



# Laws and Regulations Governing Stack Testing

---

**Toby Allen**

**PNWIS Specialty Conference – May 2008**



*Serving Island, Skagit & Whatcom Counties*

# Overview

- **Basic approach**
- **Legal requirements**
- **Information resources**
- **Implementation issues & case study**

## Why Stack Test?

- **Emissions**

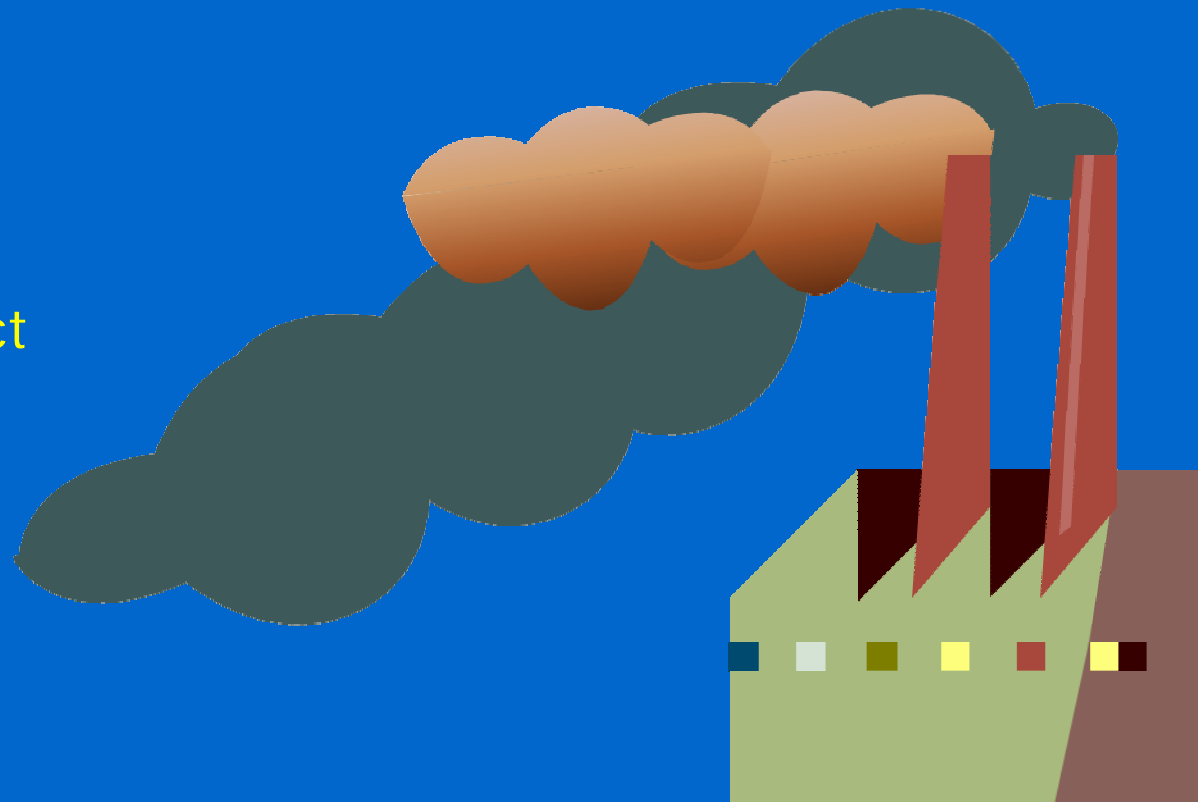
- Mass
- Concentration
- Flow

- **Performance**

- **Atmospheric models**

- Receptor impact

- Emissions inventory/information
- Continuous emissions monitoring (CEM) quality assurance
- Compliance demonstration



# Continuous Emissions Monitoring (CEM) Quality Assurance

- **Relative accuracy tests audits (RATA)**
- **Linearity checks**

*Primarily 40 CFR 60 Appendix F*

**Acid rain sources : 40 CFR 75**

# Compliance Demonstration

## **Federal/State/Local applicable regulations**

- 40 CFR 60 (NSPS), 61 & 63 (NESHAPs/MACT)

