EMISSION MEASUREMENT CENTER
APPROVED ALTERNATIVE METHOD (ALT-007)

40 CFR PART 60
APPENDIX A, TEST METHODS 6C, 7E, 3A, 20, AND 10
USE OF DILUTION PROBES WITH INSTRUMENTAL METHODS

INTRODUCTION

The Environmental Protection Agency (EPA) Methods 6C, 7E, 3A, 20, and 10 provide specifications for testing pollutants in stationary source exhausts with instrumental measurement systems. The methods call for the determination of a pollutant concentration on a dry basis. However, increased monitoring of exhaust gas emission standards on a pounds per hour (lbs/hr) basis, has resulted in the use of instrumental reference methods which evaluate concentrations on a wet basis. The dilution probe system has proven its reliability for use in the above EPA methods.

The dilution probe system is usually comprised of an ambient concentration analyzer and the dilution probe. Since this system dilutes high moisture stack gas, heating the sample is generally not necessary. Another advantage to non-dilution systems is that lower sample volumes are required. In comparison, non-dilution systems employ sample conditioning systems which physically remove moisture and are usually designed to obtain a dry concentration value.

GUIDELINE

Instrumental system dilution ratios range from 12:1 to 350:1; therefore, certain clarifications are necessary for the use of the dilution probe system:

Span: Method 6C defines span as "the upper limit of the gas concentration measurement range displayed on the data recorder." The dilution monitoring system should report concentrations that have been corrected for the dilution ratio. Therefore, the data recorder should be capable of displaying the ambient analyzer response, the amount of dilution, and combine the two for the higher range concentrations corrected for dilution. The actual span of the analyzer should be set such that this "regulatory" span or upper recorder limit is achieved. For example, if a "regulatory" span was set at 300 ppm and the dilution ratio was 10:1 then the actual span for the analyzer would be set at 30 ppm and the signal amplified or multiplied by 10 before being displayed.

Calibration Gases: The required zero, mid and high-level calibration gas values are also based on the specified span values. The dilution ratio, after the system has been set up using an appropriate Protocol 1 gas (Method 6C, Section 6.3.1), shall be recorded.

Calibration: The introduction of the three calibration gases must be prior to the glass orifice or at the probe tip. The bias check of Section 6.4.2 is still ±5 percent based on the established span value.

Wet Basis Calculations: Concentrations are reported on a wet basis. Therefore, a separate water determination may be necessary to correct to dry gas concentrations. If the dilution monitoring system is used to test a continuous emission monitoring system the data from both systems must be on a comparative basis (i.e., all data on a wet basis).

In conclusion, dilution probes are acceptable and must be included as part of the measurement system when conducting the applicable performance specification test.