



Module 4: Audits/Inspections and Enforcement



Module 4 Outline

Audits and Inspections Overview

Types of Audits

- System audit (inspection)
- CEMS performance audit (% accuracy)

What is an Inspection?

- How to prepare
- What is involved

Preventative Maintenance and Failure

Enforcement

Module 4 Learning Objectives

At the end of Module 4, learners will be able to:

- Distinguish the difference between performance audits and systems/field audits
- Explain the utility of performance audits and systems/field audits
- Describe the inspector's role during an audit
- Describe the procedures necessary to use CMS data in determining compliance
- Assess daily, weekly, monthly, quarterly, and annual required preventative maintenance and QA requirements
- Distinguish between CMS as compliance method and CMS data as credible evidence



Overview of Audits and Inspections

Performance Audit

- A quantitative evaluation, which includes things such as*:
 - Cylinder Gas Audit (CGA)
 - Relative Accuracy Test Audit (RATA)
 - Relative Accuracy Audit (RAA)

System/Field Audit

- Qualitative evaluation involving an inspection

*These elements are covered in Module 3

Performance and System Audits

EPA relies on a combination of **performance** and **system/field auditing** to verify overall data integrity.

Performance Audit Procedures

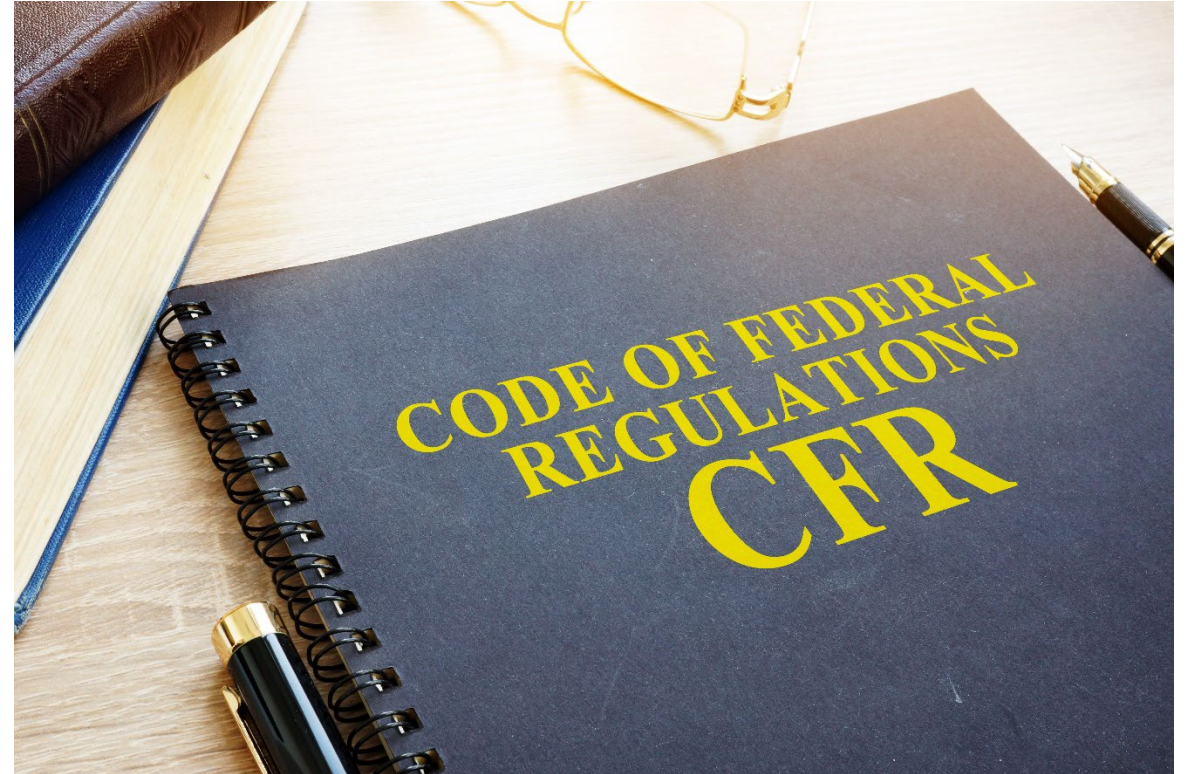
- Performance audit procedures are critical for verifying proper performance of the monitoring systems and identifying problems which may lead to inaccurate emissions accounting.

