

calibration error as the difference between the measured concentration and the manufacturer certified concentration. The difference should be less than 2 percent of the manufacturer certified concentration for the low-, mid-, and span gases.

8.2.4 NO<sub>2</sub> to NO Conversion Efficiency Test. You must conduct an NO<sub>2</sub> to NO conversion efficiency test on all analyzers whose measurement principal converts NO<sub>2</sub> to NO before analyzing for NO<sub>x</sub>. Introduce a known concentration of NO<sub>2</sub> to the analyzer in direct calibration mode and record the stable gas concentration displayed by the analyzer. (**Note:** Because the measurement data uncertainty calculation adjusts for converter efficiencies less than 100 percent and because the converter efficiency may change with concentration, we suggest the known concentration introduced be within a range of 50–150 percent of the average measured concentration.) Alternatively, the procedure for determining conversion efficiency using NO in 40 CFR 86.123–78 may be used. For those analyzers whose measurement principal detects NO<sub>2</sub> in the sample directly without a converter, this requirement is waived because the calibration gas requirements will assure adequate accounting for NO<sub>2</sub>.

8.2.5 Initial Sampling System Bias Check. Begin by introducing the span-level calibration gas (or mid-level gas if closer to the emissions concentration) in system calibration mode. Record the gas concentration displayed by the analyzer and the time it takes to reach a stable value on a form similar to Table 7E–2. A value is considered stable when the maximum difference between 3 consecutive recordings is not more than 0.5 percent of certified value and the mean is at least 97 percent of the certified value. Then introduce the zero gas in system calibration mode and similarly

record the gas concentration displayed by the analyzer and the time it takes the measurement system to decrease to a stable zero value from the higher value. Operate the measurement system at the normal sampling rate. Make only the adjustments necessary to achieve proper calibration gas flow rates at the analyzer. First, calculate the measurement system response time (see section 8.2.6) and then calculate the sampling system bias (see section 12.5). See sections 13.3 and 13.5 for acceptable performance criteria. If sampling system bias is excessive, take corrective action until an acceptable performance is achieved. You must repeat the analyzer calibration error test and sampling system bias check whenever a sampling system bias check is excessive. You must also repeat the sampling system bias check at the end of each run.

8.2.6 Measurement System Response Time. You must determine the measurement system response time during the initial sampling system bias check. Observe the times required to achieve 95 percent of a stable response for both the low- and high-level gases. The longer interval is the response time.

8.3 Interference Check. Conduct an interference response test of the gas analyzer prior to its initial use in the field. Recheck the analyzer if you make changes that could alter the interference response (e.g., a change in the gas detector). You can introduce the interference test gases (see Table 7E–3) into the measurement system separately or as mixtures. This test must be performed both with and without NO<sub>x</sub> (NO and NO<sub>2</sub>) which should be at a concentration of at least 80 percent of the analyzer range. Measure the total interference response of the system to these gases in ppmv. Record the responses and determine the interference using Table 7E–4. A copy of this data including the date

completed and signed certification must be included. This interference test is valid for 1 calendar year unless major analytical components are replaced. If major components are replaced, the annual primary interference gas recheck described in section 16.3 must be performed before returning the analyzer to service. You must conduct the primary interference gas recheck on an annual basis.

8.4 Sample Collection. Collect samples following section 8.1. Sample within 5 percent of the rate you used during the sampling system bias check.

8.5 Post-Run Sampling System Bias Check. *How do I confirm that each sample I collect is valid?* After each run, repeat the sampling system bias check to validate the run. Do not make adjustments (other than to attain the design sampling rate) to the measurement system between the run and completion of the sampling system bias check. If you do not pass this post-run sampling system bias test, then the run does not meet this method's quality assurance. To meet this method's quality assurance requirements, you must fix the problem, pass another analyzer calibration error test and sampling system bias test before repeating the run. Record the bias test results on a form similar to Table 7E–2.

8.6 Alternative Dynamic Spike Procedure. *If I want to use the dynamic spike procedure to validate my data, what procedure should I follow?* You may comply with the dynamic spiking procedure and requirements provided in section 16.2 during each test as an alternative to the analyzer calibration error test and the pre- and post-run sampling system bias checks.

## 9.0 Quality Control

*What is a summary of the quality control measures I must take?*

SUMMARY TABLE OF QA/QC

Status	Process or element	QA/QC specification	Acceptance criteria	Checking frequency	Suggested corrective action
S <sup>1</sup> .....	Identify Data User .....	.....	Regulatory Agency or other primary end user of data.	Before designing test.	
M <sup>2</sup> .....	Analyzer Design .....	Analyzer range .....	Sufficiently > than span-level gas to determine sampling system bias.	.....	Use different analyzer or reduce span value.
S .....	.....	Analyzer resolution or sensitivity.	< 2% of range .....	Manufacturer design .....	Use different analyzer.
S .....	.....	Analyzer response time	< 30 Seconds.		
M .....	.....	Interference gas check ..	< 2.5% of upper range limit See Table 7E–3.	Valid for 1 year.	
M .....	Calibration Gases .....	Traceability protocol (G1, G2).	Valid certificate uncertainty < 2%.	.....	Recertify; new standard.
M .....	.....	Span-level limit .....	Chosen so measurements are all ≤ span.	Each run .....	Use a different cylinder.
M .....	.....	Mid-level limit .....	20 to 70% of span-level gas.	Each run .....	Use a different cylinder.
M .....	.....	Low-level limit .....	< 20% of span-level gas	Each run .....	Use a different cylinder.
S .....	Data Recorder Design ...	Data resolution .....	< 1% of span .....	Manufacturer design .....	Replace recorder.
S .....	Sample Extraction .....	Probe material .....	SS or quartz if stack > 500° F.	Each run .....	Replace material.
M .....	Sample Extraction .....	Probe temperature .....	Heated > 140° C or 25° C greater than the dew point.	Each run .....	Adjust temperature.