



Continuous Emission Monitoring

Proposed Acid Rain Rule

The U.S. Environmental Protection Agency (EPA) has proposed four rules containing the core acid rain requirements: the Permits Rule (40 CFR Part 72), the Allowances Rule (40 CFR Part 73), the Continuous Emission Monitoring Rule (40 CFR Part 75), and the Excess Emissions Rule (40 CFR Part 77). EPA will also propose additional rules at a future date. These rules will include requirements for facilities that elect to opt in to the Acid Rain Program (40 CFR Part 74) and for the nitrogen oxide (NO_x) control program (40 CFR Part 76). This fact sheet summarizes the key components of the proposed *Continuous Emission Monitoring Rule* (40 CFR Part 75).

Under Title IV of the Clean Air Act Amendments of 1990, Congress authorized the U.S. Environmental Protection Agency (EPA) to establish the Acid Rain Program. The overall goal of this program is to significantly reduce sulfur dioxide (SO₂) and nitrogen oxide (NO_x) emissions, the precursors of acid rain. To achieve this goal at the lowest cost, the program will employ both traditional and innovative, market-based approaches for controlling air pollution. In addition, the program will encourage energy conservation and promote pollution prevention.

The legislation sets as its primary goal the reduction of annual SO₂ emissions by 10 million tons below 1980 levels. To achieve these SO₂ reductions, the law requires a two-phase tightening of the restrictions placed on fossil fuel-fired power plants.

Phase I begins in 1995 and affects 110 mostly coal-burning electric utility plants located in 21 eastern and midwestern states. Phase II, which begins in the year 2000, tightens the annual emissions limits imposed on these large higher emitting plants and also sets restrictions on smaller and cleaner plants fired by coal, oil, and gas.

All existing utility units with an output capacity of 25 megawatts or greater and all new utility units will be affected in Phase II. In addition, other sources of SO₂ (such as industrial facilities) may elect to participate in the Acid Rain SO₂ Program by opting in.

The Act also calls for a 2-million ton reduction in NO_x emissions by the year 2000. A significant portion of this reduction will be achieved by coal-fired utility boilers, which will be required to install low-NO_x burner technologies and meet new emissions requirements.

These requirements will also be implemented in two phases. For Phase I, EPA will establish emissions limitations for two types of utility boilers (tangentially fired and dry bottom, wall-fired boilers). For Phase II, regulations for all other types of coal-fired boilers will be issued by 1997, and must be met beginning in the year 2000 by all units not subject to the Phase I NO_x limits. Regulations for tangentially fired and dry bottom, wall-fired boilers not covered in Phase I may be tightened at this time.

The innovative, market-based SO₂ allowance trading component of the Acid Rain Program allows utilities to adopt the most cost-effective strategy to reduce SO₂ emissions at units in their system. The Acid Rain Program operating permit spells out the specific program requirements and compliance options chosen by each source. Affected utilities also will be required to install systems that continuously monitor emissions of SO₂, NO_x, and other related pollutants in order to track progress, ensure compliance, and provide credibility to the trading program. In any year that compliance is not achieved, excess emissions penalties will apply, and

sources will be required to submit a plan to EPA that specifies how the excess SO₂ emissions will be offset.

Introduction

Continuous emission monitoring (CEM) is the measurement on a continuous basis of pollutants emitted into the atmosphere in exhaust gases from combustion processes or as the by-product of industrial processes. EPA is proposing requirements for the continuous monitoring of SO₂, volumetric flow, NO_x, diluent, and opacity for units regulated under Phase I and Phase II of the Acid Rain Program. In addition, procedures for monitoring or estimating CO₂ are specified. The proposed rule also contains requirements for equipment performance specifications, certification procedures, and recordkeeping and reporting.

Why Is CEM Necessary?

The Acid Rain Program establishes an "allowance trading" system as a market-based approach to reduce SO₂ emissions in a cost-effective manner. (One allowance is an authorization to emit 1 ton of SO₂ during or after a specified calendar year; a utility may buy, sell, or hold allowances as part of its compliance strategy.) Complete and accurate emissions data are key to implementing this market-based approach.



