonstration and periodically thereafter. We are also soliciting comment and data on alternative or additional QA that should be performed when the stack HCl concentration is below the RM quantitation limit.

#### d. Long-Term Quality Control Under Procedure 6

The proposed Appendix F to part 60 (Quality Assurance Procedure 6) requires a RATA at least once every four calendar quarters, except in the case where the affected facility is off-line (does not operate in the fourth calendar quarter since the quarter of the previous RATA). Section 5.5 of the procedure specifies that if the CEMS is in-control for eight consecutive quarters that include a minimum of two RATA, you may revise your auditing procedures to use CGA or DSA each quarter for eight subsequent quarters, but you must perform at least one RATA and demonstrate that the source meets the acceptance criteria every 2 years. We are requesting comments and data on alternative grace periods allowed between required RATAs when your audits demonstrate that the source has been in-control long-term under Procedure 6.

#### e. Method 205 to Generate Cylinder Gas Audit Concentrations for Quarterly Audits

Section 7.3 (Reagents and Standards) of the proposed PS-18 allows the use of diluted high concentration HCl standards to achieve the HCl gas concentrations required in PS-18 as long as you follow Method 205 or other procedures approved by the Administrator. We are soliciting comment and data comparing the uncertainty of gases generated by dilution using Method 205 to the tolerance allowed for cylinder gas audits in section 5.2.2.3 of Procedure 6 proposed for 40 CFR part 60, Appendix F.

### f. Direct Instrument Cell Calibration Checks

As noted previously, for extractive CEMS, DS involves adding a known concentration of HCl gas at a known flow rate into the probe sample gas stream to assess the ability of the measurement system to recover and accurately measure HCl in the presence of potential interference from the flue gas matrix. We are considering an alternative that includes instrument calibration checks for extractive CEMS and request comment and supporting data on two topics related to calibration check procedures: (1) What is the feasibility of achieving DS accuracy to 95 percent of the theoretical spike at the span concentration? and (2) If calibration checks are performed at the instrument for extractive CEMS, what is the accuracy of dynamic spike recovery?

#### g. Using DS and Associated Acceptance Criteria as an Alternative to Daily Calibration Check for Quality Assurance Procedure 6

Calibration drift is a quantitative assessment of whether your HCl CEMS measurements are in control. Checking calibration also allows the facility to reset the calibration and improve the consistency and quality of HCl CEMS data. We are considering using dynamic spiking as an alternative to direct cylinder gas assessment of calibration drift as a measure of QC for HCl CEMS. We are taking comment and data on the quantitative comparison of dynamic spike recovery results compared to CD results to determine if there are comparable criteria for DS to qualify as an alternative for CD tests.

#### h. Moisture Measurements To Correct HCl Results

Section 6.8 (Moisture Measurement System) of the proposed PS-18 stipulates that, if correction of the measured HCl emissions for moisture is required, either Method 4 in Appendix A-3 of part 60 or other moisture measurement methods approved by the Administrator will be needed to measure stack gas moisture content. We are requesting comment/data on conditions or situations where continuous moisture measurements should be required to correct HCl results to the units of the standard, and where periodic Method 4 tests or equivalent is good enough on a periodic basis to define moisture for the entire duration between Method 4 tests.

#### i. Other Initial or On-Going Procedures for IP-CEMS

We are soliciting comment/data on other initial or on-going procedures for



IP-CEMS not included in the proposal that are commonly performed and necessary to ensure data are of known and acceptable quality to demonstrate compliance.

## VI. Statutory and Executive Order Reviews

### A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review

This action is not a “significant regulatory action” under the terms of Executive Order 12866 (58 FR 51735, October 4, 1993) and is therefore not subject to review under Executive Orders 12866 and 13563 (76 FR 3821, January 21, 2011).

### B. Paperwork Reduction Act

This action does not impose an information collection burden under the provisions of the *Paperwork Reduction Act*, 44 U.S.C. 3501 *et seq.* Burden is defined at 5 CFR 1320.3(b). This action provides performance criteria and QA test procedures for assessing the acceptability of HCl CEMS performance and data quality. These criteria and QA test procedures do not add information collection requirements beyond those currently required under the applicable regulation.

### C. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

For purposes of assessing the impacts of this rule on small entities, small entity is defined as: (1) A small business as defined by the Small Business Administration’s regulations at 13 CFR 121.201; (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of this rule on small entities, I certify that this action will not have a significant economic impact on a substantial number of small entities.

This proposed rule will not impose any requirements on small entities. We continue to be interested in the potential impacts of the proposed rule on small entities and welcome comments on issues related to such impacts.

### D. Unfunded Mandates Reform Act

This action contains no federal mandates under the provisions of Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), 2 U.S.C. 1531–1538, for state, local or tribal governments or the public sector. This action imposes no enforceable duty on any state, local or tribal governments or the private sector. Therefore, this action is not subject to the requirements of sections 202 or 205 of UMRA.

This action is also not subject to the requirements of section 203 of the UMRA because it contains no regulatory requirements that might significantly or uniquely affect small governments. This rule will not apply to such governments and will not impose any obligations upon them.

### E. Executive Order 13132: Federalism

This action 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. Thus, Executive Order 13132 does not apply to this action.

In the spirit of Executive Order 13132 and consistent with EPA policy to promote communications between the EPA and state and local governments, the EPA specifically solicits comment on this proposed rule from state and local officials.

### F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

This action does not have tribal implications, as specified in Executive Order 13175 (65 FR 67249, November 9, 2000). This action proposes performance specifications that can be used as an additional option to PS-15 for HCl continuous emissions monitoring. Thus, Executive Order 13175 does not apply to this action. The EPA solicits additional comment on this proposed action from tribal officials.

### G. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks

The EPA interprets Executive Order 13045 (62 FR 19885, April 23, 1997) as

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

### H. Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use

This action is not subject to Executive Order 13211 (66 FR 28355 (May 22, 2001)), because it is not a significant regulatory action under Executive Order 12866.

### I. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), Public Law 104–113, 12(d) (15 U.S.C. 272 note) directs the EPA to use voluntary consensus standards (VCS) in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.*, materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by VCS bodies. The NTTAA directs the EPA to provide Congress, through OMB, explanations when the agency decides not to use available and applicable VCS. This proposed rule does not involve technical standards. Therefore, the EPA is not considering the use of any voluntary consensus standards.

### J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order 12898 (59 FR 7629, February 16, 1994) establishes federal executive policy on environmental justice. Its main provision directs federal agencies, to the greatest extent practicable and permitted by law, to make environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the United States.

The EPA has determined that this proposed rule will not have disproportionately high and adverse human health or environmental effects on minority or low-income populations

because it does not affect the level of protection provided to human health or the environment. This proposed rule will help to ensure that emission control devices are operated properly and maintained as needed, thereby helping to ensure compliance with emission standards, which would benefit all affected populations.

**Performance Specification 18—  
Specifications and Test Procedures for  
Gaseous HCl Continuous Emission  
Monitoring Systems at Stationary  
Sources**

**List of Subjects in 40 CFR Part 60**

Environmental protection,  
Administrative practice and procedure,  
Air pollution control, Continuous  
emission monitoring systems, Hydrogen  
chloride, Performance specifications,  
Test methods and procedures.

Dated: April 30, 2014.

**Gina McCarthy,**

*Administrator.*

For the reasons stated in the preamble, the Environmental Protection Agency proposes to amend title 40, chapter 1 of the Code of Federal Regulations as follows:

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

**Authority:** 42 U.S.C., 7401–7671q.

■ 2. Appendix B is amended by adding Performance Specification 18 and Appendix A to Performance Specification 18 to read as follows:

**Appendix B to Part 60—Performance  
Specifications**

\* \* \* \* \*

**PERFORMANCE SPECIFICATION 18—  
PERFORMANCE SPECIFICATIONS AND  
TEST PROCEDURES FOR GASEOUS  
HYDROGEN CHLORIDE (HCl)  
CONTINUOUS EMISSION MONITORING  
SYSTEMS AT STATIONARY SOURCES**

**1.0 Scope and Application.**

1.1 Analyte. This performance specification (PS) is applicable for measuring gaseous concentrations of hydrogen chloride (HCl), CAS: 7647–01–0, on a continuous basis in the units of the applicable standard or in units that can be converted to units of the applicable standard(s).

**1.2 Applicability.**

1.2.1 This specification is used to evaluate the acceptability of HCl continuous emission monitoring systems (CEMS) at the time of installation or soon after and when regulations require reevaluation of HCl CEMS performance. The specification includes requirements for initial acceptance including instrument accuracy and stability assessments.

1.2.2 The Administrator may require the operator under section 114 of the Clean Air Act (CAA), to conduct CEMS performance

evaluations at other times besides the initial test to evaluate the CEMS performance. See 40 CFR part 60, § 60.13(c) and § 63.8(e)(1).

1.2.3 A source that demonstrates their CEMS meets the criteria of this PS may use the system to continuously monitor gaseous HCl. If your HCl CEMS is capable of reporting the HCl concentration in the units of the existing standard, no additional CEMS components are necessary. If your HCl CEMS does not report concentrations in the units of the existing standard, then other CEMS components (e.g., oxygen (O<sub>2</sub>), temperature, stack gas flow, moisture and pressure) are necessary to convert the units reported by your HCl CEMS to the units of the standard.

1.2.4 These specification test results are intended to be valid for the life of the system. As a result, the HCl measurement system must be tested and operated in a configuration consistent with the configuration that will be used for ongoing continuous emissions monitoring.

1.2.5 Substantive changes to the system configuration require retesting according to this PS. Examples of such conditions include, but are not limited to: major changes in dilution ratio (for dilution based systems); changes in catalyst materials, if used; changes in sample conditioning, if used, such as filtering device design or materials; changes in probe design or configuration; light source or detector substitution; and changes in materials of construction.

1.2.6 This specification is not designed to evaluate the ongoing CEMS performance nor does it identify specific calibration techniques and auxiliary procedures to assess CEMS performance over an extended period of time. The source owner or operator is responsible to calibrate, maintain, and operate the CEMS properly.

**2.0 Summary of Performance  
Specification.**

2.1 This specification covers the procedures that each HCl CEMS must meet during the performance evaluation test. Installation and measurement location specifications, data reduction procedures and performance criteria are included.

2.2 The technology used to measure gaseous HCl must provide a distinct response and address any appropriate interference correction(s). It must accurately measure gaseous HCl in a representative sample (path or point sampling) of stack effluent.

2.3 The relative accuracy (RA) must be established against a reference method (RM) (e.g., Method 26A, Method 320, ASTM International (ASTM) D6348–12, including mandatory annexes, or Method 321, as appropriate for the source concentration and category).

2.4 Dynamic spiking (DS) into the CEMS using a National Institute of Standards and Technology (NIST) traceable standard may be required to demonstrate performance at sources with emissions near the detection level of the CEMS and for ongoing quality assurance tests.

**3.0 Definitions.**

3.1 *Calibration Cell* means a gas containment cell used with cross stack or integrated path (IP) monitors to perform precision and calibration checks. The cell may be a removable sealed cell or an

evacuated and/or purged cell capable of exchanging calibration and zero gases. When charged, it contains a known concentration of HCl calibration gas. The calibration cell is filled with zero gas or removed from the optical path during stack gas measurement.

3.2 *Calibration Drift (CD)* means the absolute value of the difference between the CEMS output response and an upscale reference or a zero-level reference, expressed as a percentage of the span value, when the CEMS is challenged after a stated period of operation during which no unscheduled maintenance or repair took place. A separate CD determination must be performed for pollutant and diluent analyzers.

3.3 *Calibration Error (CE)* means the mean difference between the concentration measured by the CEMS and the known concentration from a calibration standard, divided by the span, when the entire CEMS, including the sampling interface, is challenged.

3.4 *Calibration Range Above Span (CRAS)* means the upper limit of the measurement range. The calibration range must accommodate the DS procedure if that option is selected. The CRAS should be a conservatively high estimate of the range of HCl measurements expected from the source category. The CRAS value defines the calibration and quality assurance at the upper limit of HCl concentration measurement. The CRAS may require a calibration standard above span.

3.5 *Centroidal Area* means a central area that is geometrically identical to the stack or duct cross section and is no greater than ten percent of the stack or duct cross-sectional area.

