
Colorado Department of Public Health and Environment

# Air Pollution Control Division

## Guidelines for State-Only Required Continuous Monitoring Systems in the State of Colorado

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## SECTION I - Definitions

*Combustion Tuning and Testing:* means the operation of the unit for combustion tuning and testing operations after a unit overhaul or as part of routine maintenance operations. Combustion tuning and testing can occur throughout the range of operating conditions.

*Continuous emission monitoring system (CEMS)*: equipment needed to sample, analyze, measure, and record a permanent emission record that can be used to demonstrate compliance with the applicable emission standard.

*Continuous monitoring system (CMS)*: system that is used to continuously monitor the emissions. This can be an actual measurement or parametrically determined. The four types of CMS are CEMS, COMS, PEMS, and CPMS.

*Continuous opacity monitoring system (COMS)*: equipment needed to analyze and record a permanent opacity emission record that can be used to demonstrate compliance with the opacity standard.

*Continuous parametric monitoring system (CPMS)*: equipment needed to measure and record a permanent record of the parameter that is being monitored. An example of a CPMS is a temperature sensor where the temperatures are recorded on a strip chart.

*Cylinder gas audit test (CGA)*: quarterly tests required by 40 CFR Part 60, Appendix F. Cylinder gas audit tests are QA/QC tests where the CEMS is challenged with a set of calibration gases, throughout a given monitoring range, to ensure that the CEMS is accurate.

*Data acquisition and handling system (DAHS)*: software and the hardware of the CEMS that collects, manipulates, and archives the emission data.

*Division*: Air Pollution Control Division of the Colorado Department of Public Health and Environment.

*EPA*: U.S. Environmental Protection Agency.

*Excess emission reports (EERs)*: reports submitted to the Division, which outline the amount of excess emissions and the CMS performance for a given reporting period. The frequency of the EERs is either quarterly or semi-annually.

*Emission unit*: equipment or emission source that emits air pollution emissions.

*Linearity test:* quarterly tests required by 40 CFR Part 75. Linearity tests are QA/QC tests where the CEMS is challenged with a set of calibration gases, throughout a given monitoring range, to ensure that the CEMS is accurate.

*Monitor downtime:* time that the CMS is not able to provide a valid, permanent record of the emissions.

*QA/QC testing requirements:* daily calibration error tests, cylinder gas audits, cycle time tests, 7-day drift tests, and RATA testing are considered QA/QC testing requirements.

*Quadrant-of-an-hour*: quarter of a clock hour, fifteen minutes of time. For example, a clock hour is divided into four quadrants and the first quadrant is composed of the 1st minute through the 15th minute of that clock hour. The second quadrant is composed of the 16th minute through the 30th minute of that clock hour. The third quadrant is composed of the 31st minute through the 45th minute of that clock hour. The fourth quadrant is composed of the 46th minute through the 60th minute of that clock hour.

## SECTION II - Introduction

### 1. Applicability

This guidance covers new CMS installations. The Division will work with owners of pre-existing CMS installations to adopt alternate CMS guidance and monitoring plans that address the source specific emissions monitoring requirements, and accommodate the monitoring and reporting capabilities of the existing CMS and DAHS.

This document will outline the required QA/QC requirements for continuous monitoring systems (CMS) monitoring for BACT, RACT, or any State of Colorado Monitoring Requirements not required by 40CFR60 or 40CFR75. For emission units that are subject to the Acid Rain regulations, the QA/QC requirements for CMS are detailed in 40CFR75. For NSPS emission sources, the QA/QC tests are outlined in Appendix B and Appendix F of 40CFR60.

For emission units subject to the Acid Rain regulations, the NSPS regulations, and the State regulations, the Division will allow the owner or operator to use the QA/QC tests of Part 75.

### 2. Background

Continuous monitoring systems (CMS) play an important role in the field of air pollution control. More specifically, these systems are often used as a tool to ensure that an emission unit is meeting an emission standard, or a set of emission standards on a continuous basis. There are several types of CMS that can accomplish this purpose. The type of CMS that is required on an emission unit is specified in the applicable regulation.

