CONTINUOUS EMISSION MONITORING PROTOCOL

Prepared

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Continuous Emission Monitoring Protocol

for Santa Barbara County, California

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1. INTRODUCTION

The Santa Barbara County Air Pollution Control District (SBCAPCD), hereafter "the District," requires various emission sources to obtain continuous emission and process data. These data are used to determine compliance with District rules, regulations, and facility permit conditions. In order to verify compliance, the data collected must be complete, precise, accurate, defensible, and traceable.

This continuous emission monitoring (CEM) protocol is intended to provide guidelines to ensure that CEM systems are designed and operated such that the data acquired meet these objectives.

1.1 OBJECTIVES OF THE CEM PROTOCOL

The main objective of the CEM protocol is to ensure that the continuous data collected are complete, precise, accurate, defensible, and traceable. This is accomplished through establishing minimum requirements for continuous emission monitoring systems (CEMS) in Santa Barbara County, assisting facilities in complying with the requirements of the CEM program, and establishing QA/QC programs to assure accurate and representative data collection.

The District has several Rules that require the installation and operation of CEMS. These Rules are updated on a periodic basis. An applicant should contact the District to obtain the current version of these Rules to determine the specific requirements which they must meet. Some of the existing Rules that are associated with the CEMS are: Rule 206, 328 and 505. As a reference to the reader, copies of these rules, effective at the date of publication of this protocol, are provided in Appendix D. The reader should verify the current status of the rule with the District.

1.2 REGULATORY BASIS

1.2.1 <u>Rule 206</u>

Rule 206 authorizes the District to impose CEM requirements as a condition of a facility's Authority to Construct (ATC) or Permit to Operate (PTO).

1.2.2 Rule 328

Rule 328 establishes CEM requirements for certain sources, including fossil fuel fired steam generators, nitric acid plants, sulfuric acid plants, fluidized bed cokers, CO boilers and fluidized bed catalytic cracking units. The Rule also provides the District with authority to require the installation of CEM systems on any stationary source that emits more than 5 pounds per hour of nonmethane hydrocarbons, oxides of nitrogen, oxides of sulfur, reduced sulfur compounds, or particulate matter. The Rule also establishes minimum requirements for record keeping, reporting, and maintenance.

1.2.3 Rule 505

Rule 505 specifies the procedures to be followed in the event of a breakdown of a CEM system. It specifies conditions under which the failure of a CEM system is considered a breakdown, the steps to be taken in reporting the breakdown to the District, and requirements for correcting the problem.

1.2.4 Other Requirements

There may be specific permit conditions that are also applicable to the CEMS. Each applicant should check their own permit(s) for any such conditions.

1.3 OVERVIEW OF THE PERMITTING PROCESS

In order to ensure that CEM systems are installed and placed in operation in a timely manner and that all the requirements established by this protocol are met, the District has established a formal CEM review procedure that takes place as part of the regular permitting process. The steps that are generally taken during this process and the time frame in which they occur are described below.

1.3.1 Application for Authority to Construct

The applicant must submit an application for an ATC to the District. The ATC application must contain all the information necessary for the District to make a determination that the project complies with all applicable Rules and Regulations. A description of ATC application requirements can be obtained from the District. The following list identifies major items that will be evaluated in determining the need for CEM. Additional information may be requested as deemed necessary by the District.

a. A scaled and dimensioned plot plan of the facility that shows and identifies the locations of the following:

1. Process equipment, emission control devices, and emission monitoring equipment
2. Piping and ducts for carrying fuels, products and possible sources of air pollutants
3. Emissions points

b. A detailed schematic of all equipment including emission control devices, and a list of the following:

1. Burners, showing manufacturer, model, BTU rating, mode of atomization, mode of control, (manual, high-low, etc.), firing type (tangential, opposed, front, etc.), fuel type, temperature, and excess air used
2. Air pollution control equipment, showing manufacturer, model, type, and description, including the horsepower of any prime movers
3. Automatic control equipment and instrumentation

c. A description of the operation, including the following:

1. Operating hours
2. Maximum design capacity
3. Loads such as hourly raw material usage, fuel usage, electrical usage, rate of production
4. Pressures, temperatures (including stack temperatures)
5. Process description

d. Descriptions of the following for each emission point:

1. Mitigation measures, including air pollution control equipment proposed, process changes or operations used to reduce emissions
2. Rate of emission of pollutants and stack gases at maximum design capacity and at normal working level
3. Process variables that could affect emissions from the process

e. Identification of any applicant's commitments for enforceable limitations on the operation of the new sources or modification.

The District has thirty days to determine whether the application for ATC has sufficient information to declare the application for ATC to be complete. If the application is incomplete, the District will inform the applicant in writing and request additional information. After the applicant responds to the District's incompleteness letter, the District has another 30 days to determine if all required information has been submitted. If not, another incompleteness letter will be sent. These steps will be repeated until all required information is received and the District declares the application to be complete.

1.3.2 <u>The District Determines CEM Requirements</u>

The District has 180 days in which to prepare the ATC after finding the application for an ATC complete. During this period, the District will evaluate the application and determine whether this facility will be required to have a CEMS. If the District determines that this facility requires a CEMS, then the permit will be issued with conditions that describe CEM requirements, including the following:

a. The sources to be monitored
b. The parameters to be monitored at each source
c. Record-keeping requirements
d. Telemetry requirements

1.3.3 <u>Submittal of a CEM Plan</u>

Before the start of operation, the applicant will be required to prepare a CEM plan that describes in detail its approach in satisfying these requirements. The content of the plan is described in Section 2 of this document. The permit may require that the CEM plan be submitted and approved prior to the start of the Source Compliance Demonstration Period (SCDP). SCDP is a period allowed by the District as a "shakedown" period to begin initial operation of the plant, demonstrate compliance to the District, and resolve any process, instrument or equipment operational problems.

1.3.4 Review of the CEM Plan

The District will review the plan and may request changes and/or additions to the plan as necessary. It is at this step that the adequacy of the proposed instrumentation and operating procedures is reviewed. The District will review the CEM plan and return comments to the facility. The facility will be required to make any corrections or modifications necessary in order to ensure that the plan meets the minimum standards established by this protocol and specific permit requirements.

1.3.5 CEM Installation and Field Verification

Following approval of the CEM plan by the District, the applicant will complete the CEMS installation and check-out. Once installation is complete, the facility must inform the District. The District will inspect the system on site prior to the beginning of SCDP in order to ensure that the field installation conforms to the CEM plan.

1.3.6Source Compliance Demonstration Period (SCDP)

For major energy projects and other large or complex sources, the complexity of the equipment and processes essentially precludes start-up and operation without violating what would be Permit to Operate (PTO) conditions. The SCDP allows a source to operate under the authority of an ATC for the purpose of performing equipment "shakedown", and to conduct any testing and compliance demonstrations required by the District after the completion of construction and before issuing a PTO. The applicant must request in writing to begin their SCDP and specify the exact date. The District will authorize initiation of SCDP only if applicable ATC conditions and the requirements set forth in the approved CEM Plan (which contains the CEM Audit Plan) have been met. SCDP activities are normally authorized for a 120-day period.

During this period, the facility will, among other activities, complete the CEM system check-out and troubleshooting. Once the system is in operation, the CEM system is performance-certified by a source test contractor not associated with the manufacturer of the CEMS or the facility, following the procedures that have been outlined in the CEM plan. The facility must submit a detailed contractor-specific CEM performance certification source test plan (audit protocol) and generally must allow a minimum of 30 days for the District to review and approve the plan prior to the performance test. Since CEM performance certification tests are generally conducted concurrently with the facility compliance source tests, the contractor-specific audit protocol can be included within the contractor compliance source test plan.

The facility informs the District of the test dates in writing at least 10 days in advance in order to enable the District or its representative to witness the tests. Results of the performance certification source test are generally required to be submitted to the District within 45 days of completion of the source test or prior to the end of SCDP, whichever comes first. The minimum requirements of a CEM contractor-specific audit protocol are provided in Section 5.5 of this document.

1.3.7 Application for a Permit to Operate

The applicant must submit an application for a PTO to the District. For the facility to continue operation, the PTO must be issued by the District prior to the end of the SCDP. Once issued, a PTO is reevaluated by the District every three years. This review may include determination of the adequacy of CEMS and emissions reporting.

1.4 ROUTINE OPERATION OF THE CEMS

Once the PTO has been issued, the normal operation of the permitted source begins. The facility must operate and comply with the permit conditions of the PTO and the approved CEM Plan. The facility must record data as described in the CEM Plan. In some cases, specific data will be telemetered directly to the District. The facility must perform routine maintenance and quality control, including calibration drift determinations.

1.4.1 CEM Audit Procedures

In addition to routine quality control/quality assurance procedures, the facility shall also carry out quarterly system audits. Audit procedures are described in Section 4 of this document. An audit must be carried out once every calendar quarter. At least one of these four quarterly audits must consist of a full relative accuracy test audit (RATA). The general CEM audit plan will be contained in the overall site CEM Plan.

The first quarterly audit after the initial performance certification audit must take place before the end of the calendar quarter subsequent to the calendar quarter in which the performance certification was performed. This audit will be either a Cylinder Gas Audit (CGA) or Relative Accuracy Audit (RAA), which are less comprehensive than the annual RATA. A contractor-specific audit protocol for this audit must be submitted to the District at least 30 days prior to the performance of the audit. The facility must inform the District of the audit dates in writing a minimum of ten days in advance in order to enable the District or its representative to witness the audit. If the same test contractor is utilized for subsequent RAAs/CGAs, the same audit protocol may be used.