## **Operating permit conditions**

## **Regulatory orders**

## **Information requests**

- CAA §114
- WAC 173-400-105(4)
- Local regulations

## **40 CFR 60 Appendix A - methods**

# Resources

<http://www.epa.gov/ttn/emc/tmethods.html>

## **EPA Website for Emissions monitoring**

- **Methods Proposed or Promulgated in the FR**
- **Source Category Approved Alternative Test Methods**
- **Other Test Methods (OTMs)**
- **Historic Conditional Test Methods (CTMs)**

*Includes Final and Draft proposed Methods and Frequently Asked Questions/Background*

EPA - TTN EMC - CFR PROMULGATED TEST METHODS(TM) - Windows Internet Explorer

US EPA http://www.epa.gov/ttn/emc/promgate.html

File Edit View Favorites Tools Help

US EPA - TTN EMC - CFR PROMULGATED TEST MET...

U.S. ENVIRONMENTAL PROTECTION AGENCY

**Technology Transfer Network  
Emission Measurement Center**

Recent Additions | Contact Us Search: All EPA This Area Go

You are here: EPA Home » Technology Transfer Network » Emission Measurement Center » Methods » CFR Promulgated Test Methods (TM)

## CFR Promulgated Test Methods (TM)

CFR promulgated test methods have been published in the Federal Register as final rules. These are the official, legal Federal Register Versions.

From the listing below, find the file you would like to download. The available file formats are represented by icons on the right side of the listing. Click on the icon that represents the file format you wish to receive. For an explanation of file formats and their icons, see our [TTNWeb File Types](#).

| File Description  | Posting Date | File Types |
|---|--------------|------------|
| 10/17/00 Federal Register Copy of the Amendments for Testing and Monitoring Provisions <a href="#">[EXIT Disclaimer]</a><br><a href="http://www.access.gpo.gov/su_docs/fedreq/a001017c.html">http://www.access.gpo.gov/su_docs/fedreq/a001017c.html</a> |              |            |
| Response to Comments on "Amendments for Testing and Monitoring Provisions" Published in the FR 8/27/97.   | 02/06/2001   |            |
| Preamble to the Amendments for Testing and Monitoring Provisions.   | 4/2000       |            |
| Revisions to 40 CFR Part 60   | 2/2000       |            |
| Revisions to 40 CFR Part 61   | 2/2000       |            |
| Revisions to 40 CFR Part 63   | 2/2000       |            |
| Method 1 - Traverse Points - Click <a href="#">here</a> for Method FAQs and documents   | 2/2000       |            |
| Method 1A - Small Ducts - Click <a href="#">here</a> for Method FAQs and documents  | 2/2000       |            |
| Method 2 - Velocity - S-type Pitot - Click <a href="#">here</a> for Method FAQs and documents   | 2/2000       |            |
| Method 2 - Velocity - S-type Pitot  | 2/2000       |            |
| Method 2A - Volume Meters - Click <a href="#">here</a> for Method FAQs and documents  | 2/2000       |            |
| Method 2B - Exhaust Volume Flow Rate - Click <a href="#">here</a> for Method FAQs and documents   | 2/2000       |            |
| Method 2C - Standard Pitot - Click <a href="#">here</a> for Method FAQs and documents   | 2/2000       |            |
| Method 2D - Rate Meters - Click <a href="#">here</a> for Method FAQs and documents  | 2/2000       |            |
| Method 2E - Landfill Gas Production Flow Rate - Click <a href="#">here</a> for Method FAQs and documents  | 2/2000       |            |

Internet | Protected Mode: On 100%

Subject Top Page: ARB Test Methods - Windows Internet Explorer  
http://www.arb.ca.gov/testmeth/testmeth.htm

File Edit View Favorites Tools Help  
Electronic Code of Federal ... Northwest Clean Air Agency Subject Top Page: ARB ...

