UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

MAR 2 4 2010

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. Daniel Price
Sr. Environmental Engineer
Georgia-Pacific Cedar Springs LLC
12551 Highway 273 West
Cedar Springs, GA 39832

Dear Mr. Price:

We reviewed your March 17, 2010, request to use an alternative to Method 16A (40 CFR 60, Appendix A) to determine the compliance of applicable units in your facility with 40 CFR Part 60 Subpart BB – Standards of Performance for Kraft Pulp Mills. Under Subpart BB, applicable facilities are required to use Method 16, 16A, or 16B to measure total reduced sulfur in performance tests and relative accuracy tests for continuous emission monitoring systems. Your alternative procedure is a modification of Method 16A wherein the titration analysis is replaced with a sulfur dioxide analyzer.

We concur that there are technical merits to this approach and are currently preparing to propose a new method, designated as Method 16C, based on this principal. Enclosed is a copy of draft Method 16C. Your proposed procedure meets the requirements of this new method and we, therefore, approve your request. You may use your proposed procedure or other variations that meet the requirements of draft Method 16C at any facility subject to 40 CFR Part 60 Subparts BB (kraft pulp mills) or J (petroleum refineries). We will post this approval on our web site at www.epa.gov/ttn/emc/approalt.html for use by other interested parties.

If you have questions or would like to discuss the matter further, please call Foston Curtis at (919) 541-1063, or you may e-mail him at curtis.foston@epa.gov.

Sincerely,

Conniesue B. Oldham, Ph.D., Group Leader
Measurements Technology Group

Enclosure

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METHOD 16C—DETERMINATION OF TOTAL REDUCED SULFUR EMISSIONS FROM STATIONARY

What is Method 16C?

Method 16C is a procedure for measuring total reduced sulfur (TRS) in stationary source emissions using a continuous instrumental analyzer. Quality assurance and quality control requirements are included to assure that you, the tester, collect data of known quality. You must document your adherence to these specific requirements for equipment, supplies, sample collection and analysis, calculations, and data analysis.

This method does not completely describe all equipment, supplies, and sampling and analytical procedures you will need but refers to other methods for some of the details. Therefore, to obtain reliable results, you should also have a thorough knowledge of these additional test methods which are found in appendix A to this part:

(a)   Method 6C—Determination of Sulfur Dioxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)

(b)   Method 7E—Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)

(c)   Method 16A—Determination of Total Reduced Sulfur Emissions from Stationary Sources (Impinger Technique)

1.0 Scope and Application

1.1 Analytes. What does Method 16C determine?

Analyte	CAS No.
Total reduced sulfur including:	N/A
Dimethyl disulfide (DMDS), $[(CH_3)_2S_2]$	62–49–20
Dimethyl sulfide (DMS), $[(CH_3)_2S]$	75–18–3
Hydrogen sulfide (H_2S)	7783–06–4
Methyl mercaptan (MeSH), $[CH_4S]$	74–93–1
Reported as: Sulfur dioxide (SO_2)	7449–09–5

1.2 Applicability. This method is applicable for determining TRS emissions from recovery furnaces (boilers), lime kilns, and smelt dissolving tanks at kraft pulp mills, and from other sources when specified in an applicable subpart of the regulations.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

2.0 Summary of Method

2.1 An integrated gas sample is extracted from the stack. The SO_2 is removed selectively from the sample using a citrate buffer solution. The TRS compounds are then thermally oxidized to SO_2 and determined as SO_2 by an instrumental analyzer. This method is a combination of the sampling procedures of Method 16A and the analytical procedures of Method 6C (referenced in Method 7E), with minor modifications to facilitate their use together.

3.0 Definitions [Reserved]

The following definitions are used in this method and are the same as those listed in Methods 16A and 6C.

3.1 *Analyzer Calibration Error* means the difference between the manufacturer certified concentration of a calibration gas and the measured concentration of the same gas when it is introduced into the analyzer in direct calibration mode.

3.2 *Calibration Curve* means the relationship between an analyzer's response to the injection of a series of calibration gases and the actual concentrations of those gases.