If either the routine calibration checks or the audit procedures indicate that the analyzer is not functioning within prescribed standards, then the analyzer is considered to be out-of-control. This may be considered a breakdown condition and the facility must comply with all of the requirements of District Rule 505. The facility must notify the District as soon as reasonably possible, but in no case later than four hours after the start of the next regular business day, and must take action to correct the problem. Facility operation for more than 96 hours after the breakdown of a CEMS, without rectification of the breakdown condition, is considered a violation of District Rules and Regulations unless a variance has been issued.

A facility may be notified that it must improve its quality assurance/quality control procedures, if:

- quarterly data capture (reference section 6.2.13) for a particular measurement is consistently below 90%,
- a particular breakdown condition occurs more than twice in any one calendar quarter or three times in a calendar year (recurrent breakdown),
- in the judgement of the District, a CEMS is consistently out-of-control,

These improvements must be included in a revised CEM plan and submitted to the District for approval within 21 days of such notification.

1.4.2 Data Submittal and Review

CEM data must be submitted to the District as specified by permit condition. The reports must follow the format specified in the CEM Plan. If quarterly reporting is required, then the first quarterly CEM report is generally due 45 days following the end of the calendar quarter in which the source began operation. Subsequent CEM reports are generally due 45 days after the end of each successive calendar quarter. The minimum requirements for reports are described in Section 6 of this protocol.

1.5 ORGANIZATION OF THE PROTOCOL

Apart from this introduction, this CEM protocol is divided into five main sections and four appendices.

–Section 2 describes, in general terms, the minimum amount of information to be included in the overall CEM Plan. Detailed information is provided in Sections 3, 4, and 5 of the protocol.

–Section 3 describes the specifications for instruments used as part of CEMS in the County of Santa Barbara as a minimum requirement.

–Section 4 describes the minimum performance specifications that a CEM system must meet. The methods for certification, which are part of the Performance Certification Test Plan section and Audit Plan section of the overall CEM Plan, are also provided.

–Section 5 provides guidance in establishing a QA/QC program that will ensure that data are reliable and representative of actual emissions. The procedures for quarterly audits, which are part of the Audit Plan section of the overall CEM Plan, are also included in this Section.

–Section 6 of the protocol describes minimum data reporting requirements. It includes information on the type of data to be obtained, the amount, the frequency of data collection, and the format of the reports.

-Appendix A contains all the figures referred to in the text. Many of the figures contain suggested formats for data reporting and accumulation.

–Appendix B provides a glossary of relevant terms, abbreviations, and acronyms.

–Appendix C describes the equations to be used in calculating calibration drift and relative accuracy from data obtained during performance certification source testing.

–Appendix D provides copies of District rules pertaining to CEM operation.

2. THE CEM PLAN

2.1 OBJECTIVES OF THE PLAN

The purpose of the CEM plan is to document the steps that will be taken by the facility in meeting the requirements specified in this protocol. The plan will provide the District with an opportunity to review the design of the CEMS and the proposed operating, data recording, and maintenance procedures before the system is installed and operating.

2.2CEM PLAN CONTENTS

In order to ensure that the plan contains all of the required elements and to facilitate review of plans by District personnel, each CEM plan should include eight sections with a cover page and signature page and follow the outline described in Figure 1 of Appendix A. The contents of each section are described below.

2.2.1 Cover Page

The cover page must include the name of the permit holder company, the District permit number, the document title, and the name(s) of the emission source(s) to be monitored.

2.2.2 Signature Page

The signature page must contain an endorsement by the permit holder company representative.

2.2.3 Introduction

The introduction should describe the objectives of the CEM monitoring program to be implemented at the facility and should contain a list of the permit requirements or rules and regulations that must be met. It should also include a brief summary of the contents of each section of the plan.

2.2.4 Project Description

The project description should provide a concise description of the overall project. The description should include project ownership and geographic location. This section must also describe the process in sufficient detail to establish the relationship between the process and the CEM monitors. It must include the following:

a.Facility Description

A brief description of each major process and associated equipment, including a facility diagram which notes major process rates, shall be provided.

b.Process Description

A flow diagram and description of the process to be monitored shall be provided. All major components and air pollution control equipment must be included. Include all process equipment maximum rates, normal and average process rates, fuel rates and operating hours. If the process is batch type, provide information on the duration and number of batches per day.

c.Emission Source Description

The source description must identify the location of all emission sources (i.e., stacks), so that each emission source is readily identifiable. Each piece of equipment that contributes to the emissions, as well as process conditions that could effect emissions from the equipment, must be identified. A diagram of each stack showing sampling probe sites for CEMS and source/performance tests, stack height, and stack diameter is required. Each sampling site should be identified clearly in the diagram, and the location of the sampling probe site relative to the nearest upstream/downstream disturbance should be shown. This will incorporate some of the same information as required in Section 4.1 under "Instrument Descriptions"; however, this will provide enough detail to establish the relationship between the processes and the CEM monitors. A description of the stack gas must be provided, including velocity, temperature, pressure, moisture content, approximate particulate grain-loading, expected pollutants concentrations, and expected maximum permitted emission rates. This information may be provided in a tabular format.

2.2.5 CEM Program Description

The CEM program description should provide an overview of the CEM program, including the parameters to be monitored. It should describe the project organization. This information should include an organization chart that indicates responsibility for each aspect of the CEM program. This section should provide a short description of the main personnel or job classification, the job descriptions or specific task descriptions, and the personal qualifications of the personnel. This section should also describe the role that the contractors or vendor service personnel will play in maintaining the CEMS and training program personnel.

2.2.6 Instrumentation Description

A detailed description of the components of the CEMS shall be provided, including a schematic diagram of the sampling system. It should clearly indicate which analyzers are being used for which parameter. It should then address the components of each system in turn, including the sampling system, analyzer, calibration system, mass flow monitor, process monitors, data recording, and telemetry system, where applicable. The location of each component in the plant and the environmentally controlled structure that houses the instrumentation should be described.

a.Sampling System:

At a minimum, the description of the sampling system should include the following:

1.A short description of the operating principle
2.As applicable, a description of each component, including name, model number, manufacturer and material of construction
3.The location of the calibration gas inlet
4. The location of the sampling point, showing distance to upstream and downstream disturbances

5. The location of the probe tip within the stack
6. The environmental protection enclosure

As applicable, operating manuals for the primary components of the sampling system provided by the supplier should be included as an appendix. Sales literature from the vendor can be included with the manuals or presented if operating manuals are not applicable. The minimum specifications for sampling systems are described in Section 3 of this protocol.

b. Analyzer:

At a minimum, the description of the analyzer should include the following:

1. The name, model number and manufacturer
2. A short description of the operating principle
3. The environmental protection enclosure
4. The operating range and analyzer high value as specified in section 4 of this protocol
5. The performance specifications, including
   - i. precision
   - ii. noise
   - iii. zero drift
   - iv. span drift
   - v. linearity
   - vi. lag time
   - vii. response time
   - viii. normal operating range
   - ix. humidity range
6. The output (i.e., 4-20 milliamps)

Operating manuals for each component provided by the supplier should be included as an appendix. The minimum specifications for analyzers are described in Section 3 of this protocol.

c. Dilution systems (where applicable)

At a minimum, the description of the dilution systems should include the following:

1. The name, model number and manufacturer
2. The location

3.A short description of the operating principle
4.The environmental protection
5.The range

Operating manuals for each component provided by the supplier should be included as an appendix. The minimum specifications for dilution systems are described in Section 3 of this protocol.

d.Calibration gases

At a minimum, the description of the calibration gases for both pollutant and diluent analyzers should include the following:

1. The anticipated supplier(s)
2.The grade
3. The concentration range
4. The point at which gases are introduced into the system

The minimum specifications for calibration gases are described in Section 3 of this protocol. Certificates of Traceability for all calibration gases must be available for District review upon request.

e.Stack flow rate monitoring systems/process sensors

At a minimum, the description of each monitor and associated equipment must include the following:

1.The name, model number and manufacturer
2.The location of the sensor(s)
3.A short description of the operating principle
4.The operating range and high value as specified in section 4 of this protocol
5.The instrument specifications, including
i.precision
ii.linearity
iii.zero drift
iv.span drift
6.The output

Operating manuals for each component provided by the supplier should be included as an appendix. The minimum specifications for emission rate monitors and process sensors are described in Section 3 of this protocol.

f.CEMS Data acquisition system

At a minimum, the description of the CEMS data acquisition system (DAS) should include the following, for both the primary and back-up system:

1.The name, model number and manufacturer
2.The location in the plant, including any required equipment for maintaining the proper indoor operating environment for the CEMS DAS
3.A short description of the operating principle
4.The data storage capabilities
5.The backup data storage capabilities
6.The resolution
7.The alarms

Operating manuals for each component provided by the supplier should be included as an appendix.

g.Telemetry devices

The description of the telemetry devices should include the following:

1. The name, model number and manufacturer of the modem
2.A short description of the operating principle
3. The baud rate
4.The error-correcting protocols
5.The telephone lines
6.The dial-back equipment

Operating manuals for each component provided by the supplier should be included as an appendix. Minimum specifications for telemetry systems will be described in the AAQM/CEMS Interface Specification document when it is finalized.

2.2.7 <u>Standard Operating Procedures</u>

This section of the plan must contain the CEMS related standard operating procedures (SOP) that the facility has prepared. These procedures must be sufficiently detailed to allow a person who has a general background in CEM operation to carry out all necessary procedures. These must include the following:

a.The start-up and shut-down procedures
b.The calibration procedure(s)
c.The calculation methodology and data acceptance criteria
d.The preventative maintenance program, including daily, weekly monthly and yearly checks
e.The response to system problems
f.A spare parts inventory to be kept on site
g.The training programs for operators and maintenance
h.The provisions for revision and distribution of SOP documentation

As a minimum, each SOP must include the following:

a.Title
b.Acceptance page
c.Revision number
d.Date of effect
e.Purpose and applicability of the SOP
f.Definitions
g.Health and safety considerations
h.Quality assurance considerations
i.Responsibilities
j.Training and qualifications of personnel

This section must also describe the SOP distribution, disposition of spare copies, and procedures for revising SOPs.