CA .GOV California Environmental Protection Agency  
**AIR RESOURCES BOARD**

Skip to: [Content](#) | [Footer](#) | [Accessibility](#) | [A-Z Index](#) Search ARB  
Google Advanced

Home Programs Rulemaking Board Meetings Laws & Regulations Data & Statistics Permits, Etc. Events

**ARB TEST METHODS**

Monday, April 28, 2008  
This page last reviewed April 8, 2008

**RESOURCES**

- [About ARB](#)
- [Business Assistance](#)
- [Databases](#)
- [Employment](#)
- [Factsheets / FAQs](#)
- [Find Your Community](#)
- [Forms](#)
- [Grants / Incentives](#)
- [Join Email Lists](#)
- [Library](#)
- [Maps](#)
- [News Releases](#)
- [Public Records Requests](#)
- [Publications](#)
- [Report Air Pollution](#)
- [RSS / Newsfeed](#)
- [Software](#)
- [What's New](#)
- [Videos](#)

**ARB Test Methods**

ARB test methods are formal written procedures for measurement of physical parameters related to air pollution including pollutant emissions concentration and mass flow rate, materials properties such as asbestos content of solids and volatile organic content of wastes, and various aspects of the performance of vapor recovery systems at service stations, bulk plants and terminals.

ARB test methods are broken into the various topic areas with the test methods themselves presented in Word or WordPerfect and PDF formats.

**Stationary Source Test Methods**

These include methods for determining compliance with district non-vehicular (i.e., stationary source) emission standards.

- [Volume 1](#) - Criteria Pollutant
- [Volume 2](#) - Vapor Recovery
- [Volume 3](#) - Toxic Air Contaminants
- [Volume 6](#) - Quality Assurance
- [U.S. EPA Stationary Source Test Methods](#)
- [Supplement to Stationary Source Test Methods \(10.5 MB\)](#)
- [ARB and District Test Methods Approved by U.S. EPA, Region IX for Use in the State Implementation Plan \(SIP\)](#)

**Consumer Product Test Method 310**

[This area](#) includes the actual test method plus the available Standard Operating Procedures (SOPs).

**Fuel Test Method**

This area includes the available [SOPs](#).

Internet | Protected Mode: On 100%

# CLEAN AIR ACT NATIONAL STACK TESTING GUIDANCE

- **Final SEPTEMBER 30, 2005 from EPA-OECA**  
<http://www.epa.gov/compliance/resources/policies/monitoring/caa/stacktesting.pdf>
- **Compliance with 40 CFR Parts 60, 61, & 63**
- **Using cited or other test methods approved by the Administrator under §§60.8, 61.13, or 63.7**
- **NOT applicable to visible emission testing**

# National Stack Test Guidance

- Time frame for conducting stack tests
- Stack test waivers
- Stack test notifications
- Observation of stack tests
- Representative testing conditions
- Stoppages
- Postponements
- Test reports

# Frequent Mishaps

- **nappropriate test methods**
- **est plans**
  - Averaging times
  - Significant figures
- **ermit conditions  $\neq$  Federal requirement**
- **esting frequencies**
- **est stoppage**

