SAN JOAQUIN VALLEY UNIFIED
AIR POLLUTION CONTROL DISTRICT
COMPLIANCE DEPARTMENT

COM 2030

APPROVED: **SIGNED** **DATE: March 8, 2007**

Jon Adams
Director of Compliance

TITLE: SOURCE TEST GUIDELINES

SUBJECT: POLICY GUIDELINES FOR SOURCE TESTING OF CRITERIA POLLUTANT EMISSIONS FROM STATIONARY SOURCES

OBJECTIVE:

To establish the San Joaquin Valley Unified Air Pollution Control District (District) guidelines for the source testing of criteria pollutants from stationary sources.

PURPOSE:

These guidelines include information on: source testing contractor requirements, mathematical formulas for emission calculations, and District policies for conducting tests which deviate from standard methods. This policy does not apply to testing conducted at gasoline dispensing facilities.

POLICY STATEMENT:

I. GENERAL GUIDELINES

Federal, state, and District rules require that permitted sources and emission control equipment meet rigid performance standard emission limits. To ensure that such equipment complies with these standards the Compliance Division oversees and audits compliance source testing activities. Many District Authorities to Construct (ATC) and Permits to Operate (PTO) require equipment to be tested initially upon startup and periodically thereafter. Through implementation of the procedures and policies stated herein District staff are able to accurately determine source compliance.

A. California Air Resources Board Certification

The California Air Resources Board (CARB) certifies contractors to conduct source tests while utilizing CARB and EPA emission test methods. A current list of CARB certified contractors are available on the District's web site: www.valleyair.org. Contractors must be certified by CARB prior to conducting CARB test methods and other related EPA tests within the District. Contractors wishing to have their test protocols and test results accepted by the District must be CARB certified in accordance with the criteria specified in Appendix A. All source test data submitted to the District for compliance or other purposes including, but not limited to, Emissions Reduction Credits (ERCs), ATC or PTO operating conditions, and variances must be collected by a CARB certified source testing contractor(s), qualified District staff, and/or alternative methods approved by the District.

B. Approval of Source Test Protocols and Scheduling

1. Testing contractors and/or sources must notify the District of scheduled tests 30 days in advance of the planned test date.
2. All compliance source tests must be scheduled to commence and be completed during the daylight hours, Monday through Friday, except holidays.
3. Sources that need to test with less than 30 days notice are directed to contact the regional supervisor or manager of compliance for approval.
4. Complete test protocols must be submitted for review and approval to the District at least 15 days prior to the planned test date.
5. Protocols will be accepted by e-mail or by a FAX copy provided a signed copy is then submitted to the District within 5 working days.
6. Protocols will only be approved from contractors who have obtained the appropriate CARB certification(s).
7. Source test reports and/or results will not be accepted for compliance review unless the District was properly notified of the tests and prior written approval of the protocol was granted.
8. Protocols must not be submitted with permanent glued binding.
9. If by permit conditions, sources are required to maintain fuel, production or fuel sulfur records, then a copy of those permit required records for the unit under test representing the day of the test, and 3, 6 and 9 months prior to the test must be included in the source test report. This data must be provided by the source to the testing contractor for inclusion in the Appendix G spreadsheet.

C. Compliance With ATCs and PTOs

The Manager of Compliance prior to the test must approve any deviations from this policy section.

All start up or initial compliance source tests require Compliance Division approval prior to scheduling the tests. Sources should immediately contact the District upon startup of the equipment. Tests will be scheduled only after the District staff has determined the equipment has been built and is operating according to ATC requirements. Should District staff find that the subject equipment is not installed in accordance with the ATC, the source must either: (1) comply with the terms of the existing ATC, (2) file an application to modify the ATC, reflecting the actual equipment installed, and/or (3) cease operation. The sampling equipment shall be operated according to the manufacturer's recommendations. After the equipment has commenced any operation, the source shall conduct and complete the initial source test within 60 days or within the time constraints specified by the ATC or PTO condition, whichever is longer. Sources requiring startup periods longer than that allowed by the ATC or PTO should contact the District for further instructions.

Subsequent source test dates shall be based on the frequency specified in the ATC or PTO and the date the initial source test was performed. Tests must take place within a 60-day window no more than 30-days before or after the required date. Any testing that occurs after this required test window is a violation unless a variance has been approved prior to the end of the test window or that the source has received an ATC that modifies the test date. If a source wishes to test prior to the 60-day window it must receive District approval and subsequent test dates will be determined on a case-by-case basis.