2.2.8 Performance Certification Test Plan

This section of the CEM plan must present the Performance Certification Test Plan to be used in certifying that the CEMS satisfies all applicable performance specifications as described in Sections 4 and 5 of this protocol. Note that this plan does not replace the contractor-specific Performance Certification Source Test Protocol that must be submitted and approved before any performance certification source testing.

At a minimum, the Performance Certification Test Plan must include the following:

a.An identification of the CEMS to be performance certified
b.A list of the performance specifications to be met
c.A description of the procedures to be used in determining the calibration drift (CD), including

1.The type, grade and concentration of calibration gases to be used
2.The point at which calibration gases will be introduced
3.The number of CD assessments to be performed
4.The forms to be used to record results
5.The equations to be used in calculating the CD.

d.A description of the procedures to be used in determining the relative accuracy (RA), including

1.The location of the reference method (RM) sampling points
2.The number of sampling points to be used
3.The reference methods to be used
4.The number of tests to be performed
5.The forms to be used to record results
6.The equations to be used in calculating the RA

e.A description of the contents of the report to be submitted to the District

The performance specifications and test procedures are described in Section 4 of this protocol.

2.2.9 <u>Data Acquisition and Reporting</u>

The seventh section of the plan must include a detailed description of the procedures used in acquiring data from the CEMS, in transforming and averaging those data, in recording the information, and in transmitting the data to the District either through telemetry or periodic reporting. Minimum requirements for data acquisition and reporting are described in Section 6 of this protocol.

a.The first subsection must include a description of the overall data acquisition process.

b.The second subsection must address each analyzer or monitor in the CEMS separately. It must identify the following:

1.The raw data to be acquired from each monitor or sensor, including the operational status
2.The manner in which the data are acquired
3.The rate at which that data will be acquired
4.The number of data points to be used in determining an average value for each parameter

c.The third subsection must address each parameter that must be monitored in order to satisfy permit conditions separately. It must identify the following:

1.The methodology used to calculate each parameter from the raw data
2.The source of all calibration factors used in these calculations, including procedures for altering these factors as a result of automatic or manual calibrations
3.The source of all other factors used in each calculation
4.The equations to be used in calculating all averages, including one-minute, six-minute, sliding one-hour and clock one-hour
5.The flags to be used in determining the number of data points required for a valid average
6.The flags used to indicate whether an average is based on an acceptable number of data points
7.The length of time each parameter will be stored in a form available for polling by the District (where applicable)

d.The next subsection must describe the data-recording procedures, including the following:

1.A list of data to be stored on the primary recording system
2.How and where those data are stored
3.The length of time the data will be kept on record
4.A list of all data stored on the backup recording system
5.How and where those data are stored

6.The length of time the data will be kept on the backup recording system
7.The chain-of-custody procedures

e.The next subsection must address each report that must be prepared by the facility as described in Section 6.2 of this protocol. For each report, the section must describe the following:

1.The contents of each report
2.The format of the report
3.An example output
4.Any equations used in generating the report

f.The next subsection must describe the procedures to be used in validating the data. It must include the following:

1.The personnel responsible for data validation
2.The data validation procedures to be used
3.The criteria for invalidating data
4.The procedures to be followed when data are considered to be invalid

g.The next subsection must describe the format and content of the periodic report to be submitted to the District on a quarterly basis or as required by permit condition. It must include the following:

1.The organization of the report
2.The personnel responsible for its preparation
3.A description of each section of the report, including an example of all summaries
4.The magnetic media specifications
5.The quality assurance/quality control procedures used in preparing the report
6.The chain of custody for all data in the report
7.The time schedule for data submittal

h.The next subsection must describe the contents of the audit report to be submitted after each audit of the CEMS. It must include the following:

1.The organization of the report
2.The personnel responsible for its preparation

3.A description of each section of the report, including an example of all forms
4.The quality assurance/quality control procedures used in preparing the report
5.The chain of custody for all data in the report
6.The time schedule for data submittal

i.The next subsection must describe the data that will be available for telemetry to the District. At a minimum, this section must describe each report that is available for transmission, including the following:

1.The contents of the report
2.The format under which it is stored
3.The length of time data are available for transmission
4.The procedures for polling data, including the following:

i.The dial-up procedures
ii.The re-dial procedures in the event of dial-up failure

j.The next subsection must describe the data-archiving procedures. At a minimum, it must include the following:

1.The data that will be archived
2.The length of time it will be archived
3.The personnel responsible for archiving
4.The chain-of-custody procedures

2.2.10 Quality Assurance/Quality Control

The eighth section of the CEM plan must describe the quality assurance/quality control (QA/QC) procedures that will be used to ensure that the CEMS produces high quality, reliable data. Specific elements required of the QA/QC program are detailed in section 5 of this protocol.

At a minimum, this section of the CEM plan must include the following:

1.An program overview, including its objectives
2.CEMS design features that ensure data quality
3.Criteria used in selecting the sampling location
4.The availability of SOPs

5.The operator training programs to improve data quality
6.Routine and preventative maintenance procedures
7.The quality control procedures, including the following:

i.The frequency and scheduling of calibrations for analyzers
ii.The frequency and scheduling of calibrations for process monitors
iii.The procedures for tracking zero and calibration drift
iv.The criteria for adjusting analyzers
v.The criteria for out-of-control analyzers
vi.The steps to be taken when analyzers are out-of-control including breakdown reporting and procedures
vii.Data status during out-of-control periods

8.The audit procedures, including the following:

i.The frequency and scheduling of audits
ii.The procedures to be used
iii.The criteria for declaring an analyzer out-of-control
iv.The steps to be taken when an analyzer is out-of-control
v.Data status during out-of-control periods

9.The audit plan, including the following:

i.The analyzers that will be audited
ii.The sampling locations
iii.The methods that will be used

3. INSTRUMENT SPECIFICATIONS

3.1 APPLICABILITY

This section indicates the minimum specifications for instruments used in CEMS installed in Santa Barbara County.

3.2GENERAL SPECIFICATIONS FOR POLLUTANT/DILUENT CEMS

3.2.1<u>Sample Probe Specifications, Extractive Systems</u>

A wide variety of sample probe configurations can be used in removing and conditioning stack gases before they are analyzed for phase pollutants or diluents. The configuration depends to a large extent on the nature and condition of the stack gases to be sampled. For this reason, it is important that the supplier of the CEMS be experienced in dealing with similar sources.

Regardless of the conditions in the stack, the following general requirements apply. A sample probe and conditioning system must, at a minimum, do the following:

a.Remove a representative sample from the stack
b.Maintain sample integrity by using appropriate materials of construction such as Teflon or 316 stainless steel
c.Maintain sample temperature above the dew point until the sample is dried or analyzed
d.Filter the sample to remove coarse particulate
e.Filter to remove fine particulate
f.Use a heated Teflon or equivalent sample line to transfer the sample until it is dried or analyzed, except for THC/ROC CEMS which must use a heated line until the sample is analyzed
g.Be capable of automatic and manual probe-tip calibration, with, at a minimum, the calibration gas introduced at the connection between the probe and the sample line

3.2.2 <u>Sample Probe Location</u>

CEMS which measure gas phase pollutants or diluents must be installed at an accessible location where measurements are directly representative of the total emission from the affected facility.

It is suggested that the measurement point be: (1) at least eight stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur and (2) at least two stack diameters upstream from the effluent exhaust or control device. In the case of noncircular stacks, the equivalent stack diameter will be used as the stack diameter.

If it is not possible to meet the above requirements, then as minimum requirements, the measurement point must be: (1) at least two stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and (2) at least a half diameter upstream from the effluent exhaust or control device.

The measurement point inside the stack must be chosen so that the sample is representative of the average concentration inside the stack. The position of the probe may require adjustment based on the results of an assessment of stack gas stratification upon start-up. The following guidelines on positioning the probe apply:

a.Point CEMS. It is suggested that the measurement point be: (1) no less than 1.0 meter from the stack or duct wall or (2) within or centrally located over the centroidal area of the stack or duct cross section.

b.Path CEMS. It is suggested that the effective measurement path: (1) be totally within the inner area bounded by a line 1.0 meter from the stack or duct wall, or (2) have at least 70 percent of the path within the inner 50 percent of the stack or duct cross sectional area, or (3) be centrally located over any part of the centroidal area.

3.2.3 <u>CEMS Analyzer Location</u>

The CEMS analyzers and other environmentally sensitive components must be located so that they are as close as practical to the sampling point and easily accessible.

These CEMS components must be housed in an environmentally controlled shelter that protects the instrumentation from extremes of temperature, moisture, and corrosive gases.

3.2.4 Dilution Systems (where applicable)

It is recommended that the CEMS use an analyzer that can measure the full range of pollutant/diluent concentration without sample dilution. If this is not possible, mass flow-controlled dilution systems are recommended. Critical orifice-controlled dilution systems are acceptable. Rotameter-controlled dilution systems are not acceptable.

3.2.5 Calibration Requirements

Calibration sequence must be automated and capable of both computer and manual initiation.

Calibration gases are to be prepared according to EPA Traceability Protocol G-1 and must be introduced at or near the probe tip.