## Credible Evidence Rules:

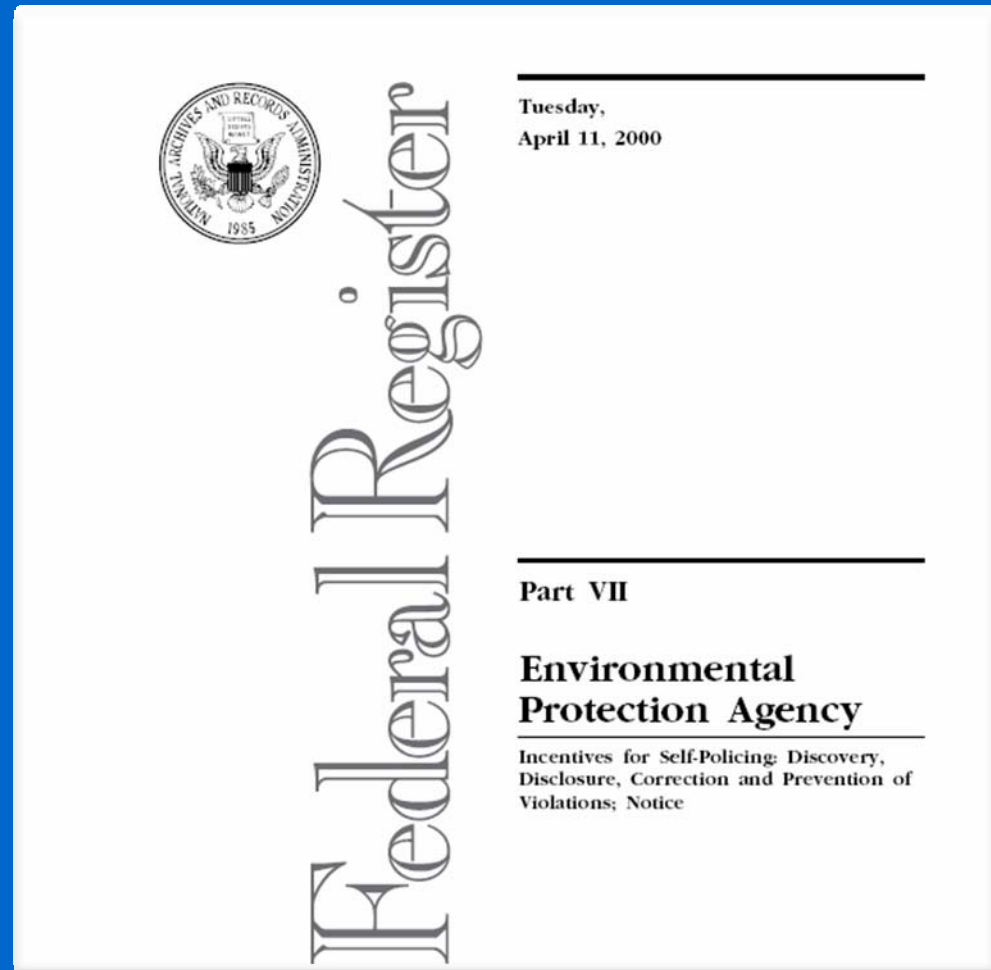
- **Federal Register: February 24, 1997  
(Volume 62, Number 36)**
- **Use of non-reference stack test methods  
for compliance demonstration**
- **Section 113(a) of the CAA provides that the  
Agency may bring an enforcement action  
"on the basis of *any information available*."**

# EPA Self Disclosure Policy

<http://www.epa.gov/compliance/incentives/auditing/auditpolicy.html>

**Conditional**

**Significant  
penalty reduction**



# Case Study

## 2 Simple cycle combustion turbine generators

- 54 MW capacity (each)

- **Controls**

- $\text{SO}_2$  and  $\text{H}_2\text{SO}_4$ : fuel sulfur content
- $\text{NO}_x$ : selective catalytic reduction (SCR) system
- PM: good combustion practices