Continuous monitoring systems can be divided into the following four categories: 1) continuous emission monitoring systems (CEMS), 2) continuous opacity monitoring systems (COMS), 3) predictive emission monitoring systems (PEMS), and 4) continuous parametric monitoring systems (CPMS).

A CEMS is a system that is designed to monitor the actual emissions from an emission unit. These systems are equipped with pollutant analyzers that will analyze for specific pollutants and determine their concentrations in terms of parts per million (ppm), or percentage (%) on a volume basis. The most prevalent analyzers in the State of Colorado are sulfur dioxide ($SO_2$) analyzers, nitrogen oxides ($NO_X$) analyzers, carbon monoxide (CO) analyzers, oxygen ($O_2$) analyzers, and carbon dioxide ($CO_2$) analyzers. A COMS is a system that measures the opacity of the effluent gas in term of percent. A PEMS, unlike a CEMS, does not directly measure the pollutant concentrations by one of the analytical methods. Instead, it uses the operational parameters of the emission unit to predict the actual emissions. An example of a PEMS is the use of the oxygen percent of the combustion air, the fuel flow rate, and the temperature of a boiler to predict the $NO_X$ emissions from the boiler. Lastly, there are sensors and instruments that are used to measure the operational parameters of the emission unit on a continuous basis. These sensors and instruments are classified as CPMS. Examples of CPMS are temperature sensors, pressure gauges, and pH meters.

Existing Federal and State air pollution regulations may require owners and operators to install one or more of these CMS to demonstrate compliance with the relevant emission standard. The data gathered by these systems could be used as credible evidence for compliance purposes. Given the importance of the data gathered by these systems, the Division believes that it is imperative for owners and operators in the State of Colorado to understand the regulatory requirements for these systems and what the owners and operators must implement to meet these requirements.

The purpose of this document is to give owners and operators general guidelines on the various issues that are related to CMS. Due to the complexity of the regulations and the requirements for CMS, a more specific CMS plan may be needed for a facility. If that is the case, the Division will work with the owner or operator to develop a specific CMS plan for their facility. The Division encourages owners and operators who are required to install CMS to discuss the various issues related to CMS with the Division as early as possible in the permitting process. This will not only facilitate the permitting process, but also may help owners and operations avoid potential enforcement actions as a result of misinterpretation of the requirements.

## 3. Authority

3.1 Authority to require sources to install and quality assure CMS is found in several places. Wording in the Colorado Air Quality Control Act enables the Air Quality Control Commission to establish methods and procedures for determining compliance and encourages the use of methods that have been established by the U. S. EPA. The wording is found in 25-7-109 as follows:

> The commission shall establish test methods and procedures for determining compliance with emission control regulations promulgated under this section and, in so doing, shall, to the maximum degree consistent with the purposes of this article, consider the test methods and procedures established by the United States Environmental Protection Agency and shall adopt such test methods and procedures as shall minimize the possibility of inconsistency or duplication of effort.

3.2 The regulatory requirements for owners or operators to install CMS are found in State air pollution regulations. Colorado's Common Provisions Section II, B gives the Division the authority to require owners and operators to install CMS when deemed necessary. In addition to the specific State regulations, there are other situations where the owner or operator may be required to install a CMS. These situations are as follows:

3.2.1 Synthetic minor facility – An owner or operator of a facility may choose to install a CEMS to demonstrate that the facility is a minor source for Title V and/or PSD/Non-Attainment NSR purposes. In some instances, a CEMS is installed to demonstrate that a modification made on an emission unit or facility will not be classified as a Major Modification.

3.2.2 Compliance Order on Consent (COC) – The Division may enter into a COC with an owner or operator and, as a result of that COC, the owner or operator may be required to install a CMS. The CMS data are then used to determine if the emission unit is complying with the requirements and emission standards outlined in the COC.