3.3 ANALYZER SPECIFICATIONS

3.3.1 NO_x Analyzer Specifications

NO_x analyzers must meet minimum specifications as follows:

a.Precision	1% of full scale
b.Noise	1% of full scale
c.Zero drift (24 hours)	1% of f.s. or 1 ppm
d.Span drift (24 hours)	1% of full scale
e.Linearity	1%
f.Lag time	5 seconds
g.Response time	90 seconds
h.Normal operating range	10-35 ^oC
i.Humidity range	5-95%

3.3.2 SO_2 Analyzer Specifications

SO_2 analyzers must meet minimum specifications as follows:

a. Precision	1% of full scale
b. Noise	1% of full scale
c. Zero drift (24 hours)	2% of f.s. or 1 ppm
d. Span drift (24 hours)	2% of full scale
e. Linearity	1%
f. Lag time	5 seconds
g. Response time	90 seconds
h. Normal operating range	10-35 °C
i. Humidity range	5-95%

3.3.3 O_2 Analyzer Specifications

O_2 analyzers must meet minimum specifications as follows:

a. Precision	1% of full scale
b. Noise	1% of full scale
c. Zero drift (24 hours)	2% of full scale
d. Span drift (24 hours)	2% of full scale
e. Linearity	1%
f. Lag time	5 seconds
g. Response time	90 seconds
h. Normal operating range	10-35 °C
i. Humidity range	5-95%

3.3.4 CO_2 Analyzer Specifications

CO_2 analyzers must meet minimum specifications as follows:

a. Precision	1% of full scale
b. Noise	1% of full scale
c. Zero drift (24 hours)	2% of full scale
d. Span drift (24 hours)	2% of full scale
e. Linearity	1%
f. Lag time	5 seconds
g. Response time	90 seconds
h. Normal operating range	10-35 °C
i. Humidity range	5-95%

3.3.5 CO Analyzer Specifications

CO analyzers must meet minimum specifications as follows:

a.Precision	1% of full scale
b.Noise	1% of full scale
c.Zero drift (24 hours)	1% of f.s. or 1 ppm
d.Span drift (24 hours)	1% of full scale
e.Linearity	1%
f.Lag time	5 seconds
g.Response time (90%)	90 seconds
h.Normal operating range	15-35 °C
i.Humidity range	5-95%

3.3.6 **<u>TRS Analyzer Specifications</u>**

TRS analyzers that remove any SO_2 from the stack gas, convert TRS to SO_2 by catalytic or thermal oxidation, and analyze the resulting SO_2 must meet the minimum specifications for SO_2 analyzers, which are as follows:

a.Precision	1% of full scale
b.Noise	1% of full scale
c.Zero drift (24 hours)	2% of f.s. or 1 ppm
d.Span drift (24 hours)	2% of full scale
e.Linearity	1%
f.Lag time	5 seconds
g.Response time	90 seconds
h.Normal operating range	10-35 °C
i.Humidity range	5-95%

In addition, the following specifications must be met:

a.SO_2 removal efficiency of the SO_2 scrubber must be sufficient to reduce SO_2 concentrations to the equivalent of 1 percent of any applicable TRS standard.

b.The efficiency of oxidation of TRS to SO_2 must be at least 95 percent.

TRS analyzers that use gas chromatographic separation of the TRS components followed by flame photometric detection of the eluded species must meet the following minimum specifications:

a.Precision	5%
b.Zero drift (24 hours)	1% of f.s. or 1ppm
c.Span drift (24 hours)	1% of full scale
d.Linearity	1%
e.Cycle time	15 minutes
f.Normal operating range	10-35 ^{o}C
g.Humidity range	5-95%

In addition, these analyzers must be capable of separating all reduced sulfur compounds of interest including hydrogen sulfide, carbonyl sulfide, carbon disulfide, methyl mercaptan, dimethyl sulfide and dimethyl disulfide and must be free from interferences from SO_2.

3.3.7 <u>H_2S Analyzer Specifications</u>

H_2S analyzers that remove any SO_2 from the stack gas, convert H_2S to SO_2 by catalytic or thermal oxidation, and analyze the resulting SO_2 must meet the minimum specifications for SO_2 analyzers, which are as follows:

a.Precision	1% of full scale
b.Noise	1% of full scale
c.Zero drift (24 hours)	2% of f.s. or 1 ppm
d.Span drift (24 hours)	2% of full scale
e.Linearity	1%
f.Lag time	5 seconds
g.Response time	90 seconds
h.Normal operating range	10-35 ^{o}C
i.Humidity range	5-95%

In addition, the following specifications must be met:

a.SO_2 removal efficiency of the SO_2 scrubber must be sufficient to reduce SO_2 concentrations to the equivalent of 1 percent of any applicable H_2S standard.

b.The efficiency of oxidation of H_2S to SO_2 must be at least 95 percent.

H_2S analyzers that measure H_2S via reaction with a lead acetate tape must as a minimum, meet the following specifications:

a.Precision ±2% of full scale
b.Zero drift (24 hours)±1% of f.s. or 1 ppm
c.Span drift (24 hours) ±2% of full scale
d.Linearity ±2% of full scale
f.Response time 3 minutes
g.Normal operating range10-140^{o}C

3.3.8 Total Hydrocarbon (THC) / Reactive Organic Compound (ROC) Analyzer Specifications

THC/ROC analyzers which do not speciate the sample must meet minimum specifications as follows:

a. Precision 1% of full scale
b. Noise 1% of full scale
c. Zero drift (24 hours) 1% of f.s. or 1 ppm
d. Span drift (24 hours) 1% of full scale
e. Linearity 1%
f. Lag time 10 seconds
g. Response time 60 seconds
h. Normal operating range 10-35 °C
i. Humidity range 5-95%

In addition, these analyzers must provide for complete separation of methane and nonmethane compounds.

Analyzers that separate the components of interest using gas chromatography followed by flame ionization detection or equivalent technique must meet the following specifications:

a. Precision 2% of full scale
b. Zero drift (24 hours) 1% of f.s. or 1 ppm
c. Span drift (24 hours) 1% of full scale
d. Linearity 1%
e. Cycle time 10 minutes
f. Normal operating range 10-35 °C
g. Humidity range 5-95%

3.4 SPECIFICATIONS FOR FLOW RATE MONITORS/SENSORS

3.4.1 Flow Sensor Location

Stack flow rate/process sensors must be installed at an accessible location where measurements are directly representative of the total emission from the affected facility.

It is suggested that the measurement point be (1) at least eight stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and (2) at least two stack diameters upstream from the effluent exhaust or control device. In the case of noncircular stacks, the equivalent stack diameter will be used as the stack diameter.

If it is not possible to meet the above requirements, then as minimum requirements, the measurement point must be (1) at least two stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and (2) at least a half stack diameter upstream from the effluent exhaust or control device.

The measurement point inside the stack must be chosen so that the sample is representative of the average mass flow inside the stack.

3.4.2 Sensor Specifications

Devices installed as part of a Stack Flow Rate Monitor, such as velocity, temperature and pressure sensors, must meet minimum specifications as follows:

a. Precision	1% full scale
b. Linearity	1% full scale
c. Zero drift (24 hours)	1% full scale
d. Span drift (24 hours)	2% full scale

3.5 SPECIFICATIONS FOR CEMS DATA ACQUISITION SYSTEMS

3.5.1 Primary Storage System

Each CEMS must be able to store data in digital form. The system used must meet the specifications provided in the Data Logger Specifications for the Santa Barbara County Air Pollution Control District Data Acquisition System.

3.5.2 Backup Data Recording System

Each CEM must be equipped with a backup data acquisition system consisting of continuous strip chart recorders. The facility must archive all strip chart records for at least two years. The recorders must meet the following minimum requirements:

a. Minimum chart speed of 1 inch/hour
b. Date and time must be clearly indicated on the strip chart
c. Span must be set to 1.5 times the value which corresponds to any limit set in a permit condition. If no such limit is applicable, the range must be chosen so that the maximum anticipated value will be within the recorder range.
d. Resolution of 0.5 percent of full scale

3.6 SPECIFICATIONS FOR TELEMETRY EQUIPMENT

Telemetry equipment must meet the requirements of the Data Logger Specifications for the Santa Barbara County Air Pollution Control District Data Acquisition System. A copy of this document is available from the District. Note that the document pertains to data loggers for CEMS and ambient air quality monitors (AAQM). Portions of the document applicable to AAQM may not apply to CEMS.

4. PERFORMANCE SPECIFICATIONS AND TEST PROCEDURES

4.1 APPLICABILITY

The following performance specifications are to be used for evaluating the acceptability of the applicable CEMS at the **time of or soon after installation** and whenever required thereafter as part of the quality assurance procedures described in Section 5 of this protocol.

4.2 PRINCIPLE

This protocol establishes certain performance specifications that CEMS installed in the County of Santa Barbara must meet. In order to ensure that these performance specifications are met during actual operation of the CEMS, a series of performance specification tests are carried out upon initial operation of the CEMS. Also, audits as described in Section 5 will be performed on the CEMS at regular intervals. In addition to tests carried out to determine Zero and Span Calibration Drift, pollutant concentrations and certain process parameters are measured using reference methods, concurrent with the operation of the CEMS. The CEMS data will be compared to the reference method data to determine the Relative Accuracy of the CEMS. For CEMS which verify compliance with concentration and emission rate limits, the Relative Accuracy of the CEMS must be verified on both bases.

4.3 PERFORMANCE SPECIFICATIONS AND TEST PROCEDURES FOR NO_x CEMS

4.3.1 <u>Applicability</u>

This specification is to be used to evaluate the acceptability of each NO_x CEMS installed in the County of Santa Barbara. For certain stationary sources, the NO_x CEMS may include a diluent (O_2 or CO_2) monitor.