When a source on a multi-year (36-month) test schedule fails to test on schedule or fails any emission limit, the source shall revert to the annual test schedule as per permit condition or District rule, i.e. 12/12/36 month. If a source fails to test on schedule, the eventual test will be credited as the first test of a multi-year test schedule. However, the second 12-month test will remain on the original schedule. Facilities that have been issued an ATC are not required to source test under the current/former PTO if the unit is out of service for ATC modifications at the original source test anniversary date. Testing will then be required as stated on the ATC.

Equipment will be tested strictly in accordance with the operating requirements specified in the ATC or PTO and, operating under a normal load and process rate. Equipment cannot be allowed to remain at a standby or idle firing setting for the duration of a test run. A normal

operation may be either a fully automatic mode or at a fixed load setting depending on how the equipment is normally used. Equipment can be tested in a locked throttle or fixed load rate when the following conditions are met:

1. The source's request to operate in a fixed setting is included in the source test protocol and has received District staff approval prior to the test **and one of the following,**

2. The equipment to be tested normally operates at a constant throttle or fixed firing setting. A fixed firing rate is defined but not limited to the following: operation of equipment in a manual mode setting, the setting of the burner to a single firing rate, limiting the fuel to a set rate, and setting the process rate to a fixed level **or,**

3. The source test cannot be "reasonably completed" without the equipment being set to a fixed throttle setting, process rate or the venting of steam. District staff on a case-by-case basis shall determine a reasonably completed time period. District staff determinations shall be based on, but not limited to, the following: length of time required to complete a test in the fully automatic mode, cost to the company, current source testing schedule and backlog, the equipment's compliance history, the equipment's normal operating parameters, and whether the testing in a fixed setting compromises validity of test results **or,**

4. The source receives prior approval from a Compliance manager or the Director of Compliance **due to unforeseen exceptional circumstances.**

No adjustments can be made to any emission control device 2-hours prior to a test or during a test. Adjustments of any kind that may affect the outcome of a source test, and are not absolutely necessary to maintain normal or safe operating conditions, are prohibited.

Source tests conducted in violation of the aforementioned requirements are invalidated and cannot be used to show that equipment is in compliance with emission limits.

D. District Witnessed Source Tests

The District may, at its discretion, witness all or any portion of a source test and, in some cases, may decline to witness a test. When scheduling

conflicts occur the Manager of Compliance shall determine if tests need to be rescheduled.

E. Termination of a Source Test

District staff will immediately notify testing contractors and source operators whenever a situation arises which may result in the rejection of one or more sampling runs under any of the following conditions:

1. The District approved source test protocol (i.e. source test methods), or applicable rules and regulations have not been followed.
2. The emission sampling equipment has failed or malfunctioned (in the opinion of the District representative) to the point where valid sample collection is in doubt.
3. The equipment is not being operated in accordance with its ATC, PTO, or other required conditions,
4. The collected sample is improperly handled.
5. Contaminated or improperly prepared equipment is utilized for sample collection.
6. Unapproved adjustments made to process or to control equipment.
7. Equipment that is failing a test may not be shut down or the test terminated simply because the test is recording a failure. Rule 1081, section 6.2, states:

> *"A scheduled source test may not be discontinued solely due to the failure of one or more runs to meet applicable standards."*

However, if an equipment failure is creating a safety hazard or the failure is due to a breakdown (Per Rule 1100, as determined by the District), the District will approve termination of the test. Should a test be terminated solely due to an apparent emissions violation, both the source and the testing contractor may be subject to being cited.

All data collected in a terminated test must be recorded and reported according to approved procedures within 60 days of the test date. Test reports must include all calculations and assumptions made in determining emission rates. In all cases, source testing must be conducted in conformance with CARB Advisory Bulletin No. 58 (Appendix B).

F. Conflicts of Interest

Many companies have the ability to perform multiple tasks on the same project, such as:

1. Preparing applications for ATCs and/or PTOs.
2. Designing, engineering, manufacturing, or installing process, control, or in-stack monitoring equipment.
3. Selling process or control equipment.
4. Contracting to calibrate or maintain control equipment or continuous emissions monitoring systems.

However, no firm that is conducting an official (District required) source test shall be involved in or related to any of the other activities noted above. Additionally, permit holders and/or any firm controlled by or related to the permit holder are prohibited from conducting official source tests on the equipment.

This policy is intended to avoid conflicts of interest. Any violations of this policy will result in the District's rejection of the test results.

II. SOURCE TEST REPORTING REQUIREMENTS

A. General Requirements

1. Source test reports must be submitted for all District authorized compliance source tests regardless of the test results.
2. Reports over 30 pages in length must be securely bound.
3. Reports must not be submitted with permanent glued binding.
4. A test report may contain the results from multiple source tests only if all units have the same District facility number, i.e. (C, N, S,)-9999.

5. Emission analyzer data must be recorded by a data logger and shall be submitted to the District in hard copy and in electronic form on disk.