3.2.3 Division's Discretion – The Division may require an owner or operator to install a CMS at its discretion. An example of this is the requirement for CMS on turbines that are subject to best available control technology (BACT) emission limits.

3.2.4 Best Available Control Technology (BACT) – Sources subject to short term BACT limits may be required to monitor on a continuous basis.

## 4. Monitoring for Multiple Regulations

4.1 An emission unit may be subject to several Federal and/or State regulations that require the owner or operator to install and operate a CMS. An example of this is a turbine that is subject to the Acid Rain regulations, NSPS Subpart Da regulations, PSD regulations, and a BACT requirement. All four regulations require the owner or operator to install a CEMS to monitor for $NO_X$ emissions. The owner or operator is not required to install four $NO_X$ CEMS. The Division will allow the owner or operator to use only one $NO_X$ CEMS. However, the data acquisition and handling system (DAHS) must be able to record the data to demonstrate compliance in the units of each applicable standard and meet the reporting requirements that are mandated by each regulation.

## 5. Time-Shared CMS

5.1 The owner or operator may use one CMS to monitor the emissions from several emission units concurrently. This is an acceptable practice as long as the owner or operator can demonstrate that there is no cross-contamination in the samples. To avoid cross-contamination between the samples, there must be a purge cycle between the samples that are being analyzed. In addition, the CMS must be able to meet the minimum sampling frequency that is required by the regulation. The regulation requires the CMS to sample, analyze, and record at least one valid data point in every 15 minutes. Given these requirements, the Division discourages the owner or operator to use a CMS to monitor the emissions from more than two emission units or on emission units with short-term startup and shutdown emission limits.

## 6. Monitoring Range

6.1 Single Range - Comply with the applicable sections in 40CFR75, Appendix A, section 2. CMS measuring concentrations of CO should adhere to the requirements for SO2 concentration monitor in Appendix A, section 2.

6.2 Dual Range - Comply with the applicable sections in 40CFR75, Appendix A, section 2. CMS measuring concentrations of CO should adhere to the requirements for SO2 concentration monitor in Appendix A, section 2.

## SECTION III - Installation and Initial Certification of New CMS

### 1. New CMS

The owner or operator must perform QA/QC tests on a newly installed CMS to demonstrate that the CMS is accurate and that it can meet the specifications that are required by the regulations. This section outlines the procedures that must be followed by the owner or operator of a newly installed CMS.

### 2. Location

2.1 The CMS should be located at a safe and accessible location and where a representative sample of the effluent gas can be taken. In addition, this location should allow the CMS to pass the relative accuracy test audit (RATA). In general, the CMS should not be located where cyclonic flow or stratification of the stack gas exists.

2.1.1 COMS – Specification 1 of 40 CFR Part 60, Appendix B should be followed when determining the installation location of a COMS.

2.1.2 CEMS – Comply with 40CFR75, Appendix A, section 1.1 for gas analyzers and section 1.2.1 for exhaust gas flow monitors.

2.1.3 CPMS – The Division will work with the owner or operator to determine the appropriate location.

### 3. Deadlines

3.1 Notifications – A Test Protocol must be submitted to the Division 30 days prior the Initial Certification Test.

3.2 Initial Certification Test – The system should be certified as soon as possible and not later than 180 days after the unit commences operation.

3.3 Certification Test Report – The Certification Test Report must be submitted to the Division within 30 days after the completion of the test.

3.4 In cases where the CEMS is required by both Part 75 and non-Part 75 regulations, the Division will allow the owner or operator to meet the deadlines of Part 75.

### 4. Initial Certification for COMS

The owner or operator must follow the procedures that are outlined in Performance Specification 1 of Appendix B, 40 CFR Part 60, for the initial certification of a COMS.

## 5. Initial Certification for CEMS

5.1 The owner or operator shall follow the procedures that are outlined in:

5.1.1 40CFR75, Subpart C, section 75.20 for NOx, SO2, CO2, O2 and Flow analyzers.

5.1.2 40CFR60 (PS 4 or 4A) for CO.

