$$\%\ CO_2\ \text{quench} = 100 \times \left(1 - \frac{(c \times a)}{(d \times a) - (d \times b)}\right) \times (a/b)$$

Where:

a = Undiluted CO_2 concentration (percent)
b = Diluted CO_2 concentration (percent)
c = Diluted NO concentration (ppm)
d = Undiluted NO concentration (ppm)

(2) *NO_X analyzer water quench check.* (i) This check applies to wet measurements only. An NO span gas having a concentration of 80 percent to 100 percent of full scale of a normal operating range is passed through the CLD (or HCLD) and the response recorded as ''D''. The NO span gas is then bubbled through water at room temperature and passed through the CLD (or HCLD) and the analyzer's response recorded as AR. Determine and record the analyzer's absolute operating pressure and the bubbler water temperature. (It is important that the NO span gas contains minimal NO_2 concentration for this check. No allowance for absorption of NO_2 in water has been made in the following quench calculations.)

(ii) Calculations for water quench must consider dilution of the NO span gas with water vapor and scaling of the water vapor concentration of the mixture to that expected during testing. Determine the mixture's saturated vapor pressure (designated as Pwb) that corresponds to the bubbler water temperature. Calculate the water concentration (''Z1'', percent) in the mixture by the following equation:

$$Z1 = 100 \times \frac{Pwb}{GP}$$

where GP is the analyzer's standard operating pressure (pascals).

(iii) Calculate the expected dilute NO span gas and water vapor mixture concentration (designated as D1) by the following equation:

$$D1 = D \times \left(1 - \frac{Z1}{100}\right)$$

§ 90.326 Pre- and post-test analyzer calibration.

Calibrate only the range of each analyzer used during the engine exhaust emission test prior to and after each test in accordance with the following:

(a) Make the calibration by using a zero gas and a span gas. The span gas value must be between 75 and 100 percent of the highest range used.

(b) Use the same analyzer(s) flow rate and pressure as that used during exhaust emission test sampling.

(c) Warm-up and stabilize the analyzer(s) before the calibration is made.

(d) If necessary clean and/or replace filter elements before calibration is made.

(e) Calibrate analyzer(s) as follows:

(1) Zero the analyzer using the appropriate zero gas. Adjust analyzer zero if necessary. Zero reading should be stable.

(2) Span the analyzer using the appropriate span gas for the range being calibrated. Adjust the analyzer to the calibration set point if necessary.

(3) Re-check zero and span set points.

(4) If the response of the zero gas or span gas differs more than one percent of full scale at the highest range used, then repeat paragraphs (e)(1) through (3) of this section.

[60 FR 34598, July 3, 1995, as amended at 70 FR 40449, July 13, 2005]

§ 90.327 Sampling system requirements.

(a) *Sample component surface temperature.* For sampling systems which use heated components, use engineering judgment to locate the coolest portion of each component (pump, sample line section, filters, and so forth) in the heated portion of the sampling system that has a separate source of power or heating element. Monitor the temperature at that location. If several components are within an oven, then only the surface temperature of the component with the largest thermal mass and the oven temperature need be measured.