B. Common Requirements For Contents Of All Source Test Reports

Each report must include the following sections:

1. A Test Summary Page Section.
   a) This page lists the results of the three test runs and their mean.

2. An Introduction Page Section, including the following:
   a) Test date
   b) The PTO or ATC number
   c) Name of the source test contractor
   d) Name of source or company
   e) Site description, including unit sizes, manufacturers, control equipment, type of fuel, and process weight rate.
   f) The names of the test team members
   g) The names of the SJVUAPCD observers
   h) The names of the client company representatives
   i) A table with columns listing pollutants tested, testing methods, and run number
   j) Reason for test, i.e. annual, initial, rule requirement
   k) Other information that is pertinent to the tests or processes

3. Nomenclature Section

   List items in the same sequence as shown in the reference method used.

4. Individual Test Run Section
   a) Include any applicable tables
   b) Show all intermediate calculations
   c) Must begin all calculations using the basic and raw test data from each test run and/or strip charts.
5. Test Method Equations Section
   a) Include a reference section that notes test method equations used for calculations.
   b) Show results from the applicable test method equations. These results should also be found on the Summary Form.
   c) If a District approved, non-EPA or non-CARB method is used, show all equations and formulas.
6. Laboratory Analyses Data Section
   a) Include copies of the original laboratory data sheets.
   b) Include copies of the original fuel analysis sheets.

7. Raw and Source Data Section
   a) Provide copies of the original stack data sheets.
   b) Provide a stack flow schematic showing the sampling port locations and any necessary reference method calculations.
   c) For sources with a permit requirement for recording and maintaining: fuel, sulfur, or production rates, copies of these records must be included in the test report. These records must include the data from the day of the test, and the days 3-months, 6-months and 9-months prior to the test day.

8. Quality Assurance Section
   a) System audit results.
   b) Performance audit results.
   c) Instrument or equipment operations.
   d) For continuous analyzers - include the analytical method theory, the monitor manufacturer, a model number, and a system diagram.
   e) Sample trains - impinger contents, probe lining, filter locations, heated sections, and a diagram.
   f) Inter-laboratory test results and the chain of custody records
      (1) Record the following on each form: the laboratory name, the ASTM or other approved methods performed, the sample identification number, and the names of the laboratory technician(s).
      (2) Include a listing of the time and the date when each laboratory process was conducted.
   g) For NOx analyzers – include the results of the daily NO2 to NO Conversion Test Procedure, See Appendix D.

9. Other Pertinent Information Section
   a) Literature references and analyzing laboratories.

C. Additional Information for Source Test Report From Tests Using Analyzers

1. Summary Section

a) All continuous emissions monitoring method test reports must include a copy of the Testing Contractor's Method 100 Quality Assurance Worksheet for every unit tested. These pages are to be inserted in the Test Summary Page Section. See Appendix G.

2. Chart Recorder and Data Acquisition/Logger Section

a) Reports must include a permanent record of gas analyzer data using a strip chart recorder and a data logger.
b) The strip chart report must be a colored copy of the original strip chart
c) The strip charts must show the NOx converter test, the leak check and all calibrations checks and test runs.
d) A copy of the data on electronic disk.
e) The data logger recordings must list each emission's 1-minute reading with the corresponding hour, minute and second time.

3. Quality Assurance Section

a) A description and drawing of the sampling train including: the probe, the sample line, the sample conditioning system, and any filters used.
b) Copies of the calibration gas certificates from all gases used in the test. All gas must meet the requirements listed in Method 100, Section 3 Calibration Gases.
c) Include the corresponding daily calibration report for NO_x converters in the Quality Assurance section of the test report.

III. TESTING METHODOLOGIES

The following information should be used when conducting tests and reporting data for the source test report:

A. General Data

1. All methods and equations are from: the United States Code of Federal Regulations (CFR), Title 40, Part 60, Appendix A, the CARB Source Test Manuals, or other methods and equations from other Air Pollution Districts and approved by the District.
2. A compliance test shall include three runs per District Rule 1081 section 6.0.
3. If the first two runs exceed an applicable limit the test must be used to demonstrate noncompliance with an applicable limit. In this case, a test can be terminated after the second run is complete.
4. In cases were the compliance and RATA runs are combined, the first three valid sequential runs must be used for compliance.
5. Test contractors may select any equivalent test method as noted, unless permit conditions specify a specific method.
6. Test contractors may not use EPA Method 8 or the combined EPA Method 5/8 when testing for condensable particulate and sulfur emissions, (back half of sampling train) as a substitute for EPA Method 202. When applicable by testing requirements, each test must be performed separately.
7. If a source tests indicates a source exceeded any permitted limit of a gaseous emission, the source must retest all of the permit required gaseous emissions. If a source exceeded any particulate emission limit a source may be required to retest all of the required gaseous emissions.

