

ACID RAIN PROGRAM

REGULATION

The Acid Rain Program, as defined under Title IV of the 1990 Clean Air Act Amendments, establishes a national cap on sulfur dioxide (SO₂) emissions and targets reductions in both SO₂ and oxides of nitrogen (NO_x) emissions. Phase I compliance, which begins in 1995, impacts 110 of the highest emitting utilities in 21 states. Phase II compliance begins in the year 2000 and affects virtually all existing utilities with greater than 25 megawatts output capacity and all new utilities.

To comply with the Acid Rain Program, Phase I utilities must have continuous emission monitoring systems (CEMS) installed and certified by November 15, 1993. Existing Phase II plants must have CEMS operational by January 1, 1995. 40 CFR Part 75 is a federal regulation which includes requirements for certification, daily calibration and ongoing quality assurance of CEMS used in the Acid Rain Program.

CEMS CERTIFICATION

Under the Acid Rain Program, CEMS must undergo a series of tests before certification. These include, but are not limited to, calibration error, linearity, and relative accuracy tests to document CEMS performance and accuracy.

7-Day Calibration Error Test

Each SO₂, NO_x, CO₂, and O₂ monitor is challenged with calibration gas at zero-level and at high-level concentrations over a seven day period to test for calibration error. In general, response values must not deviate from the calibration gas value by more than 2.5% of span. For CO₂ and O₂ monitors, response values must not deviate from the calibration gas value by more than 0.5% CO₂ or O₂.

Linearity Check

Each SO₂, NO_x, CO₂, and O₂ monitor must be challenged with calibration gases at three different concentrations (low-, mid-, and high-levels). At each concentration, response values must not deviate from the calibration gas value by more than 5.0%, as a percentage of the calibration gas value or ±5 ppm on an absolute basis. For CO₂ and O₂ monitors, the error in linearity is limited to 5.0% of the calibration gas value or to ±0.5% on an absolute basis.

Relative Accuracy Test

A relative accuracy test, which involves comparison of monitor responses to test data obtained from EPA-specified reference methods, must be performed for each monitor. Each monitor must demonstrate an accuracy of 10% or better relative to the EPA reference method.

QUALITY ASSURANCE

All facilities that must comply with Acid Rain requirements must develop and implement a written plan for quality control and quality assurance of CEMS. This plan is a step-by-step guide that addresses all procedures and operations. Among other tests and procedures, the plan must include daily calibration error tests, quarterly linearity checks and periodic relative accuracy tests.

Daily Calibration Error Test

CEMS calibration must be checked on a daily basis with a zero- and a high-level concentration calibration gas. Calibration adjustment must occur if error exceeds the limits specified in the 7-day calibration test performed at CEMS certification. In general, the monitor is deemed "out-of-control" when the calibration error exceeds twice the allowable limit.

Quarterly Linearity Checks

CEMS linearity checks must be performed during each operating quarter, but not less than two months apart. The calibration gas cylinders must be different from those used in the daily calibration error tests. The quarterly linearity check is the same procedure used in CEMS certification. The CEMS is deemed "out-of-control" when the error in linearity at any of the three concentration levels exceeds the linearity specification for certification.

Semiannual/Annual Relative Accuracy Test Audit

CEMS relative accuracy must be checked once semiannually or once annually after the calendar quarter it was last checked. The relative accuracy test audit (RATA) is the same procedure as the relative accuracy test performed at certification.

Each monitor must demonstrate an accuracy of 10% or better relative to the EPA reference method. RATA's may be performed on an annual basis if the relative accuracy result on the previous audit is 7.5% or better.

RECOMMENDED PRODUCTS

The Acid Rain Program requires that all calibration gases used for Acid Rain compliance must be: 1) Standard Reference Material (SRMs) available from the National Institute of Standards and Technology (NIST); 2) NIST/EPA-approved Certified Reference Materials (now termed NIST Traceable Reference Materials or NTRMs); 3) EPA Protocol 1 Gases which are "vendor-certified to be within 2.0% of the concentration on the cylinder label (tag value)"; or 4) zero ambient air material.

Zero ambient air material for zero-level concentration is defined by EPA as "a gas that consists of ambient air that is vendor-certified to contain: traceable concentrations respectively of SO₂, NO_x, and THC below 0.1 ppm; a concentration of CO below 1 ppm; and a concentration of CO₂ below 400 ppm."

Scott Specialty Gases offers a comprehensive line of two component and multi-component EPA Protocol 1 Gases consisting of combinations of sulfur dioxide, nitric oxide, and carbon dioxide. Scott EPA Protocol 1 Gases with ±1% analytical accuracy can help reduce errors in calibration and linearity and help maximize CEMS RATA performance. Scott's CEM Zero/Dilution Air™ is designed to meet EPA specifications for zero ambient air material. It can be used to zero CEM system monitors or as a check on the quality of house dilution air. See reverse side for product specifications and recommended gas handling equipment.