3.6 *Continuous Emission Monitoring System (CEMS)* means the total equipment required to measure the pollutant concentration or emission rate continuously.

3.7 *Continuous Operation* means the time between periodic maintenance when an instrument and sampling system operates without user intervention, continuously samples flue gas, analyzes the sample gas for HCl and related parameters (e.g., gas flow, diluent), records measurement data, and saves the results to a computer file. User intervention is permitted for initial set-up of sampling system, initial calibrations, periodic calibration corrections, periodic maintenance and periodic quality assurance audits.

3.8 *Data Recorder* means the portion of the CEMS that provides a permanent record of analyzer output. The data recorder may record other pertinent data such as effluent flow rates, various instrument temperatures or abnormal CEMS operation. The data recorder may also include automatic data reduction capabilities and CEMS control capabilities.

3.9 *Dynamic Spiking (DS)* means the procedure where a known concentration of HCl gas is injected into the probe sample gas stream for extractive CEMS at a known flow rate, or used to fill a calibration cell for *in situ* IP–CEMS, in order to assess the accuracy of the measurement system in the presence of potential interference from the flue gas sample matrix.

3.10 *Independent Measurement(s)* means the series of CEMS data values taken during

sample gas analysis separated by two times the response time (RT) of the CEMS.

3.11 *Integrated Path CEMS (IP-CEMS)* means a CEMS that measures the gas concentration along an optical path in the stack or duct cross section.

3.12 *Interference* means a compound or material in the sample matrix other than HCl whose characteristics may bias the CEMS measurement (positively or negatively). The interference may not prevent the sample measurement, but could increase the analytical uncertainty in the measured HCl concentration through reaction with HCl or by changing the electronic signal generated during HCl measurement.

3.13 *Interference Test* means the test to detect analyzer responses to interferences that are not adequately accounted for in the calibration procedure and may cause measurement bias.

3.14 *Level of Detection (LOD)* means the lowest level of pollutant the CEMS can detect with 99 percent confidence in the presence of typical source gas matrix interferences.

3.15 *Liquid Evaporative Standard* means a reference gas produced by vaporizing NIST traceable liquid standards of known HCl concentration and quantitatively mixing the resultant vapor with a diluent carrier gas.

3.16 *Optical Path* means the route light travels from the light source to the receiver used to make an optical CEMS sample measurement.

3.17 *Path Length* means, for extractive optical CEMS, the distance in meters of the optical path within a gas measurement cell. For IP-CEMS, path length is the distance in meters of the optical path that passes through the source gas in the stack or duct.

3.18 *Point CEMS* means a CEMS that measures the source gas concentration, either at a single point at the sampling probe tip or over an optical path less than 10 percent of the equivalent diameter of the stack or duct cross section.

3.19 *Relative Accuracy (RA)* means the absolute mean difference between the gas concentration determined by the CEMS and the value determined by the RM, plus the 2.5 percent error confidence coefficient of a series of tests divided by the average of the RM or the applicable emission standard.

3.20 *Response Time (RT)* means the time it takes for the measurement system, while operating normally at its target sample flow rate, dilution ratio, or data collection rate to respond to a known step change in gas concentration, either from a low- or zero-level to a high-level gas concentration or from a high level to a low or zero level, and to read within five percent of the stable gas response.

3.21 *Sample Interface* means the portion of the CEMS used for one or more of the following: Sample acquisition, sample transport, sample conditioning, optical measurement path, or protection of the analyzer from the effects of stack gas.

3.22 *Span Value* means the value established by the relevant regulatory requirement or is equal to twice the emission limit if not otherwise specified.

3.23 *Stratification* means the identification of when a measurement taken at a single point in a duct or emission stack

is different from measurements taken at multiple points that traverse the duct or stack.

3.24 *Zero gas* means a calibration gas or liquid evaporative spike with an HCl concentration that is below the LOD of the measurement system.

#### 4.0 *Interferences.*

Sample gas interferences will vary depending on the instrument or technology used to make the measurement. Interferences must be evaluated through the interference test in this performance specification. Several compounds including carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), formaldehyde (CH<sub>2</sub>O), methane (CH<sub>4</sub>), and water (H<sub>2</sub>O) are potential optical interferences with certain types of HCl monitoring technology. Ammonia is a potential chemical interference with HCl.

#### 5.0 *Safety.*

The procedures required under this PS may involve hazardous materials, operations, and equipment. This PS may not address all of the safety issues associated with these procedures. It is the user's responsibility to establish appropriate safety and health practices and determine the applicable regulatory limitations prior to performing these procedures. The CEMS users should consult instrument operation manuals, compressed gas safety requirements such as Occupational Safety and Health Administration regulations and other material safety data sheets for specific precautions to be taken.

#### 6.0 *Equipment and Supplies.*

Equipment and supplies for HCl CEMS will vary depending on the measurement technology and equipment vendors. This section provides a description of the equipment and supplies typically found in one or more types of HCl CEMS.

6.1 *Sample Extraction System.* The portion of an extractive CEMS that collects and transports the sample to the pressure regulation and sample conditioning module. The extraction system must deliver a representative sample to the measurement instrument. The sample extraction system typically consists of a sample probe and a heated umbilical line.

6.2 *Sample Conditioning Module.* The portion of an extractive CEMS that removes particulate matter and moisture from the gas stream and provides a sample gas stream to the CEMS analysis module or analyzer. You must keep the particle-free gas sample above the dew point temperature of its components.

6.3 *HCl Analyzer.* The portion of the CEMS that detects, quantifies and generates an output proportional to the stack gas HCl concentration.

6.4 *Diluent Analyzer.* The portion of the CEMS that quantifies stack gas concentrations of O<sub>2</sub> or CO<sub>2</sub>. For systems with a multi-component analyzer, the same analyzer may quantify for all measured gases.

6.5 *System Controller.* The portion of the CEMS that provides control of the analyzer and any sample extraction system components including the probe, pressure sensing and regulation, sample conditioning module and the sample interface.

6.6 *Data Recorder.* The portion of the CEMS that provides a record of analyzer

output. The data recorder may record other pertinent data such as effluent flow rates, various instrument temperatures or abnormal CEMS operation. The data recorder output range must include the full range of expected HCl concentration values in the gas stream to be sampled including zero and span value. Multiple instrument ranges or extended calibration points to extend the measurement range may be necessary to measure concentrations encountered during normal process operation.

6.7 *Reference Gas System(s).* One or more systems may be needed to introduce calibration gases into the measurement system. You will use a reference gas system to introduce a known concentration of HCl gas into the measurement system. For extractive CEMS, the system must be able to introduce reference gas flow sufficient to flood the sampling probe and prevent entry of gas from the effluent stream. For IP-CEMS, the system must be able to introduce a known concentration of HCl, at known pressure and temperature, into the optical path used to measure HCl gas concentration.

6.8 *Moisture Measurement System.* If correction of the measured HCl emissions for moisture is required, either Method 4 in Appendix A-3 of this part or other moisture measurement methods approved by the Administrator will be needed to measure stack gas moisture content.

#### 7.0 *Reagents and Standards.*

7.1 *Reference cylinder gas(es) or liquid evaporative gas standards* used to meet the performance specifications must be traceable to NIST.

7.2 *Cylinder gas and/or liquid evaporative standards* must be used within their certification period.

7.3 *High concentration HCl standards* may be diluted for use in this specification. You must document the quantitative introduction of HCl standards into the system using Method 205 or other procedure approved by the Administrator.

#### 8.0 *CEMS Measurement Location Specifications and Pretest Preparation.*

8.1 *Prior to the start of your initial PS tests*, you must ensure that the HCl CEMS is installed according to the manufacturer's specifications and the requirements in this section. You may use either point or IP sampling technology.

8.2 *Installation.* Install the CEMS at an accessible location where the pollutant concentration or emission rate measurements are directly representative of the HCl emissions or can be corrected so as to be representative of the emissions from the affected facility. For CEMS sampling at a single point, a location that has been shown to be free of HCl (or sulfur dioxide (SO<sub>2</sub>)) stratification is recommended. If you fail the RA requirements in this specification due to the measurement location and a satisfactory correction technique cannot be established, the Administrator may require the CEMS to be relocated.

8.3 *Measurement Location.* The measurement location should be (1) at least two equivalent diameters downstream of the nearest control device, point of pollution generation or other point at which a change of pollutant concentration may occur; and (2)

at least half an equivalent diameter upstream from the effluent exhaust. The equivalent duct diameter is calculated according to Method 1 in Appendix A–1 to this part.

8.3.1 Single point sample gas extraction should be (1) no less than 1.0 meter (3.3 ft.) from the stack or duct wall or (2) within the centroidal velocity traverse area of the stack or duct cross section.

8.3.2 Path-integrated measurements must (1) be conducted totally within the inner area bounded by a line 1.0 meter (3.3 ft.) from the stack or duct wall, or (2) have at least 70 percent of the path within the inner 50 percent of the stack or duct cross-sectional area, or (3) be located over any part of the centroidal area.

8.4 CEMS and Data Recorder Scale Check. After CEMS installation, we recommend you check the CE as described in section 11.7 to verify that the instrument is functioning properly. Record and document the measurement range of the HCl CEMS. The CEMS operating range (zero through CRAS) and the range of the data collection device must encompass the applicable emission limit and all expected HCl concentrations. The CEMS and data collection device output range must include zero and the CRAS value.

9.0 *Quality Control.* [Reserved]

10.0 *Calibration and Standardization.* [Reserved]

11.0 *Performance Specification Test Procedure.*

After completing the CEMS installation, setup and calibration, you must complete the performance specification test procedures in this section. You must perform the following procedures and meet the performance requirements for the initial demonstration of your HCl CEMS:

- a. Interference Test;
- b. Beam Intensity Test (IP–CEMS only);
- c. Stack Temperature Verification (IP–CEMS only);
- d. Stack Pressure Verification (IP–CEMS only);
- e. Level of Detection (LOD) Determination;
- f. Response Time (RT) Test;
- g. Calibration Error (CE) Test;
- h. Calibration Drift (CD) Test; and
- i. Relative Accuracy (RA) Test:
  - Comparison with RM
  - Stratification Test
  - Optional Dynamic Spiking (DS) Test.

11.1 Interference Test

11.1.1 You must conduct the interference test of your measurement system prior to its initial use in the field to verify that the candidate system measures HCl accurately in the presence of common interferences in emission matrices.

11.1.2 Your interference test may be conducted in either a controlled environment or on-site during initial setup and qualification of your CEMS.

11.1.3 If you have multiple measurement systems with components of the same make and model numbers, you need only perform this interference check on one system and you may also rely on an interference test conducted by the manufacturer on a system having components of the same make and model(s) of the system that you use.

11.1.4 Perform the interference check with an HCl concentration between 10 and

40 percent of the span value anticipated for your source CEMS application. Alternatively, successfully conducting the interference test at the relevant regulatory standard may be used to demonstrate performance.

11.1.5 Introduce the interference test gases listed in Table 1 in section 17.0 into the measurement system separately or in any combination.

11.1.5.1 For extractive CEMS, the interference test gases must be introduced into the sampling system at the probe such that the interference gas mixtures pass through all filters, scrubbers, conditioners, and other components as would be configured at a typical field site.

11.1.5.2 For IP–CEMS, the interference test gases may be added with the HCl in a calibration cell or separately in a temperature-controlled cell with an effective path length in the optical CEMS path representative of the required method detection level. Test gas and interference gas is added to the cell at a concentration that is equivalent to the effective stack concentration corrected for pressure, temperature and the nominal stack sampling path length of the CEMS.

11.1.6 The interference test must be performed by combining an HCl gas with each interference test gas (or gas mixture). You must measure the baseline HCl response, followed by the response after adding the interference test gas(es) at a constant HCl concentration. Your baseline HCl measurement must agree within three percent of the theoretical HCl concentration. You must perform each interference gas injection and evaluation in triplicate, and assess the combined interference of all of the gases in Table 1.

(Note: The baseline HCl injection may include interference gases at concentrations typical of ambient air (e.g., 21 percent O<sub>2</sub>, 400 parts per million (ppm) CO<sub>2</sub>, 2 percent H<sub>2</sub>O), but these concentrations must be brought to the concentrations listed in Table 1 when their interference effects are being evaluated.)

