PROPOSED RULE 218.3 **CONTINUOUS EMISSION MONITORING SYSTEM: PERFORMANCE SPECIFICATIONS**

(a) Purpose

The purpose of Rule 218.3 is to establish performance specifications on certification and quality assurance and quality control program for Continuous Emission Monitoring Systems (CEMS), Alternative Continuous Emission Monitoring System (ACEMS), and Semi-Continuous Emission Monitoring System (SCEMS). Unless otherwise specified, the owner or operator of the CEMS, ACEMS, or SCEMS is responsible for compliance with the requirements specified in this rule.

(b) Applicability

(1) This rule shall apply to an owner or operator of a CEMS, ACEMS, or SCEMS that is required by a South Coast AQMD rule, regulation or permit condition, except for a system that is to monitor:

(A) Performance of the basic or control equipment and not to determine compliance with any rule emission limit or emission standard; or

(B) NOx or SOx emissions subject to the Regulation XX - Regional Clean Air Incentives Market (RECLAIM).

(2) All requirements specified for CEMS in this rule shall be applicable for ACEMS and SCEMS, unless otherwise specified.

(c) Definitions

(1) ALTERNATIVE CONTINUOUS EMISSION MONITORING SYSTEM (ACEMS) means a system that use process or control device operating parameter measurements and a conversion equation, a graph, or computer program to produce results in units of the applicable emission limitation or standard on a continuous monitoring basis, which is demonstrated to the Executive Officer as having the same precision, reliability, accessibility, and timeliness as the data provided by a certified CEMS or certified CEMS component in accordance with Rule 218.2 and Rule 218.3.

(2) ANALYZER means the part of the continuous emission monitoring system (CEMS) that analyzes the appropriate gaseous constituents of the

conditioned gaseous sample or measures stack gas volumetric flow and fuel flow rates, as applicable.

(A) Pollutant Analyzer - the part of the CEMS that detects the air pollutant concentrations and represents those concentrations in a signal output.

(B) Diluent Analyzer - the part of the CEMS that detects oxygen (O2), carbon dioxide (CO2) or other diluent gas concentrations and represents those concentrations in a signal output.

(C) Fuel Flowmeter - the part of the CEMS that detects the parameters of all essential measurement sub-systems (e.g., temperature, pressure, differential pressure, frequency, gas density, gas composition, heating value) and generates signal outputs which are a function of the fuel flow rate and all essential measurement sub-system parameters.

(D) Stack Flowmeter - the part of the CEMS that detects the parameters from all essential measurement sub-systems (e.g., temperature, static and atmospheric pressure, gas density, gas composition, molecular weight, gas moisture content) and generates signal outputs which are a function of the stack gas volumetric flow rate and all essential measurement sub-system parameters.

(3) CALIBRATION means a procedure performed to ensure that the CEMS accurately measures and records the concentration of the specific air pollutant or diluent gas, flow rate and other parameters necessary to generate the required data, as evidenced by calibration error tests and achieved by periodic manual or automatic adjustment.

(4) CALIBRATION DRIFT - change in the CEMS output or response over a specific period of normal continuous operation when the air pollutant or diluent gas concentration at the time of the measurements is the same known value.

(5) CALIBRATION ERROR means the ratio of the absolute value of the difference between the air pollutant or diluent gas concentration indicated by the CEMS and the known concentration of the calibration gas, to the upper span value, expressed as a percentage.

(6) CALIBRATION ERROR TEST means a procedure performed to determine CEMS response to a given gaseous compound concentration by

means of injecting a certified calibration gas mixture into the CEMS as close to the probe tip as practical.

(7) CEMS MODIFICATION means a modification to a CEMS component that is identified on the CEMS final certification letter, or a modification to the CEMS sampling interface, analyzer, or data acquisition and handling system that is deemed by the Executive Officer to have a potential for adversely affecting the ability of the CEMS to provide accurate, precise and timely data representative of emissions for the unit being monitored.

(8) CERTIFIED CEMS means a CEMS installed, tested, operated, maintained, and calibrated according to the applicable requirements of Rules 218.2 and 218.3; that has met the applicable performance specifications of Rule 218.3 and, has received written approval and conditions thereto applying, from the Executive Officer.

(9) CONFIDENCE COEFFICIENT means the 2.5 percent error confidence coefficient for the 95 percent confidence interval of a series of tests.

(10) CONTINUOUS EMISSION MONITORING SYSTEM (CEMS) means the total combined equipment and systems required to continuously determine air pollutants and diluent gas concentrations and/or mass emission rate of a source effluent (as applicable). The CEMS consists of three major subsystems: sampling interface, analyzer, and data acquisition and handling system.

(11) DATA ACQUISITION AND HANDLING SYSTEM (DAHS) means the part of the CEMS that records and processes data generated by the analyzer, thus creating a permanent record of the output signal in terms of concentration, flow rate, and any other applicable parameter *necessary* to generate the required data in units of applicable standard. The DAHS consists of all equipment such as a computer and software required to record data and convert the original recorded values to any values required for reporting.

(12) DILUENT GAS means a constituent of the flue gas that is measured by the CEMS, not because it is a pollutant, but because its measurement can be used to provide values used to calculate emission levels.

(13) FORMER RECLAIM FACILITY means a facility, or any of its successors,

that was in the NOx Regional Clean Air Incentives Market (RECLAIM) as of January 5, 2018, as established in Regulation XX, that has received a final determination notification, and is no longer in the NOx RECLAIM program.

(14) LINEARITY ERROR means the percentage error in linearity expressed in terms of the ratio of the absolute value of the difference between the reference value and the mean CEMS response value, to the reference value.

(15) LOWEST VENDOR GUARANTEED SPAN RANGE means the lowest span range that the vendor guarantees to be capable of meeting all current certification requirements of Rules 218.2 and 218.3, as applicable.

(16) MAINTENANCE means the preventive evaluation and adjustment (if necessary) of CEMS performed at specified intervals to preclude system failure. Maintenance may be performed as recommended by the manufacturer or a documented standard operating procedure determined through operating experience and approved by the Executive Officer. Repairs to a malfunctioning system are excluded from this definition.

(17) NINETY-FIVE PERCENT CONFIDENCE INTERVAL means the statistical estimation denoting a range of values which is expected to include a true value with a 95 percent probability.

(18) QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PLAN means a written document in which the specific procedures for the operation, calibration and maintenance of a certified CEMS are described in detail, including additional quality assurance assessments and the corrective action system. The purpose of this plan is to ensure that the CEMS generates, collects and reports valid data that is precise, accurate, complete, and of a quality that meets the requirements, performance specifications, and standards of Rules 218.2 and 218.3.

(19) RECLAIM means the Regional Clean Air Incentives Market.

(20) RECLAIM FACILITY means a facility, or any of its successors, that was in the Regional Clean Air Incentives Market as of January 5, 2018, as established in Regulation XX.

(21) REFERENCE METHOD means the official test method employed by the South Coast AQMD to determine compliance with the rules or permit conditions. A list of reference methods is identified in Table 1.

(22) RELATIVE ACCURACY means the absolute mean difference between the gas concentration or emission rate determined by the CEMS and the value determined by the RM plus 2.5 percent error of confidence coefficient of a series of tests, divided by the mean of the RM tests.

(23) RELATIVE ACCURACY TEST AUDIT means the relative accuracy test expressed in terms of the ratio of the sum of the absolute mean difference between the CEMS-generated data and the value determined by the applicable reference method or applicable standard, and the absolute confidence coefficient, to the mean of the reference method or applicable standard value for concentration, flow, or mass emission rate. The calculation is based on raw measured data that are not corrected by diluent gas.

(24) RESPONSE TIME means the time interval from a step change in the air pollutant or gas diluent concentration to the time when 95 percent of the corresponding final value is reached as displayed on the CEMS data recorder or acquisition system. The response time is determined by introducing a certified gas mixture into the CEMS upstream of the sampling interface and as close to the probe inlet as practicable.

(25) SAMPLING INTERFACE means the part of the CEMS that performs sample acquisition using one or more of the following operations: extraction, physical/chemical separation, transportation, or conditioning of a representative sample from a designated unit.