5.1.3 40CFR60 (PS 8) for VOC

5.1.4 40CFR60 (PS 6) for Mass based emissions (i.e. lb/hr or Ton/yr).

5.1.5 Low Monitoring Range – The Division will work with the owners and operators, on a case-by-case basis, for monitors that are required to monitor extremely low emissions.

## 6. Re-certification Tests

A CMS consists of all of the equipment that are needed to collect, analyze, and produce an emission record. Therefore, the Division considers the CMS as being from the tip of the sampling probe to the computer that produces the emission data. Components or parts of a CMS may need to be replaced or repaired over time for various reasons, and the part or component that is replaced/repaired may affect the accuracy of the system. The EPA's Recertification and Diagnostic Testing Policy document located in Section 13 of the Part 75 Emissions Monitoring Policy Manual provides guidelines on actions that must be taken when qualifying events occur. The Division requires that all affected sources adhere to the requirements of this document. Applicability to CO and VOC monitors is implied by this document.

The Division recognizes that some of the specified post-maintenance QA/QC tests are either not applicable for infrequently operated units or can be modified by the owner to accommodate unit operating schedules. Units may follow allowable 40CFR75 Appendix B QA/QC Testing Schedules for infrequently operated units.

## SECTION IV - CMS Data Criteria

### 1. Background

The CMS must be available to continuously measure the emissions whenever the emission unit is in operation.

The Division's interpretation of continuous for a CEMS is the ability of the system to collect a valid data point during every fifteen-minute quadrant in which the emission unit is operating. During clock hours in which the emission unit operated for the entire clock hour, at least four valid data points, one from each fifteen-minute quadrant must be obtained. The one exception to this rule is when QA/QC activities are being performed on the system. 40CFR75 §75.10(d)(1) requires only two valid data points to be collected, separated by at least fifteen minutes, for a clock hour to be valid when these QA/QC activities are occurring. The Division shall use the definition of continuous from 40CFR75.

For a COMS, continuous means the ability to collect a valid data point every ten seconds for 36 data points in a six-minute block of time. Owners and operators should strive to achieve 100% system availability. The Division encourages owners and operators to perform all QA/QC tests that are necessary to ensure the accuracy of the system. Therefore, the accuracy of the system should not be compromised so that high system availability percentages can be achieved. In the case of an unexpected breakdown of the system, the Division encourages owners and operators to take corrective actions in an expeditious manner.

### 2. Definitions of Validity

2.1 COMS 6-minute Average – The COMS must collect at least 36 data points in the 6-minute block for the 6-minute period to be valid.

2.2 CEMS Hourly Average – When the emission unit has operated for **at least** 45 minutes of the clock hour.

2.2.1 The hourly average is valid if the CEMS has collected at least one data point from each fifteen-minute quadrant in that clock hour.

2.3 CEMS Hourly Average – When the emission unit has operated for **less** than 45 minutes of the clock hour.

2.3.1 The hourly average is valid if the CEMS has collected at least 1 data point in each quadrant of the clock hour in which the emission unit has operated. The hourly average can be composed of 1 data point, 2 data points, or 3 data points.

### 3. Calculating Hourly Emission Averages

3.1 Hourly emission averages shall be calculated as follows:

3.1.1 Hourly averages shall be computed using at least one data point in each 15-minute quadrant of an hour, where the unit combusted fuel during that quadrant of an hour.

## 4. Calculating Startup/Shutdown Emission Averages

4.1 Emission units with separate short-term emission limits during startup/shutdown periods, shall follow these rules:

4.1.1 A channel indicating to the DAHS the actual duration of a startup/shutdown event (as defined in the permit) shall be present.

4.1.2 The data collected during the entire duration of the startup/shutdown event shall be averaged together and compared to the startup/shutdown limit.

4.1.3 The data collected during the remainder of the clock hour in which a startup/shutdown occurred shall be averaged together and compared to the normal operation limit.