Table 1. CEM Monitor Components Required for Proposed Acid Rain Monitoring Regulations

Monitoring requirement (units required)	Required CEM Monitoring Component					
	SO ₂	NO _x	Flow	Opacity	Diluent Gas	Data Handling
SO ₂ (lbs/hr)	Yes		Yes			Yes
NO _x (lbs/mmBtu) ¹		Yes			Yes	Yes
Opacity (%)				Yes		Yes
CO ₂ (lbs/hr) ²			Yes		Yes	Yes

¹Heat input in mmBtu/hr is also required. ²Alternative methods may be used to monitor CO₂.

An essential feature of smoothly operating markets is a method for certifying the existence of the commodity being traded. The CEM data will, in effect, supply the "gold standard" to back up the paper currency of emissions allowances. The CEM requirements, therefore, will instill confidence in the market-based approach by certifying the existence and value of the trading commodity (the allowance).

CEM will also be instrumental in ensuring that the mandated reductions of SO₂ and NO_x are achieved. While traditional emissions limitation programs have required facilities to meet specific emissions rate limitations, the Acid Rain Program requires an accounting of the total emissions from regulated units during each year. Compliance for each unit is then determined through a direct comparison of SO₂ emissions totals reported by CEM and allowances held for the unit.

What Are the Proposed Monitoring Requirements?

Under the proposed rule, the owner or operator of a unit regulated under Phase I or Phase II (or a unit that opts in to the program) and any new unit must install a CEM system on the unit unless otherwise specified in the regulation. A CEM system includes:

- An SO₂ pollutant concentration monitor.
- A NO_x pollutant concentration monitor.
- A volumetric flow monitor.
- An opacity monitor.
- A diluent gas monitor.

- A data acquisition and handling system (computer-based) for recording and performing calculations with the data.

Table 1 summarizes the CEM monitors required by the proposed rule. In all cases, a data acquisition and handling system must be used to collect and report the data.

To monitor SO₂ emissions using a CEM system, a facility must use both an SO₂ pollutant concentration monitor and a volumetric flow monitor to measure the emissions in pounds per hour (the units needed to determine compliance). If the SO₂ monitor measures on a dry basis and the flow monitor measures on a wet basis, the owner or operator must determine the hourly moisture content of the flue gases and correct the measured flow rate for moisture using procedures specified in the rule.

To measure NO_x emissions, both an NO_x pollutant concentration monitor and a diluent gas monitor are required to calculate an emissions rate in pounds per million British thermal units (lbs/mmBtu).

Opacity monitoring, which involves a percentage calculation, requires only an opacity monitor. (Under the proposed rule, units firing 90 percent or more natural gas with oil as the backup fuel are exempted from the opacity monitoring requirements.)

The proposed rule does not require a utility to use a CEM system to measure CO₂. If a utility chooses to use a CEM system, however, a CO₂ diluent monitor plus a flow monitor may be used to compute emissions in pounds per hour.

If a CEM system is installed in such a way that any portion of the flue gases from an affected unit can bypass the monitoring system, a separate CEM system is required on the bypass flue gas stream.

All CEM systems must be in continuous operation and must be able to sample, analyze, and record data at least every 15 minutes. All emissions and flow data will be reduced to 1-hour averages. The proposed rule specifies procedures for converting the hourly emissions data into the appropriate units (pounds per hour for SO₂ and pounds per million Btus for NO_x).

How Will Emissions Be Calculated for Periods of Missing Data?

Four or more data points are needed to compile valid 1-hour averages for emissions flow data, except during calibration, maintenance, repair, or other required quality assurance activity periods, where two or more data points may comprise a valid hour. Failure of the system to acquire the data points would result in the loss of data for the entire hour. The proposed rule contains procedures for "filling in" data when no valid hour or hours of data have been recorded by the SO₂ monitor, the flow monitor, and the NO_x CEM system consisting of the NO_x monitor and the diluent gas monitor. The proposed rule uses a conservative approach to substituting for missing data. The proposed procedures are summarized in Table 2.