11.1.7 You must document the quality and quantity of the gas volume/rate, temperature, and pressure used to conduct the interference test to be able to establish the error of blending the HCl and interference gases while maintaining a known HCl concentration. A gas blending system or manifold may be used.

11.1.8 The duration of each interference test should be sufficient to ensure the HCl measurement system surfaces are conditioned and a stable measurement is obtained.

11.1.9 Measure the HCl response of the analyzer to these gases in ppm. Record the responses and determine the overall interference response using Table 2 in section 17.0.

11.1.10 For each interference gas (or mixture), calculate the mean difference ( $\Delta MC_{avg}$ ) between the measurement system responses with and without the interference test gas(es) using Equation 1 in section 12.0. Summarize the results following the format contained in Table 2 in section 17.0.

11.1.11 Calculate the total percent interference (I) for the gas runs using

Equation 2 in section 12.0. The combined interference response for the analyzer that was used for the test must not be greater than  $\pm 3.0$  percent of the equivalent HCl concentration used for the interference test.

11.2 Beam Intensity Test for IP–CEMS

11.2.1 For IP–CEMS, you must establish the beam intensity attenuation tolerance of your system and demonstrate that the HCl span response is independent of the beam intensity in the absence of HCl.

11.2.2 Insert one or more neutral density filter(s) or otherwise attenuate the beam intensity (e.g., 90 percent of the beam intensity).

11.2.3 Perform a high-level calibration check.

11.2.4 Record and report the attenuated beam intensity, calibration gas concentration measured by the CEMS and the percent difference between the measured calibration gas concentration at full beam intensity and the measured concentration with attenuated beam intensity. The percent difference during the attenuated beam intensity calibration check for the light source and detector used in the IP–CEMS must not be more than  $\pm 3.0$  percent of the measured calibration concentration used for the test.

11.2.5 In the future, you may not operate your IP–CEMS at a beam intensity lower than that established during this test. However, you may repeat the test to establish a lower beam intensity cut point.

11.3 Temperature Measurement Verification Procedure for IP–CEMS

11.3.1 Any measurement instrument or device that is used to conduct ongoing verification of temperature measurement must have an accuracy that is traceable to NIST.

11.3.2 You must perform a temperature verification test on-site as part of the initial installation and verification procedures.

11.3.3 Comparison to Calibrated Temperature Measurement Device.

11.3.3.1 Place the sensor of a calibrated temperature measurement device adjacent to the sensor used to measure stack temperature for your HCl CEMS. The calibrated temperature measurement device must satisfy the accuracy requirements specified in Table 3 of this PS. The calibrated temperature measurement device must also have a range equal to or greater than the range of your HCl CEMS temperature monitor.

11.3.3.2 Allow sufficient time for the response of the calibrated temperature measurement device to reach equilibrium. With the process or control device operating under normal conditions concurrently, record the temperatures measured by your HCl CEMS system ( $M_i$ ) and the calibrated measurement device ( $V_i$ ). You must meet the accuracy requirements described in section 13.5.4 of this PS.

11.3.3.3 If your HCl CEMS temperature monitor does not satisfy the accuracy requirement of this PS, check all system components and take any corrective action that is necessary to achieve the required minimum accuracy. Repeat this validation check procedure until the accuracy requirement of this specification is satisfied.

11.4 Pressure Measurement Verification Test for IP–CEMS

11.4.1 For stack pressure verification, you should select a gauge or monitor that conforms to the design requirements of ASME B40.100–2010, “Pressure Gauges and Gauge Attachments” (incorporated by reference—see § 60.17).

11.4.2 As an alternative for a calibrated pressure measurement device with NIST traceable accuracy, you may use a mercury-in-glass or water-in-glass U-tube manometer to validate your pressure measurement equipment.

11.4.3 Allow sufficient time for the response of the calibrated pressure measurement device to reach equilibrium. With the process or control device operating under normal conditions, concurrently record the pressures measured by your HCl CEMS system ( $M_p$ ) and the calibrated measurement device ( $V_p$ ). You must meet the accuracy requirements described in section 13.5.5 of this PS.

11.4.4 If your HCl CEMS pressure monitor does not satisfy the accuracy requirement of this PS, check all system components and take any corrective action that is necessary to achieve the required minimum accuracy. Repeat this validation check procedure until the accuracy requirement of this specification is satisfied.

#### 11.5 Level of Detection (LOD) Determination

11.5.1 You must determine the minimum amount of HCl that can be detected above the background in a representative gas matrix.

11.5.2 You may perform the LOD determination as part of the interference test in section 11.1, in either a controlled environment or on-site during initial setup and qualification of your CEMS.

11.5.2.1 For extractive CEMS, spike the HCl and interferences into the CEMS at the probe prior to all filters and sample conditioning elements.

11.5.2.2 For IP–CEMS, spike the mixture described in section 11.1.4 into the system calibration cell.

11.5.3 The challenge standard mixture used to determine LOD must include HCl at a concentration no greater than three times the estimated LOD and must include the interferences listed in Table 1 of this PS.

11.5.4 Collect seven consecutive measurements separated by twice the response time.

11.5.5 Calculate the standard deviation of the measured values and define the LOD as three times the standard deviation of these measurements.

11.5.5.1 The LOD for extractive units must be determined and reported in ppmv.

11.5.5.2 The LOD for IP units must be determined and reported on a ppm-meter basis and the site- or installation-specific LOD must be calculated based on the actual measurement path length and gas density of the specific site installation in ppmv.

11.5.6 If you choose to perform the LOD determination test in a controlled environment, you must verify the LOD during the initial field certification test using the DS test procedure in Appendix A of this PS.

11.5.6.1 You must make three independent DS measurements at no more than five times the LOD for the detection level verification.

11.5.6.2 If your system limitation verification does not demonstrate the ability to distinguish the spike concentration from the background, you must increase the spike concentration incrementally until you establish a field verified detection level where the HCl measurement is a minimum of three times the noise for zero HCl concentration. The field verified detection level replaces the controlled environment LOD and becomes the site- or installation-specific LOD.

#### 11.6 Response Time Determination

11.6.1 If your HCl CEMS extracts gas from stack emissions you must determine the average upscale and downscale RTs from three repetitions of each test. You will report the greater of the average upscale or average downscale RTs as the RT for the system.

11.6.2 Start the upscale RT determination by injecting zero gas into the measurement system at the extractive probe tip or IP calibration cell inlet. You may use humidified zero gas.

11.6.3 When the system output has stabilized (no change greater than 1 percent of full scale for 30 sec), record the response in ppmv and introduce an upscale reference gas.

11.6.4 Take repetitive measurements until you obtain a stable value at 95 percent or greater than the expected calibration gas response. You may use humidified calibration gas.

11.6.5 Record the time (upscale RT) required to reach 95 percent of the final stable value.

11.6.6 Next, reintroduce the zero gas and record the time required to reach five percent of the zero gas reading. This time is the downscale RT.

(Note: For CEMS that perform a series of operations (purge, blow back, sample integration, analyze, etc.), you must start adding calibration gases immediately after these procedures are complete.)

11.6.7 Repeat the entire procedure three times and determine the mean upscale and downscale RTs. The slower or longer of the two means is the system RT.

11.7 Calibration Error (CE) Test. The percent CE is the mean difference between the HCl calibration gas value and the CEMS response at each calibration point expressed as a percentage of the span. The CE must be less than five percent.

#### 11.7.1 Extractive CEMS CE check.

11.7.1.1 Sequentially introduce calibration gas to the CEMS probe, before the sample conditioning and filtration system.

11.7.1.2 Measure three upscale HCl gas concentrations in the ranges shown in Table 4 of this PS.

11.7.1.3 Introduce the gases into the sampling probe with sufficient flow rate to replace the entire source gas sample.

11.7.1.4 Continue to add the standard gas until the response is stable as evidenced when the difference between two consecutive measurements is less than the LOD or within five percent of each other.

11.7.1.5 Make triplicate measurements for each gas standard. Introduce different calibration concentrations in any order but do not introduce the same gas concentration twice in succession. Conduct independent measurements three times for each concentration, for a total of nine measurements.

11.7.1.6 At each reference gas concentration, determine the average of the three CEMS responses

$$(\overline{MC}_i)$$

Calculate the CE using Equation 3 in section 12.0.

11.7.1.7 If you desire to determine the system RT during this test, you may inject zero gas immediately followed by the high-level standard.

11.7.1.8 For non-dilution systems, you may adjust the system to maintain the correct flow rate at the analyzer during the test, but you may not make adjustments for any other purpose. For dilution systems, you must operate the measurement system at the appropriate dilution ratio during all system CE checks, and you may make only the adjustments necessary to maintain the proper ratio.

#### 11.7.2 IP–CEMS CE check

11.7.2.1 Conduct a 3-point system CE test by sequential addition of known concentrations of HCl standard into a calibration cell of known volume, temperature, pressure and path length.

(Note: The optical path used for IP–CEMS calibration error checks must include the native measurement path. You must also collect native stack concentration before and after each HCl standard measurement. Bracketing HCl standard measurements with native stack measurements may be used in the calculations to correct the upscale measurements for stack gas HCl concentration changes.)

11.7.2.2 Introduce HCl standards into your calibration cell in a range of concentrations that produce responses equivalent to the source concentrations shown in Table 4 for your path length.

11.7.2.3 Introduce the low-, mid-, and high-level calibration standards in any order. Make three independent measurements of each concentration. Introduce different calibration concentrations in any order but do not introduce the same gas concentration twice in succession.

11.7.2.4 You must calculate the equivalent concentration ( $C_{i,eff}$ ) of the HCl calibration gas equivalent to the stack concentration by correcting for calibration cell temperature, pressure, path length, line

strength factor (LSM) and, if necessary, the native source gas HCl concentration using equations 4, 5 and 6 in section 12.0.

11.7.2.5 You may use the LSM provided by your instrument manufacturer or determine an instrument-specific LSM as a function of temperature using a heated gas cell and effective gas concentrations ( $C_{i,eff}$ ) between 50 and 150 percent of the emission limit.

11.7.2.6 At each gas concentration, determine the average of the three independent CEMS measurement responses corrected for stack concentration, and the average response during zero gas injections (background or native stack gas measurement). Calculate the CE using Equation 6 in section 12.0.

11.7.3 You may use Figure 1 to record and report your CE test results.

11.7.4 If the CE specification is not met for all three standard concentrations, take corrective action and repeat the test until an acceptable 3-point CE test is achieved.

11.8 Seven-Day Calibration Drift (CD) Test

11.8.1 The CD Test Period. Prior to the start of the RA tests, you must perform a CD test. The purpose of the CD measurement is to verify the ability of the CEMS to maintain calibration for each of seven, 24-hour periods.

11.8.2 The CD tests must be performed using the zero and either mid-level or high-level calibration standards as defined in Table 4.

11.8.3 Conduct the CD test during normal facility operations following the procedures in section 11.7 of this PS.

11.8.4 If periodic automatic or manual adjustments are made to the CEMS zero and upscale response factor settings, conduct the CD test immediately before these adjustments.

(Note: Automatic signal or mathematical processing of all measurement data to determine emission results may be performed throughout the entire CD process.)

11.8.5 Determine the magnitude of the CD at 24-hour intervals, for seven consecutive unit operating days. The seven consecutive unit operating days need not be seven consecutive calendar days. You may use Figure 2 to record and report the results of your CD test.

11.8.6 Record the average CEMS response for zero gas and mid- or high-level calibration gas.

11.8.6.1 For extractive CEMS, calculate the CD using Equation 3 in section 12. Report the absolute value of the differences as a percentage of the span value.

11.8.6.2 For IP-CEMS, you may exclude the in stack measurement path when determining zero gas concentration. Calculate the CD using equations in section 12.4.

11.8.7 You must record the average CEMS response for each reference gas and calculate the mid- or high-level CD using Equation 6 in section 12.0. Calculate the zero drift value using Equation 7.

11.8.8 The zero-level and high-level drift for each day must be less than five percent of the span value. You must pass each day's drift checks for seven days to meet this requirement. Each zero- and high-level drift

check must be recorded and reported for the seven-day drift check tests.