3.3 *Calibration Gas* means the gas mixture containing SO_2 at a known concentration and produced and certified in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards," September 1997, as amended August 25, 1999, EPA-600/R-97/121 or more recent updates. The tests for analyzer calibration error and drift require the use of calibration gas prepared according to this protocol. If a zero gas is used for the low-level gas, it must meet the requirements under the definition for "zero air material" in 40 CFR 72.2 in place of being prepared by the traceability protocol.

3.3.1 *Low-Level Gas* means a calibration gas with a concentration that is less than 20 percent of the calibration span and may be a zero gas.

3.3.2 *Mid-Level Gas* means a calibration gas with a concentration that is 40 to 60 percent of the calibration span.

3.3.3 *High-Level Gas* means a calibration gas with a concentration that is equal to the calibration span.

3.4 *Calibration Drift* means the difference between the calibration drift test measurement and the initial calibration error value for the test gas.

3.5 *Calibration Span* means the upper limit of the analyzer's calibration that is set by the choice of high-level calibration gas. No valid run average concentration may exceed the calibration span. To the extent practicable, the measured emissions should be between 20 to 100 percent of the selected calibration span. This may not be practicable in some cases of low-concentration measurements or testing for compliance with an emission limit when emissions are substantially less than the limit. In such cases, calibration spans that are practicable to achieving the data quality objectives without being excessively high should be chosen.

3.6 *Data Recorder* means the equipment that permanently records the concentrations reported by the analyzer.

3.7 *Direct Calibration Mode* means introducing the calibration gases directly into the analyzer (or into the assembled measurement system at a point downstream of all sample conditioning equipment) according to manufacturer's recommended calibration procedure.

3.8 *Gas Analyzer* means the equipment that senses the gas being measured and generates an output proportional to its concentration.

3.9 *Interference Check* means the test to detect analyzer responses to compounds other than the compound of interest, usually a gas present in the measured gas stream,

that is not adequately accounted for in the calibration procedure and may cause measurement bias.

3.10 *Measurement System* means all of the equipment used to determine the TRS concentration.

3.11 *Response Time* means the time it takes the measurement system to respond to a change in gas concentration occurring at the sampling point when the system is operating normally at its target sample flow rate or dilution ratio.

3.12 *Run* means a series of gas samples taken successively from the stack or duct. A test normally consists of a specific number of runs.

3.13 *System Calibration Mode* means introducing the calibration gases into the measurement system at the probe, upstream of the filter and all sample conditioning components.

3.14 *System Performance Check* means a recovery check of calibration gas through the system in system calibration mode to determine system losses or biases. The check determines the difference between a calibration gas measured in system calibration mode and the actual certified concentration of the gas.

3.15 *Test* refers to the series of runs required by the applicable regulation.

4.0 *Interferences*

4.1 Reduced sulfur compounds other than those regulated by the emission standards, if present, may be measured by this method. Compounds like carbonyl sulfide, which is partially oxidized to SO_2 and may be present in a lime kiln exit stack,

would be a positive interferent. Interferences may vary among instruments and instrument-specific interferences must be evaluated through the interference test.

4.2 Particulate matter from the lime kiln stack gas (primarily calcium carbonate) can cause a negative bias if it is allowed to enter the citrate scrubber; the particulate matter will cause the pH to rise and H_2S to be absorbed before oxidation. Proper use of the particulate filter, described in Section 6.1.3 of Method 16A, will eliminate this interference.

5.0 Safety

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 Hydrogen Sulfide. Hydrogen sulfide is a flammable, poisonous gas with the odor of rotten eggs. H_2S is extremely hazardous and can cause collapse, coma, and death within a few seconds of one or two inhalations at sufficient concentrations. Low concentrations irritate the mucous membranes and may cause nausea, dizziness, and headache after exposure.

6.0 Equipment and Supplies

What do I need for the measurement system? . The measurement system is similar to those applicable components in Methods 16A and 6C. An example measurement system is shown in Figure 16C–1 and component parts are discussed below. Modifications to the apparatus are accepted provided the performance criteria in Section 13.0 are met.