4.2 Emission rate and heat input rate data calculated from diluent measurements within the following validation thresholds can be excluded from the startup and shutdown duration averages. This data invalidation is necessary to exclude highly suspect and unverifiable data resulting from measurement mismatch between the diluent and pollutant monitor response times.

4.2.1 Combustion Turbines

4.2.1.1 $O_2$ - minute measurements equal to or greater than 19.0%

4.2.1.2 $CO_2$ - minute measurements equal to or less than 1.0%

4.2.2 Boilers

4.2.2.1 $O_2$ - minute measurements equal to or greater than 14.0%

4.2.2.2 $CO_2$ - minute measurements equal to or less than 5.0%

## 5. Precision of CEMS data

For consistency with 40CFR60.13(h), after conversion into units of the standard, data may be rounded to the same number of significant digits as the applicable emission limit is written.

## 6. Calculating Excess Emissions

6.1 Excess emissions from clock hours in which a startup or shutdown event has taken place shall be calculated as follows:

6.1.1 All data, collected during each startup or shutdown event, are averaged together to give one startup or shutdown average. If this average is in excess of the startup/shutdown limit set by the permit, then one hour of exceedance time shall be reported for each clock

hour or partial clock hour in which the startup/shutdown event takes place. Alternatively, the DAHS may be set up to report an exceedance time of the actual duration of the startup or shutdown event.

6.1.2 All data, collected during the remainder of a clock hour in which a startup or shutdown event takes place, are averaged together to give one normal operation average. If this average is in excess of the normal operation limit set by the permit, then one hour of exceedance time shall be reported. Alternatively, the DAHS may be set up to report an exceedance time of the actual duration of the normal operation period.

6.2 Excess emissions from clock hours in which a startup or shutdown event has not taken place or units that do not have separate emission limits for startup/shutdown shall be reported as follows:

6.2.1 If the hourly average calculated from the minimum of one data point from each 15 minute quadrant of an hour, where the unit combusted fuel during that quadrant of an hour is in exceedance of normal operation limit, then one hour of exceedance time shall be reported.

## 7. Calculating Downtime

All downtime shall be reported according to the definition of a valid hour found in this section.

## 8. Combustion Tuning and Testing Provisions

Combustion tuning and testing means the operation of the unit for combustion tuning and testing operations after a unit overhaul or as part of routine maintenance operations. Combustion tuning and testing can occur throughout the range of operating conditions. The emission limits during combustion tuning and testing shall be the same as those during startup and shutdown.

8.1 Compliance with the limitations shall be monitored using the data generated by the CMS during the combustion tuning and/or testing period. An average emissions rate concentration shall be calculated using all concentration data points generated by the CMS during any actual hour during the combustion tuning and/or testing period and each hourly average shall be compared to the startup/shutdown limitation.

8.2 For periods of combustion tuning and/or testing that last less than one hour, the average concentration shall be calculated using all concentration (ppm) data points within that combustion tuning and/or testing period.

8.3 In the event that combustion tuning and/or testing begins and/or ends within a clock hour, all non-combustion tuning and/or testing concentration (ppm) data points within that clock hour shall be averaged together to generate the average concentration and that average concentration shall be compared to the normal operation limitation.

8.4 Hours of combustion tuning and/or testing shall be summed together to monitor compliance with the 12-month rolling total hour per unit limit.

## SECTION V - QA/QC Tests

### 1. Accuracy Tests

1.1 Once the system has gone through the initial certification process, the owner or operator must perform on-going QA/QC tests to ensure that the system is still collecting and producing accurate emission data. The Division believes that, at a minimum, the following QA/QC tests should be performed on the system.

### 2. Daily Assessments

2.1 40CFR75, Appendix B, section 2.1. defines the requirements for calibrations for NOx, SO2, CO2, O2 and Flow analyzers.

2.2 40CFR60, Appendix B, defines the requirements for analyzers not addressed in 40CFR75.

2.3 The Division will work with the owners and operators, on a case-by-case basis, for monitors that are required to monitor extremely low emissions (i.e. less than 10 ppm).