System or Field Audits

- System or field audits are an opportunity to provide information to the source on the regulatory requirements, and for the inspector to observe monitoring practices that may lead to regulatory problems.

Performance Audits

- Required by 40 CFR Part 60
- Found in performance specifications and QA procedures
- Include the daily, quarterly, and annual audit procedures
- Audit results usually submitted to agency for review



System/Field Audit or Inspection

- May be conducted in conjunction with a performance audit such as a RATA or RCA.
- Allows the observer to...
 - Physically inspect the CEMS,
 - Review the data collected, and
 - Review maintenance logs, etc.



**Note: The audit procedures for Part 75 can be found here:
<https://www.epa.gov/airmarkets/clean-air-markets-field-audit-manual>**

Inspector's Role in System/Field Audits



Every inspector should check with their agency to see exactly what their policies and procedures are before conducting an audit.



Typically, the inspector's role is not to provide technical advice or consulting on the operation of the monitoring equipment.



Usually a "hands off" approach is used when conducting the audit so that the inspector does not have any physical contact with the monitoring system hardware.

Inspections: Before Going Onsite

Preparing for an inspection:

- ✓ Review any monitoring plans or test protocols, quality assurance/quality control (QA/QC) manuals, RATA records, quarterly audit records, and quarterly emission report submittals.
- ✓ Check data availability, amount and causes of downtime, significant maintenance and any reports of replacement of key components.
- ✓ Make note of multiple failed QA tests, missing data, unusual data trends (inconsistent over time, or inconsistent with other, similar facilities), and calculation errors.



Inspections: Before Observing a Performance Audit

Preparing to observe any performance audit that will be conducted during the site visit:

- ✓ Review the results of the last audits, noting any issues
- ✓ Review the necessary performance specifications and QA procedures
- ✓ Remember these performance specifications and QA procedures were covered in greater detail in Module 3 of this training





1. Let's Test Your Knowledge!

Feedback

It's false. The auditor should not have any physical contact with the monitoring system hardware.

Audits/Inspections – Question 1

1. The observer of an audit should move the CEMS analyzers in order to be able to verify their model and serial numbers.

True

False

Feedback

C. An inspector's role is NOT to provide technical advice or consulting.

Audits/Inspections – Question 2

2. From the list below, which activity should not be done to prepare for an onsite visit?

A. Review records (e.g., monitoring plans, RATA, etc)

B. Check data availability reports

C. Be prepared to provide technical advice or consulting on the operation of the monitors

D. Make note of any data errors or issues

E. Review previous audits

F. Review performance specifications and QA procedures, where relevant

Feedback

It's false. A system audit can be done at the same time as a performance audit. In many cases, it is more efficient to do so.

Audits/Inspections – Question 3

3. A systems/field audit should never be conducted during the same period a performance audit is being performed.

True

False

Inspections Process – At the Facility



Verify:

- Calibration and audit gas used, and
- General appearance of analyzers and sampling system



Check:

- Check if any alarms or warnings are indicated on DAS screen or system panels



Review:

- Additionally, review maintenance logs and verify regular maintenance (daily, weekly, monthly) activities.
 - Compare with description of these activities in QA/QC manual
 - Note any frequent or reoccurring problems

Visual Inspection of the CEMS

If possible, do a visual inspection of the CEMS from the sample probe location on the stack or duct, following the sample line to the CEMS shelter, and continuing inside the shelter through the gas conditioning system (if source-level extractive) to the analyzers.