6.1 Probe. Teflon tubing, 6.4-mm (1/4-in.) diameter, sequentially wrapped with heat-resistant fiber strips, a rubberized heat tape (plug at one end), and heat-resistant adhesive tape. A flexible thermocouple or other suitable temperature measuring device should be placed between the Teflon tubing and the fiber strips so that the temperature can be monitored to prevent softening of the probe. The probe should be sheathed in stainless steel to provide in-stack rigidity. A series of bored-out stainless steel fittings placed at the front of the sheath will prevent moisture and particulate from entering between the probe and sheath. A 6.4-mm (1/4-in.) Teflon elbow (bored out) should be attached to the inlet of the probe, and a 2.54 cm (1 in.) piece of Teflon tubing should be attached at the open end of the elbow to permit the opening of the probe to be turned away from the particulate stream; this will reduce the amount of particulate drawn into the sampling train. The probe is depicted in Figure 16A–2 of Method 16A.

6.2 Probe Brush. Nylon bristle brush with handle inserted into a 3.2-mm (1/8-in.) Teflon tubing. The Teflon tubing should be long enough to pass the brush through the length of the probe.

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6.3 Particulate Filter. 50-mm Teflon filter holder and a 1- to 2-μm porosity, Teflon filter (available through Savillex Corporation, 5325 Highway 101, Minnetonka, Minnesota 55343). The filter holder must be maintained in a hot box at a temperature sufficient to prevent moisture condensation. A temperature of 121 °C (250 °F) was found to be sufficient when testing a lime kiln under sub-freezing ambient conditions.

6.4 SO_2 Scrubber. Three 300-ml Teflon segmented impingers connected in series with flexible, thick-walled, Teflon tubing. (Impinger parts and tubing available through Savillex.) The first two impingers contain 100 ml of citrate buffer and the third impinger is initially dry. The tip of the tube inserted into the solution should be constricted to less than 3 mm (1/8-in.) ID and should be immersed to a depth of at least 5 cm (2 in.).

6.5 Combustion Tube. Quartz glass tubing with an expanded combustion chamber 2.54 cm (1 in.) in diameter and at least 30.5 cm (12 in.) long. The tube ends should have an outside diameter of 0.6 cm (1/4in.) and be at least 15.3 cm (6 in.) long. This length is necessary to maintain the quartz-glass connector near ambient temperature and thereby avoid leaks.

6.6 Furnace. A furnace of sufficient size to enclose the combustion chamber of the combustion tube with a temperature regulator capable of maintaining the temperature at 800 ±100 °C (1472 ±180 °F). The furnace operating temperature should be checked with a thermocouple to ensure accuracy.

6.7 Sampling Pump. A leak-free pump is needed to pull the sample gas through the system at a flow rate sufficient to minimize the response time of the measurement system and constructed of material that is non-reactive to the gas it contacts. For dilution-type measurement systems, an eductor pump may be used to create a vacuum that draws the sample through a critical orifice at a constant rate.

6.6 Calibration Gas Manifold. The calibration gas manifold should allow the introduction of calibration gases either directly to the gas analyzer in direct calibration mode or into the measurement system, at the probe, in system calibration mode, or both, depending upon the type of system used. In system calibration mode, the system should be able to flood the sampling probe and vent excess gas. Alternatively, calibration gases may be introduced at the calibration valve following the probe. Maintain a constant pressure in the gas manifold. For in-stack dilution-type systems, a gas dilution subsystem is required to transport large volumes of purified air to the sample probe and a probe controller is needed to maintain the proper dilution ratio.

6.7 Sample Gas Manifold. The sample gas manifold diverts a portion of the sample to the analyzer, delivering the remainder to the by-pass discharge vent. The manifold should also be able to introduce calibration gases directly to the analyzer. The manifold must be made of material that is non-reactive to SO_2 and be configured to safely discharge the bypass gas.

6.8 SO_2 Analyzer. You may use an instrument that uses an ultraviolet, non-dispersive infrared, fluorescence, or other detection principle to continuously measure SO_2 in the gas stream provided it meets the performance specifications in Section 13.0.

6.9 Data Recording. A strip chart recorder, computerized data acquisition system, digital recorder, or data logger for recording measurement data may be used.

7.0 Reagents and Standards

Note: Unless otherwise indicated, all reagents must conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society. When such specifications are not available, the best available grade must be used.

7.1 Water. Deionized distilled to conform to ASTM Specification D 1193-77 or 91 Type 3 (incorporated by reference – see § 60.17). The $KMnO_4$ test for oxidizable organic matter may be omitted when high concentrations of organic matter are not expected to be present.