### 3. Quarterly Assessments

3.1 40CFR75, Appendix B, section 2.2. defines the requirements for NOx, SO2, CO2, O2 and Flow analyzer quarterly assessments.

3.2 40CFR60, Appendix B, defines the quarterly requirements for analyzers not addressed in 40CFR75. A cylinder gas audit (CGA) must be performed every operating quarter in which a RATA is not performed. If the emission unit has operated for less than 168 hours in a calendar quarter, a CGA will not be required for that quarter. No more than four calendar quarters shall elapse after the quarter in which a CGA was last performed without a subsequent CGA having been conducted.

3.3 The Division will work with the owners and operators, on a case-by-case basis, for monitors that are required to monitor extremely low emissions (i.e. less than 10 ppm).

### 4. Semiannual and Annual Assessments

4.1 See 40CFR75, Appendix B, section 2.3 the annual RATAs must be performed in units of the emission standard. For example, if the emission standard is 9-ppm (@15% $O_2$), then the RATA must also be calculated in terms of these units. For emission units that have only annual limits (i.e. tons/yr), the RATA will be conducted in terms of lbs/hr. The following procedures will be used to determine the applicable lbs/hr value:

4.1.1 For emission units that are permitted to operate for 8760 hours/yr, the lbs/hr will be calculated from the permitted ton/yr emission value divided by 8760 hours of operation per year.

4.1.2 For emission units that are permitted to operate less than 8760 hours/yr, the hours of operation per year for the emission unit must first be calculated. The calculation will be based on the permitted fuel usage limit or some other permitted parameter. In some permits, the hours of operation will be stated in the permit. The lbs/hr value then will be calculated from the permitted tons/yr emission value and the hours of operation per year.

4.2 When conducting a RATA on a time-shared system, the owner or operator must operate the system in the time-shared mode (i.e should not "lock" the system on the stack that is being tested). The time-shared system should be allowed to operate in its normal operating conditions (i.e., sampling between the different emission units with purges in between the samples).

4.3 The Division recognizes that RATA schedules can be modified by the owner to accommodate unit-operating schedules. Units may follow allowable 40CFR75 Appendix B QA/QC Testing Schedules for infrequently operated units.

4.4 RATA Specifications

4.4.1 The allowable relative accuracy for the different types of monitors is given in Appendix A of this manual.

4.5 The Division will work with the owners and operators, on a case-by-case basis, for monitors that are required to monitor extremely low emissions.

4.6 Reference method heat input determination necessary for RATA determinations in mass emissions rate units may utilize heat input rates calculated from fuel consumption and heat content of fuel per EPA Method 19.

## 5. Calibration Gases

5.1 The owner or operator must use current calibration gases when performing QA/QC test on their systems. Certificates of the current calibration gases must be on file at the facility for inspection by the Division, if requested.

5.2 Calibration Gases – Certified gases, NIST-SRM, NIST-NTRM, or EPA Protocol 1gases.

## SECTION VI - Mass Flow of Effluent Gas

### 1. Mass Flow Calculations

1.1 The Division will allow the owner or operator to use EPA Method 19 to estimate the stack gas flowrate from an emission unit if the following conditions are met:

1.1.1 The fuel has an F factor that is published in 40CFR Part 60, Appendix A.

1.1.2 The composition of the fuel is consistent.

1.1.3 There is an accurate method of measuring the fuel flowrate to each individual emission unit (i.e. a fuel flowmeter for each emission unit).

1.1.4 The Division will allow fuel meters that are 40CFR75 Appendix D qualified, to be used in the determination of the stack gas mass flow rate.

1.2 In contrary, the owner or operator **cannot** use EPA Method 19 to estimate the stack gas flowrate from an emission unit if any of the followings is true:

1.2.1 The process removes $CO_2$ (e.g. sources that use wet scrubbers) or $O_2$ from the stack gas.

1.2.2 The process adds $O_2$ or $N_2$ in a proportion that is different from that of ambient air.

1.2.3 The process adds $CO_2$ to the stack gas (e.g. cement kilns).

### 2. Fuel Heating Value

2.1 The owner or operator will be required to use the gross calorific value (GCV) (i.e., higher heating value) of the fuel in the calculation of the stack gas mass flowrate if EPA Method 19 is used.

