



EPA Methods 3A, 6C, 7E, 10 & 20

Corrections to May 15, 2006 Final Rule
That Updated the Methods

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Updated Methods

- Method 3A – O₂ & CO₂
- Method 6C – SO₂
- Method 7E – NO_x
- Method 10 – CO
- Method 20 – NO_x/SO₂/Diluent



Update of Methods 3A, 6C, 7E, 10, and 20

Purpose

□ Harmonize

- Consistent Equipment Requirements
- Consistent Performance Tests
- Calibration Gases & Ranges

■ Simplify & Make Flexible

- Make Equipment Performance-Based Instead of Technology-Based
- Allow Verifications by Manufacturer

■ Update

- Relax Outdated Requirements
- Incorporate Recently Accepted Options & New Techniques
- Address Dilution Sampling Systems



EPA Methods 3A, 6C, 7E, 10 & 20

In This Talk

A Discussion of

- Technical Corrections
- Clarifications

Rule Clarifications on Website

www.epa.gov/ttn/emc

The screenshot shows a web browser window displaying the EPA website. The address bar shows the URL <http://www.epa.gov/ttn/emc/methods/method7e.html>. The page header includes the U.S. Environmental Protection Agency logo and the text "U.S. Environmental Protection Agency". The main heading is "Technology Transfer Network Emission Measurement Center". Below this, there are links for "Recent Additions", "Contact Us", and "Print Version", along with a search box and a "GO" button. The breadcrumb trail reads: "EPA Home > Air & Radiation > TTNWeb - Technology Transfer Network > Emission Measurement Center > Method 7E - NOx - Instrumental". The main content area is titled "Method 7E - NOx - Instrumental" and contains the text "Text of Test Method 7E - NOx - Instrumental" followed by a PDF icon. Below this is a section titled "FREQUENTLY ASKED QUESTIONS (FAQS)" with three bullet points:

- [Does the new interference test apply to analyzers that have already met the requirements of the old Method 6C, 7E, 10, and 20 interference tests?](#)
- [Section 8.2.7\(2\) implies that the interference test needs to be repeated after replacement of a major piece of equipment. Does this mean a like kind replacement?](#)
- [Specifically, which analyzers are required to conduct the Manufacturer Stability Test \(MST\)?](#)

A vertical navigation menu on the left side of the page lists the following items: Recent Additions, Facts, Methods, Monitoring, Technical Support, Audit Programs, QA/QC, Related Web Sites, Instructional Material, Upcoming Events, Who is EMC?, EMC Contacts, Voluntary Superior Monitoring.



Federal Register

Monday,
May 15, 2006

Part II

Environmental Protection Agency

40 CFR Part 60
Update of Continuous Instrumental Test
Methods; Final Rule



Stratification Test Requirement

Clarifications

- Stratification Test Required at Each Site
- Only 1 Stratification Test/Group of Methods
- No Need to Test Stacks $< 4''$



Sample Collection

Clarifications

- Method 20 – Min. Test Run Time = 21 Min.
- Single-Point OK for Stacks < 4”



Dilution Sampling Systems

- No Initial Bias Test for Dilution Sampling Systems



General Equipment Specifications

- Performance Based - OK If Can Pass
Interference Check, CE, System Bias Tests
- Before Sample Conditioning –
Maintain Components Above Gas Dew Point
- Components Not Included in System Bias
Check Must Be SS, Teflon, or Glass



Calibration Gas Clarifications

❑ **Zero Air**

Part 72.2 Definition for Zero Air Materials

- SO_x/NO_x/VOC < 0.1 ppm
- CO < 1 ppm
- CO₂ < 400 ppm
- Part 72.2 Definition for Zero Air Material

❑ **Method 3A High Calibration Gas**

- May Use Precleaned or Scrubbed Air



Calibration Gas Clarifications

- ❑ Must Obtain Gas Quality Certificate from Gas Manufacturer
- ❑ Analyzers That Measure NO & NO₂ w/o Using Converter – Must Calibrate With Both NO & NO₂