(26) SEMI-CONTINUOUS EMISSION MONITORING SYSTEM (SCEMS) means an emission monitoring system that is different from a regular CEMS on response time and data acquisition frequency. SCEMS continuously takes and records measurements (e.g. concentration, mass emission, flow rate) at a minimum of once in every fifteen (15) minutes. SCEMS includes but is not limited to gas chromatography, integrated sensitized tape analyzer, other sample integration based technologies, and time-shared CEMS.

(27) SPAN RANGE means the full range that is 0% to 100% of the data display output that a monitor component has been calibrated to measure.

(28) SYSTEM BIAS means the difference between the gas concentrations exhibited by the CEMS when a calibration gas is introduced at a location upstream of the sampling interface, and as close to the sampling probe inlet

as practicable, and when the same calibration gas is introduced directly to the analyzer.

(29) TIME-SHARED CEMS means an emission monitoring system where the analyzer, and possibly the associated sample conditioning system, is used on more than one source. A time-shared CEMS is categorized as a type of SCEMS under Rules 218.2 and 218.3.

(30) UNIT means, for the purposes of this rule, a combustion source for which the continuous emission monitoring system, semi-continuous emission monitoring system, or alternative continuous emission monitoring system, monitors the source's emissions.

(31) UNIT OPERATING HOUR means a clock hour during which a unit combusts any fuel either for part of the hour or for the entire hour.

(32) UPPER SPAN VALUE means the upper range value of a span range that is 100% of the data display output that a monitor component has been calibrated to measure.

(33) ZERO GAS means a gas containing less than a specified amount of the pollutant or diluent gas which, when periodically injected into the CEMS, is used to check CEMS' response to the absence of the air pollutant or diluent gas.

(d) Implementation Schedule

(1) Prior to the implementation date specified in paragraphs (d)(2) to (d)(4), the owner or operator shall comply with:

(A) Rules 218 and 218.1 for a CEMS that is subject to paragraph (d)(2); or

(B) Rule 2012 for a CEMS that is subject to paragraph (d)(3).

(2) For a CEMS certified to comply with Rules 218 and 218.1, the owner or operator of the CEMS shall meet the requirements of this rule no later than:

(A) The date an application is submitted to the Executive Officer between January 1, 2022 and January 1, 2025 for any CEMS certification or recertification;

(B) January 1, 2025, for any CEMS that was certified prior to January 1, 2022 but without an application submitted to the Executive Officer between January 1, 2022 and January 1, 2025 for a CEMS recertification; or

(C) The implementation date of a source-specific rule for which the CEMS shall be certified or recertified as part of the implementation.

(3) For a CEMS certified to comply with Rule 2012, the owner or operator of the CEMS shall meet the requirements of this rule no later than:

(A) The date an application is submitted to the Executive Officer for any CEMS certification or recertification that is within twenty-four (24) months after the NOx RECLAIM facility has been notified as a former RECLAIM facility;

(B) Twenty-four (24) months after the NOx RECLAIM facility has been notified as a former RECLAIM facility, if there is no CEMS recertification during this 24-month period; or

(C) The implementation schedule of a source specific rule for which the CEMS shall be certified or recertified as part of the implementation.

(4) If a CEMS that is subject to paragraph (d)(2) is sharing the sampling interface or other component(s) with another CEMS that is subject to paragraph (d)(3), the owner or operator of the CEMS shall meet the requirements of this rule based on the later implementation date determined by paragraphs (d)(2) and (d)(3).

(e) Pre-Certification Requirements

Prior to any certification, recertification, or relative accuracy test, the owner or operator of the CEMS shall meet all of the following standards:

(1) CEMS Location

The CEMS shall be installed at a location that enables measurements of air pollutant and diluent gas concentration, and flow rates are representative of the stack emissions of the unit.

(2) Sampling Location

(A) The monitoring system sampling probe tip and the reference method sampling port locations shall be determined according to the South Coast AQMD Method 1.1.

(B) The monitoring sampling probe shall be located where the sample obtained is representative of emissions.

(C) Each probe shall not interfere with any other probe when in use.

(D) The owner or operator may choose other sample locations subject to a written approval of the Executive Officer.

(E) If an alternate location is chosen as allowed in subparagraph (e)(2)(D) which does not conform with the South Coast AQMD Method 1.1:

(i) The absence of cyclonic flow for a stack flow monitor probe shall be demonstrated using the South Coast AQMD method 1.1, Section 2.4 in the Test Manual, Chapter X, Section 1.4 - "Alternative Site Selection Method", or 40 CFR, Part 60, Appendix A, Method 1, Section 11.4 – "Verification of Absence of Cyclonic Flow"; and

(ii) The absence of stratification shall be demonstrated using the South Coast AQMD method in the Test Manual, Chapter X, Section 13 - "Determination of Gaseous Constituent Stratification"; or

(iii) In the presence of stratification, alternatives to sampling site selection shall comply with the requirements specified in Attachment B section (C).

(3) Span Range

(A) The span range for air pollutant and diluent analyzers shall be set such that all data points are within 10 to 95 percent of the upper span value under normal operating conditions for the unit.

(B) For air pollutant analyzers:

(i) The upper span value shall be set between 150 and 200 percent of the concentration limit.

(ii) The upper span value may be set outside of the 150 to 200 percent of the concentration limit, but no lower than 120 percent, provided that:

(I) The owner or operator of the CEMS demonstrates that the span range will not be exceeded. Such demonstrations shall include, but not limited to, historical emissions data, historical process information, and historical operational information.

(II) A written approval from the Executive Officer shall be obtained prior to the upper span value

being modified outside of the 150 to 200 percent of the concentration limit.

(C) If the owner or operator of the CEMS cannot meet both requirements specified in subparagraphs (e)(3)(A) and (e)(3)(B), the owner or operator of the CEMS shall be exempt from subparagraph (e)(3)(A), provided that the air pollutant analyzer is set at a span range approved by the Executive Officer that allows data points to fall at or below 10 percent of the upper span value.

(D) If an air pollutant analyzer monitors a unit with the concentration limit less than 5 ppm, the owner or operator of the CEMS shall be exempt from subparagraph (e)(3)(B), and the air pollutant analyzer shall be set at a span range approved by the Executive Officer, provided that the approved upper span value for the analyzer is not higher than 10 ppm.

(E) The owner or operator of a CEMS analyzer with multiple span ranges shall set the span ranges for this analyzer pursuant to subparagraphs (e)(3)(A) through (e)(3)(D), for each span range or the combined span ranges, except for:

(i) The higher span range of a dual range analyzer; or

(ii) The highest span range of an analyzer with more than two span ranges.

(F) For diluent monitors, the span range shall be set such that the full range of oxygen and carbon dioxide concentrations can be measured. The upper span value shall be set at 25.0 percent O2 (maximum) and 1.0 percent CO2 (minimum) concentrations, or at a value approved by the Executive Officer.

(4) The Data Acquisition and Handling System (DAHS) of the CEMS shall meet the following requirements:

(A) Record data from monitored parameters at least once every minute for CEMS.

(B) Record data from monitored parameters at least once every 15 minutes for SCEMS.

(C) The acquisition rate shall be set at a constant rate such that the data points are equally spaced.

(D) The sample acquisition rate during certification and relative accuracy test audit(s) shall be the same as the sample acquisition rate during CEMS or SCEMS normal operation.

(E) Record all status codes specified in Table 2 for all data points.

(F) Utilize all valid data points to determine compliance with applicable limit(s), certification testing, and relative accuracy test audit(s).

(G) Incorporate all applicable data handling requirements specified in subdivision (i).

(5) Operational Period

The CEMS operational period prior to any certification tests shall be a minimum of 168 continuous hours.

(f) Certification Test Requirements and Specifications

The owner or operator of the CEMS shall perform a series of certification tests to demonstrate the acceptability of CEMS performance for a CEMS certification or recertification. Unless specified otherwise, the required certification tests and specifications shall, at a minimum, include the following:

(1) Seven-Day Calibration Drift Testing

The owner or operator of a CEMS shall perform a seven-day calibration drift test for each span range for pollutant analyzers, diluent analyzers, and stack flow monitors.