11.9 Relative Accuracy (RA) Test

11.9.1 Unless otherwise specified in an applicable subpart of the regulations, use Method 26A in 40 CFR part 60 Appendix A-8, Method 320 and Method 321, both found in 40 CFR part 63 Appendix A, or ASTM D6348-12 including mandatory annexes, as the acceptable reference methods for HCl measurement. Other RMs for moisture,  $O_2$ , etc., may be necessary. Conduct the RM tests in such a way that they will yield results representative of the emissions from the source and can be compared to the CEMS data.

11.9.2 Conduct the diluent (if applicable), moisture (if needed), and pollutant measurements simultaneously. However, diluent and moisture measurements that are taken within an hour of the pollutant measurements may be used to calculate dry pollutant concentration and emission rates.

11.9.3 Stratification Test. A stratification test must be conducted during normal facility operating conditions. The purpose of this test is to verify that excess stratification of the target pollutant does not render the sampling point of the CEMS non-representative. You must traverse as required in this section while taking reference method samples used for the RA testing.

11.9.3.1 Perform a stratification test at each test site to determine the appropriate number of sample traverse points. If testing for multiple pollutants or diluents at the same site, a stratification test using only one pollutant or diluent satisfies this requirement. A stratification test is not required for small stacks that are less than four inches in diameter. To test for stratification, use a probe of appropriate length to measure the HCl concentration or an alternative analyte, as described in this section, at 12 traverse points located according to Table 1-1 or Table 1-2 of Method 1 in Appendix A-1 to 40 CFR part 60, as appropriate.

11.9.3.2 You may substitute a stratification test for  $SO_2$  for the HCl stratification test if the HCl concentration is less than ten times the LOD of your HCl CEMS. If you select this option, you must follow the test procedures in Method 6C of Appendix A-4 to 40 CFR part 60.

11.9.3.3 You may substitute a stratification test for  $CO_2$ , CO or nitrogen oxides ( $NO_x$ ) if you anticipate the concentration of both  $SO_2$  and HCl are less than ten times the associated LOD for the CEMS instrument.

11.9.3.4 Calculate the mean measured concentration for all sampling points ( $MN_{avg}$ ).

11.9.3.5 Calculate the percent stratification ( $S_i$ ) of each traverse point using Equation 8 in section 12.0.

11.9.3.5.1 If the concentration at any traverse point differs from the mean concentration for all traverse points by no more than: (a)  $\pm 5.0$  percent of the mean concentration or (b)  $\pm 0.5$  ppm (whichever is less restrictive), the gas stream is considered unstratified and you may perform a single point RA test.

11.9.3.5.2 If the 5.0 percent or 0.5 ppm criterion is not met, but the concentration at

any traverse point differs from the mean concentration for all traverse points by no more than: (a)  $\pm 10.0$  percent of the mean or (b)  $\pm 1.0$  ppm (whichever is less restrictive), the gas stream is considered to be minimally stratified, and you may take RA samples from three points. Space the three points at 16.7, 50.0, and 83.3 percent of the measurement traverse line.

11.9.3.5.3 If the traverse point differs from the mean concentration by more than 10 percent, the gas stream is considered stratified and you must conduct a full traversing RA test following tables 1-1 and 1-2 of Method 1 in Appendix A-1 to 40 CFR part 60.

11.9.3.6 Conduct all necessary RM tests within 3 cm (1.2 in.) of the traverse points, but no closer than 3 cm (1.2 in.) to the stack or duct wall.

11.9.3.7 In order to correlate the CEMS and RM data properly, record the beginning and end of each RM run (including the exact time of day) with the permanent record of CEMS output.

11.9.4 Conduct the RA test using an RM.

11.9.4.1 You must conduct RA tests at the affected facility during process operating conditions representing average production and full control operation at the source, or as specified in an applicable subpart.

11.9.4.2 Conduct a minimum of nine sets of all necessary RM test runs.

11.9.4.3 If HCl CEMS measurements are less than or equal to 20 percent of the applicable standard, you must perform a DS verification test during CEMS installation and performance tests following the procedures in Appendix A of this PS.

11.9.4.4 When Method 26A is used as the RM, you must conduct the RM test runs with paired or duplicate sampling systems and use the average of the HCl concentrations measured by the two trains. You must sample sufficient gas to reach three times your method detection limit for Method 26A in 40 CFR part 60, Appendix A-8, or for a minimum of one hour, whichever is less.

11.9.4.5 Identify outliers in the paired Method 26A data by calculating the relative difference (RD) for the paired RM tests. Data that do not meet the RD criteria may not be used in the calculation of RA. The primary reason for performing paired RM sampling is to ensure the quality of the RM data. Determine the RD for paired data points using Equation 9 in section 12.0.

11.9.4.6 The minimum performance criteria for RM paired HCl data is an RD for any data pair of  $\leq 10$  percent when the mean HCl concentration is greater than 50 percent of the applicable emission limit expressed as an equivalent concentration. If the mean HCl concentration is less than or equal to 50 percent of the applicable emission limit expressed as an equivalent concentration, the RD must be  $\leq 20$  percent. Pairs of RM data exceeding these RD criteria must be eliminated from the data set used to develop the HCl CEMS RA assessment.

(Note: More than nine sets of RM tests may be performed. If this option is chosen, a maximum of three sets of the test results may be rejected when the HCl concentration is greater than 50 percent of the applicable standard; a maximum of six sets of test

results may be rejected when the HCl concentration is less than 50 percent of the applicable standard so long as the total number of test results used to determine the RA is greater than or equal to nine. However, all data must be reported, including the rejected data.)

11.9.5 When Method 320 and Method 321, both found in 40 CFR part 63 Appendix A, or ASTM D6348–12, are used, you must collect gas samples that are at stack conditions (hot and wet) and you must traverse as required in section 11.9.3.

11.9.6 Analyze the results from the RM test runs using equations in section 12.7 (equations 10–15). Calculate and report the RA between the HCl CEMS results and the RM.

11.9.7 As an option, in addition to performing a RATA with a reference method, you may perform a DS test verification during CEMS installation and performance tests following the procedures in Appendix A of this PS. If the HCl CEMS passes the DS test verification, you may use DS as an alternative to selected quarterly RATA tests as specified in 40 CFR part 60 Appendix F requirements for ongoing quality assessment of the HCl CEMS.

#### 11.10 Reporting

11.10.1 For systems that use a gas blender and/or liquid evaporative calibrator to deliver HCl gas standards, record and report supporting data for these devices, including liquid feed calibrations, liquid standard(s) concentration, feed rate and gas flow calibrations for all diluent and HCl gas flows. All calibrations must include a stated uncertainty, and the combined uncertainty of the delivered gas concentration must be calculated and reported.

11.10.2 Record and summarize in tabular form the results of the CD test, the linearity tests, the RT test, CE test, RA test, and optional spike recovery procedure, as

appropriate. Include all data sheets, calculations, CEMS data records (*i.e.*, charts, records of CEMS responses), and cylinder gas or other reference material certifications necessary to confirm that the performance of the CEMS met the performance specifications.

11.10.3 Record and report supporting dilution system data including standard cylinder gas flow, total gas flow, and the results of the test measurements.

11.10.4 Record and report the LOD and system limitation verification in ppmv for the HCl CEMS as installed.

#### 12.0 Calculations and Data Analysis.

##### 12.1 Nomenclature

$C_i$  = Actual HCl calibration gas concentration used for test *i* (ppmv);

$C_{i,eff}$  = Equivalent concentration of the reference value,  $C_i$ , at the specified conditions;

CC = Confidence coefficient;

$CD_{extractive}$  = Calibration drift for extractive CEMS (percent);

$CD_{IP}$  = Calibration drift for IP–CEMS (percent);

$CD_0$  = The calibration drift at zero HCl concentrations for an IP–CEMS;

$CE_{extractive}$  = Calibration error for extractive CEMS (percent);

$CE_{IP}$  = Calibration error for IP–CEMS (percent);

$d_{avg}$  = Mean difference between CEMS response and the reference gas (ppmv);

$d_i$  = Difference of CEMS response and the RM value (ppmv);

*I* = Total interference from major matrix stack gases, percent;

LSM = Line strength factor for IP–CEMS, measurements, temperature dependent derivation from the HITRAN database;

$\Delta MC_{avg}$  = Average of the 3 absolute values of the difference between the measured HCl calibration gas concentrations with and

without interference from selected stack gases (ppmv);

$MC_i$  = Measured HCl calibration gas concentration *i* (ppmv);

$MC_{int}$  = Measured HCl concentration of the HCl calibration gas plus the individual or combined interference gases (ppmv);

$MN_{avg}$  = Average concentration at all sampling points (ppmv);

$MN_b$  = Measured native concentration

bracketing calibration spike measurements;

$MN_i$  = Measured native concentration for test or run *i* (ppmv);

*n* = Number of measurements in an average value;

$PL_{Cell}$  = Path length of IP–CEMS calibration cell;

$PL_{Stack}$  = Path length of IP–CEMS stack optical path;

$R_a$  = HCl concentration measured by the first of two RM pairs (ppmv);

$R_b$  = HCl concentration measured by the second of two RM pairs (ppmv);

RA = Relative accuracy of CEMS compared to a RM (percent);

RD = Relative difference between paired RM trains (percent);

$RM_i$  = RM concentration for test run *i*;

$RM_{avg}$  = Mean measured RM value or the mean dynamic spike concentration (ppmv);

*S* = Span of the instrument (ppmv);

$S_d$  = Standard deviation of the differences;

$S_t$  = Stratification (percent);

$t_{0.975}$  = One-sided t-value obtained from Table 5 for *n*-1 measurements;

$T_{reference}$  = Temperature of the calibration cell for IP–CEMS (degrees Kelvin);

$T_{stack}$  = Temperature of the stack at the monitoring location for IP–CEM (degrees Kelvin).

12.2 Calculate the difference between the measured HCl concentration with and without interferences for each interference gas (or mixture) for your CEMS as:

$$\Delta MC_{avg} = \frac{\sum_{i=1}^3 |MC_i - MC_{int}|}{3} \quad \text{Eq. 1}$$

Calculate the total percent interference as:

$$I = \sum_{i=1}^3 \frac{\Delta MC_{avg}}{C_i} * 100 \quad \text{Eq. 2}$$

12.3 Calculate the calibration error or calibration drift at concentration *i* for an extractive CEMS as:

$$CE_{extractive} = CD_{extractive} = \frac{(|C_i - \overline{MC}_i|)}{S} * 100 \quad \text{Eq. 3}$$

12.4 Calculate the calibration error or calibration drift at concentration *i* for IP–CEMS that use a calibration cell as follows:

12.4.1 Calculate the equivalent concentration  $C_{i,eff}$  using Equation 4:

$$C_{i,eff} = \left[ C_i \times \frac{PL_{cell}}{PL_{stack}} \times \frac{T_{stack}}{T_{reference}} \times LSM \right] \quad \text{Eq. 4}$$

12.4.2 Calculate the average native concentration before and after a calibration check measurement as:

$$MN_b = \frac{MN_i + MN_{i+1}}{2} \quad \text{Eq. 5}$$

12.4.3 Calculate the calibration error or calibration drift at concentration  $i$  for an IP-CEMS as:

$$CE_{IP} = CD_{IP} = \frac{(|C_{i,eff} - \overline{MC}_i - MN_b|)}{S} * 100 \quad \text{Eq. 6}$$

12.4.4 Calculate the calibration drift at zero HCl concentrations for an IP-CEMS as:

$$CD_0 = \frac{(|(MC_i - MN_b) - (MC_{i+1} - MN_b)|)}{S} \quad \text{Eq. 7}$$

12.5 Calculate the percent stratification at each traverse point as:

$$S_t = \frac{|MN_i - MN_{avg}|}{MN_{avg}} * 100 \quad \text{Eq. 8}$$

12.6 Calculate the relative difference between paired RM sampling train results as:

$$RD = \frac{|R_a - R_b|}{R_a + R_b} * 100 \quad \text{Eq. 9}$$

12.7 Calculate the relative accuracy using RM and CEMS Data.

12.7.1 Determine the HCl CEMS final integrated minute average pollutant concentration or emission rate for each RM test period. Consider system response time, if important, and confirm that the results have been corrected to the same moisture, temperature and diluent concentration basis.

12.7.2 When Method 26A, found in 40 CFR part 60 Appendix A-8, is used as the RM, compare each CEMS integrated average value against the corresponding average of the paired RM values.