4.3.2 <u>Performance Specifications</u>

Each CEMS used to monitor NO_x in Santa Barbara County must meet the following minimum specifications:

a. The CEMS response range must include zero and a high value. For a CEMS to measure an uncontrolled emission, the high value must be between 1.25 and 2 times the average potential emission level. The facility is responsible for ensuring that the CEMS response range is adequate. If actual concentrations are such that the analyzer response is either off scale or less than 5 percent of full scale on a regular basis, the District can require that the range be changed. For a CEMS installed to measure controlled emissions or emissions that are in compliance with an applicable regulation, the high value must be between 1.5 times the pollutant concentration corresponding to the emission standard and the span value. The data recorder output must be established so that the high level value is read between 90 and 100 percent of the data recorder full scale. (This scale requirement may not be applicable to digital data recorders.)

b.Zero and Span Calibration Drift for any given 24-hour period during the seven day drift test must not deviate from the reference value of the gas cylinder, gas cell, or optical filter by more than 2.5 percent of the span value. If the CEMS includes pollutant and diluent monitors, the Zero and Span Calibration Drift must be determined separately for each in terms of concentrations. Performance certification test procedures for diluent monitors are described in Sections 4.5 and 4.6.

c.Relative Accuracy must be no greater than 20 percent of the mean value of the RM test data in terms of the units of the emission standard or 10 percent of the applicable standard, whichever is greater.

4.3.3 <u>Reference Method (RM) Measurement Location and Traverse Points</u>

Select an accessible RM measurement point at least eight diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two stack diameters upstream from the effluent exhaust or control device. If no such location is available, the minimum distance is at least two stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two diameters upstream from the effluent exhaust or control device. The CEMS and RM locations need not be the same, however, the RM location must be chosen such that a representative sample can be obtained.

Select traverse points that assure acquisition of representative samples over the stack or duct cross section. The minimum requirements are as follows: Establish a "measurement line" that passes through a centroidal area in the direction of any expected stratification. If this line interferes with the CEMS measurements, displace the line up to 30 cm (or 5 percent of the stack diameter of the cross section, whichever is less) from the centroidal area. Locate three traverse points at 16.7, 50.0, and 83.3 percent of the measurement line. If the measurement line is longer than 2.4 meters and pollutant stratification is not expected, the tester may choose to locate the three traverse points on the line at 0.4, 1.2, and 2.0 meters from the stack or duct wall. This option must not be used after wet scrubbers or at points where two streams with different pollutant concentrations are combined. The tester may select other traverse points, provided that they can be shown, to the satisfaction of the District, to provide a representative sample over the stack or duct cross section. Conduct all necessary RM tests within 3 cm of the traverse points (but no less than 3 cm from the stack or duct wall).

4.3.4 <u>Performance Specification Test Procedures</u>

a. Principle: The concentration of oxides of nitrogen pollutants in stack emissions and, where appropriate, the concentration of a diluent gas will be measured by a continuously operating emission measurement system. Concurrent with operation of the continuous monitoring system, the appropriate parameters will also be measured with reference methods. An average of the continuous monitoring system data will be computed for each reference method testing period and compared with those from the reference methods to determine the Relative Accuracy of the continuous monitoring system. Other tests of the continuous monitoring system will also be performed to determine Zero and Span Calibration Drift.

b. The following apparatus are required:

1. Calibration Gas Mixture. A mixture of known concentration of pollutant gas in a diluent gas must be prepared according to EPA Traceability Protocol G-1. The

pollutant gas must be the appropriate oxide(s) of nitrogen. For nitric oxide (NO) gas mixtures, the diluent gas must be oxygen-free nitrogen, i.e., nitrogen with less than 10 ppm oxygen; for nitrogen dioxide (NO_2) gas mixtures the diluent gas must be air. A concentration of approximately 90 percent of full scale is required. The 90 percent gas mixture, which is referred to as the span gas, will be used to set and to check the span. Alternatively, a span gas value between 50 and 100 percent of full scale may be used.

2.Zero Gas. A gas certified by the manufacturer to contain less than 1 ppm NO_x must be used.

3.Equipment for measurement of the pollutant gas concentration using the reference method specified in EPA Method 7E.

4.Data Recorder. An analog chart recorder or other suitable device with input voltage range compatible with analyzer system output must be used. The resolution of the recorder's data output must be sufficient to allow completion of the test procedures within the specification.

c.The following Zero and Span Calibration Drift test procedures are to be used:

1.While the affected facility is operated at more than 50 percent of normal load, determine the magnitude of the CD once each day (24-hour interval) for seven consecutive days.

2.For extractive systems;

i.Introduce the zero and span calibration gases. Adjust the analyzer zero and span if necessary. Record the zero and span calibration results (after adjustment) on a standard data sheet such as the one described by Figure 2 of Appendix A.

ii. 24-hours later, re-introduce the zero and span calibration gases and record the CEMS response. Note, the analyzer is not adjusted before recording the data.

iii. Calculate the Zero and Span Calibration Drift for each of the seven 24-hour periods as shown in Appendix C.

3. For nonextractive measurement systems;

i. Determine the zero value by mechanically producing a zero condition that provides a system check of the analyzer's internal mirrors and all electronic circuitry, including the radiation source and detector assembly or by inserting three or more calibration gas cells and computing the zero point from the upscale measurements. If this latter technique is used, retain a graph(s) for each measurement system that shows the relationship between the upscale measurements and the zero point. Check the span of the system using a calibration gas cell certified by the manufacturer to be functionally equivalent to 50 percent of span concentration. Adjust the analyzer if necessary. Record the zero and span calibration results on a standard data sheet such as the one described by Figure 2 of Appendix A.

ii. 24-hours later, re-check the zero and span response prior to any instrument adjustments. Record the zero and span response.

iii. Calculate the Zero and Span Calibration Drift for each of the seven 24-hour periods as shown in Appendix C.

4. During the test period, zero and calibration corrections and adjustments are allowed only at 24-hour intervals or at such shorter intervals as the manufacturer's written instructions specify. Conduct the CD test

immediately before these adjustments or conduct it in such a way that the CD can be determined.

d.The following Relative Accuracy test procedures are to be used:

1.Unless otherwise approved by the District, EPA Reference Method 7E or an approved alternative is the reference method for NO_x, while EPA Reference Method 3A or an approved alternative is the reference method for diluent (O_2 or CO_2) gases. If moisture measurements are required, carry them out using EPA Reference Method 4.

2.Number of RM tests. Conduct a minimum of nine sets of all necessary RM tests. Conduct each set within a period of 30 to 60 minutes. The tester may choose to perform more than nine sets of RM tests. If this option is chosen, the tester may reject a maximum of three sets of the test results, so long as the total number of test results used to determine the RA is greater than or equal to nine. Data for all points must be reported, including the rejected data.

3.Sampling strategy for RM tests. Conduct the RM tests in such a way that they will yield results representative of the emissions from the source and can be correlated to the CEMS data. Although it is preferable to conduct the diluent (if applicable), moisture (if needed), and pollutant measurements simultaneously, the diluent and moisture measurements that are taken within a 30- to 60-minute period that includes the pollutant measurements, may be used to calculate dry pollutant concentration.

4.In order to correlate the CEMS and RM data properly, mark the beginning and end of each RM test period of each run (including the exact time of the day) on the CEMS chart recordings or other permanent record of output.

5.For Method 4, make a sample traverse of at least 21 minutes, sampling for 7 minutes at each of the three traverse points as described in 4.3.3.

6.Record the results of the RM tests and the concurrent analyzer response on a data sheet similar to Figure 3 of Appendix A.

7.In cases when the mean of the RM values is less than 20 % of the span value of the CEMS, the District may require that a CGA be performed instead of an RATA. (This will be decided on a case by case basis.)

The procedures for calculating Zero and Span Calibration Drift and Relative Accuracy are described in Appendix C.

4.4PERFORMANCE SPECIFICATIONS AND TEST PROCEDURES FOR SO_2 CEMS

4.4.1<u>Applicability</u>

This specification is to be used to evaluate the acceptability of each SO_2 CEMS installed in the County of Santa Barbara. For certain stationary sources, the SO_2 CEMS may include a diluent (O_2 or CO_2) monitor.

4.4.2<u>Performance Specifications</u>

Each CEMS used to monitor SO_2 in Santa Barbara County must meet the following minimum specifications:

a.The CEMS response range must include zero and a high value. For a CEMS to measure an uncontrolled emission, the high value must be between 1.25 and 2 times the average potential emission level. The facility is responsible for ensuring that the CEMS response range is adequate. If actual concentrations are such that the analyzer response is either off scale or less than 5 percent of full scale on a regular basis, the District can require that the range be changed. For a CEMS installed to measure controlled emissions or emissions that are in compliance with an applicable regulation, the high value must be between 1.5 times the pollutant concentration corresponding to the emission standard and the span value. The data recorder output must be established so that the high level value is read between 90 and 100 percent of the data recorder full scale. (This scale requirement may not be applicable to digital data recorders.)

b.Zero and Span Calibration Drift for any given 24-hour period during the seven day drift test must not deviate from the reference value of the gas cylinder, gas cell, or optical filter by more than 2.5 percent of the span value. If the CEMS includes pollutant and diluent monitors, the Zero and Span Calibration Drift must be determined separately for each in terms of concentrations. Performance certification test procedures for diluent monitors are described in Sections 4.5 and 4.6.

c.Relative Accuracy must be no greater than 20 percent of the mean value of the RM test data in terms of the units of the emission standard or 10 percent of the applicable standard, whichever is greater. For SO_2 emissions between 130 and 86 ng/J (0.30 and 0.20 lb/million Btu), use 15 percent of the applicable standard; below 86 ng/J (0.20 lb/million Btu), use 20 percent of the applicable standard.

4.4.3 Reference Method (RM) Measurement Location and Traverse Points

Select an accessible RM measurement point at least eight diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two diameters upstream from the effluent exhaust or control device. If no such location is available, the minimum distance is at least two diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two diameters upstream from the effluent exhaust or control device. The CEMS and RM locations need not be the same, however, the RM location must be chosen such that a representative sample can be obtained.

