

$$F_o = 0.209 \frac{F_d}{F_c} \quad \text{Eq. 7E-8}$$

12.7.2.2 Use Equation 7E-9 to calculate the equivalent CO₂ correction factor for correcting measurement data to 15 percent O₂.

$$X_{CO_2} = \frac{20.9 - 15}{F_o} \quad \text{Eq. 7E-9}$$

12.7.2.3 Correct the pollutant concentrations to 15 percent O₂ equivalent. Using Equations 7E-10, calculate the NO_x gas concentrations adjusted to 15 percent O₂. The correction to 15 percent O₂ is very sensitive to the accuracy of the O₂ or CO₂ concentration measurement. Therefore, oxygen or CO₂ analyzer stability and careful calibration are necessary.

$$C_{adj} = C_d \frac{X_{CO_2}}{\%CO_2} \quad \text{Eq. 7E-10}$$

12.7.3 Dilution Adjustment of Pollutant Concentration Using O₂ Concentration. Use Equation 7E-11 to calculate the concentration adjusted to 15 percent O₂.

$$C_{adj} = C_d \frac{20.9 - 15}{20.9 - \%O_2} \quad \text{Eq. 7E-11}$$

12.7.4 Average Adjusted NO_x Concentration. To calculate the average adjusted NO_x concentration, sum the adjusted values for each sample point and divide by the number of points (k) for each run using Equation 7E-12.

$$\bar{C}_{adj} = \sum_{i=1}^k \left[\frac{1}{k} \sum_{j=1}^k C_{adj} \right] \quad \text{Eq. 7E-12}$$

12.7.5 NO_x Emission Rate Calculations. Calculate the emission rates for NO_x in units of pollutant mass per quantity of heat input using the pollutant and diluent concentrations and fuel-specific F-factors based on the fuel combustion characteristics. You must convert the measured concentrations of pollutant from parts per million by volume (ppmv) to mass per unit volume. See Table 7E-2 for conversion factors.

TABLE 7E-2.—CONVERSION FACTORS FOR CONCENTRATION

From	To	Multiply by conversion factor (CV)
g/sm ³	ng/sm ³	10 ⁹
mg/sm ³	ng/sm ³	10 ⁶
lb/scf	ng/sm ³	1.602 × 10 ¹³
ppmv (NO _x)	ng/sm ³	1.912 × 10 ⁶
ppmv (NO _x)	lb/scf	1.194 × 10 ⁻⁷

12.7.5.1 Calculation of Emission Rate Using Oxygen Correction. The O₂ concentration and pollutant concentration must be on a dry basis. Use Equation 7E-13 to calculate the pollutant emission rate in units of mass NO_x per unit of heat input.

$$E = C_d F_d \frac{20.9}{20.9 - \%O_2} \quad \text{Eq. 7E-13}$$

12.7.5.2 Calculation of Emission Rate Using Carbon Dioxide Correction. The CO₂ concentration and the pollutant concentration may be on either a wet basis or a dry basis. Both concentrations must be on the same basis for the calculations. Use Equation 7E-14 or 7E-15 to calculate the pollutant emission rate in units of mass NO_x per unit of heat input.

$$E = C_d F_c \frac{100}{\%CO_2} \quad \text{Eq. 7E-14}$$

$$E = C_w F_c \frac{100}{\%CO_{2w}} \quad \text{Eq. 7E-15}$$

12.7.5.3 Calculation of mass emission rate using fuel usage rate and F-Factors. Use Equation 7E-16

$$E_{mass} = E(GCV)(Q_{fuel}) \quad \text{Eq. 7E-16}$$

13.0 Method Performance

13.1 Analytical Range. Your span-level calibration gas sets the upper limit of your instrument's calibration. Choose the span-level calibration gas that would result in the sampled gases being on-scale and averaging 20–100 percent of the span. If at any time during a run a measured 1-minute average gas concentration exceeds the span, you must at a minimum identify and report these minutes as deviations of the method. Depending on the data quality objectives of the sampling program, this event may require additional corrective action before proceeding with the test program. See section 13.1 for discussion.

13.2 Sensitivity. See discussion in section 13.1.

13.3 System Response and Minimum Sampling Times. The system response time determines the minimum sampling time at each sampling point. There is no minimum system response time specified, however the minimum sampling time per sample point is 2 times the system response time plus purge time. For example, if you use a sampling system with a 2 minute system response time, this means that in addition to purging the system for at least 4 minutes, you must record a minimum of 4 one-minute averages at each sample point.

13.4 Analyzer Calibration Error. The difference between the direct calibration response and the manufacturer certified concentration must be less than ±2 percent of the manufacturer certified concentration for the low-, mid- and span-level calibration gases and ±0.25 percent of analyzer upper range limit for the zero gas.

13.5 Sampling System Bias. The pre- and post-run sampling system bias must be within ±5 percent of the concentration equivalent of the emission standard (or ±5 percent of span if not subject to an emission standard) for the low- and span-level (or mid-level, as applicable) calibration gases. However, for test facilities with emission standards equivalent to 10.0 ppmv or less, if

the absolute value of the bias is less than or equal to 0.50 ppmv, then the requirements of the sampling system bias test are satisfied. This provision for low-standard facilities is valid only for tests completed within 3 years of the effective date of this amendment's promulgation.

13.6 Interference Check. The interference response must not be greater than 2.5 percent of the analyzer upper range limit.

13.7 NO₂ to NO Conversion Efficiency Test (as applicable). The conversion efficiency must be greater than 90 percent of the certified value of the test gas.

13.8 Alternative Dynamic Spike Check (ADSC). If your analyzer has been certified through the manufacturer's stability test, you may substitute a pre- and post-test ADSC for the interference check and pre- and post-run sampling system bias checks. Recoveries of both pre-test spikes must be within 100 ±5 percent. Recoveries of both the post-test ADSC spikes must be within 100 ±10 percent. If the absolute difference between the calculated spike value (CS) and measured spike value (Cm) is equal to or less than 0.20 ppmv, then the requirements of the ADSC are met. This provision for low-standard facilities is valid only for tests completed within 3 years of the effective date of this amendment's promulgation.

14.0 Pollution Prevention [Reserved]

15.0 Waste Management [Reserved]

16.0 Alternative Procedures

16.1 Dynamic Spiking Procedure. You may choose to validate your test data with this alternative dynamic spiking procedure. You must meet the following requirements to use this option.

16.1.1 You must certify that you followed a written procedure and have demonstrated ability, within the last calendar year, to operate the spiking system following that written procedure in either a simulated or actual application. Demonstrated ability means that you have operated the spiking system at a target concentration equal to or less than the target concentration for this test and obtained a data set of 30 1-minute averages with a mass recovery of 100 ±5 percent of the mass of NO_x spiked with a relative standard deviation of those 30 1-minute averages equal or less than 5 percent.

16.1.2 Spiking procedure requirements. You must follow the written procedure that you have demonstrated your ability to perform. The volume of the spike gas added must be less than 10 percent of the total volume. The dynamic spiking procedure must be done before the first run and repeated after the last run of the test program. However, the pre-test requirement is waived if you provide a valid certification that the analyzer has been shown to meet the manufacturer's stability test in section 16.2 below. Both the pre- and post-test must consist of 2 target levels. One level must add between 1 and 2 time the native mass and the other level must add between 5 and 1 times the native stack NO_x mass in the sample stream. The spikes must be prepared from a gas certified by the traceability protocol (G1 or G2) to contain NO_x of known concentration with an uncertainty equal to or