- ✓ Does the system look to be well maintained?
- ✓ Are there low spots in the sample line where moisture might collect and scrub out pollutants? If the facility experiences cold winters, are all parts of the sampling system heated?
- ✓ Is the physical location of the CEMS probe reasonable to access for maintenance?

Visual Inspection of the CEMS (Cont'd)

Inside the CEMS shelter, check the condition of the sample gas conditioning system for any condensed liquid in Teflon lines.

- ✓ Where does the liquid drain?
- ✓ Could it get blocked or freeze?
- ✓ Are there signs of corrosion of valves and fittings?

CEMS Shelter



Calibration Gas Cylinders



Pressure on Gas Cylinder



CEMS Inspection



Measurement of Emissions

CEMS must be representative:

When the effluents from two or more emission points are combined before being released to the atmosphere, the owner or operator:

- May install applicable continuous monitoring systems on each effluent or on the combined effluent, if subject to the same emission standards
- Must install separate continuous monitoring systems on each effluent, if not subject to the same emissions standard.

Measurement of Emissions (Cont'd)

When the effluent from one affected facility is released to the atmosphere through more than one point, the owner or operator shall install an applicable continuous monitoring system on each separate effluent unless the installation of fewer systems is approved by the administrator.

Results must be reported for each CEMS.

Who, What, Where, and Why

- Importance of a pre-test meeting
 - Who should be at the test...
 - What will happen...
 - Where is the meeting to be held...
 - Why is this meeting necessary, etc....



The Road to Continuous Compliance: Operation of CEMS



Conduct Calibration Drift (CD) at least once per operating day: Zero and Span - New Source Performance Standards (NSPS)



Must be in continuous operation. Except for system breakdowns, repairs, calibration checks, and zero and span adjustments. A “continuous operation” means a minimum of one cycle of operation (sampling, analyzing, and data recording) is completed or each successive 15-minute period.



Maintain and operate the CEMS in a manner consistent with good air pollution control practices and manufacturer’s written specifications.



Ensure the visual display or indication of operation is readily available on-site

Daily Data Readings

Current DateTime Range: Feb 08, 2020 00:00 to Mar 11, 2020 23:59

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Start Time	Channel	Type	Warn Check	Part 75	Part 60	ZERO reading	ZERO Target	ZERO err75	ZERO err60	SP1 read
03/11/2020 08:48	7_O2	DAILY	PASS	PASS	PASS	0	0	0.0	0.0	22.2
03/11/2020 08:48	7_NOx_L	DAILY	PASS	PASS	PASS	0.02	0	0.0%	0.0%	44.7
03/11/2020 08:48	7_NOx_H	DAILY	PASS	PASS	PASS	0	0	0.0%	0.0%	179.6
03/11/2020 04:32	12_O2	DAILY	PASS	PASS	PASS	-0.04	0	0.0	-0.04	22.6
03/11/2020 04:32	12_NOx_L	DAILY	PASS	PASS	PASS	0.04	0	0.0%	0.1%	44.7
03/11/2020 04:32	12_NOx_H	DAILY	PASS	PASS	PASS	-0.01	0	0.0%	0.0%	184.2
03/11/2020 04:12	9_O2	DAILY	PASS	PASS	PASS	0	0	0.0	0.0	22.3
03/11/2020 04:12	9_NOx_L	DAILY	PASS	PASS	PASS	0.27	0	0.6%	0.5%	44.87
03/11/2020 04:12	9_NOx_H	DAILY	PASS	PASS	PASS	0.19	0	0.1%	0.1%	176.65
03/11/2020 04:11	8_O2	DAILY	PASS	PASS	PASS	0.02	0	0.0	0.02	22.46
03/11/2020 04:11	8_NOx_L	DAILY	PASS	PASS	PASS	0.09	0	0.2%	0.2%	44.66
03/11/2020 04:11	8_NOx_H	DAILY	PASS	PASS	PASS	0.04	0	0.0%	0.0%	178.56
03/11/2020 04:11	7_O2	DAILY	PASS	PASS	PASS	0	0	0.0	0.0	22.43
03/11/2020 04:11	7_NOx_L	DAILY	PASS	[S]	PASS	0.27	0	0.6%	0.5%	43.63
03/11/2020 04:11	7_NOx_H	DAILY	PASS	[S]	PASS	0.19	0	0.1%	0.1%	174.72
03/11/2020 04:11	6_O2	DAILY	PASS	PASS	PASS	0.01	0	0.0	0.01	22.1
03/11/2020 04:11	6_NOx_L	DAILY	PASS	PASS	PASS	0.08	0	0.2%	0.2%	45.41
03/11/2020 04:11	6_NOx_H	DAILY	PASS	PASS	PASS	0.03	0	0.0%	0.0%	180.95
03/11/2020 04:11	11_O2	DAILY	PASS	PASS	PASS	0	0	0.0	0.0	22.09
03/11/2020 04:11	11_NOx_L	DAILY	PASS	PASS	PASS	0.09	0	0.2%	0.2%	44.13
03/11/2020 04:11	11_NOx_H	DAILY	PASS	PASS	PASS	0.03	0	0.0%	0.0%	180.17