Select traverse points that assure acquisition of representative samples over the stack or duct cross section. The minimum requirements are as follows:

Establish a "measurement line" that passes through a centroidal area in the direction of any expected stratification. If this line interferes with the CEMS measurements, displace the line up to 30 cm (or 5 percent of the diameter of the cross section, whichever is less) from the centroidal area. Locate three traverse points at 16.7, 50.0, and 83.3 percent of the measurement line. If the measurement line is longer than 2.4 meters and pollutant stratification is not expected, the tester may choose to locate the three traverse points on the line at 0.4, 1.2, and 2.0 meters from the stack or duct wall. This option must not be used after wet scrubbers or at points where two streams with different pollutant concentrations are combined. The tester may select other traverse points, provided that they can be shown, to the satisfaction of the District, to provide a representative sample over the stack or duct cross section. Conduct all necessary RM tests within 3 cm of the traverse points (but no less than 3 cm from the stack or duct wall).

4.4.4 <u>Performance Specification Test Procedures</u>

a. Principle: The concentration of SO_2 in stack emissions and, where appropriate, the concentration of a diluent gas will be measured by a continuously operating emission measurement system. Concurrent with operation of the continuous monitoring system, the pollutant concentrations will also be measured with reference methods. An average of the continuous monitoring system data will be computed for each reference method testing period and compared with those from the reference methods to determine the Relative Accuracy of the continuous monitoring system. Other tests of the continuous monitoring system will also be performed to determine Zero and Span Calibration Drift.

b. The following apparatus are required:

1. Calibration Gas Mixture. A mixture of known concentration of pollutant gas in a diluent gas must be prepared according to EPA Traceability Protocol G-1. The diluent gas may be air or nitrogen. A concentration of approximately 90 percent of span is required. The 90 percent gas mixture, which is referred to as the span gas, will be used to set and to check the span.

Alternatively, a span gas value between 50 and 100 percent of full scale may be used.

2.Zero Gas. A gas certified by the manufacturer to contain less than 1 ppm SO_2 must be used.

3.Equipment for measurement of the pollutant gas concentration using the reference method specified in EPA Method 6C.

4.Data Recorder. An analog chart recorder or other suitable device with input voltage range compatible with analyzer system output must be used. The resolution of the recorder's data output must be sufficient to allow completion of the test procedures within the specification.

c.The following Zero and Span Calibration Drift test procedures are to be used:

1.While the affected facility is operated at more than 50 percent of normal load, determine the magnitude of the CD once each day (24-hour interval) for seven consecutive days.

2.For extractive systems;

i.Introduce the zero and span calibration gases. Adjust the analyzer zero and span if necessary. Record the zero and span calibration results (after adjustment) on a standard data sheet such as the one described by Figure 2 of Appendix A.

ii.24-hours later, re-introduce the zero and span calibration gases and record the CEMS response. Note, the analyzer is not adjusted before recording the data.

iii.Calculate the Zero and Span Calibration Drift for each of the seven 24-hour periods as shown in Appendix C.

3.For nonextractive measurement systems;

i.Determine the zero value by mechanically producing a zero condition that provides a system check of the analyzer's internal mirrors and all electronic circuitry, including the radiation source and detector assembly or by inserting three or more calibration gas cells and computing the zero point from the upscale measurements. If this latter technique is used, retain a graph(s) for each measurement system that shows the relationship between the upscale measurements and the zero point. Check the span of the system using a calibration gas cell certified by the manufacturer to be functionally equivalent to 50 percent of span concentration. Adjust the analyzer if necessary. Record the zero and span calibration results on a standard data sheet such as the one described by Figure 2 of Appendix A..

ii.24-hours later, re-check the zero and span response prior to any instrument adjustments. Record the zero and span response.

iii.Calculate the Zero and Span Calibration Drift for each of the seven 24-hour periods as shown in Appendix C.

4.During the test period, zero and calibration corrections and adjustments are allowed only at 24-hour intervals or at such shorter intervals as the manufacturer's written instructions specify. Conduct the CD test immediately before these adjustments or conduct it in such a way that the CD can be determined.

d.The following Relative Accuracy test procedures are to be used:

1.Unless otherwise approved by the District, EPA Reference Method 6C or an approved alternative is the reference method for SO_2, while EPA Reference Method 3A or an approved alternative is the reference method for diluent (O_2 or CO_2) gases. If moisture measurements are required, carry them out using EPA Reference Method 4.

2.Number of RM tests. Conduct a minimum of nine sets of all necessary RM tests. Conduct each set within a period of 30 to 60 minutes. The tester may choose to perform more than nine sets of RM tests. If this option is chosen, the tester may reject a maximum of three sets of the test results, as long as the total number of test results used to determine the RA is greater than or equal to nine. Data for all points must be reported, including the rejected data.

3.Sampling strategy for RM tests. Conduct the RM tests in such a way that they will yield results representative of the emissions from the source and can be correlated to the CEMS data. Although it is preferable to conduct the diluent (if applicable), moisture (if needed), and pollutant measurements simultaneously, the diluent and moisture measurements that are taken within a 30- to 60-minute period that includes the pollutant measurements, may be used to calculate dry pollutant concentration.

4.To correlate the CEMS and RM data properly, mark the beginning and end of each RM test period of each run (including the exact time of the day) on the chart recordings or other permanent record of output.

5.For Method 4, make a sample traverse of at least 21 minutes, sampling for 7 minutes at each of the three traverse points as described in 4.4.3.

6.Record the results of the RM tests and the concurrent analyzer response on a data sheet similar to Figure 3 of Appendix A.

7.In cases when the mean of the RM values is less than 20 percent of the span value of the CEMS, the District may require that a CGA be performed instead of an RATA. (This will be decided on a case by case basis.)

The procedures for calculating Zero and Span Calibration Drift and Relative Accuracy are described in Appendix C.

4.5 PERFORMANCE SPECIFICATIONS AND TEST PROCEDURES FOR O_2 CEMS

4.5.1 Applicability

This specification is to be used to evaluate the acceptability of each O_2 CEMS installed in the County of Santa Barbara that is not required to meet the performance specification for NO_x or SO_2 CEMS.

4.5.2 Performance Specifications

Each CEMS used to monitor O_2 in Santa Barbara County must meet the following minimum specifications:

a. The CEMS response range must include zero and a high value. The high value must be between 1.25 and 2 times the average potential concentration of O_2 in the stack gases or 21 percent, whichever is less. The facility is responsible for ensuring that the CEMS response range is adequate. If actual concentrations are such that the analyzer response is either off scale or less than 5 percent of full scale on a regular basis, the District can require that the range be changed. The data recorder output must be established so that the high level value is read between 90 and 100 percent of the data recorder full scale. (This scale requirement may not be applicable to digital data recorders.)

b. Zero and Span Calibration Drift for any given 24-hour period during the seven day drift test must not deviate by more than 0.5 percent O_2 from the reference value of the gas, gas cell, or optical filter.

c. Relative Accuracy must be no greater than 20 percent of the mean value of the RM test data or 1 percent O_2, whichever is greater.

4.5.3 Reference Method (RM) Measurement Location and Traverse Points

a. Select an accessible RM measurement point at least eight stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two stack diameters upstream from the effluent exhaust or control device. If no such location is available, the minimum distance is at least two stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two diameters upstream from the effluent exhaust or control device. The CEMS and RM locations need not be the same, however, the RM location must be chosen such that a representative sample can be obtained.

b.Select traverse points that assure acquisition of representative samples over the stack or duct cross section. The minimum requirements are as follows: Establish a "measurement line" that passes through a centroidal area in the direction of any expected stratification. If this line interferes with the CEMS measurements, displace the line up to 30 cm (or 5 percent of the diameter of the cross section, whichever is less) from the centroidal area. Locate three traverse points at 16.7, 50.0, and 83.3 percent of the measurement line. If the measurement line is longer than 2.4 meters and pollutant stratification is not expected, the tester may choose to locate the three traverse points on the line at 0.4, 1.2, and 2.0 meters from the stack or duct wall. This option must not be used after wet scrubbers or at points where two streams with different pollutant concentrations are combined. The tester may select other traverse points, provided that they can be shown, to the satisfaction of the District, to provide a representative sample over the stack or duct cross section. Conduct all necessary RM tests within 3 cm of the traverse points (but no less than 3 cm from the stack or duct wall).

4.5.4 <u>Performance Specification Test Procedures</u>

a.Principle: The concentration of O_2 in stack emissions will be measured by a continuously operating emission measurement system. Concurrent with operation of the continuous monitoring system, the pollutant concentrations will also be measured with reference methods. An average of the continuous monitoring system data will be computed for each reference method testing period and compared with those from the reference methods to determine the Relative Accuracy of the continuous monitoring system. Other tests of the continuous monitoring system will also be performed to determine Zero and Span Calibration Drift.

b.The following apparatus are required:

1.Calibration Gas Mixtures. A concentration of approximately 90 percent of span is required. The 90 percent gas mixture, which is referred to as the span gas, will be used to set and to check the span. If the span is higher than 21 percent O_2, ambient air may be used in place of the 90 percent of span calibration gas mixture. Alternatively, a span gas value between 50 and 100 percent of full scale may be used.

2.Zero Gas. A gas certified by the manufacturer to contain less than 100 ppm O_2 must be used.

3.Equipment for measurement of the pollutant gas concentration using the reference method specified in EPA Method 3A.

4.Data Recorder. An analog chart recorder or other suitable device with input voltage range compatible with analyzer system output must be used. The resolution of the recorder's data output must be sufficient to allow completion of the test procedures within the specification.

c.The following Zero and Span Calibration Drift test procedures are to be used:

1.While the affected facility is operated at more than 50 percent of normal load, determine the magnitude of the CD once each day (24-hour interval) for seven consecutive days.