(A) A seven-day calibration drift test shall be comprised of a series of eight (8) calibration error tests during a seven-day period performed once each day with an interval of 24 hours plus a 2-hour grace period for each test, when the CEMS is in continuous operation.

(B) Each calibration error test shall be performed for:

(i) Pollutant and diluent analyzers, at the low and high ranges, which is at 0 to 20, and 80 to 100 percent of the upper span value; and

(ii) Stack flow monitors, by introducing a zero-reference value to the transducer or transmitter.

(C) Calibration error for each calibration error test during the entire testing period, as calculated using Equation 1 in Table 3, shall not exceed:

(i) 2.5 percent of the upper span value for pollutant and diluent analyzers, and

(ii) 3.0 percent of the upper span value for stack flow monitors.

(2) Analyzer Enclosure

(A) The analyzer shall be contained in an environmentally controlled enclosure and equipped with an alarm and temperature recording device that provides an audible alert that the temperature drift for the analyzer exceeds the manufacturer's recommended specifications. The owner or operator of the CEMS shall make corrective actions within 8 hours of receiving the audible alert.

(B) In lieu of subparagraph (f)(2)(A), the owner or operator of the CEMS shall perform the 2-hour calibration error tests in meeting the analyzer enclosure requirement, provided that the 2-hour calibration error is performed:

(i) Once every two hours as close to 2-hour intervals as practicable, with total of thirteen consecutive tests performed;

(ii) When ambient temperature is expected to vary diurnally at least 30 degree Fahrenheit (^{o}F); and

(iii) At the low and high ranges, which is at 0 to 20, and 80 to 100 percent of each span range respectively.

(iv) With calibration error meeting the requirements specified under subparagraph (f)(1)(C).

(C) The owner or operator of the CEMS shall qualify for an exemption from subparagraph (f)(2)(A) to provide environmental controls for the analyzer enclosure by demonstrating that the CEMS is located:

(i) In a geographic area where seasonal high and low temperatures do not exceed the operational temperature specifications for the analyzer;

(ii) In a geographic area where monthly maximum temperature variation is less than 30^{o}F for all months of the year; and

(iii) The CEMS is located in a site that is protected from radiation and convection heating sources.

(3) Relative Accuracy Test Audit

The owner or operator of a CEMS shall perform a relative accuracy test audit for pollutant concentration that is not corrected by diluent gas, O2/CO2 diluent gas concentration, stack flow, and mass emission rate, whichever is applicable to the CEMS, in the as-found unit operating condition.

(A) There shall be a minimum of nine sets of test data generated.

(B) If the number of tests exceeds nine sets, data may be discarded if it is identified as an outlier according to the South Coast AQMD Technical Guidance Document R-004 (TGD R-004), or for valid reasons (e.g., process upsets, CEMS malfunction, etc.) which must be substantiated with appropriate documentation and subject to approval by the Executive Officer.

(C) The relative accuracy shall be calculated according to Equation 4 in Table 3 and expressed as a percentage.

(D) Alternatively, a *de minimis* value shall be determined according to Equation 5, Equation 6, and Equation 7 in Table 3 for pollutant/diluent gas, stack flow, and mass emission respectively.

(E) The owner or operator of the CEMS shall meet the following relative accuracy or *de minimis* value (no more than):

(i) For pollutant concentrations, a relative accuracy of 20.0 percent of the mean value of the reference method, or the *de minimis* concentration as follows:

Pollutant	*De minimis*
NOx	0.5 ppm
SO_2	2.0 ppm
CO	2.0 ppm (or the rule or permitted concentration limit for the unit when it is lower than 2.0 ppm)
Reduced Sulfur Compounds	4.0 ppm

(ii) For diluent concentrations, a relative accuracy of 10.0 percent of the mean value of the reference method, or a relative accuracy of 20.0 percent when the measured

diluent gas, O2 or CO2, is at or below 15 percent, or the *de minimis* value of 1.0 percent diluent gas.

(iii) For stack flow monitoring systems including stack flow monitors and fuel flow measuring devices in conjunction with F-factor in determining stack flow, a relative accuracy of 15.0 percent of the mean value of the reference method, or the *de minimis* value when the mean stack gas velocity obtained by the reference method test is less than 15 feet per second.

(iv) For mass emission rates, a relative accuracy of 20.0 percent of the mean value of the reference method for mass emission rates, or the *de minimis* value when the mean stack gas velocity obtained by the reference method test is less than 15 feet per second.

(4) Within fourteen days of or during a relative accuracy test audit, the owner or operator of the CEMS shall demonstrate compliance with the following requirements:

(A) Response Time

(i) The response time for CO CEMS shall not exceed 1.5 minutes except where there is a technical limitation, in which case the response time shall be 5 minutes; and

(ii) The response time for all other CEMS and stack flow monitoring system shall not exceed 5 minutes.

(B) NOx Converter Efficiency

NOx converter efficiency test shall be conducted to indicate an average converter efficiency greater than 90 percent.

(C) Sampling System Bias Check

(i) The CEMS system bias shall not exceed 5.0 percent of each upper span range for pollutant analyzers.

(ii) The owner or operator of the CEMS shall include in the facility QA/QC Plan, criteria for excessive drift (e.g. control limits on cumulative drift) and appropriate diagnostic techniques to identify sources of analyzer drift and system bias when control limits are exceeded.

(D) Concentration Stratification

The owner or operator of the CEMS shall demonstrate the absence of stratification and locate the CEMS probe in accordance with Attachment B.

(E) Cyclonic Flow

If the CEMS determines mass emission rate, the owner or operator of the CEMS shall perform the cyclonic flow test pursuant to clause (e)(2)(E)(i).

(F) Linearity Error for Pollutant and Diluent Gas Analyzers

(i) A linearity error test shall be comprised of three tests for each span range.

(ii) Each test shall be performed by introducing calibration gas into the CEMS at the low, middle and high ranges, which are 20 to 30, 50 to 60, and 80 to 100 percent of the upper span value respectively.

(iii) The same calibration gas shall not be used twice in succession during the linearity error tests.

(iv) Linearity error shall not exceed 5.0 percent of the calibration gas concentration, as calculated pursuant to Equation 3 in Table 3.

(v) In lieu of the requirement as specified in clause (f)(4)(F)(iv), for a pollutant analyzer with an upper span value less than or equal to 5 ppm, linearity error shall not exceed 5.0 percent of the upper span value, as calculated pursuant to Equation 3a in Table 3.

(5) Alternative Emission Monitoring System (ACEMS)

(A) In lieu of certifying a CEMS according to the requirements specified in paragraphs (f)(1) through (f)(4), the owner or operator shall request the Executive Officer to certify an alternative emission monitoring system that is at a minimum equivalent in relative accuracy, precision, reliability, and timeliness to a CEMS for that unit, according to the criteria specified in 40 CFR Part 75 Subpart E.

(B) Substitute criteria is acceptable if the applicant demonstrates to the satisfaction of the Executive Officer that the proposed alternative

monitoring device is at minimum equivalent in relative accuracy precision, reliability, and timeliness to a CEMS for that unit.

(C) Upon approval by the Executive Officer, the substitute criteria specified in subparagraph (f)(5)(B) shall be submitted to the federal Environmental Protection Agency as an amendment to the State Implementation Plan (SIP).

(6) All certification tests shall be performed by testing firms/laboratories who have received approval through the South Coast AQMD's laboratory approval program.

(g) Quality Assurance Testing Requirements and Specifications

After completing the certification testing pursuant to subdivision (f), the owner or operator of the CEMS shall operate and maintain the CEMS according to the following quality assurance testing requirements and specifications, for all applicable analyzer span ranges of the CEMS, unless otherwise specified.

(1) Calibration Error

The owner or operator of a CEMS shall perform the calibration error test for pollutant analyzers, diluent analyzers, and stack flow monitors. The calibration error test is not applicable to an ACEMS or a fuel flow measuring device in conjunction with F-factor in determining stack flow.

(A) A calibration error test shall be performed for:

(i) Pollutant and diluent analyzers, for every 24 hours with a 2-hour grace period during which emissions are generated, at the low (0 to 20 percent) and high (80 to 100 percent) of the upper span value of each span range that has recorded data since the last calibration error test; and

(ii) Stack flow monitors, for every 14-day period during which emissions flow through the stack, by introducing a zero reference value to the transducer or transmitter

(B) A calibration error test shall be performed within 4 hours of the unit restart, if the unit restart is after a period longer than the testing cycle specified in subparagraph (g)(1)(A) when no emissions are generated.