12.7.3 If the RM is Method 320 or Method 321, found in 40 CFR part 63 Appendix A, or ASTM D6348-12, make a direct comparison of the average RM results and

CEMS average value for identical test periods.

12.7.4 Calculate the arithmetic difference of the RA measurements to the CEMS one-minute average results using Equation 10.

$$d_i = RM_i - MN_i \quad \text{Eq. 10}$$

12.7.5 Calculate the standard deviation of the differences ( $S_d$ ) of the HCl CEMS measured and RM results using Equation 11.

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



12.7.6 Calculate the confidence coefficient (CC) for the relative accuracy tests using Equation 12.

$$CC = t_{0.975} * \left( \frac{S_d}{(n^{1/2})} \right) \quad \text{Eq. 12}$$

12.7.7 Calculate the mean difference ( $d_{avg}$ ) between the RM and CEMS values in the units of ppmv or the emission standard using Equation 13.

$$d_{avg} = \frac{1}{n} \sum_{i=1}^n d_i \quad \text{Eq. 13}$$

12.7.8 Calculate the average RM value using Equation 14.

$$RM_{avg} = \frac{1}{n} \sum_{i=1}^n RM_i \quad \text{Eq. 14}$$

12.7.9 Calculate RA for the HCl CEMS using Equation 15.

$$RA = \left[ \left( |d_{avg}| + |CC| \right) / RM_{avg} \right] * 100 \quad \text{Eq. 15}$$

13.0 Method Performance.

13.1 Level of Detection. You may not use an HCl CEMS whose LOD is greater than 20 percent of the regulatory limit or other action level for the intended use of the data. An LOD less than or equal to 20 percent of the standard should result in 95 percent confidence level or better for measurements at the level of the standard.

13.2 Calibration Drift. The calibration drift for the HCl CEMS must not drift or deviate from the reference gas value by more than five percent of the span value for seven consecutive days.

13.3 Calibration Error Check (linear or quadratic)

13.3.1 The calibration intercept must be equal to or less than 15 percent of the system span.

13.3.2 The mean percent difference between the reference gas value and the CEMS measured concentration at each of the three points (Eq.7) must be less than five percent of span.

13.4 Relative Accuracy Check—Reference Method. The RA of the CEMS compared to a RM in the units of the HCl concentration must be less than or equal to 20 percent of the RM when  $RM_{avg}$  is used in the denominator of Equation 14. In cases where the average emission level for the test is less than 50 percent of the applicable standard, substitute the equivalent emission standard value in ppmvw in the denominator of Equation 14 in place of  $RM_{avg}$ , and this alternative calculated RA must be less than or equal to 15 percent of the RM.

13.5 Response Time.

13.5.1 The RT to a measurable change in concentration must be less than or equal to 15 minutes.

13.5.2 Interference Check. The combined interference response for the HCl CEMS that

was used for the test must not be greater than ±3.0 percent of the equivalent HCl concentration used for the interference test.

13.5.3 Integrated Path Beam Intensity. The percent difference during attenuated light calibration check for the light source and detector used in an IP-CEMS must not be more than ±3.0 percent of the known measured concentration without attenuation used for the test.

13.5.4 Your temperature monitor satisfies the accuracy required if the absolute relative difference between  $M_t$  and  $V_t$  is ≤ one percent or if the absolute difference between measured value of stack temperature ( $M_t$ ) and the value of calibrated temperature reference device ( $V_t$ ) is ≤2.8 °C (5.0 °F), whichever is greater.

13.5.5 Your pressure monitor satisfies the accuracy required if the absolute relative difference between  $M_p$  and the value of calibrated pressure reference device ( $V_p$ ) is ≤ five percent or if the absolute difference between the measured value of stack pressure ( $M_p$  and  $V_p$ ) is ≤0.12 kilopascals (0.5 inches of water column), whichever is greater.

14.0 Pollution Prevention. [Reserved]

15.0 Waste Management. [Reserved]

16.0 References.

1. Method 318, 40 CFR, part 63, Appendix A (Draft), "Measurement of Gaseous Formaldehyde, Phenol and Methanol Emissions by FTIR Spectroscopy," EPA Contract No. 68D20163, Work Assignment 2–18, February, 1995.
2. "EPA Protocol for the Use of Extractive Fourier Transform Infrared (FTIR) Spectrometry in Analyses of Gaseous Emissions from Stationary Industrial Sources," February, 1995.
3. "Measurement of Gaseous Organic and Inorganic Emissions by Extractive FTIR

Spectroscopy," EPA Contract No. 68–D2–0165, Work Assignment 3–08.

4. "Method 301—Field Validation of Pollutant Measurement Methods from Various Waste Media," 40 CFR part 63, Appendix A.
5. EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards 2012. See [www.epa.gov/ttn/emc](http://www.epa.gov/ttn/emc).

17.0 Tables, Diagrams, Flowcharts, and Validation Data.

TABLE 1—INTERFERENCE CHECK GAS CONCENTRATIONS

Potential interferent gas <sup>1</sup>	Approximate concentration (balance N <sub>2</sub> )
CO <sub>2</sub> .....	15% ± 1% CO <sub>2</sub> . <sup>2</sup>
CO .....	100 ± 20 ppm.
CH <sub>2</sub> O .....	20 ppm.
CH <sub>4</sub> .....	100 ± 20 ppm.
NH <sub>3</sub> .....	10 ppm (extractive CEMS only).
NO <sub>2</sub> .....	250 ± 50 ppm.
SO <sub>2</sub> .....	200 ± 20 ppm.
O <sub>2</sub> .....	3% ± 1% O <sub>2</sub> . <sup>2</sup>
H <sub>2</sub> O .....	10% ± 1% H <sub>2</sub> O. <sup>2</sup>
N <sub>2</sub> .....	Balance. <sup>2</sup>

<sup>1</sup> Any of these specific gases can be tested at a lower level if the manufacturer has provided reliable means for limiting or scrubbing that gas to a specified level.

<sup>2</sup> Gases for short path IP cell interference tests added at relative concentration ratios indicated in the table.



TABLE 3—DESIGN STANDARDS FOR TEMPERATURE SENSORS—Continued

If the sensor is a . . .	You can use the following design standards as guidance in selecting a sensor for your CPMS
	b. ASTM E585/E585M–04, “Specification for Compacted Mineral-Insulated, Metal-Sheathed, Base Metal Thermocouple Cable.” c. ASTM E608/E608M–06, “Specification for Mineral-Insulated, Metal-Sheathed Base Metal Thermocouples.” d. ASTM E696–07, “Specification for Tungsten-Rhenium Alloy Thermocouple Wire.” e. ASTM E1129/E1129M–98 (2002), “Standard Specification for Thermocouple Connectors.” f. ASTM E1159–98 (2003), “Specification for Thermocouple Materials, Platinum-Rhodium Alloys, and Platinum.” g. ISA–MC96.1–1982, “Temperature Measurement Thermocouples.”
2. Resistance temperature detector .....	ASTM E1137/E1137M–04, “Standard Specification for Industrial Platinum Resistance Thermometers.”

TABLE 4—PERFORMANCE SPECIFICATION TEST CALIBRATION GAS RANGES

Test	Units	HCl calibration material concentrations <sup>a</sup>				Section
		Zero	Low level	Mid level	High level	
Calibration Drift .....	% of Span .....	<LOD ...	10–30	NA	80–120	11.8
Calibration Error Test .....	% of Span .....	NA .....	0–30	50–60	80–100	11.7
Dynamic Spiking .....	% of Limit <sup>b</sup> .....	NA .....	30–60	80–120	130–180	11.9

<sup>a</sup>Reference calibration material concentration must be NIST traceable.

<sup>b</sup>Dynamic spiking concentrations are a percent of the applicable emission limit or the actual source emission concentration, whichever is larger.

TABLE 5—STUDENTS T-VALUES

n-1 <sup>a</sup>	t-value	n-1 <sup>a</sup>	t-value	n-1 <sup>a</sup>	t-value	n-1 <sup>a</sup>	t-value
5 .....	2.571	11	2.201	17	2.110	23	2.069
6 .....	2.447	12	2.179	18	2.101	24	2.064
7 .....	2.365	13	2.160	19	2.093	25	2.060
8 .....	2.306	14	2.145	20	2.086	26	2.056
9 .....	2.262	15	2.131	21	2.080	27	2.052
10 .....	2.228	16	2.120	22	2.074	28	2.048

<sup>a</sup>The value n is the number of independent pairs of measurements (a pair consists of one spiked and its corresponding unspiked measurement). Either discreet (independent) measurements in a single run, or run averages can be used.

SOURCE :			DATE :		
CEMS :			LOCATION :		
SERIAL NUMBER :			SPAN :		
RUN NUMBER	CALIBRATION VALUE	CEMS RESPONSE	DIFFERENCE		
			Zero/Low	Mid	High
1					
2					
3					
4					
5					
6					
7					
8					
9					
Mean Difference =					
Calibration Error =			%	%	%

Figure 1. Calibration Error Determination

SOURCE :					DATE :		
CEMS :					LOCATION :		
SERIAL NUMBER :					SPAN :		
LEVEL	DAY	DATE	TIME	CALIBRATION VALUE	CEMS RESPONSE	DIFFERENCE	PERCENT OF SPAN
ZERO/LOW LEVEL	1						
	2						
	3						
	4						
	5						
	6						
	7						
HIGH LEVEL	1						
	2						
	3						
	4						
	5						
	6						
	7						

Figure 2. Calibration Drift Determination

#### Performance Specification—18 APPENDIX A Dynamic Spiking Procedure

##### A1. Scope and Application

1.1 This appendix to Performance Specification (PS) 18 describes the procedure and performance requirements for dynamic spiking (DS) as a quality check for hydrogen chloride (HCl) continuous emission monitoring systems (CEMS).

1.2 This appendix is applicable to quality checks of both extractive and integrated path (IP) technologies used to measure HCl emissions.

1.3 When performed during PS-18 qualification of an HCl CEMS, this procedure may be used, as allowed by individual rules or ongoing quality assurance requirements, as an alternative to cylinder gas audit tests and relative accuracy tests with a reference method.

##### A2. Summary of the Appendix for Dynamic Spiking.

Dynamic spiking is a gas phase method of standard additions used to verify the accuracy of CEMS in the presence of the sample matrix. It consists of spiking a known quantity of HCl into the measurement system that includes the native HCl and the native source gas matrix.

##### A3. Definition.

*Dynamic Spiking (DS)* means the procedure where a known concentration of HCl gas is injected into the probe sample gas stream for extractive CEMS at a known flow rate, or spiked into a calibration cell for *in-situ* IP-CEMS in order to assess the ability of the measurement system to recover and measure HCl in the presence of potential interference from the flue gas matrix.

A4. *Interferences.* Interferences are defined in PS-18, section 4.0.

A5. *Safety.* The procedures required under this appendix may involve hazardous materials, operations and equipment. This procedure may not address all of the safety problems associated with these procedures. It is the user's responsibility to establish appropriate safety and health practices and determine the applicable regulatory limitations prior to performing these procedures. The CEMS users should consult instrument operation manuals, compressed gas safety requirements such as Occupational Safety and Health Administration regulations and other material safety data sheets for specific precautions to be taken.

A6. *Equipment and Supplies.* An example of equipment and supplies is described in section 6 of PS-18.

A7. *Reagents and Standards.* Spiking materials must meet the quality requirements defined for calibration standards in section 7 of PS-18 to perform this procedure. You must use HCl calibration material traceable to a National Institute of Standards and Testing (NIST) standard.

(Note: The concentration of standard material required for dynamic spiking may be significantly higher than the concentration required to calibrate your CEMS.)

A8. *Dynamic Spiking Procedure.* You must calculate the mean and relative standard deviation for the required number of dynamic spiking measurements to determine CEMS spike recovery. For initial demonstration of relative accuracy, you will compare the average of nine dynamic spike recovery measurements to the specifications in section A12 of this appendix. For ongoing relative accuracy assessment, you will compare the average of three dynamic spike

recovery measurements to the requirements in section A12.

##### 8.1 Spiking Concentration and Measurement Replicates.

8.1.1 You must add and measure the HCl gas spike at concentrations of approximately 50, 100, and 150 percent of the applicable emission limit or source emission concentration, whichever is larger.