B. EPA Method 1

1. Show relevant data and diagrams for duct diameters and sampling locations.
2. From EPA Method 1 include the appropriate figure 1-3 or figure 1-4.
3. From EPA Method 1 include the appropriate equations 1-3 and 1-4.

C. EPA Method 2

1. From EPA Method 2 include data found on a form similar to Figure 2-5.
2. From EPA Method 2 show equations 2-5, 2-9, 2-10 and applicable values from the nomenclature list.

D. EPA Method 3

1. Show equation 3-1 and applicable values from the nomenclature list.

E. EPA Method 4

1. From EPA Method 4 include data found on a form similar to Figure 4-2 Field Moisture Determination - Approximation Method.
2. Show EPA equations 4-1, 4-2, 4-3 and 4-4 and applicable values from the nomenclature list.

F. EPA Method 5 with particulate matter collected in the impingers

1. Total filterable and condensable particulate matter will be summed and considered as PM10.
2. From EPA Method 5 include data found on a form similar to Figure 5-2
3. When using EPA Method 5 show equations 5-1, 5-2, 5-3, 5-4, 5-5, 5-6, and 5-7 and applicable values from the nomenclature list and equations below.

a) $\mathbf{m}_n = \mathbf{m}_{n(probe)} + \mathbf{m}_{n(filter)} + \mathbf{m}_{n}$(impinger).
Where: $\mathbf{m}_n$ = Total amount of particulate matter (PM10) collected, mg

G. EPA Method 6

1. Show equations 6-1, and 6-2 and applicable values from the nomenclature list

H. EPA Method 17

1. This method is to be used only when specified in an applicable subpart of the EPA standard and when approved by the District.
2. From EPA Method 17 include data found on a form similar to Figure 17.3.
3. When using EPA Method 17 show equations 17-1, 17-2, 17-3, 17-4, 17-5, 17.6, 17-7, and data found on a form similar to Figure 17-4. Use

applicable values from the nomenclature list and equations and modifications shown below.

a) $m_n = m_{n(probe)} + m_{n(filter)} + m_{n(impinger)}$.
Where: m_n = Total amount of particulate matter (PM10) collected, mg.

I. EPA Method 18

1. From EPA Method 18 include data found on a form similar to Figure 18-10.
2. Show equations 18-5 and data using a form similar to Figure 18-3. Use applicable values from the nomenclature list.

J. EPA Method 19

1. Include a description where fuel sample was drawn.
2. May use the EPA, Table 19-1 when fuel source is from a PUC regulated supplier.
3. When source is not using PUC fuel gas:
   a) Conduct an ultimate analysis of fuel (Weight percent) and gross calorific value (Btu/lb.) to determine F factor (dry).
4. Show Equations 19-1, 19-13, 19-16 (when more than one fuel source is used). Use applicable values from the nomenclature list.

K. EPA Method 25

1. From Method include data using a form similar to Figure 25-8.
2. From Method show equations 25-1, 25-2, 25-3, 25-4, and 25-8 and applicable values from the nomenclature list.

L. EPA Method 201A

1. From EPA Method 5 include data found on a form similar to Figure 5-2. From Method 201A include data found on Figures 4, 5, 6, and 7

M. CARB Method 501

1. From EPA Method 5 include data found on a form similar to Figure 7.

IV. CONTINUOUS EMISSIONS MONITORING METHODS (INCLUDING CARB METHOD 100, AND EPA'S: 3A, 6C, 7E, 10, 25A, 25B AND RATA FOR CEM TESTS)

A. General Requirements

1. All tests shall include stack traverses for the determination of stratification. The only exceptions to this requirement are for oil field steam generators, heater treaters and IC engines under certain conditions, (See exceptions Sections E and F).
2. Testing contractors must measure and record the electric voltage supplying power to the testing van at the beginning of each run. Test contractors shall have sufficient electrical power to ensure a valid run.
3. All instruments must meet the Gas Analyzer Specifications as shown in Method 100, Table 100.1.
4. In cases where a compliance test and a RATA test are run concurrently, the first three valid sequential runs shall be used for demonstrating compliance. A run shall be not less than 30 minutes plus the sampling system response time.
5. No change in the strip chart recorder speed can be made during the test.
6. The strip chart speed must be maintained at not less than 6 in/hr.
7. All tests must be recorded on 110% (of range) paper chart.
8. The zero calibration point must be set at the strip chart zero grid line. Any drift that falls below the zero grid line must be accurately detected.
9. The data logger recordings must list each emission's 1-minute reading with its corresponding hour, minute and second time.
10. Both electronic data acquisitions systems must be capable of integration at a 1-minute interval and must have a resolution of 0.5 percent of the analyzer range.
11. Copies of all calibration gas certificates used during a test must be conveniently located in a binder in the tester's van.
12. Record the sampling system response time.
13. Conduct the sample collection for not less than 30 minutes. The first run shall include stack traverses for the determination of stratification unless source is listed as an exception. If there is stratification then subsequent runs must follow the same stack traverse procedure as the first run.
14. Use the Method 100 testing parameters, nomenclature and equations (Eqs. 100-1, 100-2, and 100-3) for determining both sample run validity and pollutant concentrations.