Road to Continuous Compliance Data Reduction

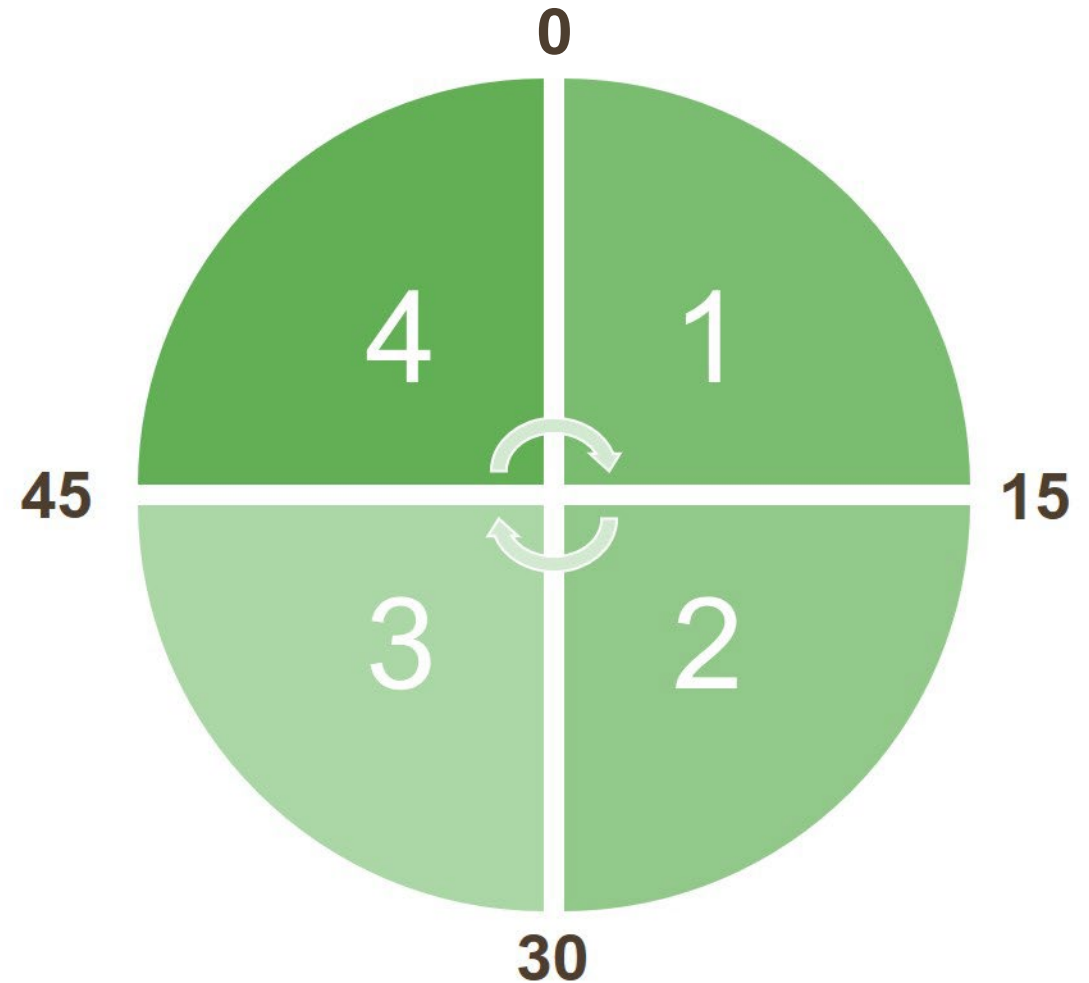
Data from CEMS shall be reduced to 1-hour averages of valid data as follows*:

Operating Hour is a:	Valid Data Means:	What is excluded?
Full Hour (60 minutes of operation)	At least four data points – one data point in each 15-minutes quadrant of the hour	Unavoidable CMS breakdowns, out-of-control periods, repairs, maintenance periods, calibration checks, and zero (low-level) and high-level adjustments
Partial Hour (less than 60 minutes of operation)	At least one data point in each 15-minutes quadrant of the hour of operation	Same
Operating Hour with Maintenance or QA and the CMS operates:	<p>Two or more quadrants of the hour - a minimum of two data points, separated by at least 15 minutes;</p> <p>One quadrant of the hour - at least one valid data point (not applicable for Part 63)</p>	Same

*Note: the information presented here is aligned with the General Provisions and may vary by Subpart.

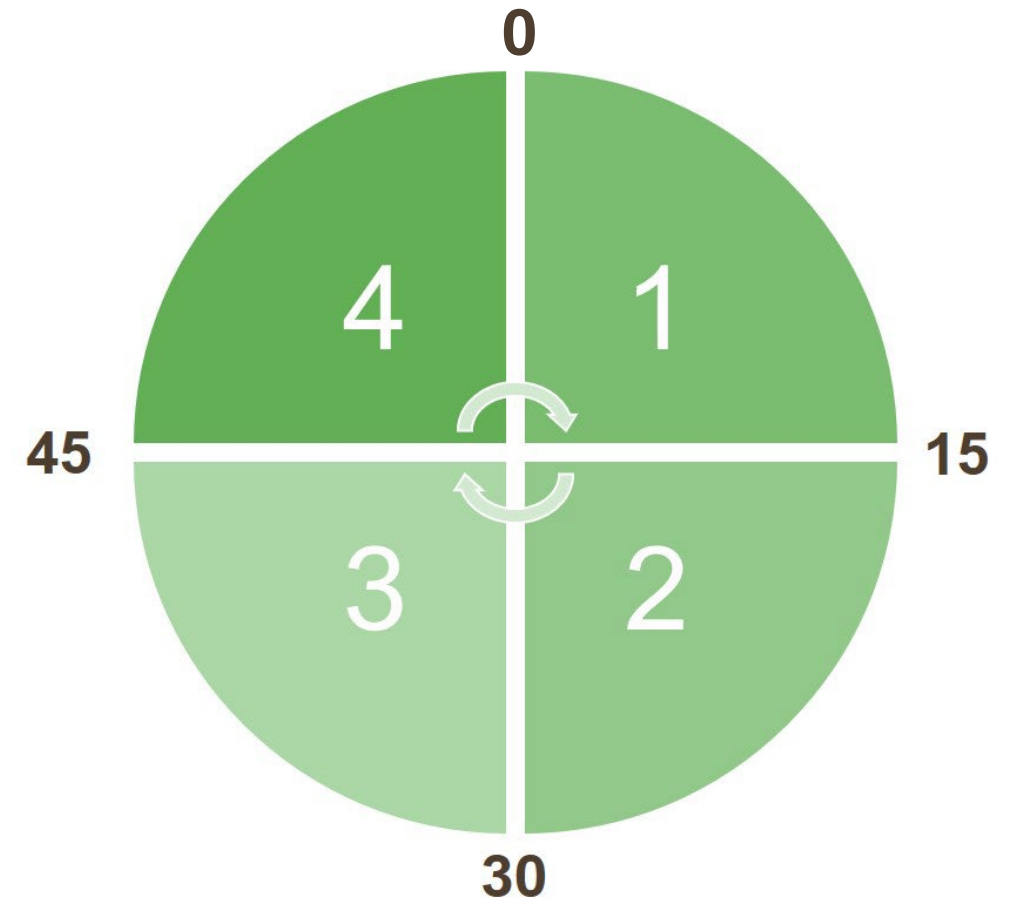
1-Hour Average Validation

....1-hour averages shall be computed as follows...for a full operating hour (any clock hour with 60 minutes of unit operation), at least four valid data points are required to calculate the hourly average, i.e., one data point in each of the 15-minute quadrants of the hour. [§ 60.13 (h)(1) & (h)(2)(i)]



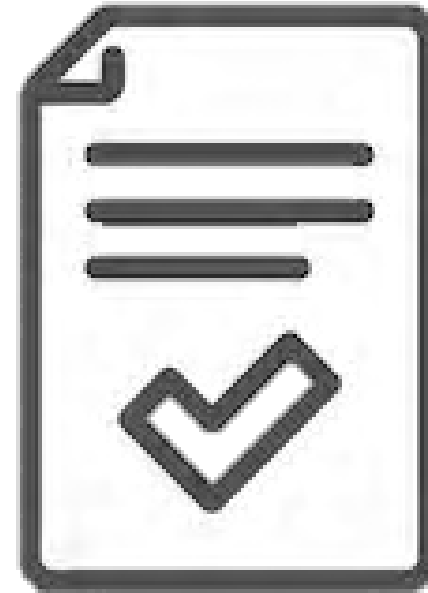
Hourly Validation Example

Minute	Value	Minute	Value	Minute	Value	Minute	Value
0	3	15	Invalid	30	2	45	2
1	4	16	Invalid	31	3	46	4
2	Invalid	17	Invalid	32	4	47	5
3	Invalid	18	Invalid	33	2	48	Invalid
4	Invalid	19	Invalid	34	3	49	Invalid
5	Invalid	20	Invalid	35	4	50	Invalid
6	Invalid	21	Invalid	36	4	51	5