7.2 Citrate Buffer. Dissolve 300 g of potassium citrate (or 284 g of sodium citrate) and 41 g of anhydrous citric acid in 1 liter of water (200 ml is needed per test). Adjust the pH to between 5.4 and 5.6 with potassium citrate or citric acid, as required.

7.3 Calibration Gas. Refer to Section 7.1 of Method 7E (as applicable) for the calibration gas requirements. Example calibration gas mixtures are listed below.

(a) SO_2 in nitrogen (N_2).

(b) SO_2 in air.

(c) SO_2 and CO_2 in N_2.

(d) SO_2 and O_2 in N_2.

(e) $SO_2/CO_2/O_2$ gas mixture in N_2.

(f) CO_2/NO_x gas mixture in N_2

(g) $CO_2/SO_2/NO_x$ gas mixture in N_2

For fluorescence-based analyzers, the O_2 and CO_2 concentrations of the calibration gases as introduced to the analyzer shall be within 1 percent (absolute) O_2 and 1 percent (absolute) CO_2 of the O_2 and CO_2 concentrations of the effluent samples as introduced to the analyzer. Alternatively, for fluorescence-based analyzers, use calibration blends of SO_2 in air and the nomographs provided by the vendor to determine the quenching correction factor (the effluent O_2 and CO_2 concentrations must be known). This requirement does not apply to ambient-level fluorescence analyers that are used in conjunction with sample dilution systems.

7.4 System Performance Check Gas. Hydrogen sulfide (100 ppmv or less) in nitrogen, stored in aluminum cylinders with concentration certified by the manufacturer.

Note: Alternatively, hydrogen sulfide recovery gas generated from a permeation device gravimetrically calibrated and certified at some convenient operating temperature may be used. The permeation rate of the device must be such that at the appropriate dilution gas flow rate, an H_2S concentration can be generated in the range of the stack gas or within 20 percent of the emission standard.

7.5 Interference Check. Examples of test gases for the interference check are listed in Table 7E-3 of Method 7E. .

8.0 Sample Collection, Preservation, Storage, and Transport

8.1 Pre-sampling Tests. **What initial pre-sampling tests must be conducted before I begin collecting samples?** Before measuring emissions, perform the following procedures:

(a) Calibration gas verification,

(b) Calibration error test,

(c) System performance check,

(d) Verification that the interference test has been satisfied.

8.1.1 Calibration Gas Verification. Obtain a certificate from the gas manufacturer documenting the quality of the gas. Confirm that the manufacturer certification is complete and current. Ensure that your calibration gases certifications have not expired. This documentation should be available on-site for inspection. To the extent practicable, select a high-level gas concentration that will result in the measured emissions being between 20 and 100 percent of the calibration span.

8.1.2 Analyzer Calibration Error Test. After you have assembled, prepared, and calibrated your sampling system and analyzer, you must conduct a 3-point analyzer calibration error test before the first run and again after any failed system performance check or failed drift test to ensure the calibration is acceptable. Introduce the low-, mid-, and high-level calibration gases sequentially to the analyzer in direct calibration mode. For each calibration gas, calculate the analyzer calibration error using Equation 16C-1 in Section 12.2 . The calibration error for the low-, mid-, and high-level gases must not exceed 5 percent or 0.5 ppmv. If the calibration error specification is not met, take corrective action and repeat the test until an acceptable 3-point calibration is achieved.

8.1.4 System Performance Check. Same as in Method 16A, Section 8.5, except test samples need not be 30 minutes in duration, and the prior TRS sample concentration(s) is corrected for the system performance. Average the two system performance samples. System performance checks are conducted before sampling begins (optional) and after each sample run or series of runs (mandatory).

8.1.5 Interference Check. Same as in Method 7E, Section 8.2.7.

8.2 Measurement System Preparation.

8.2.1 For the SO_2 scrubber, measure 100 ml of citrate buffer into the first and second impingers; leave the third impinger empty. Immerse the impingers in an ice bath, and locate them as close as possible to the filter heat box. The connecting tubing should be free of loops. Maintain the probe and filter temperatures sufficiently high to prevent moisture condensation, and monitor with a suitable temperature sensor. Prepare the oxidation furnace and maintain at $800 \pm 100\ °C$ ($1472 \pm 180\ °F$).