What Are the Requirements for Units Using a Phase I Qualifying Technology?

The proposed rule specifies additional monitoring requirements for units that are implementing an optional compliance method specified under the Permits Rule that allows a unit to use a Phase I

qualifying technology (a system that achieves a 90-percent reduction in SO₂ emissions). Each such unit must be equipped with pollutant and diluent gas monitors to measure SO₂ emissions at the inlet to the control device, in addition to the monitors required for measuring SO₂ emissions discharged to the atmosphere.

What Are the Requirements for Multiple Units with a Common Stack?

If two or more units share a common stack, the proposed rule allows the owner or operator to combine SO₂ allowances according to the procedures outlined in the Allowance System Rule and install one monitoring system. If a Phase I and Phase II unit share a common stack, the owner or operator must either (1) install a separate CEM system in each duct leading to the stack; (2) declare the Phase II unit as a substitute unit in accordance with the requirements of the Permits Rule; or (3) obtain the Administrator's approval to differentiate between the units parametrically.

If a regulated unit and a nonregulated unit share a common stack, the owner or operator must either (1) install a separate CEM sys-

tem in each duct leading to the stack; (2) declare the nonregulated unit as an opt-in unit under the Opt-in Rule; or (3) obtain the Administrator's approval to differentiate the units parametrically.

What Tests Are Required for Performance Certification?

The proposed rule requires the following performance certification tests for CEM systems:

- Calibration error tests for each pollutant concentration monitor, diluent gas monitor, and flow monitor capable of daily calibration tests.
- An electronic stability test for each flow monitor not capable of daily calibration tests.
- A relative accuracy test for each SO₂ pollutant concentration monitor, flow monitor, and the NO_x CEM system. (Units with SO₂ concentrations of 250 parts per million or less, gas velocities of 10 feet per second or less, or NO_x emissions rates of 0.5 lbs/mmBtu or less are not required to meet the relative accuracy requirement for the SO₂ monitor, the flow monitor, or the NO_x monitoring system, respectively, but must meet an alterna-

tive requirement specified in the rule.)

- A bias test for each SO₂ pollutant concentration monitor, flow monitor, and the NO_x CEM systems.
- A cycle response test for SO₂ pollutant concentration monitors and NO_x CEM systems.
- For differential pressure flow monitors, an orientation sensitivity test, and for ultrasonic and differential pressure flow monitors, an interference test, and calibration error tests whenever possible.
- For continuous opacity monitoring systems, performance verification tests for calibration error, response time, zero drift, and calibration drift. These tests must be conducted according to the requirements of 40 CFR Part 60, Appendix B ("Performance Specification 1—Standards of Performance for New Stationary Sources").

What Are the Certification Requirements for CEMS?

Under the proposed rule, the EPA Administrator must certify the CEM system (CEMS) before it can be used in the Acid Rain Program. To

Table 2. Summary of CEM Substitution Criteria for Estimating Values for Missing Data Periods

Annual availability (%) of monitor or system ¹	Number of hours missing (N)	Value substituted for each missing hour
Greater than or equal to 95%	N ≤ 24 hours	Average of the hour before missing period and the hour recorded after missing period
	N > 24 hours	90th percentile value recorded in previous 30 days of service or the before/after value, whichever is greater
Less than 95% but greater than or equal to 90%	N ≤ 6 hours	Average of the hour recorded before missing period and the hour recorded after missing period
	N > 6 and ≤ 24 hours	90th percentile value recorded in previous 30 days of service or the before/after value, whichever is greater
	N > 24 hours	90th percentile value recorded in previous 365 days of service or the before/after value, whichever is greater.
Less than 90%	N > 0 hours	90th percentile value recorded in previous 365 days of service or the before/after value, whichever is greater.