7	Invalid	22	Invalid	37	5	52	4
8	Invalid	23	4	38	5	53	2
9	Invalid	24	4	39	Invalid	54	Invalid
10	Invalid	25	3	40	Invalid	55	Invalid
11	Invalid	26	3	41	Invalid	56	Invalid
12	Invalid	27	3	42	Invalid	57	Invalid
13	Invalid	28	2	43	Invalid	58	Invalid
14	Invalid	29	2	44	Invalid	59	Invalid
No.		No.		No.		No.	
Valid	2	Valid	7	Valid	9	Valid	6
Invalid	13	Invalid	8	Invalid	6	Invalid	9
Quadrant	Valid	Quadrant	Valid	Quadrant	Valid	Quadrant	Valid



Preventative Maintenance Examples Handout

- Refer to the handout, “Daily, Weekly, Monthly, Quarterly, and Annual Preventative Maintenance Examples” in your participant guide.





2. Let's Test Your Knowledge!

Feedback

CEMS must be installed so that representative measurements of emissions are obtained.

Audits/Inspections – Question 4

4. Where should a CEMS be sited?

[Check Answer](#)

Feedback

For a full operating hour, at least four valid points are required to calculate the hourly average (i.e., one data point in each of the 15-minute quadrants of the hour).

Audits/Inspections – Question 5

5. How is data from a CEMS reduced to 1-hour averages?

[Check Answer](#)

Feedback

Sample flow, gas pressure, and moisture (there are certainly others)

Audits/Inspections – Question 6

6. What are some examples of parameters that an observer should be looking at for CEMS daily operations?

[Check Answer](#)

Use of CMS Data for Enforcement

On technical grounds, CMS data typically are at least comparable to compliance method and inspection data derived from equally well-executed and quality-assured monitoring.