2.2 The owner or operator can use one of the methods outlined below to determine the GCV of the fuel.

2.2.1 The GCV from the most recent monthly sample of the fuel taken at the facility.

2.2.2 The maximum GCV from the contract with the fuel vendor.

2.2.3 The highest GCV from the previous year's sample.

2.3 If method 2.2.1 above is used, the owner or operator will not be required to retroactively use the new monthly value in the emission calculations. For example, the GCV is determined on the 8$^{th}$

day of the month. The owner or operator will not be required to use this value in the emission calculations for the 1st day through the 7th day of that month.

## SECTION VII - Excess Emission Report

### 1. Frequency and Deadline

1.1 In general, excess emission reports (EERs) are submitted to the Division on a quarterly basis. There are instances where EERs can be submitted on a semi-annual basis. On a case-by-case basis, the owner or operator can request approval from the Division for the semi-annual frequency. Excess emission reports are due within 30 days of the end of the reporting period.

### 2. Format

2.1 Cover Letter – This letter summarizes any significant events, either for excess emission or monitor downtime, for the reporting period.

2.2 Source Information Page – An example of the information that should be included on this page are outlined in the table below.

| | |
|---|---|
| Quarterly Emission Reporting Ending | March 31, 1998 |
| Reporting Date and Year | April 5, 1999 |
| Plant Name | ABC Station |
| Emission Point | Coal fired boiler |
| Plant Location and Address | 123 Main Street<br>Denver, CO 80122 |
| Name and Phone Number of Person Completing the Report | John Doe<br>(303) 777-7777 |

2.3 Monitor Information Page – An example of the information that should be included on this page are outlined in the table below.

| | |
|---|---|
| Monitor Type | $SO_2$ |
| Manufacturer Name | ABC Company |
| Model Number | Model T |
| Serial Number | 12345 |
| Installation Date | 2/12/99 |
| Date of Last Certification | 2/12/2001 |
| Full Scale Range | 0 -100 ppm |
| Span Calibration Value | 80.6 ppm |

2.4 Summary Page – An example of the information that should be included on this page are outlined in the table below. For CEMS data, all values should be reported in whole hours, or, if the source has separate short-term limits for startup/shutdown, CEMS data may be reported in tenths of an hour. For COMS data, all values should be reported in tenths of an hour. The owner or operator may modify the example below, as needed, so that the form is more appropriate for their facility.

| **Excess Emission** | **$SO_2$** | **$NO_X$** | **Opacity** |
|---|---|---|---|
| Startup/Shutdown | | | |
| Cleaning/Sootblowing | | | |
| Control Equipment | | | |
| Control Equipment (upset) | | | |
| Process Problem | | | |
| Process Problem (upset) | | | |
| Fuel Problems | | | |
| Other Known Causes | | | |
| Unknown Causes | | | |
| **Total Excess Emissions** | | | |

| **Monitor Downtime Reason** | **$SO_2$** | **$NO_X$** | **Opacity** |
|---|---|---|---|
| Monitor Equipment Failure [(1)] | | | |
| Non-Monitor Equipment Failure [(2)] | | | |
| Daily Calibrations | | | |
| Other Known Causes | | | |
| Unknown Causes | | | |
| **Total Downtime** | | | |
| **Total Unit Operating Time for Reporting Period** | | | |

[(1)] Monitor – Events that are due to the failure of the monitor. Examples are the failure of the light source, chopper wheel, or the photo multiplier tube.

[(2)] Non - monitor equipment failure - Events that are due to due the failure of the software or the data acquisition handling system (DAHS)

## SECTION VIII - Predictive Emission Monitoring System (PEMS)

### 1. Introduction

This section provides general guidelines for owner or operator who are required to install a PEMS to demonstrate compliance with the various regulations. These systems do not use one of the analytical methods to determine the concentration of a pollutant in the effluent gas stream. Instead, they monitor physical operational parameters of the emission unit and they predict the emissions from these parameters.