¹SO₂ and flow monitors are individually evaluated for missing data. For NO_x monitoring, the monitor system (NO_x pollutant concentration monitor and diluent gas monitor) are considered in combination. NO_x and flow monitoring data is correlated to unit gross operating load before selecting the percentile values. SO₂ data are correlated to fuel sulfur content before selecting the percentile value.

obtain certification, the owner or operator of a unit must submit a request to the EPA Administrator. The request must include the following information:

- Unit identification.
- Stack inside diameter at monitor location and stack height.
- Description of CEMS and continuous opacity monitoring system (COMS) installed.
- Results and date of each performance verification test for certification.
- Supporting documentation to substantiate the test results.
- Calculations to verify that the data acquisition and handling system properly calculates and converts the recorded emissions data into units of the standard.

EPA will issue a notice approving or disapproving the request for certification within 120 days. If the proposed system is disapproved, the owner or operator must revise the equipment, procedures, or methods as necessary and resubmit a request for certification.

What Quality Assurance/Quality Control Procedures Are Required?

The proposed rule requires the owner or operator to develop and implement a written quality assurance/quality control plan for each system. This plan must be submitted as part of the utility's acid rain permit application. The quality control plan must include complete, step-by-step procedures and operations for calibration checks, calibration adjustments, preventive maintenance, audits, and record-keeping and reporting. The proposed rule specifies procedures for assessment of calibration error, relative accuracy, and bias. The quality assurance plan must include relative accuracy test audits, calibration error tests, and bias tests.

What Alternative Monitoring Systems Are Allowed?

The owner or operator of an affected unit may apply to the

EPA Administrator for approval of an alternative monitoring system to determine hourly emissions data for SO₂, NO_x, and/or volumetric flow. An alternative system must provide the same or better precision, reliability, accessibility, and timeliness as a certified CEM system. The owner or operator must submit certain information and data to demonstrate that the alternative system meets these criteria.

The proposed rule includes an exception for units fired 90 percent or more by natural gas because emissions from the 525 units in this category emitted only about 7,600 tons of SO₂ in 1985. These units may use in-line oil flow meters and oil sampling and analysis to estimate tons of SO₂ emitted. Units burning greater than 10 percent oil may also use this approved, excepted method, although they must sample the oil hourly using flow-proportional or continuous drip methods. This exception is based on a combination of factors: (1) the relative ease of obtaining oil samples; (2) the fact that oil is much more homogeneous in sulfur content than coal; and (3) the approved oil sampling and analysis methods produce SO₂ emission estimates consistently higher than actual CEM data.

What Are the Recordkeeping, Reporting, and Notification Requirements?

The CEM rule proposes requirements for notification, recordkeeping, and reporting for the Acid Rain Program. The requirements include:

- Submission of monitoring plans as part of the compliance plan and permit required under the Permits Rule.
- Written notifications of monitor certification tests.
- Daily recording of hourly emissions data and other information.
- Maintaining records of emissions, flow data, and other information.
- Initial and quarterly reports of quality assurance and

quality control tests for the CEM system.

- Reports of recorded emissions, flow, unit operating status, and monitoring performance data.

The proposed rule also requires the owner or operator to electronically report the required information on a quarterly basis as an ASCII flat file via either an IBM-compatible personal computer floppy diskette or a modem. EPA will use the information to determine compliance with the emissions reductions mandated by the Clean Air Act.

What Are the Deadlines for Compliance?

The proposed rule applies to existing units regulated under Phase I or Phase II of the Acid Rain Program, and to each new utility unit when it begins its operation. (A "new unit" is a defined as a unit that begins commercial operation on or after November 15, 1990.) Equipment required by the proposed rule must be installed, certified, and operational by November 15, 1993, for Phase I affected units, and by January 1, 1995, for any Phase II units. A unit that formally commits to retirement before December 31, 1994, will be exempt from the requirements of the proposed rule.

For More Information

For more information, write to:

U.S. EPA Office of Air and
Radiation
Acid Rain Division
(ANR-445)
Washington, DC 20460

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