8.1.2 You must measure each of the three spike gas concentrations (zero and two upscale) three times each for a total of nine independent measurements. Introduce the gases in such a manner that the entire CEMS is challenged. Do not measure the same gas concentration twice in succession.

8.1.3 You may not exceed the calibration range above span when the spike and native HCl concentration are combined.

8.1.4 You may perform dynamic spiking with NIST traceable calibration gas, humidified NIST traceable calibration gas, or NIST traceable liquid evaporative generated HCl gas.

8.1.5 You must collect a pre- and post-spike background measurement of stack HCl concentration for each spike measurement.

8.1.6 As an alternative to making background measurements pre- and post-spiking, you may use an independent continuous HCl monitor as a temporary unit to measure unspiked stack HCl concentration while simultaneously using the CEMS to measure the spike plus background/native concentration.

8.1.7 You must collect background or native HCl measurements using both the installed HCl CEMS and the independent continuous HCl monitor to confirm the independent monitoring system measures the

same background concentration as the HCl CEMS being qualified with this PS.

8.1.8 Background measurements must be corrected to the dilution affected by the spike additions.

## 8.2 Extractive CEMS Dynamic Spiking Procedure

8.2.1 Spike Additions. Your HCl spike addition may not alter the total volumetric sample system flow rate or basic dilution ratio of your CEMS (if applicable).

8.2.2 You may add no more than 10 percent of the total volumetric flow rate through the CEMS.

8.2.3 You must determine a dilution factor (DF) or relative concentration of HCl for each dynamic spike. You must document the quantitative uncertainty of flow dilutions using Method 205. (Note: Since the spiking mass balance calculation is directly dependent on the accuracy of the DF determination, high accuracy is required for total volumetric flow rate, spike gas flow rate, or effective standard addition concentration as applicable to the technology you use. NIST-traceable flow meters, venturies and/or orifices accurate to within two percent or certified tracer gas measurements are required to make the necessary flow rate determination at the accuracy required for this performance specification.)

8.2.4 You must monitor and record the total sampling system flow rate and sample dilution ratio (if applicable) for the spiking and stack gas sampling systems to ensure they are known and do not change during the spiking procedure. Record all data on a data sheet similar to Table 1 in section 13 of this appendix.

8.2.4.1 You may either measure the spike gas flow and the total flow with a calibrated flow monitor capable of NIST traceable  $\pm 2.0$  percent accuracy or calculate the flow using a stable tracer gas included in your spike gas standard.

8.2.4.2 If you use flow measurements to determine the spike dilution, then use equation A1 in section 11 of this appendix to calculate the DF. Total probe flow measurement requires measurement of HCl spike flow ( $Q_{\text{spike}}$ ) and total flow through the CEM sampling system ( $Q_{\text{probe}}$ ).

8.2.4.3 If your CEMS is capable of measuring an independent stable tracer gas, you may use a spike gas that includes the tracer to determine the DF using equation A2 in section 11 of this appendix.

8.2.5 Begin by collecting unspiked sample measurements. You must use the average of two unspiked sample measurements as your pre-spike background.

(Note: Measurements should agree within five percent or three times the level of detection to avoid biasing the spike recovery results.)

8.2.5.1 Introduce the HCl gas spike into the permanent CEMS probe, upstream of the particulate filter or sample conditioning system and as close to the sampling inlet as practical.

8.2.5.2 Maintain the HCl gas spike for at least twice the response time of your CEMS or until the consecutive measurements agree within five percent. Collect two independent

measurements of the native plus spiked HCl concentration.

8.2.5.3 Stop the flow of spike gas for at least twice the response time of your CEMS or until the consecutive measurements agree within five percent. Collect two independent measurements of the native HCl concentration.

8.2.6 Repeat the collection of sample measurements in section 8.2.5 until you have data for each spike concentration for a total of nine sets of data including a final set of unspiked sample measurements according to section 8.2.5.

8.2.7 Calculate the percent recovery for extractive CEMS as described in section 11.2 of this appendix.

8.2.8 If the spikes persistently show poor recovery repeatability, or if the recoveries are not within the range specified in section 12 of this appendix, you must take corrective action and repeat the dynamic spiking accuracy procedure.

## 8.3 Dynamic Spiking Procedure for IP-CEMS.

8.3.1 For IP-CEMS, you must spike a known quantity of calibration gas into a calibration cell that is in the optical path used to make CEMS source measurements.

8.3.2 Use calibration gas at a concentration that produces a signal equivalent to the ranges specified in Table 4 of PS-18.

8.3.3 Introduce zero gas into a permanently mounted calibration cell located in the optical measurement path of the instrument. Continue to flush the zero gas into the cell for at least the response time of your CEMS or until two consecutive measurements taken are within five percent, then collect two independent measurements. Introduce spike gas into the same calibration cell. Continue to flush the spike gas into the cell for at least the response time of your CEMS or until two consecutive measurements taken are within five percent. Then collect two independent measurements.

8.3.4 Repeat the collection of sample spike and native HCl measurements in section 8.3.3 until you have data for each spike concentration for a total of nine sets of data including a final zero gas sample measurement. The measured concentrations must be corrected for calibration cell and stack temperature, pressure and stack measurement path length.

8.3.5 Calculate the percent spike recovery (%SA) for IP-CEMS, as described in section 11.2.3.5, using the appropriate equations in section 11.2 of this appendix.

8.3.6 If the spikes persistently show poor repeatability, or if the recoveries are not within the range specified in section 12 of this appendix, you must take corrective action and repeat the dynamic spiking accuracy procedure.

A9. *Quality Control.* (Reserved)

A10. *Calibration and Standardization.* (Reserved)

A11. *Calculations and Data Analysis.* Calculate the spike recoveries for each injection and its associated pair of native HCl measurements, using equations in this section. (Note: For cases where the emission

standard is expressed in units of lb/MMBtu or corrected to a specified O<sub>2</sub> or CO<sub>2</sub> concentration, an absolute accuracy specification based on a span at stack conditions may be calculated using the average concentration and applicable conversion factors. The appropriate procedures for use in cases where a percent removal standard is more restrictive than the emission standard are the same as in 40 CFR part 60 PS-2, sections 12 and 13.)

## 11.1 Nomenclature

$C_i$  = Actual HCl calibration gas concentration used for test  $i$  (ppmv);

$C_{i,\text{eff}}$  = Spike equivalent concentration of the reference value,  $C_i$ , at the specified conditions;

$C_{\text{spike gas}}$  = Actual HCl standard gas concentration spiked (e.g., bottle or standard gas concentration) ppmv;

$C_{\text{tracer spiked}}$  = Tracer gas concentration injected with spike gas ("standard concentration") ppmv;

$C_{\text{expected}}$  = Expected HCl concentration response for dynamic spike;

CC = Confidence coefficient;

DF = Spiked gas dilution factor;

LSM = Line strength factor for integrated path; measurements, temperature dependent derivation from the HITRAN database (see <http://www.cfa.harvard.edu/hitran/> for HITRAN access);

$MC_i$  = Measured HCl calibration gas concentration  $i$  (ppmv);

$MC_{\text{native}}$  = Average measured concentration of the native HCl (ppmv);

$M_{\text{native tracer}}$  = Measured tracer gas concentration present in native effluent gas (ppmv);

$M_{\text{spiked tracer}}$  = Measured diluted tracer gas concentration in a spiked sample (ppmv);

$n$  = Number of measurements in an average value;

$PL_{\text{Cell}}$  = Path length of IP-CEMS calibration cell;

$PL_{\text{Stack}}$  = Path length of IP-CEMS stack optical path;

$Q_{\text{spike}}$  = Flow rate of the dynamic spike gas (Lpm);

$Q_{\text{probe}}$  = Average total stack sample flow through the system (Lpm);

S = Span;

%SA = Spike recovery accuracy (percent);

%SR<sub>avg</sub> = Mean dynamic spike recovery (percent);

%SR <sub>$i$</sub>  = Dynamic spike recovery (percent);

$S_d$  = Standard deviation of the differences;

$t_{0.975}$  = One-sided Students  $t$ -value  $n-1$  measurements;

$T_{\text{stack}}$  = Temperature of the stack gas;

$T_{\text{reference}}$  = Temperature measured by the reference temperature indicator.

## 11.2 Calculating Dynamic Spike Recovery for Extractive CEMS.

11.2.1 If you determine your spike dilution factor using spike gas and stack sample flow measurements, calculate the dilution factor for dynamic spiking accuracy tests using equation A1:

$$DF = \frac{Q_{probe}}{Q_{spike}} \quad \text{Eq. A1}$$

11.2.2 If you determine your spike dilution factor using an independent stable tracer gas that is not present in the native

source gas, calculate the dilution factor for dynamic spiking using equation A2:

$$DF = \frac{M_{spiked\ tracer}}{C_{tracer\ spiked}} \quad \text{Eq. A2}$$

11.2.3 If you determine your spike dilution factor using an independent stable tracer that is present in the native source gas,

calculate the dilution factor for dynamic spiking using equation A3:

$$DF = \frac{M_{spiked\ tracer} - M_{native\ tracer}}{C_{tracer\ spiked}} \quad \text{Eq. A3}$$

11.2.3.1 Calculate the percent spike recovery (SR<sub>i</sub>) between the CEMS results and

the spike gas concentration for each spiked sample measurement using equation A4.

$$\%SR_i = \frac{MC_i - MC_{native} * (1 - DF)}{C_{spike} * DF} * 100 \quad \text{Eq. A4}$$

11.2.3.2 You must calculate the mean of the recovery for the nine (or more) dynamic spikes using equation A5.

$$\%SR_{avg} = \frac{1}{n} \sum_{i=1}^n \%SR_i \quad \text{Eq. A5}$$

11.2.3.3 You must calculate the standard deviation of the spike recoveries for the nine (or more) dynamic spiking measurements to

determine CEMS accuracy using equation A6.

$$S_d = \sqrt{\frac{\sum_{i=1}^n (\%SR_i - \%SR_{avg})^2}{n-1}} \quad \text{Eq. A6}$$

11.2.3.4 Calculate the confidence coefficient (CC) for the relative accuracy tests using equation A7.

$$CC = t_{0.975} * \left( \frac{S_d}{(n^{1/2})} \right) \quad \text{Eq. A7}$$

11.2.3.5 Calculate the percent %SA for the extractive CEMS using equation A8.

$$\%SA = (|\%SR_{avg} - 100| + |CC|) \quad \text{Eq. A8}$$

11.3 DS Recovery for IP-CEMS.

11.3.1 If you use an *in-situ* IP-CEMS and a calibration cell, calculate and substitute the

spike equivalent concentration C<sub>i,eff</sub> for C<sub>spike</sub> using equation A9:

$$C_{i,eff} = \left[ C_{spike} \times \frac{PL_{cell}}{PL_{stack}} \times \frac{T_{stack}}{T_{reference}} \times LSM \right] \quad \text{Eq. A9}$$

11.3.2 Calculate the percent spike equivalent recovery (%SR<sub>i</sub>) between the CEMS results and the spike equivalent

concentration for each spiked sample measurement using equation A10.

$$\%SR_i = \frac{(MC_i - MC_{native})}{C_{i,eff}} * 100\% \quad \text{Eq. A10}$$

11.3.3 Calculate the average spike recovery (SR<sub>avg</sub>) using equation A11.

$$\%SR_{avg} = \frac{1}{n} \sum_{i=1}^n \%SR_i \quad \text{Eq. A11}$$

11.3.4 Calculate the standard deviation of the spike recoveries for the nine (or more)

dynamic spiking measurements to determine CEMS accuracy using equation A12.

$$S_d = \sqrt{\frac{\sum_{i=1}^n (\%SR_i - \%SR_{avg})^2}{n-1}} \quad \text{Eq. A12}$$

11.3.5 Calculate the confidence coefficient (CC) for the spiking accuracy using equation A13.

$$CC = t_{0.975} * \left( \frac{S_d}{(n^{1/2})} \right) \quad \text{Eq. A13}$$

11.3.6 Calculate the relative spike recovery accuracy (%SA) for the IP-CEMS using equation A14.

$$\%SA = \left[ (|\%SR_{avg}| + |CC|) / S \right] * 100 \quad \text{Eq. A14}$$

A12. *Performance Requirements DS Spike Accuracy Check.*

12.1 The %SA of the average CEMS results calculated using equation A8 for

extractive CEMS or equation A14 for IP-CEMS in the units of HCl concentration (ppm) must be less than or equal to 25

percent of (the average of) the spiked sample concentration.