(C) A successful calibration error test, with the calibration error calculated using Equation 1 in Table 3, shall not exceed two times

the calibration error specification in subparagraph (f)(1)(C) for each range.

(D) Any calibration error test result, which does not exceed two times the calibration error specification in subparagraph (f)(1)(C) but is greater than the specification in subparagraph (f)(1)(C), shall be addressed by the QA/QC Plan for possible remediation.

(E) Data recorded by the CEMS pollutant and diluent analyzers are validated for 26 clock hours (i.e., 24 hours plus a 2-hour grace period) beginning from the hour of completing a successful calibration error test, and either ending after 26 hours, or ending at the hour of failing any quality assurance test specified under subdivision (g) within the 26-hour period.

(F) Data recorded by the CEMS at the unit restart that are prior to the hour of completing a successful calibration error test are validated starting from the hour of unit restart, if the owner or operator of the CEMS conducts a successful calibration error test in accordance with subparagraphs (g)(1)(B) and (g)(1)(C).

(2) Relative Accuracy Test Audit

The owner or operator of the CEMS shall conduct the relative accuracy test audit for pollutant concentration that is not corrected by diluent gas, O2/CO2 diluent gas concentration, stack flow, and emission rate, whichever is applicable to the CEMS.

(A) A relative accuracy test audit shall be performed within 12 months of the end of the month of the previous relative accuracy test in the as-found unit operating condition.

(B) During any relative accuracy test audit, the owner or operator shall comply with all the requirements in paragraphs (f)(3) and (f)(4), except that the owner or operator of the CEMS:

(i) Is not required to conduct linearity error check.

(ii) May request a waiver from stratification, cyclonic flow, and/or interference requirements in subparagraphs (f)(4)(E), (f)(4)(F), and (f)(4)(G) respectively, by submitting to the Executive Officer, for approval, any applicable documentation or previous test or historical data

that meets the stratification, cyclonic flow, and/or interference requirements.

(C) The CEMS shall meet the relative accuracy or *de minimis* standards as specified in paragraph (f)(3).

(D) If the unit for which the CEMS is certified to monitor is not operating or generating emissions when a relative accuracy test audit is due, the relative accuracy testing audit shall be performed within 14 days after the unit is restarted.

(3) Cylinder Gas Audit for Pollutant and Diluent Gas Analyzers

(A) The owner or operator of the CEMS shall conduct a cylinder gas audit:

(i) For every calendar quarter when relative accuracy test audit is not conducted, but in no more than three quarters in succession;

(ii) According to the provisions of 40 CFR 60, Appendix F; and

(iii) Using calibration gas as specified in subdivision (h).

(B) The owner or operator of the CEMS is not required to conduct the cylinder gas audit for a calendar quarter when it is due, provided that within that calendar quarter:

(i) The CEMS has passed a linearity error check according to subparagraph (f)(4)(F) or the provisions of 40 CFR 75, Appendix A; or

(ii) The accumulative unit operating hours are no more than 168 hours.

(4) The owner or operator of an ACEMS shall conduct:

(A) Daily checks with the ACEMS modeling software to:

(i) Verify that the emission values generated by the ACEMS modeling software are consistent as certified, given specific parameter inputs;

(ii) Perform the daily check pursuant to the same schedule specified in clause (g)(1)(A)(i) and subparagraph (g)(1)(B); and

(iii) Validate the same time period as defined in subparagraph (g)(1)(E) with a successful daily check.

(B) Periodic calibrations of the sensors pursuant to manufacturer's specifications for each component.

(5) The owner or operator of a stack flow monitor shall conduct:

(A) Daily flow monitor interference checks, according to the same schedule as specified in clause (g)(1)(A)(i) and subparagraph (g)(1)(B), with each interference check validating the same time period as specified in subparagraph (g)(1)(E); and

(B) A leak detection check no later than the end of each calendar quarter, if the stack flow is determined by a differential pressure flow monitor.

(6) The owner or operator of a fuel flow measuring device in conjunction with F-factor in determining stack flow shall:

(A) Maintain the fuel flow measuring device in accordance with the manufacturer's recommendation; and

(B) Include the maintenance schedule and activities in the CEMS QA/QC plan.

(h) Calibration Gas and Zero Gas

(1) For the purpose of Rules 218.2 and 218.3, the owner or operator of the CEMS shall ulitilize the calibration gas identified in the following:

(A) U.S. EPA Protocol Gas that are calibration gas mixtures manufactured, analyzed and certified in accordance with the Section 2 "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards" - EPA-600/R-12/531, May 2012, or U.S. EPA's the most recently published protocol for certification of gaseous certification standards.

(B) National Institute of Standards and Technology (NIST) Standard Reference Materials (SRM).

(C) NIST Standard Reference Material-Equivalent Compressed Gas Primary Reference Materials that are calibration gas mixtures listed in a declaration of equivalence in accordance with subparagraph (h)(1)(A).

(D) NIST Traceable Reference Materials that are calibration gas mixtures tested by and certified by NIST to have a certain specified concentration of gases. NIST Traceable Reference Materials may

have different concentrations from those of standard reference materials.

(E) NIST/EPA-approved certified reference materials (CRM) that are calibration gas mixtures approved by U.S. EPA and NIST as having specific known chemical or physical property values certified by a technically valid procedure as evidenced by a certificate or other documentation issued by a certifying standard-setting body.

(F) For gas calibration standards not covered by programs specified in subparagraphs (h)(1)(A) through (h)(1)(E), the owner or operator of the CEMS shall obtain the Executive Officer's approval for using any of the following alternatives:

(i) The Manufacturer of Calibration Gas' Intermediate Standard that is a compressed gas calibration standard assayed and certified by direct comparison to a calibration gas identified under subparagraph (h)(1)(B), (h)(1)(C), (h)(1)(D), or (h)(1)(E), in accordance with Section 2.1.3.1 of the "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards" - EPA-600/R-12/531, May 2012, or U.S. EPA's the most recently published protocol for certification of gaseous certification standards;

(ii) NIST Research Gas Mixture that is a calibration gas mixture developed by agreement of a requestor and NIST that NIST analyzes and certifies as "NIST traceable"; or

(iii) The manufacturer of calibration Gas' alternative certification protocol for the specific compound or compounds subject to the Executive Officer's approval.

(I) The procedures of the U.S. EPA Protocol shall be used for gas calibration standards, except that the manufacturer of calibration gas must identify a recertification period and submit data documenting the applicability of this period. The manufacturer of calibration gas may submit alternative performance standards for calibration gas certification and recertification, based on

supporting technical data also provided by the manufacturer of calibration gas.

(II) If there is no existing National Institute of Standards and Technology (NIST) standard for the measured parameter, the manufacturer of calibration gas may submit an alternative reference standard and the supporting technical data that define the stability, accuracy, and precision of the alternative reference standard.

(III) The owner or operator of the CEMS may submit an alternative protocol to the U.S. EPA Protocol, provided that the owner or operator of the CEMS demonstrates through supporting technical data that the procedures therein are not applicable to the constituent in the calibration gas standard being certified.

(G) Compressed and/or filtered air, such as instrument air, may also be used instead of oxygen span gas provided that the owner or operator demonstrates, to the satisfaction of the Executive Officer, that it is of equivalent quality to the calibration gas standards above. As part of such documentation, the owner or operator shall include in their QA/QC plan the process or operation in producing such compressed and/or filtered air and periodically checking that compressed air and/or filtered air continues to meet the calibration gas standards.

(2) Zero Gas

The owner or operator of the CEMS shall ulitilize zero gases meeting the following criteria:

(A) For gaseous air pollutant monitors, the zero gas shall be certified by the manufacturer to contain no more than 0.1 ppm of the air pollutant analyzed by the subject monitor or 1.0 percent of the applicable standard, whichever is less.

(B) For carbon monoxide monitors, the zero gas shall be certified by the manufacturer to contain less than 0.5 ppm carbon monoxide or 1.0 percent of the applicable standard, whichever is less.