- CMS data are more representative of actual continuous emissions than are some traditional sources of compliance data, such as emission factors and engineering calculations.

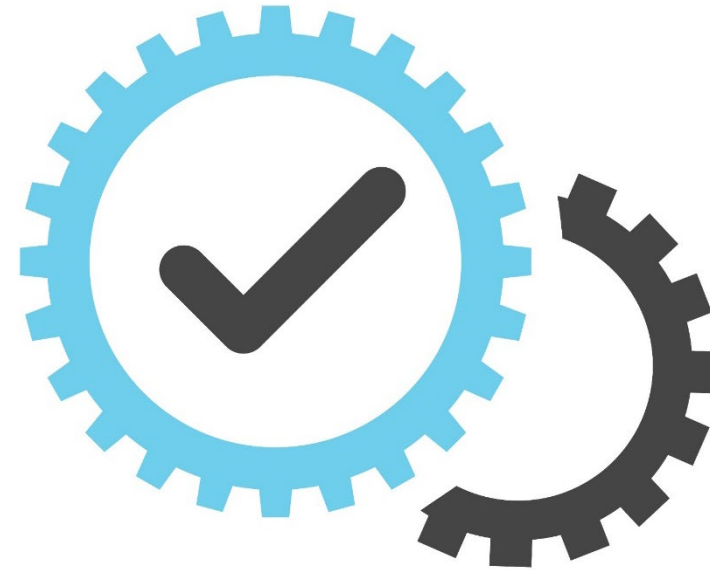
Use of CMS Data for Enforcement (Cont'd)

CMS is important to enforcement, irrespective of whether the legal requirement being enforced specifies CMS as the compliance method.

- However, a governing regulation (e.g., 40 CFR Part 60) must specify CMS as the compliance method in order for EPA to rely on CMS data alone to prove a violation of an emission limitation in Federal district court, or to issue a Notice of Noncompliance ("NON").
- The same is true if EPA is to rely on CMS data alone to issue an administrative order respecting emissions violations.

Enforcement Applications of CMS

- The governing regulation* specifies CMS as the compliance method
- The governing regulation* specifies some method other than CMS as the compliance method, or, the governing regulation doesn't specify a compliance method.



*e.g., 40 CFR Part 60

The next few slides will walk through these two enforcement applications.

CMS is the Compliance Method



- Required by some NSPS, National Emission Standards for Hazardous Air Pollutants (NESHAPS), and State Implementation Plans (SIPs)
- Includes data validation requirements
- Requires monitoring against emission limits with long averaging time
- Data documents compliance against the emissions standard in the units of the emissions standard

CMS is Not the Compliance Method



CMS data is “Credible Evidence”

- Data is used for initiating and supporting enforcement cases alleging emissions violations.
- CMS data may provide a basis to issue a section 114 request for compliance method data.
- CMS data may be used to enforce operation and maintenance, monitoring and recordkeeping and reporting requirements, when the regulation does not specify a compliance method or an emissions standard (e.g. general duty clause).



3. Let's Test Your Knowledge!

Feedback

CMS may be the compliance method specified in the rule or CMS may be used as credible evidence.

Audits/Inspections – Question 7

7. How can CMS be used to determine compliance with an emissions standard?

[Check Answer](#)

Activity



Title: Geometric Close

Purpose: To review the module content by enabling participants to summarize what they learned.

Time: 40 minutes

- 20 minutes in groups
- 20 minutes group debrief

Activity Debrief



Module 4 Summary

Now that you have completed Module 4, you should be able to:

- Distinguish the difference between performance audits and systems/field audits
- Explain the utility of performance audits and systems/field audits
- Describe the inspector's role during an audit
- Describe the procedures necessary to use CMS data in determining compliance
- Assess daily, weekly, monthly, quarterly, and annual required preventative maintenance and QA requirements
- Distinguish between CMS as compliance method and CMS data as credible evidence