A13. *Tables and Figures.*

TABLE 1—SPIKE RECOVERY WORK SHEET

Facility name:	Date:	Time:
Unit(s) tested:	Test personnel:	
Analyzer make and model:		
Serial number:		
Calibration range above span:		

Q <sub>probe</sub> (lpm)	Q <sub>spike</sub> (lpm)	CF <sup>1</sup>	C <sub>native</sub>			Actual Values		SR (% spike recovery)
			Pre	Post	Avg	C <sub>i</sub> <sup>2</sup> (ppmv)	MC <sub>ss</sub> <sup>3</sup> (ppmv)	
							Average	
							SD	

<sup>1</sup> CF must be ≥ 10 for extractive CEMS.  
<sup>2</sup> C<sub>i</sub> = Actual HCl concentration of the spike gas, ppmv.  
<sup>3</sup> MC<sub>ss</sub> = Measured HCl concentration of the spiked sample at the target level, ppmv.

■ 3. Appendix F to part 60 is amended by adding Procedure 6 to read as follows:

**Appendix F to Part 60—Quality Assurance Procedures**

\* \* \* \* \*

Procedure 6. Quality Assurance Requirements for Gaseous Hydrogen Chloride (HCl) Continuous Emission Monitoring Systems Used for Compliance Determination at Stationary Sources

1.0 *Applicability and Principle.*

1.1 Applicability. Procedure 6 is used to evaluate the effectiveness of quality control (QC) and quality assurance (QA) procedures and evaluate the quality of data produced by any hydrogen chloride (HCl) gas, CAS: 7647–01–0, continuous emission monitoring system (CEMS) that is used for determining compliance with emission standards for HCl on a continuous basis as specified in an applicable permit or regulation.

1.1.1 This procedure specifies the minimum QA requirements necessary for the control and assessment of the quality of CEMS data submitted to the Environmental Protection Agency (EPA). Source owners and operators responsible for one or more CEMS used for HCl compliance monitoring must meet these minimum requirements and are encouraged to develop and implement a more extensive QA program or to continue such programs where they already exist.

1.1.2 Data collected as a result of QA and QC measures required in this procedure are to be submitted to the EPA or the delegated authority. These data are to be used by both the responsible agency and the CEMS operator in assessing the effectiveness of the CEMS QC and QA procedures in the maintenance of acceptable CEMS operation and valid emission data.

1.2 Principle.

1.2.1 The QA procedures consist of two distinct and equally important functions. One function is the assessment of the quality of the HCl CEMS data by estimating accuracy. The other function is the control and improvement of the quality of the CEMS data by implementing QC policies and corrective actions. These two functions form an iterative control loop. When the assessment function indicates that the data quality is inadequate, the control effort must be increased until the data quality is acceptable. In order to provide uniformity in the assessment and reporting of data quality, this procedure specifies the assessment procedures to evaluate response drift and accuracy. The procedures specified are based on Performance Specification 18 (PS–18) in appendix B of this part. Procedure 6 also requires the analysis of reference method audit samples, if they are available, concurrently with reference method tests as specified in the general provisions of the applicable part. (Note: Because the control and corrective action function encompasses a variety of policies, specifications, standards and corrective measures, this procedure treats QC requirements in general terms to allow each source owner or operator to develop the most effective and efficient QC system for their circumstances.)

2.0 Definitions.

2.1 *Calibration Cell* means a gas containment cell used with cross stack or integrated path (IP) monitoring systems to perform precision and calibration checks. The cell may be a removable sealed cell or an evacuated and/or purged cell capable of exchanging calibration and zero gases. When charged for calibration, the calibration cell contains a known concentration of calibration gas. The calibration cell is filled

with zero gas or removed from the optical path during normal stack gas measurement.

2.2 *Calibration Drift (CD)* means the absolute value of the difference between the CEMS output response and an upscale reference gas or a zero-level reference gas, expressed as a percentage of the span value, when the CEMS is challenged after a stated period of operation during which no unscheduled maintenance or repair took place. A separate CD determination must be performed for pollutant and diluent analyzers. The calibration standards must meet the requirements of section 7.0 in PS–18 of Appendix B in this part.

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

2.4 *Diluent Gas* means a major gaseous constituent in a gaseous pollutant mixture. For combustion sources, either carbon dioxide (CO<sub>2</sub>) or oxygen (O<sub>2</sub>) or a combination of these two gases are the major gaseous diluents of interest.

2.5 *Dynamic Spiking (DS)* means, for extractive CEMS, the procedure where a known concentration of HCl gas is injected into the sample gas stream at the probe with a known flow rate; for *in-situ* IP–CEMS, it is a procedure where a known concentration of HCl gas is spiked into a calibration cell. In both cases, the procedure is performed to assess the accurate recovery of HCl introduced into the measurement system in the presence of potential interference from the flue gas sample matrix.

2.6 *Liquid Evaporative Standard* means a calibration standard produced by vaporizing National Institute of Standards and Testing (NIST) traceable liquid standards of known



HCl concentration and quantitatively mixing the resultant vapor with a diluent carrier gas.

2.7 *Span Value* means the calibration portion of the measurement range as established by the applicable regulatory requirement. If the span is not specified by an applicable regulation or other requirement, then it must be equal to an instrument value representative of twice the emission limit.

2.8 *HCl concentration values* (Zero, Low-Level, Mid-Level and High-Level Values) means the values that are defined in Table 4 of PS-18 in Appendix B of this part.

2.9 *Relative Accuracy (RA)* means the value calculated using Equation 15 of PS-18 in Appendix B of this part or as specified in an applicable regulation. The RA is the absolute mean difference between the gas concentration determined by the CEMS and the value determined by the reference method (RM), plus the 2.5 percent error confidence coefficient of a series of tests divided by the average of the RM or the applicable emission standard.

#### 3.0 *QC Plan Requirements.*

3.1 Each source owner or operator must develop and implement a QC program. As a minimum, each QC program must include written procedures and/or manufacturer's information which should describe in detail, complete, step-by-step procedures and operations for each of the following activities:

- (a) CD checks of HCl CEMS;
- (b) CD determination and adjustment of HCl CEMS;
- (c) Integrated path HCl CEMS emission source (e.g., stack) temperature and pressure accuracy;
- (d) Integrated path HCl CEMS beam intensity checks;
- (e) Routine and preventative maintenance of HCl CEMS (including spare parts inventory);
- (f) Data recording, calculations, and reporting;
- (g) Accuracy audit procedures for HCl CEMS including sampling and analysis methods; and
- (h) Program of corrective action for malfunctioning HCl CEMS.

3.2 These written procedures must be kept on record and available for inspection by the enforcement agency. As described in section 5.3, whenever excessive inaccuracies occur for two consecutive quarters, the source owner or operator must revise the current written procedures or modify or replace the CEMS to correct the deficiency causing the excessive inaccuracies.

#### 4.0 *Daily Quality Requirements, Calibration and Measurement Standardization Procedures.*

##### 4.1 CD Assessment.

4.1.1 CD Requirement. As described in 40 CFR 60.13(d) and 63.8(c), source owners and operators of HCl CEMS must check, record, and quantify the CD at two concentration values and at the calibration range above span (CRAS) concentration value at least once daily (approximately 24 hours) in accordance with the method prescribed by the manufacturer. The HCl CEMS calibration must, at a minimum, be adjusted whenever the daily zero (or low-level) CD or the daily

high-level CD exceeds two times the drift limits of the applicable performance specification (e.g., PS-18 in Appendix B to this part).

4.1.2 Recording Requirement for Automatic CD Adjusting CEMS. A CEMS that automatically adjusts the data to the corrected calibration values (e.g., microprocessor control) must be programmed to record the unadjusted concentration measured in the CD prior to resetting the calibration, if performed, or record the amount of adjustment.

4.1.3 Criteria for Excessive CD. If either the zero (or low-level) or high-level CD result exceeds twice the drift requirement in the applicable performance specification in Appendix B of this part for five consecutive daily periods, the CEMS is out-of-control. If either the zero (or low-level) or high-level CD result exceeds four times the applicable drift specification during any CD check, the CEMS is out-of-control. If the CEMS is out-of-control, take necessary corrective action. Following corrective action, repeat the CD checks.

4.1.4 Out-Of-Control Period Definition. The beginning of the out-of-control period for the CEMS calibration is the time corresponding to the completion of the fifth consecutive daily check with a CD in excess of two times the allowable limit, or the time corresponding to the completion of the daily CD check preceding the daily CD check that results in a CD in excess of four times the allowable limits. The end of the out-of-control period is the time corresponding to the completion of the CD check following corrective action that results in the CDs at both the zero (or low-level) and high-level measurement points being within the corresponding allowable CD limit (i.e., either two times or four times the allowable limit of the applicable rule).

##### 4.2 Beam Intensity Requirement for HCl integrated path-CEMS (IP-CEMS).

4.2.1 Beam Intensity Verification. Source owners and operators of HCl IP-CEMS must quantify and record the beam intensity of their IP-CEMS in appropriate units at least once daily (approximately 24 hours apart) according to manufacturer's specifications and procedures.

4.2.2 Criteria for Excessive Beam Intensity Loss. If the beam intensity falls below the level established for the operation range determined following the procedures in section 11.2 of PS-18 of this part, then the HCl CEMS is out-of-control. This quality check is independent of whether the HCl CEMS daily calibration drift is acceptable. If the HCl CEMS is out-of-control, take necessary corrective action. Following corrective action, repeat the beam intensity check.

4.3 CEMS Data Status During Out-of-Control Period. During the period the CEMS is out-of-control, the CEMS data may not be used in calculating compliance with an emissions limit nor be counted towards meeting minimum data availability as required and described in the applicable regulation or permit.

##### 5.0 *Data Accuracy Assessment.*

Each CEMS must be audited at least once each calendar quarter. Successive quarterly audits shall occur no closer than two months.

##### 5.1 Temperature and Pressure Accuracy Assessment for IP CEMS.

5.1.1 Stack or source gas temperature measurement audits for HCl IP-CEMS must be conducted and recorded at least quarterly in accordance with the procedure described in section 11.3 of PS-18 in Appendix B of this part. Any measurement instrument or device that is used to conduct ongoing verification of temperature measurement must have an accuracy that is traceable to NIST.

5.1.2 Stack or source gas pressure measurements for HCl IP-CEMS must be checked and recorded at least quarterly in accordance with the procedure described in section 11.4 of PS-18 in Appendix B of this part. Any measurement instrument or device that is used to conduct ongoing verification of pressure measurement must have an accuracy that is traceable to NIST.

5.1.3 Excessive Parameter Verification Inaccuracy. If the temperature or pressure verification exceeds the criteria in section 5.3.5, the HCl CEMS is out-of-control. If the CEMS is out-of-control, take necessary corrective action to eliminate the problem. Following corrective action, the source owner or operator must repeat the failed verification to determine if the HCl CEMS is operating within the specifications.

5.2 Concentration Accuracy Auditing Requirements. The accuracy of each HCl CEMS must be audited at least once each calendar quarter (except the quarter the relative accuracy audit test (RATA) is conducted) by dynamic spiking audit (DSA), a cylinder gas audit (CGA), a relative accuracy audit (RAA), or other acceptable alternative. Successive quarterly audits must occur no closer than two months apart. The accuracy audits shall be conducted as follows:

5.2.1 Relative Accuracy Test Audit. The RATA must be conducted at least once every four calendar quarters, except as otherwise noted in section 5.2.5 of this procedure. Unless otherwise specified in an applicable regulation or permit, conduct the RATA during process operating conditions representing average production and full control operation at the source as specified in section 11.9.4 of PS-18 in Appendix B of this part.

5.2.1.1 Repeating the stratification test in section 11.9.3 is not required unless the flow path of the emission stream has been altered or changed since the initial RATA.

5.2.1.2 You must analyze and pass the appropriate performance audit samples for the reference method (i.e., Method 26 and Method 26A) as described in the general provisions to the applicable part (e.g. 40 CFR part 60 or 63).