B. Analyzer Ranges

1. If at any time during a test run the measured gas concentration exceeds the span the test run shall be considered invalid. The tester may terminate the run, re-calibrate the analyzer in a higher range and repeat the test run.
2. For non-RATA runs, the range of the monitoring system shall first be selected such that the pollutant gas concentration equivalent to the emission standard is not less than 30 percent of the monitoring rage and the sample gas concentration shall be between 0 and 95 percent of the monitoring range.
3. For CEM RATA compliance tests, the sample gas concentration shall be between 10 and 95 percent of the monitoring range.

C. Calibration of Analyzers

1. All calibration gases used for zeroing and spanning the analyzers need to meet the EPA certification requirements, See Appendix C. The interior pressure of the span gas cylinders cannot be less than or equal to 100 psi.
2. An on-site NO2 converter efficiency check must be performed before stack testing at the beginning of every test day. The NO_2 gas is sampled in both the total NO_X mode and the NO mode. Stable responses in both modes are necessary. The NO_2 converter efficiency must be greater than 90 percent. See Appendix D.
3. During the analyzer and system bias checks, readings are to be marked and recorded after the strip traces are level (flat line).
4. Analyzer response time is defined as the time for the system to display 95 percent of a step change in gas concentration on the data recorder.
5. If any adjustments are made to the analyzer, the analyzer calibration error check and the system bias check must be conducted before starting a new test run.
6. An analyzer check must be performed whenever a change of electrical power has occurred or a loss of power for greater than thirty minutes.

D. Stack Flow Stratification

1. For boilers, heaters, dryers and non-CEM required turbines.
   a) The determination of stratification for each pollutant must be incorporated before or during the first test run. If the first run proves there is no stratification, then during the following runs, sampling may be drawn from any point on the traverse. (not less than 3 cm from the stack wall).

b) A gas stream is considered stratified when the difference between the raw pollutant concentrations read at any one point along either stack traverse is equal to or greater than 10 percent of the mean concentration from all points.
c) The number of sampling points per traverse is determined from EPA Method 1, Figures 1-2 and 1-3, and Tables 1-1 and 1-2. Sample at each point for at least the longest sampling system response time (recorded during the initial system bias check) plus one minute.

2. IC engines with exhaust stack diameters greater than four inches, and do not have permanently installed sample lines as per policy.

a) Select two accessible sampling port locations that are at least two equivalent diameters downstream from the nearest control device or disturbance and at least a half equivalent diameter upstream of outlet.
b) The two ports shall be separated by 90 degrees. These ports must allow their respective "measuring line" to pass through the center of the stack.
c) The probe access ports must be thoroughly sealed to prevent leaks and dilution of the gas stream.
d) The first run consists of the average concentration from a total of five individual sampling points.
e) Sample at three traverse points at 16.7, 50.0 and 83.3 percent of the first measurement line. Move the sampling probe to the second port and sample at 16.7 and 83.3 percent of the second measurement line.
f) Sample at each point for at least 6-minutes plus response time.
g) Multipoint gas sampling must be performed on subsequent runs unless data from the first run demonstrates that the mean pollutant concentration is less than 10% different from that at any single point.

E. Exceptions from Sampling Traverses and Stack Flow Stratification Checks.

1. Oil Field Steam Generators

a) Sample through the convection section sight glass or port.

2. Oil Field Heater Treaters

a) All stacks and burners from a heater treater must be identified and tested.
b) For multiple burner units, the test results from each stack must be reported separately. Do not average the ppm concentrations or the lb./MMBtu emissions.
c) Sample must be drawn from within the central area in the stack
d) Sample must be drawn from at least one full stack diameter upstream of the stack outlet.

3. IC Engines With Exhaust Stack Diameters Less Than Or Equal To Four Inches And Without Qualified Sampling Lines.

a) Sample must be drawn at a single site located at least eight inches downstream and four inches upstream of any flow disturbance.
b) The sampling probe opening must protrude inside the stack a distance equal to 1/3 the stack diameter.
c) The sampling port opening around the sampling probe must be thoroughly sealed to prevent air and exhaust leaks that will cause a dilution to the gas stream.