(C) For carbon dioxide and oxygen monitors, the zero gas shall be certified by the manufacturer to contain less than 1.0 ppm carbon dioxide or oxygen.

(D) Compressed and/or filtered air, such as instrument air, may also be used instead of zero gas provided that the owner or operator demonstrates, to the satisfaction of the Executive Officer, that it is of equivalent quality to the above zero gas standards. As part of such documentation, the owner or operator shall include in their QA/QC plan the process or operation in producing such compressed and/or filtered air and periodically checking that compressed air and/or filtered air continues to meet the zero gas standards.

(i) Data Handling

(1) Data Points Below 10 Percent of the Upper Span Value

If a data point falls below 10 percent of the upper span value, the owner or operator of the CEMS shall record and report that data point according to the following:

(A) For a CEMS analyzer with certified single span range, the owner or operator of the CEMS shall report any data point that falls below 10 percent of the upper span value, at the 10 percent value of the upper span value.

(B) For a CEMS analyzer with certified multiple span ranges, the owner or operator of the CEMS shall report a data point at:

(i) Ten (10) percent of the upper span value of the higher span range if the data point:

(I) Falls between the upper span values of two span ranges; and

(II) Is below 10 percent of the upper span value of the higher span range but above 95 percent of the upper span value of the lower span range.

(ii) Ten (10) percent of the upper span value of the:

(I) Lower span range if it is below 10 percent of the upper span value of the lower span range for a dual range analyzer; or

(II) Lowest span range if it is below 10 percent of the upper span value of the lowest span range for an analyzer with more than two span ranges.

(C) In lieu of subparagraphs (i)(1)(A) and (i)(1)(B), in the event that any data point falls below 10 percent of the upper span value of the span range that is the lowest vendor guaranteed span range for that CEMS analyzer, the owner or operator of the CEMS shall report the data point at:

(i) Ten (10) percent of the upper span value; or

(ii) The actual measured value, provided that the CEMS meets the Supplemental and Alternative Performance Requirements that are specified in Attachment A of this rule.

(D) Data points recorded and reported pursuant to clause (i)(1)(A) and subparagraphs (i)(1)(B) and (i)(1)(C)(i), shall be flagged as below 10 percent of the upper span value for CEMS status code.

(2) Data Points Above 95 Percent of the Upper Span Value

If a data point is above 95 percent of the upper span value , the owner or operator of the CEMS shall record and report the data point according to the following:

(A) For a CEMS analyzer with certified single span range, the permit holder and operator of the CEMS shall record any data point that is above 95 percent of the upper span value, at the 95 percent of the upper span value.

(B) For a CEMS analyzer with certified multiple span ranges, the owner or operator of the CEMS shall report the data point at:

(i) Ten (10) percent of the upper span value of the higher span range if the data point:

(I) Falls between the upper span values of two span ranges; and

(II) Is below 10 percent of the upper span value of the higher span range but above 95 percent of the upper span value of the lower span range.

(ii) Ninety-Five (95) percent of the upper span value of:

(I) The higher span range if it is above 95 percent of the upper span value of the higher span range for a dual range analyzer; or

(II) The highest span range if it is above 95 percent of the upper span value of the highest span range for an analyzer with more than two span ranges.

(C) The owner or operator of the CEMS shall:

(i) Flag any data point that is recorded and reported pursuant to clause (i)(2)(A) and subparagraph (i)(2)(B)(ii) as above 95 percent of upper span value for CEMS status code; and

(ii) Calculate a spiking data percentage for each calendar quarter using the following equation:

Spiking Data Percentage = F/T x 100%

Where:

F isthe amount of flagged one-minute data points recorded pursuant to clause (i)(2)(C)(i) for the calendar quarter during unit operation, excluding CEMS out-of-control period; and

T isthe total amount of one-minute data points recorded for the calendar quarter during unit operation, excluding CEMS out-of-control period.

(D) If the percentage determined pursuant to clause (i)(2)(C)(ii) is over 1.0 percent for any two calendar quarters in a consecutive four calendar quarter period, the owner or operator the CEMS shall submit a CEMS application within 30 days to certify an additional span range.

(3) If the owner or operator of a certified CEMS is meeting the quality assurance requirements as specified in subdivision (g), data recorded and reported pursuant to paragraphs (i)(1) and (i)(2) shall be valid data for quantification, and available for the purpose of determining CEMS data availability.

(4) Emission Data Averaging

The owner or operator of the CEMS shall perform emission data averaging according to the following methods:

(A) An hourly average shall cover the 60-minute period commencing on the hour. An hourly average shall be computed as follows utilizing all valid data points:

(i) For a full or partial unit operating hour, at least one valid data point in each 15-minute quadrant of the hour in which the unit operates is required to calculate the hourly average.

(ii) For any unit operating hour in which required maintenance or quality-assurance activities are performed:

(I) If the unit operates in two or more quadrants of the hour, a minimum of two valid data points, separated by at least 15 minutes, is required to calculate the hourly average; or

(II) If the unit operates in only one quadrant of the hour, at least one valid data point is required to calculate the hourly average.

(B) For continuous monitoring systems used to demonstrate compliance for a 15-minute interval, emission data may be averaged for each 15-minute quadrant of the hour in which the unit operates, utilizing all valid data points.

(C) For continuous monitoring systems used to demonstrate compliance for an interval greater than one-hour, emission data may be averaged for the required interval utilizing hourly averages computed in accordance with subparagraph (i)(4)(A).

(D) Pollutant concentration correction by diluent gas shall be performed with the averaged value at the interval required for compliance demonstration.

(E) Comparable emission data average requirements specified in source specific rules or permit conditions shall supersede subparagraphs (i)(4)(A) through (i)(4)(D).

(5) CEMS Data Availability

(A) On a quarterly basis, the owner or operator of the CEMS shall calculate data availability for each analyzer using the following equation:

Data Availability = Y/Z x 100%

Where:

Y is the total unit operating hours during the calendar quarter when the monitor provided data, excluding the operating hours identified under subparagraph (i)(5)(B) and CEMS out-of-control period specified under subparagraph (i)(6)(A); and

Z is the total unit operating hours during the calendar quarter, excluding the operating hours identified under subparagraph (i)(5)(B).

(B) An operating hour that includes any of the following periods shall be excluded from the data availability calculation:

(i) Startup and shutdown period that is not subject to any emission limit according to the permit condition or source specific rule;

(ii) CEMS maintenance, repair, or audit for up to 30 hours for each calendar quarter; and

(iii) A unit Breakdown that meets all Breakdown provisions of Rule 430 and is deemed as a valid Breakdown.

(C) CEMS data availability threshold and subsequent requirements

(i) When data availability of any analyzer falls below 95 percent for one calendar quarter, the owner or operator of the CEMS shall:

(I) Conduct a relative accuracy test audit within 30 days after the end of that calendar quarter; and

(II) Report the incident and corrective actions in the semi-annual report pursuant to Rule 218.2 (h)(1) for the period covering that calendar quarter.

(ii) When data availability of any analyzer falls below 95 percent for two consecutive calendar quarters, the owner or operator of the CEMS shall:

(I) Within 30 days after the end of those two consecutive calendar quarters, provide a temporary alternative monitoring method identified in subparagraph (i)(6)(B); and

(II) Within 180 days after the end of those two consecutive calendar quarters, modify or replace the CEMS, and recertify the CEMS.

(iii) The Executive Officer may request the owner or operator of the CEMS to revise the QAQC plan whenever data availability of any analyzer falls below the 95 percent threshold.

(6) CEMS Out-of-Control Period and Alternative Data Acquisition

(A) A CEMS out-of-control period:

(i) Occurs when the owner or operator fails any QAQC test specified under subdivision (g), or fails to conduct the test when it is due.

(ii) Begins with the hour of completion of the failed test, or the hour when it becomes overdue, and ends with the hour of completion of a passing test.

(B) The CEMS data generated during the CEMS out-of-control period shall be deemed invalid for emission quantification in any compliance demonstration

(C) The CEMS during the CEMS out-of-control period shall be considered not providing quality-assured data period for the data availability calculation.