8.2.2 Citrate Scrubber Conditioning Procedure. Condition the citrate buffer scrubbing solution by pulling stack gas through the Teflon impingers and bypassing all other sampling train components. A purge rate of 2 liters/min for 10 minutes has been found to be sufficient to obtain equilibrium. After the citrate scrubber has been conditioned, assemble the sampling train, and conduct (optional) a leak-check as described in Method 6, Section 8.2.

8.3 Pretest Procedures. After the complete measurement system has been set up at the site and deemed to be operational, the following procedures should be completed

before sampling is initiated. These procedures are not required, but would be helpful in preventing any problem which might occur later to invalidate the entire test.

8.3.1 Leak-Check. Appropriate leak-check procedures should be employed to verify the integrity of all components, sample lines, and connections. The following procedure is suggested: For components upstream of the sample pump, attach the probe end of the sample line to a manometer or vacuum gauge, start the pump and pull a vacuum greater than 50 mm (2 in.) Hg, close off the pump outlet, and then stop the pump and ascertain that there is no leak for 1 minute. For components after the pump, apply a slight positive pressure and check for leaks by applying a liquid (detergent in water, for example) at each joint. Bubbling indicates the presence of a leak. As an alternative to the initial leak-test, the system performance check in Section 8.3.2 may be performed to verify the integrity of components.

8.3.2 Initial System Performance Check. A system performance check using the test gas (Section 7.4) is recommended but not required prior to testing to validate the sampling train components and procedure.

8.4 Sample Collection and Analysis

8.4.1 After performing the required pretest procedures described in Section 8.1, insert the sampling probe into the test port ensuring that no dilution air enters the stack through the port. Condition the sampling system and citrate buffer solution for a minimum of 15 minutes before beginning analysis. (This preconditioning may not be

necessary if the initial system performance check is performed.) Begin the sampling and analysis. Determine the concentration of SO_2 for the prescribed sample or run time.

Method 16 defines a test run as sampling over a period of not less than 3 hours or more than 6 hours when testing kraft pulp mills. For Method 16C to be consistent with Method 16, a run may be obtained by: (1) sampling for three 60-minute intervals or (2) sampling for a 3-hour interval. (Three runs constitute a test.)

8.5 Post-Run Evaluations

8.5.1 .System Performance Check. Perform a post-run system performance check (Section 8.5 of Method 16A) before replacing the citrate buffer solution and particulate filter probe and before the probe is cleaned. The check results must not exceed the 100 ± 20 percent limit set forth in Section 13.3. If this limit is exceeded, the intervening run or runs are considered invalid.

8.5.2 Calibration Drift. After a run or series of runs, not to exceed a 24-hour period after initial calibration, perform a calibration drift test using a calibration gas (preferably the level that best approximates the sample concentration). The calibration drift is determined from the mean of three analyses of the gas. This drift must not differ from the manufacturer certified concentration of the gas by more than 8 percent or 0.5 ppm. If the drift exceeds this limit, the intervening run or runs are considered invalid. Alternatively, the calibration data set which gives the highest sample values may be chosen by the tester.

9.0 Quality Control

Section	Quality control measure	Effect
8.1	Sampling equipment leak-check and calibration	Ensures accurate measurement of stack gas flow rate, sample volume
8.1.2	Analyzer calibration error	Establishes initial calibration accuracy within 2%
8.3.2, 8.5.1	System performance check	Ensures accuracy of sampling/analytical procedure within 5% (initally) and 20% (after runs)
8.5.2	Calibration drift test	Ensures a stable calibration within 8%
10.0	Interference check	Checks for analytical interferences.

10.0 Calibration

10.1 Calibrate the system using the gases described in Section 7.3. The initial 3-point calibration error test as described in Section 8.1.2 is required and must meet the specifications in Section 13 before you start the test. We recommend you conduct an initial system performance test described in Section 8.1.4 as well before the test to validate the sampling components and procedures before sampling. After the test commences, a system performance check is required after each run or series of runs.

You must include a copy of the manufacturer's certification of the calibration gases used in the testing as part of the test report. This certification must include the 13 documentation requirements in the EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards, September 1997, as amended August 25, 1999.