4. For Boilers and Process Heaters
   a) If on previous tests they have demonstrated a non-stratified stack flow, then permanent stainless steel sampling and calibration lines may be installed.
   b) The sampling probes must be within an area at least eight times the stack diameter equivalent downstream from a disturbance and at least two stack diameter equivalents upstream from a disturbance or outlet. The sampling probe opening must protrude inside the stack a distance equal to 1/3 the stack diameter.
   c) Additional requirements are the same as for IC engines listed in section IV.F.1. of this Guideline.

F. All IC engines may be tested using a permanent stainless steel sampling and calibration gas lines.

1. For safety, costs and testing consistency a permanent sampling system may be constructed to allow emissions to be drawn at the ground level. If this sampling system cannot be accomplished then multipoint sampling will be required on all stack diameters greater than 4 inches. The permanent system must include the following conditions.
   a) Due to the concerns of contamination and leaks, this sampling system must pass a bias test as per CARB Method 100, section 4.4.
   b) The sampling probe opening must protrude inside the stack a distance equal to 1/3 the stack diameter.
   c) A valve less "T" connection fitting must be plumbed into the sample line and must be located within two inches of the stack wall exterior.
   d) Connected to the "T" fitting are two parallel stainless steel draw lines. The through line is for the test sample draw and the other line is for the system bias calibration check and for the EPA Method 18 sample draw.
   e) The CARB Method 100 Figure 100.1 shall be used to illustrate the proper connection of the sample and calibration lines.
   f) The parallel lines below the "T" connection must always be in a downward direction.
   g) The overall length cannot exceed twenty-five feet.

2. For IC engines without a catalyst the measurement site must be located from within an area that is at least two stack diameter equivalents lengths downstream from a disturbance and at least two stack diameter equivalents upstream from a disturbance or outlet.

3. For IC engines with a catalyst the measurement site must be located from within an area at least eight times the stack diameter equivalents downstream from a disturbance and at least two stack diameter equivalents upstream from a disturbance or outlet.

APPENDIX A

Test Methods That Require CARB Certification

This table includes methods that are approved for District required tests. However, not all CARB certified methods are listed in this table. Permit conditions may require the testing of a pollutant for which a CARB method is not available. In such cases, tests are conducted in accordance with approved reference methods listed in the test protocol and followed in the actual test.

Table 1: Methods for Certification

Must be CARB certified in:	To conduct these test methods in the District.	Special Notes:
Method 5	EPA 5, 5B, 5C, 5D, 5F, 5G, 5H, 19 (for PM), 17, 201A/202, 436	Used for PM and PM-10 (when all PM is considered PM-10).
Method 7	EPA 7; 7A, 7B, 7C, 7D	
Method 501	CARB 501; EPA 201A	When testing PM-10
Method 6	EPA 6, 6A, 6B	
Method 11	EPA 11	
Method 100	For continuous gases emission stack sampling.	Used in over 90% of all District tests.
Method 431	CARB 431	Also, needs a letter of approval directly from CARB.
Method 2, 2A	EPA 2, 2A	

Table 2: Source Test Methods Requirements

Pollutant	Test Method	All Annual and Initial[1] Tests (No. Of Runs)
Total Particulate	EPA 5, EPA 17 when applicable by an EPA subpart and allowed by District	3
PM_{10}	EPA 201A, CARB 501	3
Sulfur Dioxide	EPA 6	3
	CARB 100	3
Nitrogen Dioxide	CARB 100	3
Carbon Monoxide	CARB 100	3
Hydrocarbons Combustion Well Vents	EPA 18, Tedlar Bag, CARB 100 Integrated & Condensables	3 Samples[2] 3 Samples[2]
H_2S	EPA 11	3
NH_3	BAST ST-1B [3]	3 Samples
Benzene	CARB 410A	3 Samples
ETO	CARB 431 and 21	3 Samples
Fuel Sulfur, Total (PUC equivalent.)	ASTM D3246. Double GC	1 Samples[4]

[1] Applies to new equipment or modifications requiring an ATC.

[2] Tedlar bags should be filled and purged at least three times to ensure representative sampling. Protect the Tedlar bag and its container from sunlight. Samples must be analyzed within 72-hours of collection to minimize sample deterioration. For well vents, take 1 bag sample over a 1-hour period.

[3] Bay Area Source Test Method.

[4] If fuel source is under high pressure or, has a high sulfur concentration, a container made of high nickel stainless-steel alloy (such as Series 316) may be used provided interior wall of container has been Passivated or similarly treated to preserve sample for sulfur analysis. All sample containers should be filled and purged at least three times to ensure representative sampling. When using Tedlar bags, protect the bag and its container from sunlight. Samples must be analyzed as soon as possible, but no later than 24-hours after collection to minimize sample deterioration.