(D) The owner or operator of the CEMS may choose from the following options for alternative data acquisition during the CEMS out-of-control period. Data generated by the alternative options shall be considered valid for emission quantification, and quality-assured for the data availability calculation.

(i) South Coast AQMD Method 100.1 in conjunction with South Coast AQMD Methods 1.1, 2.1, 3.1, and 4.1, or South Coast AQMD Method 100.1 in conjunction with South Coast AQMD Method 3.1 and EPA Method 19.

(ii) A standby CEMS (such as in a mobile van or other configuration), which is subject to the following requirements:

(I) The standby CEMS shall be certified by the South Coast AQMD, and equivalent to the corresponding permanently installed CEMS on relative accuracy, reliability, reproducibility, and data handling.

(II) The owner or operator of the CEMS shall submit a standby CEMS plan to the Executive Officer for review prior to using the standby CEMS.

(III) The Executive Officer's acceptance of standby CEMS data shall be contingent on its approval of the standby CEMS plan.

(IV) The use of standby CEMS shall be limited to a total of 6 months for any unit(s) within a calendar year

(V) The owner or operator of the CEMS shall notify the Executive Officer within 24 hours if the standby CEMS is to be used in place of the permanently installed CEMS.

(VI) During the first 30 days of standby CEMS use, the permit holder or operator shall conduct a Certified Gas Audit (CGA) of the standby CEMS.

(VII) The owner or operator of the CEMS shall notify the Executive Officer within the 30-day period if the standby CEMS shall be used longer than 30 days.

(VIII) After the first 30 days of using the standby CEMS, the owner or operator of the CEMS shall conduct at least one relative accuracy test audit of the standby CEMS and the relative accuracy test audit shall be conducted within 90 days of the initial use of the standby CEMS.

(IX) All tests shall be performed by testing firms/laboratories who have received approval from the South Coast AQMD through its Laboratory Approval Program.

(iii) An alternative data acquisition method with the Executive Officer's approval provided that:

(I) The method is deemed equivalent to a South Coast AQMD certified CEMS on relative accuracy, reliability, reproducibility, and data handling; and

(II) The approval defines contingent requirements on duration of using the method, notification, and testing.

(7) Automatic Calibration Data

If automatic adjustments to the monitor settings are made, the owner or operator shall conduct the calibration tests in a way that the magnitude of the adjustments can be determined and recorded.

(8) F-Factors

The powner or operator of the CEMS shall use in the CEMS calculations the F-factors listed in 40 CFR Part 60, Appendix A, Method 19, Table 19-2, as applicable. Alternatively, the owner or operator may submit a plan for Executive Officer's approval to develop F-factors for fuels not listed in Method 19, Table 19-2.

(j) SCEMS Requirements

(1) The owner or operator of a SCEMS shall:

(A) Comply with the pre-certification and certification requirements pursuant to subdivisions (e) and (f), except for the requirements on response time specified in subparagraph (f)(4)(A), where the response time for any SCEMS shall not exceed 15 minutes;

(B) Comply with the quality assurance requirements specified in subdivision (g);

(C) Comply with the data handling requirements pursuant to subdivision (i); and

(D) Use 15-minute data points instead of one-minute data points for the calculation required by subparagraph (i)(2)(C).

(2) The owner or operator of a time-shared CEMS shall meet all the following additional requirements for the time-shared CEMS:

(A) All units shall have mutually compatible range(s) of air pollutant gases at all times.

(B) Each unit shall have a data-reading period, at a minimum, equal to three times the longest response time of the system.

(C) For shared systems the response time shall be measured at the input or probe at each unit.

(D) A demonstration of response time for each unit shall be made during certification testing.

(E) Data shall not be collected following a switch of sample unit until a period of time equal to one response time has passed.

(F) Data shall be recorded every 15 minutes for each unit.

(G) Perform and record zero and span calibrations for each unit, including the calibration factors and correction values before and after every automatic calibration.

(H) Uniquely identify each unit on the DAHS.

(k) Moisture Correction

(1) If a moisture correction in reporting flow and concentration is required, the owner or operator of a CEMS shall measure and monitor moisture in the stack gas used for emission data calculations in accordance with the South Coast AQMD Technical Guidance Document R-001(TGD-R-001).

(2) Alternatively, with Executive Officer approval, for equipment moisture that emanates only from fuel combustion, the owner or operator of the CEMS shall calculate the moisture content using fuel properties and ambient air humidity data or, for processes that saturate the exhaust gas with moisture, such as a wet scrubber system, the owner or operator shall use the saturation temperature for moisture content data

(l) Exemption

(1) If a rule or permit specify CEMS requirements that are different than requirements specified in Rule 218.3, the owner or operator shall adhere to CEMS requirements in the rule or permit, unless otherwise notified by the Executive Officer.

Table 1
REFERENCE METHODS
RULE 218.3

South Coast AQMD Method 1.1 - Sample and Velocity Traverses for Stationary Sources

South Coast AQMD Method 1.2 - Sample and Velocity Traverses for Stationary Sources with Small Stack or Ducts

South Coast AQMD Method 2.1 - Determination of Stack Gas Velocity and Volumetric Flow Rate (S-type Pitot tube)

South Coast AQMD Method 2.2 - Direct Measurement of Gas Volume through Pipes and Small Ducts

South Coast AQMD Method 2.3 - Determination of Gas Velocity and Volumetric Flow Rate from Small Stacks or Ducts

South Coast AQMD Method 3.1 - Gas Analysis for Dry Molecular Weight and Excess Air

South Coast AQMD Method 4.1 - Determination of Moisture Content in Stack Gases

South Coast AQMD Method 6.1 - Determination of Sulfuric Acid and Sulfur Oxides from Stationary Sources

South Coast AQMD Method 7.1 - Determination of Nitrogen Oxide Emissions for Stationary Sources

South Coast AQMD Method 100.1 - Instrumental Analyzer Procedures for Continuous Gaseous Emission Sampling

South Coast AQMD Method 307.91 - Determination of Sulfur in a Gaseous Matrix

South Coast AQMD Method 10.1 – Determination of Carbon Monoxide, Carbon Dioxide, and Oxygen by Gas Chromatograph

EPA Method 6 - Determination of Sulfur Dioxide Emissions from Stationary Sources

EPA Method 19 - Determination of Sulfur Dioxide Removal Efficiency and Particulate, Sulfur Dioxide and Nitrogen Oxides Emission Rates from Electric Utility Steam Generator (40 CFR Part 60 Appendix A)

ASTM D4294 – 03 Standard Test Method for Sulfur in Petroleum and Petroleum Products by Energy-Dispersive X-Ray Fluorescence Spectrometry

ASTM D2622 – 05 Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry

Table 2
Data Acquisition and Handling System (DAHS) Status Codes
RULE 218.3

Status Code for the Following Parameters (True as 1 and False as 0)
Valid data point
Calibration
Monitoring system off-line
Alternative data acquisition
CEMS out-of-control
Fuel switch
10% of upper span value[1] (concentration reported at 10% of upper span value when the monitored value was below 10% of upper span value)
Lower than 10% of upper span value[1] (Concentration reported at the actual monitored value when the monitored value was below 10% of upper span value)
Above 95% of upper span value[2]
Unit non-operational

1. 10% of upper span value of the lower span range for dual range analyzer or the lowest span range for multiple range analyzer
2. 95% of upper span value of the higher span range for dual range analyzer or the highest span range for multiple range analyzer

Table 3
Equations
RULE 218.3

Test	Equation #	Equation	Where:
Calibration Error	1	$CE = \frac{\lvert C - A \rvert}{SR} \times 100$	C = Calibration gas concentration A = Actual response or the concentration indicated by the monitoring system SR = Span range of the instrument
Confidence Coefficient	2	$CC = t_{0.975} \frac{S_d}{\sqrt{n}}$	S_d = Standard deviation n = Number of data in a series of tests $t_{0.975}$ = t-value (see Table 4 below for t-Values)
Linearity Error	3	$LE = \frac{\lvert R - \overline{C} \rvert}{R} \times 100$	$\overline{C}$ = Mean of the CEMS response values R = Certified gas concentration as reference value
Linearity Error - For air pollutant analyzer with a span range at or below 5 ppm	3a	$LE = \frac{\lvert R - \overline{C} \rvert}{SR} \times 100$	$\overline{C}$ = Mean of the CEMS response values R = Certified gas concentration as reference value SR = Span range of the instrument
Relative Accuracy Test Audit – Relative Accuracy	4	$RA = \frac{\lvert \overline{d} \rvert + \lvert CC \rvert}{\overline{RM}} \times 100$	$\lvert \overline{d} \rvert$ = Absolute value of the mean difference |CC| = Absolute value of the 95% confidence coefficient $\overline{RM}$ = Average reference method value
Relative Accuracy Test Audit – *de minimis (Pollutant/Diluent Gas)*	5	$\lvert \overline{d} \rvert + \lvert CC \rvert$	$\lvert \overline{d} \rvert$ = Absolute value of the mean difference |CC| = Absolute value of the 95% confidence coefficient