2.For extractive systems;

i.Introduce the zero and span calibration gases. Adjust the analyzer zero and span if necessary. Record the zero and span calibration results (after adjustment) on a standard data sheet such as the one described by Figure 2 of Appendix A.

ii.24-hours later, re-introduce the zero and span calibration gases and record the CEMS response. Note, the analyzer is not adjusted before recording the data.

iii.Calculate the Zero and Span Calibration Drift for each of the seven 24-hour periods as shown in Appendix C.

3.For nonextractive measurement systems;

i.Determine the zero value by mechanically producing a zero condition that provides a system check of the analyzer's internal mirrors and all electronic circuitry, including the radiation source and detector assembly or by inserting three or more calibration gas cells and computing the zero point from the upscale measurements. If this latter technique is used, retain a graph(s) for each measurement system that shows the relationship between the upscale measurements and the zero point. Check the span of the system using a calibration gas cell certified by the manufacturer to be functionally equivalent to 50 percent of span concentration. Adjust the analyzer if necessary. Record the zero and span calibration results on a standard data sheet such as the one described by Figure 2 of Appendix A.

ii.24-hours later, re-check the zero and span response prior to any instrument adjustments. Record the zero and span response.

iii.Calculate the Zero and Span Calibration Drift for each of the seven 24-hour periods as shown in Appendix C.

4.During the test period, zero and calibration corrections and adjustments are allowed only at 24-hour intervals or at such shorter intervals as the manufacturer's written instructions specify. Conduct the CD test immediately before these adjustments or conduct it in such a way that the CD can be determined.

d.The following Relative Accuracy test procedures are to be used:

1.Unless otherwise approved by the District, EPA Reference Method 3A or an approved alternative is the reference method for O_2.

2.Number of RM tests. Conduct a minimum of nine sets of all necessary RM tests. Conduct each set within a period of 30 to 60 minutes. The tester may choose to perform more than nine sets of RM tests. If this option is chosen, the tester may reject a maximum of three sets of the test results, so long as the total number of test results used to determine the RA is greater than or equal to nine. Data for all points must be reported, including the rejected data.

3.Sampling strategy for RM tests. Conduct the RM tests in such a way that they will yield results representative of the emissions from the source and can be correlated to the CEMS data.

4.In order to correlate the CEMS and RM data properly, mark the beginning and end of each RM test period of each run (including the exact time of the day) on the CEMS chart recordings or other permanent record of output.

5.Record the results of the RM tests and the concurrent analyzer response on a data sheet similar to Figure 3 of Appendix A.

The procedures for calculating Zero and Span Calibration Drift and Relative Accuracy are described in Appendix C.

4.6PERFORMANCE SPECIFICATIONS AND TEST PROCEDURES FOR CO_2 CEMS

4.6.1Applicability

This specification is to be used to evaluate the acceptability of each CO_2 CEMS installed in the County of Santa Barbara.

4.6.2Performance Specifications

Each CEMS used to monitor CO_2 in Santa Barbara County must meet the following minimum specifications:

a.The CEMS response range must include zero and a high value. The high value must be between 1.25 and 2 times the average potential concentration of CO_2 in the stack gases. The facility is responsible for ensuring that the CEMS response range is adequate. If actual concentrations are such that the analyzer response is either off scale or less than 5 percent of full scale on a regular basis, the District can require that the range be changed. The data recorder output must be established so that the high level value is read between 90 and 100 percent of the data recorder full scale. (This scale requirement may not be applicable to digital data recorders.)

b.Zero and Span Calibration Drift for any given 24-hour period during the seven dat drift test must not deviate by more than 0.5 percent CO_2 from the reference value of the gas, gas cell, or optical filter.

c.Relative Accuracy must be no greater than 20 percent of the mean value of the RM test data or 1 percent CO_2, whichever is greater.

4.6.3Reference Method (RM) Measurement Location and Traverse Points

Select an accessible RM measurement point at least eight stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two stack diameters upstream from the effluent exhaust or control device. If no such location is available, the minimum distance is at least two stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two diameters upstream from the effluent exhaust or control device. The CEMS and RM locations need not be the same, however, the RM location must be chosen such that a representative sample can be obtained

Select traverse points that assure acquisition of representative samples over the stack or duct cross section. The minimum requirements are as follows: Establish a "measurement line" that passes through a centroidal area in the direction of any expected stratification. If this line interferes with the CEMS measurements, displace the line up to 30 cm (or 5 percent of the diameter of the cross section, whichever is less) from the centroidal area. Locate three traverse points at 16.7, 50.0, and 83.3 percent of the measurement line. If the measurement line is longer than 2.4 meters and pollutant stratification is not expected, the tester may choose to locate the three traverse points on the line at 0.4, 1.2, and 2.0 meters from the stack or duct wall. This option must not be used after wet scrubbers or at points where two streams with different pollutant concentrations are combined. The tester may select other traverse points, provided that they can be shown to the satisfaction of the District to provide a representative sample over the stack or duct cross section. Conduct all necessary RM tests within 3 cm of the traverse points (but no less than 3 cm from the stack or duct wall).

4.6.4 Performance Specification Test Procedures

a. Principle: The concentration of CO_2 in stack emissions will be measured by a continuously operating emission measurement system. Concurrent with operation of the continuous monitoring system, the pollutant concentrations will also be measured with reference methods. An average of the continuous monitoring system data will be computed for each reference method testing period and compared with those from the reference methods to determine the Relative Accuracy of the continuous monitoring system. Other tests of the continuous monitoring system will also be performed to determine Zero and Span Calibration Drift.

b.The following apparatus are required:

1.Calibration Gas Mixture. A concentration of approximately 90 percent of span is required. The 90 percent gas mixture, which is referred to as the span gas, will be used to set and to check the span. Alternatively, a span gas value between 50 and 100 percent of full scale may be used.

2.Zero Gas. A gas certified by the manufacturer to contain less than 100 ppm CO_2 must be used.

3.Equipment for measurement of the pollutant gas concentration using the reference method specified in EPA Method 3A.

4.Data Recorder. An analog chart recorder or other suitable device with input voltage range compatible with analyzer system output must be used. The resolution of the recorder's data output must be sufficient to allow completion of the test procedures within the specification.

c.The following Zero and Span Calibration Drift test procedures are to be used:

1.While the affected facility is operated at more than 50 percent of normal load, determine the magnitude of the CD once each day (24-hour interval) for seven consecutive days.

2.For extractive systems;

i.Introduce the zero and span calibration gases. Adjust the analyzer zero and span if necessary. Record the zero and span calibration results (after adjustment) on a standard data sheet such as the one described by Figure 2 of Appendix A.

ii.24-hours later, re-introduce the zero and span calibration gases and record the CEMS response. Note, the analyzer is not adjusted before recording the data.

iii.Calculate the Zero and Span Calibration Drift for each of the seven 24-hour periods as shown in Appendix C.

3.For nonextractive measurement systems;

i.Determine the zero value by mechanically producing a zero condition that provides a system check of the analyzer's internal mirrors and all electronic circuitry, including the radiation source and detector assembly or by inserting three or more calibration gas cells and computing the zero point from the upscale measurements. If this latter technique is used, retain a graph(s) for each measurement system that shows the relationship between the upscale measurements and the zero point. Check the span of the system using a calibration gas cell certified by the manufacturer to be functionally equivalent to 50 percent of span concentration. Adjust the analyzer if necessary. Record the zero and span calibration results on a standard data sheet such as the one described by Figure 2 of Appendix A.

ii.24-hours later, re-check the zero and span response prior to any instrument adjustments. Record the zero and span response.

iii.Calculate the Zero and Span Calibration Drift for each of the seven 24-hour periods as shown in Appendix C.

4.During the test period, zero and calibration corrections and adjustments are allowed only at 24-hour intervals or at such shorter intervals as the manufacturer's written instructions specify. Conduct the CD test immediately before these adjustments or conduct it in such a way that the CD can be determined.

d.The following Relative Accuracy test procedures are to be used:

1.Unless otherwise approved by the District, EPA Reference Method 3A or an approved alternative is the reference method for CO_2.

2.Number of RM tests. Conduct a minimum of nine sets of all necessary RM tests. Conduct each set within a period of 30 to 60 minutes. The tester may choose to perform more than nine sets of RM tests. If this option is chosen, the tester may reject a maximum of three sets of the test results, so long as the total number of test results used to determine the RA is greater than or equal to nine. Data for all points must be reported, including the rejected data.

3.Sampling strategy for RM tests. Conduct the RM tests in such a way that they will yield results representative of the emissions from the source and can be correlated to the CEMS data.

4.In order to correlate the CEMS and RM data properly, mark the beginning and end of each RM test period of each run (including the exact time of the day) on the CEMS chart recordings or other permanent record of output.

5.Record the results of the RM tests and the concurrent analyzer response on a data sheet similar to that shown in Figure 3 of Appendix A.

The procedures for calculating Zero and Span Calibration Drift and Relative Accuracy are described in Appendix C.

4.7PERFORMANCE SPECIFICATIONS AND TEST PROCEDURES FOR CO CEMS

4.7.1<u>Applicability</u>

This specification is to be used to evaluate the acceptability of each CO CEMS installed in the County of Santa Barbara.