Interference Test - Clarifications

- ❑ Table 7E-3 Lists *Example* Test Gases
- ❑ Must Address All Potential Interferences
- ❑ May Be Verified by the Manufacturer
- ❑ Test Gases - Manufacturer-Certified
- ❑ One Initial Test Per Analyzer Make & Model
- ❑ Repeat for Non-model Replacement Parts
- ❑ Current Analyzers Grandfathered

Table 7E-3. Example Interference Check Gas Concentrations

Potential Interferent Gas ¹	Concentrations ²	
	Hot Wet	Dried
CO ₂	5 and 15%	5 and 15%
H ₂ O	25%	1 %
NO	15 ppmv	15 ppmv
NO ₂	15 ppmv	15 ppmv
N ₂ O	10 ppmv	10 ppmv
CO	50 ppmv	50 ppmv
NH ₃	10 ppmv	10 ppmv
CH ₄	50 ppmv	50 ppmv
SO ₂	20 ppmv	20 ppmv
H ₂	50 ppmv	50 ppmv
HCl	10 ppmv	10 ppmv

- 1) Any applicable gas may be eliminated or tested at a reduced level if the manufacturer has provided reliable means for limiting or scrubbing that gas to a specified level.
- 2) As Practicable, gas concentrations should be the highest expected at test sites.



Calibration Drift

□ Section 3.9 of Method 7E

“Difference between measurement system readings for pre- & post-bias checks”

Should read:

“Difference between pre- and post-run system bias checks”



System Bias Check

- Particulate Media Included Only When Using Out-of-Stack Filters



Method 7E NO₂ Converter Check

May Be Performed Before or After a Test or
After a Series of Tests



Converter Efficiency Check

Direct Conversion of NO₂ Gas

Protocol Traceable Gas Unstable

- Use Manufacturer-Certified Gas
- Use Mid- to High-Concentration Range Gas
Instead of 40-60 ppm Gas
- Other, Lower Concentrations Also Allowed



Converter Efficiency Check

Method 20 Bag Procedure

- Procedure Amendment
 - Secondary Steps For Determining Conversion Efficiency Were Confusing - Dropped
 - Acceptance Criterion: 2% Drop from NO_x Peak
 - Requirement to Introduce Test Gas Upstream of Dilution Assembly For Sample Dilution Systems has been Dropped



Manufacturer Stability Test

- Use Procedures Similar to 40 CFR 53.23 (not 53.55 or 53.56 as listed in Final Rule)
- Stability Against Test Site Variations in
 - Temperature*
 - Line Voltage*
- For Routine Analyses Below 20 ppm
- Performed by Manufacturer or Tester
- One Time Test



Alternative Dynamic Spike Check

- Optional in place of:
 - Bias Test
 - Interference Check
- Best on Steady-State Process
- Approval Required for CAMD Tests

Converter Eff. Calculation Corrections

Old Method 20 Converter Check Calculation

- ❑ Final Rule Incorrect Equation

$$EffNO2 = \frac{NOx_{final} - NO_{final}}{NOx_{peak} - NOx_{final}} \times 100$$

- ❑ Correct Equation

$$\% \text{ Decrease} = \frac{NOx_{peak} - NOx_{final}}{NOx_{peak}} \times 100$$



Calculation Corrections/Revisions

System Calibration Error Calculation

Missing DF in Eq. 7E-3

$$SCE = \frac{(C_s - C_v) \times DF}{CS} \times 100 \quad \text{Eq. 7E-3}$$

Calculations Corrections/Revisions

Dynamic Spike Recovery Calculation

- Final Rule Incorrect Equation

$$R = \frac{C_{ss} - C_{avg}}{C_{calc}} \times 100 \quad Eq.7E - 12$$

- Correct Equation

$$R = \frac{DF(C_{ss} - C_{native}) + C_{native}}{C_{spike}} \times 100$$

Calculations Corrections/Revisions

Missing Sample Concentration Calculation

When Using a Zero Gas

- Final Rule Equation for Non-Zero Gas

$$C_{gas} = (C_{avg} - C_m) \frac{C_{ma} - C_{oa}}{C_m - C_o} + C_{ma} \quad Eq. 7E - 5a$$

- Added Equation For Zero Gas

$$C_{gas} = (C_{avg} - C_o) \frac{C_{ma}}{C_m - C_o} \quad Eq. 7E - 5b$$