Table 3
Equations - continued
RULE 218.3

Test	Equation #	Equation	Where:
Relative Accuracy Test Audit – *de minimis* *(Stack Flow Monitoring System)*	6	$\|d\|+\|cc\| \leq 2$ feet per second x A x cf	|d| = Absolute value of the mean difference in units of standard cubic feet per hour. |cc| = Absolute value of the 95% confidence coefficient A = Stack cross sectional area in the plane of measurement. cf = Conversion factor to standard cubic feet per hour.
Relative Accuracy Test Audit – *de minimis* *(Mass Emission Rate)*	7	$\|d\|+\|cc\| \leq (c \times s \times A) \times cf$	|d| = Absolute value of the mean difference in units of standard cubic feet per hour. |cc| = Absolute value of the 95% confidence coefficient c = Pollutant *de minimis* or mean concentration obtained by reference test method, whichever is greater. s = 2 feet per second or mean stack gas velocity obtained by reference test method, whichever is greater. A = Stack cross sectional area in the plane of measurement. cf = Conversion factor to pounds per hour.
The Mean Difference $\bar{d}$	8	$\bar{d} = \frac{1}{n}\sum_{i=1}^{n} d_i$	$\sum_{i=1}^{n} d_i$ = Algebraic sum of the individual differences di n = Number of data points di = The difference between the reference method value and CEMS value, both in units of the applicable standard

Table 4
t-Values*
RULE 218.3

N	$t_{0.975}$	n	$t_{0.975}$	n	$t_{0.975}$
2	12.706	7	2.447	12	2.201
3	4.303	8	2.365	13	2.179
4	3.182	9	2.306	14	2.160
5	2.776	10	2.262	15	2.145
6	2.571	11	2.228	16	2.131

* The t-values in this table are already corrected for n-1 degrees of freedom. Use n equal to the number of data points.

ATTACHMENT A

SUPPLEMENTAL AND ALTERNATIVE CEMS PERFORMANCE REQUIREMENTS

A. Applicability of Supplemental and Alternative Performance Requirements

The owner or operator of the CEMS electing (or who may be required) to measure concentrations that fall below 10 percent of the upper span value of the lowest vendor guaranteed span range, shall satisfy the performance requirements as specified in Table A-1 listed below.

TABLE A-1
Alternative Performance Requirement(s)

CEMS Certified per Rule 218.1 Yes or No	Performance Requirement(s)			
	LLSR/BFD	HLSR/BFD	LLR/BFD	LLCE
Yes	x		+	x
No	x	x	+	x

1. + (plus) denotes an additional performance requirement that shall be conducted if the mandatory performance requirement(s) cannot be met.

2. If the concentration of the CEMS is such that the specifications for the low level spike recovery/bias factor determination cannot be met, the owner or operator of the CEMS shall conduct a low level RATA/bias factor determination.

3. Abbreviations used in this Attachment are:

   Low Level Spike Recovery/Bias Factor Determination (LLSR/BFD)
   High Level Spike Recovery/Bias Factor Determination (HLSR/BFD)
   Low Level RATA/Bias Factor Determination (LLR/BFD)
   Low Level Calibration Error (LLCE)
   Relative Accuracy Test Audit (RATA)
   Relative Accuracy (RA)
   National Institute of Standards Traceability (NIST)

B. Test Definitions, Performance Specifications and Test Procedures

This section explains in detail how each performance requirement is to be conducted.

1. Low Level Calibration Error
   The low level calibration error test is defined as challenging the CEMS (from probe to monitor) with certified calibration gases (e.g., NO in N2) at three levels in the 0-20

percent of the upper span value. Since certified gas mixtures or standards may not be available at the concentrations required for this test, gas dilution systems may be used, with the Executive Officer's approval, if they are used according to either the South Coast AQMD or EPA protocols as specified in Rule 218.1, for the verification of gas dilution systems in the field. The CEMS high-level calibration gas may be diluted for the purpose of conducting the low level calibration error test.

a. Performance Specifications
Introduce pollutant concentrations at approximately the 20 percent, 10 percent, and 5 percent of the upper span value through the normal CEMS calibration system. No low level calibration error shall exceed 2.5 percent of the upper span value.

b. Testing Procedures
   i. Perform a standard zero/span check; if zero or span check exceeds 2.5 percent of the upper span value, adjust monitor and redo zero/span check.

   ii. After zero/span check allow the CEMS to sample stack gas for at least 15 minutes.

   iii. Introduce any of the low level calibration error standards through the CEMS calibration system.

   iv. Read the CEMS response to the calibration gas starting no later than three system response times after introducing the calibration gas; the CEMS response shall be averaged for at least three response times and for no longer than six response times.

   v. After the low level calibration error check allow the CEMS to sample stack gas for at least 15 minutes.

   vi. Repeat steps iii through v until all three low level calibration error checks are complete.

   vii. Conduct post test calibration and zero checks.

2. Spike Recovery and Bias Factor Determinations
Spiking is defined as introducing known concentrations of the pollutant of interest (e.g., gas standard to contain a mixture of NO and NO2 is representative of the ratio of NO and NO2 in stack gas) and an appropriate non-reactive, non-condensable and non-soluble tracer gas from a single cylinder (EPA Protocol as specified in Rule 218.1 or NIST traceable to 2 percent analytical accuracy if no EPA Protocol is available) near the probe and upstream of any sample conditioning systems, at a flow rate not to exceed 10 percent of the total sample gas flow rate. The purpose of the 10 percent limitation is to ensure that the gas matrix (water, CO2, particulates, interferences) is essentially the same as the stack gas alone. The tracer gas is monitored in real time and the ratio of the monitored concentration to the certified concentration in the cylinder is the dilution factor. The

expected pollutant concentration (dilution factor times the certified pollutant concentration in the cylinder) is compared to the monitored pollutant concentration.

3. High Level Spike Recovery/Bias Factor Determination
The high level spike recovery/bias factor determination is used when it is technologically not possible to certify the CEMS per the standard Rule 218.1 requirements. The spiking facility/interface shall be a permanently installed part of the CEMS sample acquisition system and accessible to the Executive Officer as well as the CEMS operator.

   a. Performance Specifications
   The CEMS shall demonstrate a RA $\leq$ 20 percent, where the spike value is used in place of the reference method in the normal RA calculation, as described below.
   b. Testing Procedures
      i. Spike the sample to the CEMS with a calibration standard containing the pollutant of interest and CO or other non-soluble, non-reacting alternative tracer gas (alternative tracer gas) at a flow rate not to exceed 10 percent of the CEMS sampling flow rate and of such concentrations as to produce an expected 40-80 percent of the upper span value for the pollutant of interest and a quantifiable concentration of CO (or alternative tracer gas) that is at least a factor of 10 higher than expected in the unspiked stack gas. The calibration standards for both pollutants of interest and CO (or alternative tracer gas) shall meet Rule 218.1 requirements

      ii. Monitor the CO (or alternative tracer gas) using an appropriate continuous (or semi-continuous if necessary) monitor meeting the requirements of Method 100.1 and all data falling within the 10-95 percent of the upper span value, and preferably within 30-70 percent of the upper span value.

      iii. Alternate spiked sample gas and unspiked sample gas for a total of nine runs of spiked sample gas and ten runs of unspiked sample gas. Sampling times should be sufficiently long to mitigate response time and averaging effects.

      iv. For each run, the average CEMS reading must be between 40 percent of the upper span value n and 80 percent of the upper span value. If not, adjust spiking as necessary and continue runs, but expected spike must represent at least 50 percent of the total pollutant value read by the CEMS.

      v. Calculate the spike recovery for both the pollutant and the CO (or alternative tracer gas) for each run by first averaging the pre- and post-spike values for each run and subtracting that value from the spiked value to yield nine values for recovered spikes.

      vi. Using the CO (or alternative tracer gas) spike recovery values for each run and the certified CO (or alternative tracer gas) concentration, calculate the dilution ratio for each run. Multiply the certified pollutant concentration by the dilution factor for each run to determine the expected diluted pollutant concentrations.