5.2.1.3 If the measured source concentration during a RATA is 20 percent or less than the applicable emission standard, you must perform a CGA or a DSA for at least one subsequent (one of the following three) quarterly audits.

5.2.2 Quarterly Cylinder Gas Audit. A quarterly CGA may be conducted as an option to conducting a RATA in three of four calendar quarters, but in no more than three quarters in succession.

5.2.2.1 To perform a CGA, challenge the CEMS with a zero-level and two upscale

level audit gases of known concentrations within the following ranges:

Audit point	Audit range
1 (Mid-Level)	50 to 60% of span value.
2 (High-Level)	80 to 120% of span value.

5.2.2.2 Sequentially inject each of the three audit gases (zero and two upscale) three times each for a total of nine injections. Inject the gases in such a manner that the entire CEMS is challenged. Do not inject the same gas concentration twice in succession.

5.2.2.3 Use HCl audit gases that are NIST certified or NIST traceable. Cylinder gases must be certified accurate to a tolerance of five percent or less.

5.2.2.4 Calculate results as described in section 6.3.

5.2.3 Dynamic Spiking Audit (DSA). A DSA may be conducted as an option to a RATA in three of four calendar quarters, but in no more than three quarters in succession.

5.2.3.1 To conduct a DSA, you must conduct the dynamic spiking procedure as described in Appendix A to PS-18 of Appendix B to this part.

5.2.3.2 You must calculate the mean and relative standard deviation for dynamic spiking measurements to determine CEMS accuracy.

5.2.3.3 For extractive HCl CEMS, you must perform the DSA by passing the spiked source gas through all filters, scrubbers, conditioners and other monitoring system components used during normal sampling, and as much of the sampling probe as is practical. For IP-CEMS, you must perform the DSA by adding or passing a known concentration calibration gas into a calibration cell in the optical path of the CEMS. You must include the source measurement optical path while performing a DSA using an IP-CEMS.

5.2.4 Relative Accuracy Audit (RAA). As an alternative to a CGA or DSA, an RAA may be conducted in one to three of four calendar quarters. To conduct an RAA, follow the RATA test procedures in section 11.9 of PS-18 in Appendix B to this part, except that only three test runs are required.

5.2.5 Other Alternative Quarterly Audits. Other alternative audit procedures, as approved by the Administrator, may be used for three of four calendar quarters. One RATA is required at least every four calendar quarters, except in the case where the affected facility is off-line (does not operate in the fourth calendar quarter since the quarter of the previous RATA). In that case, the RATA shall be performed in the quarter in which the unit recommences operation. Also, a CGA, DSA, RAA, or RATA is not required for calendar quarters in which the affected facility does not operate.

5.3 Excessive Audit Inaccuracy. If the results of the RATA, the DSA, CGA, or RAA exceed the criteria in section 5.3.5, the HCl CEMS is out-of-control. If the CEMS is out-of-control, take necessary corrective action to eliminate the problem. Following corrective action, the source owner or operator must audit the CEMS with a RATA, DSA, CGA, or RAA to determine if the HCl CEMS is operating within the specifications.

5.3.1 A RATA must always follow an out-of-control period resulting from a RATA.

5.3.2 If the audit results show the CEMS to be out-of-control, the CEMS operator shall report both the audit showing the CEMS to be out-of-control and the results of the audit following corrective action showing the CEMS to be operating within specifications.

5.3.3 Out-Of-Control Period Definition. The beginning of the out-of-control period is the time corresponding to the completion of the sampling for the failed RATA, CGA or DSA. The end of the out-of-control period is the time corresponding to the completion of the sampling of the subsequent successful audit.

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

5.3.5 Criteria for Excessive Quarterly Test Inaccuracy. Unless specified otherwise in the applicable regulation or permit, the criteria for excessive inaccuracy are:

(a) For the RATA, the allowable RA is equal to 20 percent of the RM when  $RM_{avg}$  is used in the denominator of equation 15 in PS-18 of Appendix B to this part. In cases where the average emission level for the test is less than 50 percent of the applicable standard, you may substitute the equivalent emission standard value (in ppmvw) in the denominator of equation 15 in the place of  $RM_{avg}$  and this alternative calculation of RA must be less than or equal to 15 percent of the RM.

(b) For CGA, the allowable calibration error in PS-18 of Appendix B to this part is applicable (less than five percent of span).

(c) For the DSA, the allowable RA is + 15 percent of the average spike value or  $\pm 20$  percent of the applicable emission standard at source conditions under the production rate during the time of the DSA, whichever is greater.

(d) For temperature verification, the CEMS must satisfy the requirements in section 13.5.4 in PS-18 of Appendix B to this part.

(e) For pressure verification, the CEMS must satisfy the requirements in section 13.5.5 in PS-18 of Appendix B to this part.

5.4 Criteria for Acceptable QC Procedures. Repeated excessive inaccuracies (*i.e.*, out-of-control conditions resulting from the quarterly audits) indicate that the QC procedures are inadequate or that the CEMS is incapable of providing quality data. Therefore, whenever excessive inaccuracies occur for two consecutive quarters, the source owner or operator must revise the QC procedures (see section 3.0) or modify or replace the CEMS.

5.5 Criteria for Optional QA Test Frequency. If all the quality criteria are met in section 4 and 5 of this procedure, the CEMS is in-control.

5.5.1 If the CEMS is in-control and if the source releases  $\leq 75$  percent of the HCl emission limit for eight consecutive quarters that include a minimum of two RATA, the source owner or operator may revise their auditing procedures to use CGA, RAA or DSA each quarter for eight subsequent quarters following a RATA.

5.5.2 The source owner or operator must perform at least one RATA that meets the acceptance criteria every two years.

If the source owner or operator fails a RATA, CGA, or DSA, then the audit schedule in section 5.2 must be followed until the audit's results meet the criteria in section 5.3.5 to start requalifying for the optional QA test frequency in section 5.5.

6.0 Calculations for CEMS Data Accuracy.

6.1 RATA RA Calculation. Follow equation 15 in Section 12 of PS-18 in Appendix B to this part to calculate the RA for the RATA. The RATA must be calculated in units of the applicable emission standard.

6.2 CGA Accuracy Calculation. For each reference gas concentration, determine the average of the three CEMS responses and subtract the average response for the reference gas value. For extractive HCl CEMS, calculate the measurement error at each gas level using Equation 3 in section 12.3 of PS-18 in Appendix B to this part. For IP-CEMS, calculate the measurement error at each gas level using Equation 6 in section 12.6 of PS-18. Calculate CGA accuracy in units of the appropriate concentration (*e.g.*, ppmvd, lb/MWhr, lb/MMBtu).

6.3 DSA Accuracy Calculation.

6.3.1 For extractive HCl CEMS, use the equations described in section 11.2 in Appendix A of PS-18 of this part to calculate the accuracy for the dynamic spike assessment. The DSA reported as the percent spike recovery accuracy (%SA) must be calculated in units of the applicable emission standard (*e.g.*, ppmv).

6.3.2 For HCl IP-CEMS, use the equations described in section 11.3 in Appendix A of PS-18 to this part to calculate the accuracy for the dynamic spike accuracy assessment for IP-CEMS. The DSA reported as the percent spike recovery accuracy (%SA) must be calculated in units of the applicable emission standard (*e.g.*, ppmvd, lb/MWhr, lb/MMBtu).

7.0 Reporting Requirements.

At the reporting interval specified in the applicable regulation or permit, report for each CEMS the accuracy results from section 6 and the CD assessment results from section 4.

7.1 Report the drift and accuracy information as a Data Assessment Report (DAR), and include one copy of this DAR for each quarterly audit with the report of emissions required under the applicable subparts of this part or other applicable regulations or permits. An example of a DAR format is shown in Figure 1.

7.1.1 At a minimum, the DAR must contain the following information:

- Source owner or operator name and address.
- Identification and location of monitors in the CEMS.
- Manufacturer and model number of each monitor in the CEMS.
- Assessment of CEMS data accuracy and date of assessment as determined by a RATA, CGA or DSA described in section 5 including:
  - The RA for the RATA;
  - The RA for the CGA or DSA;
  - Beam intensity results for IP-CEMS;

- The RM results, the cylinder gases certified values;
  - The CEMS responses;
  - The calculations results as defined in section 6;
  - Results from EPA performance audit samples described in section 5 and the applicable RMs; and
  - Summary of all corrective actions taken when CEMS was determined out-of-control, as described in sections 4 and 5.
- 7.1.2 If the accuracy audit results show the CEMS to be out-of-control, the CEMS operator shall report both the audit results

showing the CEMS to be out-of-control and the results of the audit following corrective action showing the CEMS to be operating within specifications.

8.0 *Bibliography.*

1. "A Procedure for Establishing Traceability of Gas Mixtures to Certain National Bureau of Standards Standard Reference Materials." Joint publication by NBS and EPA-600/7-81-10, Revised 1989. Available from the U.S. Environmental Protection Agency. Quality Assurance Division (MD-77). Research Triangle Park, NC 27711.

2. Method 205, "Verification of Gas Dilution Systems for Field Instrument Calibrations," 40 CFR 51, appendix M.

9.0 *Tables, Diagrams, Flowcharts and Validation Data.*

9.1 Accuracy assessment results. Complete the applicable DAR sections (A, B and C) for each CEMS or for each pollutant and diluent analyzer, as applicable. If the quarterly audit results show the CEMS to be out-of-control, report the results of both the quarterly audit and the audit following corrective action showing the CEMS to be operating properly.

FIGURE 1—EXAMPLE FORMAT FOR DATA ASSESSMENT REPORT

Period ending date \_\_\_\_\_

Year \_\_\_\_\_

Company name \_\_\_\_\_

Plant name \_\_\_\_\_

Source unit No. \_\_\_\_\_

CEMS manufacturer \_\_\_\_\_

Model No. \_\_\_\_\_

CEMS serial No. \_\_\_\_\_

CEMS type (e.g., extractive, integrated path) \_\_\_\_\_

CEMS sampling location (e.g., control device outlet) \_\_\_\_\_

CEMS span values as per the applicable regulation: \_\_\_\_\_ (e.g., HCl ppmv)

A—RELATIVE ACCURACY TEST AUDIT (RATA) FOR HCL IN ppmv

1. Date of audit \_\_\_\_\_

2. Reference methods (RMs) used \_\_\_\_\_ (e.g., Methods 26A, 320, 321).

3. Average RM value \_\_\_\_ (e.g., lb/MMw, ng/J, mg/dsm<sup>3</sup>, or percent volume).

4. Average CEMS value \_\_\_\_ .

5. Absolute value of mean difference [d] \_\_\_\_ .

6. Confidence coefficient [CC] \_\_\_\_ .

7. Percent relative accuracy (RA) \_\_\_\_ percent.

8. \* Method 26A performance audit results:

a. Audit lot number (1) \_\_\_\_ (2) \_\_\_\_

b. Audit sample number (1) \_\_\_\_ (2) \_\_\_\_

c. Results (mg/dsm<sup>3</sup>) (1) \_\_\_\_ (2) \_\_\_\_

d. Actual value (mg/dsm<sup>3</sup>) (1) \_\_\_\_ (2) \_\_\_\_

e. Relative error (1) \_\_\_\_ (2) \_\_\_\_

\* As applicable

B—CYLINDER GAS AUDIT (CGA) FOR HCL IN ppmv

	Audit point 1	Audit point 2	
1. Date of audit			
2. Cylinder ID number			
3. Date of certification			
4. Type of certification .....	.....	.....	e.g., EPA Protocol 1 or CRM).
5. Certified audit value .....	.....	.....	(e.g., ppm).
6. CEMS response value .....	.....	.....	(e.g., ppm).

B—CYLINDER GAS AUDIT (CGA) FOR HCL IN ppmv—Continued

	Audit point 1	Audit point 2	
7. Accuracy .....	.....	.....	Percent.

C—DYNAMIC SPIKING AUDIT (DSA) FOR HCL IN ppmv

	Concentration 1	Concentration 2	Concentration 3
1. Date of audit			
2. Effective Spike Addition (ppmv)			
3. Average CEMS value			
4. Spike Recovery Accuracy (%SA)			
5. Average Recovery Accuracy (%SA average.)			

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