11.0 Analytical Procedure

Because sample collection and analysis are performed together (see Section 8.0),
additional discussion of the analytical procedure is not necessary.

12.0 Calculations and Data Analysis

12.1 Nomenclature.

ACE = Analyzer calibration error, percent of calibration span.

B_{WO} = Fraction of volume of water vapor in the gas stream.

CD = Calibration drift, percent.

C_{Dir} = Measured concentration of a calibration gas (low, mid, or high) when
introduced in direct calibration mode, ppmv.

C_{H2S} = Concentration of the system performance check gas, ppmv H_2S.

C_S = Measured concentration of the system performance gas when introduced in
system calibration mode, ppmv H_2S.

C_V = Manufacturer certified concentration of a calibration gas (low, mid, or
high), ppmv SO_2.

C_{SO2} = Sample SO_2 concentration, ppmv.

C_{TRS} = Total reduced sulfur concentration corrected for system performance and
adjusted to dry conditions, ppmv.

SP = System performance, percent of calibration span.

12.2 Analyzer Calibration Error. Use Equation 16C-1 to calculate the analyzer calibration error for the low-, mid-, and high-level calibration gases.

$$ACE = \frac{C_{Dir} - C_v}{C_v} \ x \ 100 \qquad\qquad Eq. \ 16C\text{-}1$$

12.3 System Performance. Average the two system performance check sampes, and use Equation 16C-2 to calculate the system performance.

$$SP = \frac{C_S - C_{H2S}}{C_{H2S}} \ x \ 100 \qquad\qquad Eq. \ 16C\text{-}2$$

12.5 Calibration Drift. Use Equation 16C-3 to calculate the single level calibration drift after a run or series of runs within a 24-hr period of calibration. Compare the average of triplicate analyses of the appropriate calibration gas with the results obtained for the same gas during the initial analyzer calibration error test.

$$CD = \left| ACE_i - ACE_{final} \right|$$

12.6 TRS Concentration as SO_2. For each sample or test run, calculate the arithmetic average of SO_2 concentration values (e.g., 1-minute averages). Then calculate the sample TRS concentration using Equation 16C-4.

$$C_{TRS} = \frac{\overline{C_{SO2}}}{1 - |SP| - B_{WO}} \qquad\qquad Eq. \ 16C\text{-}4$$

13.0 Method Performance

13.1 Analyzer Calibration Error. At each calibration gas level (low, mid, and high) the calibration error must either not exceed 5.0 percent of the calibration gas concentration or $|C_s - C_v|$ must be $\leq$ 0.5 ppmv.

13.2 System Performance. The post-run system performance check result must be within 20 percent of the system performance gas concentration. Alternatively, the results are acceptable if $|C_s - C_{dir}|$ is $\leq$ 0.5 ppmv .

13.3 Calibration Drift. The calibration drift determined from the mean of three injections of a calibration gas at the end of any run or series of runs within a 24-hour period must not differ by more than 8 percent from the original ACE at that level or $|ACEi - ACE_{final}|$ must not exceed 0.5 ppmv.

13.4 Interference Check. The total interference response (i.e., the sum of the interference responses of all tested gaseous components) must not be greater than 2.50 percent of the calibration span for the analyzer tested. In summing the interferences, use the larger of the absolute values obtained for the interferent tested with and without the pollutant present. The results are also acceptable if the sum of the responses does not exceed 0.5 ppmv for a calibration span of 5 to 10 ppmv, or 0.2 ppmv for a calibration span < 5 ppmv.

14.0 Pollution Prevention [Reserved]

15.0 Waste Management [Reserved]

16.0 References

1. The references are the same as in Section 16.0 of Method 16, Section 17.0 of Method 16A, and Section 17.0 of Method 6C.

2. National Council of the Paper Industry for Air and Stream Improvement, Inc, A Study of TRS Measurement Methods. Technical Bulletin No. 434. New York, NY. May 1984. 12p.

3. Margeson, J.H., J.E. Knoll, and M.R. Midgett. A Manual Method for TRS Determination. Draft available from the authors. Source Branch, Quality Assurance Division, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

17.0 Tables, Diagrams, Flowcharts, and Validation Data