Using the expected diluted concentrations as the "reference method" value, calculate the Relative Accuracy. The RA shall be ≤ 20 percent.

4. Low Level Spike Recovery/Bias Factor Determination
The low-level spike recovery/bias factor determination is used to determine if a significant bias exists at concentrations near the 10 percent of the upper span value. The spiking facility/interface shall be a permanently installed part of the CEMS sample acquisition system and accessible to the Executive Officer staff as well as the owner or operator of the CEMS.

   a. Performance Specifications
   There are no pass/fail criteria with respect to the magnitude of the percent relative accuracy. There are performance criteria for the range of concentration on the CEMS the extent to which the spike must be greater than the background pollutant level.

   b. Testing Procedures
      i. Spike the sample to the CEMS with a calibration standard containing the pollutant of interest and CO or other non-soluble, non-reacting alternative tracer gas (alternative tracer gas) at a flow rate not to exceed 10 percent of the CEMS sampling flow rate and of such concentrations as to produce an expected 10-25 percent of the upper span value for the pollutant of interest and a quantifiable concentration of CO (or alternative tracer gas) that is at least a factor of 10 higher than expected in the unspiked stack gas. The calibration standards for both pollutants of interest and CO (or alternative tracer gas) shall meet Rule 218.3 requirements.

      ii. Monitor the CO (or alternative tracer gas) using an appropriate continuous (or semi-continuous if necessary) monitor meeting the requirements of Method 100.1 and all data falling within the 10-95 percent of the upper span value, and preferably within 30-70 percent of the upper span value.

      iii. Alternate spiked sample gas and unspiked sample gas for a total of nine runs of spiked sample gas and ten runs of unspiked sample gas. Sampling times should be sufficiently long to mitigate response time and averaging effects.

      iv. For each run, the average CEMS reading must be below 25 percent of the upper span value and > 10 percent of the upper span value. If not, adjust spiking as necessary and continue runs; but expected spike shall represent at least 50 percent of the total pollutant value read by the CEMS.

      v. Calculate the spike recovery for both the pollutant and the CO (or alternative tracer gas) for each run by first averaging the pre- and post-spike values for each run and subtracting that value from the spiked value to yield nine values for recovered spikes.

vi. Using the CO (or alternative tracer gas) spike recovery values for each run and the certified CO (or alternative tracer gas) concentration, calculate the dilution ratio for each run. Multiply the certified pollutant concentration by the dilution factor for each run to determine the expected diluted pollutant concentrations. Using the expected diluted concentrations as the "reference method" value, calculate the Relative Accuracy as specified in Rule 218.3. If the average difference is less than the confidence coefficient then no low level bias factor is applied. If the average difference is greater than the confidence coefficient and the average expected spike is less than the average CEMS measured spike, then no low level bias factor is applied. If the average difference is greater than the confidence coefficient and the average expected spike is greater than the average CEMS measured spike, then a low level bias factor equal to the absolute value of the average difference is added to data reported at or below the 10 percent of the upper span value.

5. Low Level RATA/Bias Factor Determination using Enhanced Reference Method 6.1
A low level RATA/bias factor determination is designed to determine if there exists a statistically significant bias at low level concentrations. It consists of nine test runs that measure the stack concentration and the CEMS concentration concurrently.

   a. Performance Specifications
   There are no pass/fail criteria with respect to the magnitude of the percent relative accuracy. There are performance criteria for the special RATA with respect to the reference method and range of concentration on the CEMS.

   b. Testing Procedures
   The reference method for the low level RATA/bias factor determination is Method 100.1
      i. Perform a minimum of nine runs of low level RATA for CEMS versus the reference method at actual levels (unspiked).

      ii. The span range for the reference method shall be such that all data falls with 20 - 95 percent of the upper span value.

      iii. The reference method shall meet all Method 100.1 performance criteria.

      iv. Calculate the average difference (d = CEMS - reference method, ppm) and confidence coefficient (cc = statistical calculated, ppm).

      v. If $d > 0$ then the bias = 0 ppm; if $d < 0$ and $|d| > cc$ then bias = d; if $d < 0$ and $|d| < cc$ then bias = 0 ppm.

C. Testing Frequency

The owner or operator of the CEMS shall perform the aforementioned performance requirements once a year thereafter. These annual assessments shall be completed within six months of the end of the calendar quarter in which the CEMS was originally certified.

ATTACHMENT B

Concentration stratification and CEMS probe location

A. Test for Concentration Stratification

The owner or operator of the CEMS shall demonstrate the absence of stratification through testing performed according to the method in Chapter X, Section 13 - "Non-Standard Methods and Techniques", of the District Source Testing Manual. The tests shall be conducted at:

1. One load level if the owner or operator demonstrates to the satisfaction of the Executive Officer that the equipment operates within a 20 percent load range for at least 80 percent of the time;
2. Two different load levels if the owner or operator demonstrates to the satisfaction of the Executive Officer that the equipment operates within a 50 percent load range for at least 80 percent of the time; or
3. Three different load levels if the equipment operates outside of the criteria in subclauses (f)(4)(E)(i)(I) and (f)(4)(E)(i) (II).

B. Absence of Stratification

The absence of stratification is considered verified if the difference between the highest measured concentration (time normalized) and the lowest measured concentration (time normalized) divided by the average measured concentration (time normalized), when expressed as a percentage, is less than or equal to 10 percent. Upon verification of the absence of stratification:

1. The owner or operator of the CEMS may position the CEMS sampling probe at any point within the stack with the exception of those points that are adjacent to the stack wall;

2. The CEMS sampling probe shall be located in the stack at least one-third of the stack diameter; and

3. The reference method for RATA may be conducted at a single point within the stack that is not adjacent to the stack wall and does not interfere with the sampling and the operation of the facility CEMS.

C. Presence of Stratification

If the testing demonstrates the presence of stratification, the owner or operator of the CEMS shall elect one of the following alternatives:

1. If the stratification is greater than 10 percent but the difference between the highest measured concentration (time normalized) and the lowest measured concentration (time normalized) is less than or equal to 1.0 ppmv:
    a. Then the CEMS sampling probe may be located at any point within the stack except any points that is adjacent to the stack or adjacent to the highest measured concentration (time normalized) and the lowest measured concentration (time normalized); or
    b. If it is not possible to avoid using a point adjacent to either the highest measured concentration (time normalized) or the lowest measured concentration (time normalized), then the CEMS sampling probe shall be located such that the placement minimizes the difference between the concentration at the proposed probe location and the concentration at the point of highest measured concentration (time normalized) or the lowest measured concentration (time normalized).

2. Determine a representative CEMS probe location such that the following criteria are met:
    a. All traverse point concentrations are within 10 percent of the average of all traverse point concentrations (time normalized), or, the difference is less than or equal to 1.0 ppm, whichever is greater;
    b. There exists at least one traverse point concentration (Xr), not located next to the stack or duct wall, that is less than or equal to 10 percent of each adjacent traverse point concentration of Xr, or the difference is less than or equal to 1.0 ppm, whichever is greater; and
    c. The CEMS probe is located at (or as near as practical to) Xr with minimum adjacent traverse point concentration fluctuations as determined above in section (C)(2)(b).

3. Determine a representative multiple point sampling configuration as approved by the Executive Officer, following the guidance document prepared by Emission Measurement Technical Information Center, "Evaluation Procedure for Multi-Hole Sample Probes" (EMTIC GD-031) and the South Coast AQMD guidance document, “Multi-Point Probe Acceptance and Quality Assurance Standards”.

4. Modify the stack and/or CEMS sampling probe location and retest for the absence of stratification.