APPENDIX B

California
Air Resources Board
Compliance Division

Advisory
Source Testing

Number 58

November 30, 1990

SOURCE TESTING FOR COMPLIANCE PURPOSES

It has recently come to our attention that some source testing companies have been discontinuing District-mandated compliance tests when preliminary results indicate the source to be in violation. Preliminary results that indicate the source to be in violation are not to a legitimate reason to stop a compliance test. Such a test should only be suspended for a valid mechanical breakdown. If the results of a compliance test show a violation, the test must be completed and the results turned in to the appropriate agency for action. During District-mandated compliance testing an Air Resources Board approved contractor is acting for the agency requiring the testing to be conducted, even while being paid by the source operator.

If the Air Resources Board finds that contractors approved to conduct testing on behalf of the Board are engaged in such activity, we will take steps to revoke the contractor's approval. Any history of such activity will be taken into consideration in any future attempt to be approved to conduct testing on behalf of the Board.

If you have any questions regarding compliance source testing, please call Mr. Gary Zimmerman at (916)322-2886. If you have any questions regarding the Independent Contractor Program, please call Ms. Kathryn Gugeler at (916)327-1521.

Compliance Division
California Air Resources Board
Post Office 2815, Sacramento, CA 95812

APPENDIX C

EPA CERTIFICATION PERIODS FOR COMPRESSED GAS CALIBRATION STANDARDS IN ALUMINUM CYLINDERS

Certified components	Balance gas	Applicable concentration range	Certification period (months)
Aromatic organic gases	Nitrogen	≥0.25 ppm	36
Aliphatic organic gases	Nitrogen	≥0.20 ppm	36
Benzene	Nitrogen	≥0.25 ppm	36
Carbon dioxide	Nitrogen or air	≥300 ppm	36
Carbon monoxide	Nitrogen or air	≥8 ppm	36
Hydrogen sulfide	Nitrogen	≥4 ppm	12
Methane	Air	≥1 ppm	36
Nitric oxide	Oxygen-free nitrogen	≥4 ppm	24
Nitrous oxide	Air	≥300 ppm	36
Oxides of nitrogen (i.e., sum of nitrogen dioxide and nitric acid)	Air	≥80 ppm	24
Oxygen	Nitrogen	≥0.8%	36
Propane	Nitrogen or air	≥1 ppm	36
Sulfur dioxide	Nitrogen or air	40 to 499 ppm	24
Sulfur dioxide	Nitrogen or air	≥500 ppm	36
Tetrachloroehtylene	Nitrogen	≥0.25 ppm	36

[1] When used as a balance gas “air” is defined as a mixture of oxygen and nitrogen where the minimum concentration of oxygen is 10 percent and the concentration of the nitrogen is greater than 60 percent.

[2] Oxygen-free nitrogen contains < 0.5 ppm of oxygen.

APPENDIX D

NO_2 TO NO CONVERTER EFFICIENCY CHECK PROCEDURE

1. NO_X Analyzer Requirements

   a). Equipped with NO and NO_X modes

2. Auditing Gas Requirements

   a). NO_2 in air (or N_2): Use NO_2 in air for a stainless steel converter.
   b). Concentration of NO_2 : 10% to 95% of range, *(C_0 ppm)*

3. Calibration Gas Requirements

   a). Concentration of NO: 80% to 98% of range with less than 0.1 ppm NO_2
   b). Zero Gas: High purity N_2

4. Calibration of Analyzer:

   a). Calibrate NO mode with the NO calibration and Zero gases.

5. Conversion Efficiency (CE) Test
   a). Analyze the audit gas with NO mode. Read and standardize concentration *(C_1 ppm)*
   b). Analyze the audit gas with NO_X mode. Read and standardize concentration *(C_2 ppm)*

6. Calculation for Conversion Efficiency:

$$\%CE = (D_2 \div D_1) \times 100$$

Where,

$$D_1 = |C_0 - C_1|$$
$$D_2 = |C_2 - C_1|$$

7. Criteria for Acceptability of CE

   a). %CE must be larger than 90%

APPENDIX E

ROUNDING FOR SIGNIFICANT FIGURES PROCEDURE

When testing for permitted limits that are listed as a whole integer without a decimal point, round the final test results to the whole integer.

The individual run calculated emissions rates and concentrations are to be rounded off to the smallest significant units.