For complete information about this regulation's requirements, please consult Federal Register, Vol. 58, No. 6, January 11, 1993.



EPA PROTOCOL GASES

INTRODUCTION

In response to the growing importance of environmental gas measurements, the Environmental Protection Agency (EPA) published a set of guidelines for commercially produced calibration standards (EPA Protocol Gases) in 1978. The latest of several revisions to these guidelines occurred in 1987.

EPA Protocol guidelines specifically define how a calibration standard is to be analyzed, and specify methods for traceability to National Institute of Standards and Technology (NIST) Standard Reference Materials (SRMs) or other NIST-approved reference materials. Currently, there are two types of EPA Protocol Gases: EPA Protocol 1 Gases for continuous source emission measurements, and EPA Protocol 2 Gases for ambient air measurements.

EPA Protocol Gases can be prepared from a variety of gas mixture components including carbon monoxide (CO), carbon dioxide (CO₂), nitric oxide (NO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), propane (C₃H₈), methane (CH₄), hydrogen sulfide (H₂S), oxygen (O₂), and others.

In January, 1993, the EPA Protocol guidelines were published in the Federal Register for the first time. A new revision of the EPA Protocol guidelines is expected to be published in the Federal Register in late 1993. Scott Specialty Gases has actively participated in the development and revisions of EPA Protocol guidelines and continues to work closely with EPA on gas calibration issues.

BENEFITS OF SCOTT EPA PROTOCOL GASES

- Accurate calibration standards that are reliable reference standards for certification testing, daily calibration, and quarterly auditing of CEMS.
- $\pm 1\%$ analytical accuracy to help customers meet CEMS relative accuracy requirements of the Acid Rain Program (10%), Boiler and Industrial Furnace Rule (10%), and other regulations.
- $\pm 1\%$ analytical accuracy to help customers meet the 7.5% Acid Rain relative accuracy specification needed to eliminate one relative accuracy test audit per year (potential savings of \$20,000 or more).
- Dependable delivery lead times attributable to Scott's extensive inventory of SRMs and NTRMs.
- Timely and complete certificates of analysis and labels to document compliance with federal, state, and local government regulations.
- Dependable certification expiration dates based on the most current EPA information and Scott internal stability studies.
- Assured availability through regional manufacturing of EPA Protocol Gases.
- Guaranteed stability of two- and multi-component EPA Protocol Gas mixtures.

EPA PROTOCOL GAS APPLICATIONS

Title 40 of the Code of Federal Regulations (CFR) addresses protection of the environment. "Reference" or "calibration" gases are defined throughout several parts of the CFR including: Part 58, Ambient Air Quality Surveillance; Part 60, New Stationary Source Performance Standards; Part 75 which is part of the Acid Rain Program; and Part 266, Hazardous Waste Management.

To comply with federal regulations in these parts and with more stringent regulations enforced at the state and local levels, EPA Protocol 1 Gases are often specified by EPA and state and local agencies for use in the certification, quarterly auditing, and daily calibration of continuous emissions monitoring systems (CEMS). For example, CEMS quality assurance procedures as specified under 40 CFR Part 60, Appendix F, Procedure 1 require the use of EPA Protocol 1 Gases for quarterly cylinder gas audits. Also, EPA Protocol 1 Gases are the minimum requirement for all daily calibration and quarterly linearity test gases used in the Acid Rain Program.

EPA PROTOCOL GAS GUIDELINES

The EPA Protocol guideline documents describe a procedure for assaying the concentration of gaseous pollutant standards and certifying that the assayed concentrations are traceable to an authoritative reference standard. Requirements of the EPA guidelines include:

- NIST traceability through the use of NIST SRMs, EPA/NIST approved and gas manufacturer produced NIST Traceable Reference Materials (NTRMs), or Gas Manufacturer's Intermediate Standards (GMIS) that have been assayed with direct reference to an SRM or NTRM.
- A four day incubation period between blending and the first analysis of the EPA Protocol Gas.
- Detailed analysis procedures and requirements for instruments and calibration curves used in the certification of EPA Protocol Gases, including triplicate measurements.
- Stability testing requirements of reactive gas standards (NO, NO₂, SO₂, H₂S, and CO). A repeat analysis must be performed seven days after the first analysis for mixtures containing reactive gases.
- A detailed description of the information that must be present on the certificate of analysis and label.
- A defined period for an EPA Protocol Gas, after which the mixture must be recertified for regulatory compliance use. EPA Protocol certification periods vary by mixture composition and by application. EPA Protocol Gases used in the Acid Rain Program may have certification periods that are different from those generally specified by EPA (See EPA Protocol Availability Chart).