# Case Study

| POLLUTANT OR TYPE                       | REGULATORY CITATION                            | REGULATORY DESCRIPTION   | MONITORING, RECORDKEEPING AND REPORTING REQUIREMENTS   |
|---|--|--|--|
| 5.4.7<br>H <sub>2</sub> SO <sub>4</sub> | PSD xx-xx<br>Conditions 10 and 15<br>(7/29/03) | <p><u>H<sub>2</sub>SO<sub>4</sub> Emissions</u> - Emissions from each turbine exhaust stack shall not exceed:</p> <ul style="list-style-type: none"> <li>• <b>310 pounds per day when burning distillate fuel</b> having more than 0.01% wt. sulfur</li> <li>• <b>88 pounds per day when burning natural gas or low-sulfur (less than 0.01% wt. sulfur) distillate fuel</b></li> </ul> | <p>Emissions shall be measured according to <b>EPA Method 8</b> incorporating procedures in EPA Reference Method 6 instrument span shall be 3 ppm or less.</p> <p>Provide test plan for approval at least 30 days prior to performance testing. Submit results of certification testing to NWCAA.</p> <p>Source testing for H<sub>2</sub>SO<sub>4</sub> shall not be conducted less frequently than annually until three consecutive annual tests are in compliance with the 88 or 310 pound per day standard.</p> <p>Source testing may be reduced to once every three years if the immediately previous year's results demonstrate compliance.</p> <p>If a source test indicates non-compliance, the frequency of testing reverts to annual testing.</p> |

**H<sub>2</sub>SO<sub>4</sub> – Method 8: 310 lb per day  
Initial testing + annual  
(Eligible for 3 yr interval upon  
compliance demonstration)**

## Case Study: Method 8—Determination of Sulfuric Acid and Sulfur Dioxide Emissions From Stationary Sources

**Method 8: *specifically* for measuring sulfuric acid mist emissions from sulfuric acid manufacturing plants.**

**Works well for relatively clean and dry emission streams**



# Technology Transfer Network Emission Measurement Center

[Recent Additions](#) | [Contact Us](#) **Search:** All EPA his Area

You are here: [EPA Home](#) » [Technology Transfer Network](#) » [Emission Measurement Center](#) » Method 8 - Sulfuric Acid Mist

EMC Home

Frequent Questions

Methods

Monitoring

Technical Support  
Audit Programs  
QA/QC

Related Web Sites

Instructional Material

Upcoming Events

Who is EMC?

EMC Contacts

Voluntary Superior  
Monitoring

## Method 8 - Sulfuric Acid Mist

Text of Test Method 8 - Sulfuric Acid Mist



Method 8 audit materials available



### FREQUENTLY ASKED QUESTIONS (FAQS)

- [What pollutant\(s\) does this method seek to measure?](#)
- [Was it developed for a specific source category?](#)
- [Is it applicable to other sources?](#)
- [How are samples collected?](#)
- [What technique is used for sample analysis?](#)
- [Is the method analysis usually completed in the field or after the sample is returned to the laboratory?](#)
- [Is an audit sample available for this method?](#)

# Case Study: Method 8 - Interferences

## *Method 8 §4.0 Interferences*

**4.1 Possible interfering agents of this method are fluorides, free ammonia, and dimethyl aniline. If any of these interfering agents is present (this can be determined by knowledge of the process), alternative methods, subject to the approval of the Administrator, are required.**

## Case Study: Method 8 – Continued

### Is it applicable to other sources?

- Only method that EPA has published for measuring sulfuric acid mist
- **May** not work very well and should not be used to measure sulfuric acid mist from sources that have *significant emissions* of
  - sulfur dioxide and
  - ammonia.

# Case Study: Stack Characteristics

**Distillate fuel combustion = water**

- **2-5 ppm SO<sub>2</sub>**
- **3-4 ppm ammonia**

# Case Study: Initial Results

3 failed Method 8  
stack tests in 1 year



Mass balance (fuel sulfur) showed  
that the emissions couldn't exist.

# Case Study: Actions

- **PSD permit writer**
- **EPA**
- **Other facilities**
- **Other stack test companies**
  
- **New test plan**
  - Immediate titration to minimize SO<sub>2</sub> bias
  - SCR off – excess NO<sub>x</sub> emissions

# Case Study: End of Story

## **Regulators in the field at time of testing**

- Ammonia off – no SCR (5X NO<sub>x</sub> emissions)
- Available for decisions at the time of the test

## **Entrained soot on filter – In compliance w/ VE limit (10%)**

- Split samples into two aliquots for more titrations
- Averaged splits

**Final Result: 3 years passing tests- reduced frequency and no enforcement action.**