### 2. Hourly Average

The requirement to continuously monitor for a PEMS is the same as a CEMS. The hourly average is calculated from 4-equally spaced data points.

### 3. Initial Certification

The owner or operator must certify the PEMS before it can be used for compliance purposes. At a minimum, the initial certification process will consist of the following:

A RATA will be performed at various loads to ensure the PEMS accurately predicts the emissions throughout the emission unit's operational range. The Division will determine on a case-by-case basis the Relative Accuracy requirements for each PEMS parameter.

### 4. On-Going QA/QC Tests

4.1 Daily – The operator will inspect the DAHS to ensure that all pertinent parameters are being logged and the emission rates are being calculated correctly. If malfunctions exist, corrective actions should be taken.

4.2 Quarterly – The owner or operator shall check the zero or span settings of the controls that are used as inputs to the predictive equation, and verify that the DAHS is receiving all of the signals correctly. The controls will be calibrated and checked, as necessary.

4.3 Annually – An annual RATA will be performed on the PEMS to ensure its accuracy. The RATA will be performed at various loads to ensure the PEMS accurately predicts the emissions throughout the emission unit's operational range. RA as determined in 3.1.1 will be used to determine acceptability.

## Appendix A – Performance Specifications

| Performance Specification Number | Annual RATAs | Comments |
|---|---|---|
| 1- Specifications and Test Procedures for Continuous Opacity Monitoring Systems in Stationary Sources | NA | |
| 2- Specifications and Test Procedures for $SO_2$ and $NO_X$ Continuous Monitoring Systems in Stationary Sources | 20% of RM or 10% of emission standard<br>for low emitters (≤ RM 250 ppm during RATA) ± 12 ppm of RM [1] | [1]40CFR75 App B |
| 3 - Specifications and Test Procedures for $O_2$ and $CO_2$ Continuous Monitoring Systems in Stationary Sources | 1.0% $O_2$ or $CO_2$ | |
| 4 - Specifications and Test Procedures for Carbon Monoxide Continuous Monitoring Systems in Stationary Sources | 10% of RM or 5% of emission standard | |
| 4A - Specifications and Test Procedures for Carbon Monoxide Continuous Monitoring Systems in Stationary Sources | 10% of RM or 5% of emission standard, or ± 5 ppm difference. | Developed for CO CEMS with a span value of 200 ppm |
| 4B - Specifications and Test Procedures for Carbon Monoxide Continuous Monitoring Systems in Stationary Sources | $O_2$ – Same as $O_2$ and $CO_2$ CEMS above<br>CO - 10% RA or<br>5% of emission standard or<br>±5 ppm of RM if < 200 ppm range | |
| 5 - Specifications and Test Procedures for TRS Continuous Monitoring Systems in Stationary Sources | 20% of RM or 10% of emission standard | |
| 6 - Specifications and Test Procedures for Continuous Emission Rate Monitoring Systems in Stationary Sources | 20% of RM or 10% of emission standard | Emission rate CEMS (i.e. lbs/hr) |
| 7 - Specifications and Test Procedures for Hydrogen Sulfide Continuous Emission Monitoring Systems in Stationary Sources | 20% of RM or 10% of emission standard | |
| 8 - Specifications and Test Procedures for Volatile Organic Compound Continuous Emission Monitoring Systems in Stationary Sources | 20% of RM or 10% of emission standard | |
| 8A - Specifications and Test Procedures for Total Hydrocarbon Continuous Emission Monitoring Systems in Stationary Sources | 20% of RM or 10% of emission standard | |
| 9 - Specifications and Test Procedures for Gas Chromatographic Continuous Emission Monitoring Systems in Stationary Sources | NA | |
| 15 - Specifications and Test Procedures for Extractive FTIR Continuous Emission Monitoring Systems in Stationary Sources | NA | |