Pollutant	lb/hr	lb/day	lb/MMBtu	ppm	gr/dscf
NOx	0.01	0.1	0.001	0.1	
VOC	0.01	0.1		0.1	
Sulfur Oxides	0.01	0.1	0.001	0.1	
CO	0.01	0.1		0.1	
PM	0.01	0.1	0.001		0.0001

To prevent errors due to cumulative rounding, District and EPA policy stipulates that intermediate values used to calculate a final test result should be retained to the maximum decimal precision (at least seven decimal places) supported by the computer used. As far as practicable with the calculating device or form used, carry out calculations with the test data exactly and round only the final result.

Rounding off is accomplished by dropping the digits that are not significant. The digits 0, 1, 2, 3, and 4 are dropped without altering the preceding digit. The preceding digit is increased by one when a 5, 6, 7, 8, or 9 are dropped. The calculated quantity of 8.24 lb/day of NOx, for example, would be rounded off to 8.2 lb/day.

For limits based on material usage or process rates, reported data must be consistent with good measurement practices.

APPENDIX F

Equation For Wet Sampling Train Procedures

$$E = C_s \times Qsd$$

Where:

E = The pollutant mass rate in, lb./hr.

C_s = Concentration in stack gas, dry basis, corrected to standard conditions, lb./dscf.

Qsd = Stack flow rate determined from EPA Methods 2 and 4, or alternative determinations of fuel flow rate and moisture content, dscf/hr.

EPA Course 450, Equation 2-24

Equation For Converting Fuel Gas Rate From cf to scf

$$scf = cf \times \left[\frac{\text{Gas line Pressure (psi)} + 14.7}{14.7}\right]$$

Testers need to determine the scf fuel flow when the source facility does not have a scf fuel meter and, concurrently, test calculations use a fuel Ffactor for limits in units of lbs/hr, lbs/day or lbs/process weight. Testers need to establish how a facility proposes to record and report the actual fuel flow rate prior to beginning the compliance test.

Equation For Alternative Determinations of Qsd Flow Rate

$$Qs = \text{Fuel Rate} \times \text{Fuel HHV} \times \left[\frac{1\ \text{MMBtu}}{10\text{^}6\ \text{Btu}}\right] \times \text{Ffactor} \times \left[\frac{20.9\%}{20.9\%\text{-stack \%O2}}\right]$$

Where:

Fuel Rate = scf/hr

Fuel HHV = Higher heating value of fuel combusted, may use 1040 if PUC gas is used, Btu/scf

Ffactor = Oxygen-based F Factor, dry basis, 68 ºF, may use 8710 if PUC gas, is used, dscf/MMBtu

Equation For g/hp-hr

g/hp-hr =

$$\left[\frac{453g}{1\text{-lb}}\right] \times Cppm \times \left[\frac{M}{385 \times 10^{6}}\right] \times 0.00848\ MMBtu \times Ffactor \times \left[\frac{20.9\%}{20.9\% - \%O2}\right]$$

Where:

453	=	conversion to grams from pounds
Cppm	=	effluent gas concentration corrected to dry basis, ppm
M	=	molecular weight in lb/lb-mole
385	=	standard volume in cubic feet of one lb mole (at 528° R and atmosphere)
0.00848	=	$\left[\frac{0.002544\ MMBtu}{1\ hp\text{-}hr}\right]$ x 1/30% ICE eff. factor

APPENDIX G

Instructions for Using Spreadsheet

- Appendix G is on a password protected MS Excel spreadsheet.
- Appendix G does not replace the tester's Data Summary page.
- A printout of the Appendix G worksheet must be included for every unit tested using continues emission analyzers. This printout must be in the Data Summary section in the beginning pages of the report.
- If a tester changes ranges during a test, include a printout of Three Run Sheet and either the Two Run Sheet or the One Run Sheet. The tester must make the appropriate selection on the Three Run Sheet in order to calculate the averages correctly.
- Testers may either hand enter or link from their existing spreadsheet the data in the yellow cells. Some of the yellow cells will not apply to every test.
- Testers must select the appropriate data from the dropdown list in the light blue cells.
- Before selecting the analyzer ranges, testers need a copy of the current District PTO or ATC to determine the ppm limit equivalent. With an estimate of the unit's excess stack O2%, testers can use CARB Method 100 Eqs. 100-4, 100-5, 100-6 and EPA Eq. 19-1 to back calculate most ppm limit equivalents. A limit conversion sheet is included as an aid.
- Most yellow and light blue cells have linked data validation code cells to their right. If the data entered is appropriate or within specification a corresponding "OK" will display. If the data is not appropriate or within a specification a corresponding "X" will display.
- In some cases the validation code cell will be displayed above the cell row the corresponding data was entered on.
- If an "X" is displayed and the tester believes the data is still appropriate, than the testers must include an explanation in the comment section.