4.7.2 Performance Specifications

Each CEMS used to monitor CO in Santa Barbara County must meet the following minimum specifications:

a. The CEMS response range must include zero and a high value. For a CEMS to measure an uncontrolled emission, the high value must be between 1.25 and 2 times the average potential emission level. The facility is responsible for ensuring that the CEMS response range is adequate. If actual concentrations are such that the analyzer response is either off scale or less than 5 percent of full scale on a regular basis, the District can require that the range be changed. For a CEMS installed to measure controlled emissions or emissions that are in compliance with an applicable regulation, the high value must be between 1.5 times the pollutant concentration corresponding to the emission standard and the span value. The data recorder output must be established so that the high level value is read between 90 and 100 percent of the data recorder full scale. (This scale requirement may not be applicable to digital data recorders.)

b. Zero and Span Calibration Drift for any given 24-hour period during the seven day drift test must not deviate from the reference value of the gas cylinder, gas cell, or optical filter by more than 5 percent of the span value for six of the seven days.

c. Relative Accuracy must be no greater than 10 percent of the mean value of the RM test data in terms of the units of the emission standard or 5 percent of the applicable standard, whichever is greater.

4.7.3 Reference Method (RM) Measurement Location and Traverse Points

Select an accessible RM measurement point at least eight stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two stack diameter upstream from the effluent exhaust or control device. If no such location is available, the minimum distance is at least two stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two diameters upstream from the effluent exhaust or control device. The CEMS and RM locations need not be the same, however, the RM location must be chosen such that a representative sample can be obtained.

Select traverse points that assure acquisition of representative samples over the stack or duct cross section. The minimum requirements are as follows: Establish a "measurement line" that passes through a centroidal area in the direction of any expected stratification. If this line interferes with the CEMS measurements, displace the line up to 30 cm (or 5 percent of the diameter of the cross section, whichever is less) from the centroidal area. Locate three traverse points at 16.7, 50.0, and 83.3 percent of the measurement line. If the measurement line is longer than 2.4 meters and pollutant stratification is not expected, the tester may choose to locate the three traverse points on the line at 0.4, 1.2, and 2.0 meters from the stack or duct wall. This option must not be used after wet scrubbers or at points where two streams with different pollutant concentrations are combined. The tester may select other traverse points, provided that they can be shown, to the satisfaction of the District, to provide a representative sample over the stack or duct cross section. Conduct all necessary RM tests within 3 cm of the traverse points (but no less than 3 cm from the stack or duct wall).

4.7.4 Performance Specification Test Procedures

a.Principle: The concentration of CO in stack emissions will be measured by a continuously operating emission measurement system. Concurrent with operation of the continuous monitoring system, the pollutant concentrations will also be measured with reference methods. An average of the continuous monitoring system data will be computed for each reference method testing period and compared with those from the reference methods to determine the Relative Accuracy of the continuous monitoring system. Other tests of the continuous monitoring system will also be performed to determine Zero and Span Calibration Drift over seven consecutive days.

b.The following apparatus are required:

1.Calibration Gas Mixtures. A mixture of known concentration of pollutant gas in a diluent gas must be prepared according to EPA Traceability Protocol G-1. A concentration of approximately 90 percent of span is required. The 90 percent gas mixture, which is referred to as the span gas, is used to set and to check the span. Alternatively, a span gas value between 50 and 100 percent of full scale may be used.

2.Zero Gas. A gas certified by the manufacturer to contain less than 1 ppm of the pollutant gas, or ambient air, must be used.

3.Equipment for measurement of the pollutant gas concentration using the reference method specified in EPA Method 10.

4.Data Recorder. An analog chart recorder or other suitable device with input voltage range compatible with analyzer system output must be used. The resolution of the recorder's data output must be sufficient to allow completion of the test procedures within the specification.

c.The following Zero and Span Calibration Drift test procedures are to be used:

1.While the affected facility is operated at more than 50 percent of normal load, determine the magnitude of the CD once each day (24-hour interval) for seven consecutive days.

2.For extractive systems;

i.Introduce the zero and span calibration gases. Adjust the analyzer zero and span if necessary. Record the zero and span calibration results (after adjustment) on a standard data sheet such as the one described by Figure 2 of Appendix A.

ii.24-hours later, re-introduce the zero and span calibration gases and record the CEMS response. Note, the analyzer is not adjusted before recording the data.

iii.Calculate the Zero and Span Calibration Drift for each of the seven 24-hour periods as shown in Appendix C.

3.For nonextractive measurement systems;

i.Determine the zero value by mechanically producing a zero condition that provides a system check of the analyzer's internal mirrors and all electronic circuitry, including the radiation source and detector assembly or by inserting three or more calibration gas cells and computing the zero point from the upscale measurements. If this latter technique is used, retain a graph(s) for each measurement system that shows the relationship between the upscale measurements and the zero point. Check the span of the system using a calibration gas cell certified by the manufacturer to be functionally equivalent to 50 percent of span concentration. Adjust the analyzer if necessary. Record the zero and span calibration results on a standard data sheet such as the one described by Figure 2 of Appendix A.

ii.24-hours later, re-check the zero and span response prior to any instrument adjustments. Record the zero and span response.

iii.Calculate the Zero and Span Calibration Drift for each of the seven 24-hour periods as shown in Appendix C.

4.During the test period, zero and calibration corrections and adjustments are allowed only at 24-hour intervals or at such shorter intervals as the manufacturer's written instructions specify. Conduct the CD test immediately before these adjustments or conduct it in such a way that the CD can be determined.

d.The following Relative Accuracy test procedures are to be used:

1.Unless otherwise approved by the District, EPA Reference Method 10 or an approved alternative is the reference method for CO.

2.Number of RM tests. Conduct a minimum of nine sets of all necessary RM tests. Conduct each set within a period of 30 to 60 minutes. The tester may choose to perform more than nine sets of RM tests. If this option is chosen, the tester may reject a maximum of three sets of the test results, so long as the total number of test results used to determine the RA is greater than or equal to nine. Data for all points must be reported, including the rejected data.

3.Sampling strategy for RM tests. Conduct the RM tests in such a way that they will yield results representative of the emissions from the source and can be correlated to the CEMS data. Although it is preferable to conduct the diluent (if applicable), moisture (if needed), and pollutant measurements simultaneously, the diluent and moisture measurements that are taken within a 30- to 60-minute period that includes the pollutant measurements, may be used to calculate dry pollutant concentration and emission rate.

4.In order to correlate the CEMS and RM data properly, mark the beginning and end of each RM test period of each run (including the exact time of the day) on the CEMS chart recordings or other permanent record of output.

5.Record the results of the RM tests and the concurrent analyzer response on a data sheet similar to that shown in Figure 3 of Appendix A.

6.In cases when the mean of the RM values is less than 10 percent of the span value of the CEMS, the District may require that a CGA be performed instead of an RATA. (This will be decided on a case by case basis.)

The procedures for calculating Zero and Span Calibration Drift and Relative Accuracy are described in Appendix C.

4.8PERFORMANCE SPECIFICATIONS AND TEST PROCEDURES FOR TRS CEMS

4.8.1Applicability

This specification is to be used to evaluate the acceptability of each TRS CEMS installed in the County of Santa Barbara. For certain stationary sources, the TRS CEMS may include a diluent (O_2 or CO_2) monitor that is subject to the performance specifications in Sections 4.5 or 4.6.

4.8.2Performance Specifications

Each CEMS used to monitor TRS in Santa Barbara County must meet the following minimum specifications:

a.The CEMS response range must include zero and a high value. For a CEMS to measure an uncontrolled emission, the high value must be between 1.25 and 2 times the average potential emission level. The facility is responsible for ensuring that the CEMS response range is adequate. If actual concentrations are such that the analyzer response is either off scale or less than 5 percent of full scale on a regular basis, the District can require that the range be changed. For a CEMS installed to measure controlled emissions or emissions that are in compliance with an applicable regulation, the high value must be between 1.5 times the pollutant concentration corresponding to the emission standard and the span value. The CEM design must also allow the determination of calibration at the zero of the calibration curve. If zero calibration is not possible or is impractical, this determination may be conducted at a low point (up to 20 percent of span value). The data recorder output must be established so that the high level value is read between 90 and

100 percent of the data recorder full scale. (This scale requirement may not be applicable to digital data recorders.)

b. Zero and Span Calibration Drift for any given 24-hour period during the seven day drift test must not deviate from the reference value of the calibration gas by more than 5 percent of the span value for six of the seven days.

c. Relative Accuracy must be no greater than 20 percent of the mean value of the RM test data in terms of the units of the emission standard or 10 percent of the applicable standard, whichever is greater.

4.8.3 Reference Method (RM) Measurement Location and Traverse Points

Select an accessible RM measurement point at least eight stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two stack diameters upstream from the effluent exhaust or control device. If no such location is available, the minimum distance is at least two stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two diameters upstream from the effluent exhaust or control device. The CEMS and RM locations need not be the same, however, the RM location must be chosen such that a representative sample can be obtained.

Select traverse points that assure acquisition of representative samples over the stack or duct cross section. The minimum requirements are as follows: Establish a "measurement line" that passes through a centroidal area in the direction of any expected stratification. If this line interferes with the CEMS measurements, displace the line up to 30 cm (or 5 percent of the diameter of the cross section, whichever is less) from the centroidal area. Locate three traverse points at 16.7, 50.0, and 83.3 percent of the measurement line. If the measurement line is longer than 2.4 meters and pollutant stratification is not expected, the tester may choose to locate the three traverse points on the line at 0.4, 1.2, and 2.0 meters from the stack or duct wall. This option must not be used after wet scrubbers or at points where two streams with different pollutant concentrations are combined. The tester may select other traverse points, provided that they can be shown, to the satisfaction of the District, to provide a representative sample over the stack or duct cross section. Conduct all necessary RM tests within 3 cm of the traverse points (but no less than 3 cm from the stack or duct wall).

4.8.4 <u>Performance Specification Test Procedures</u>

a. Principle: The concentration of TRS in stack emissions and, where appropriate, the concentration of a diluent gas will be measured by a continuously operating emission measurement system. Concurrent with operation of the continuous monitoring system, the pollutant concentrations will also be measured with reference methods. An average of the continuous monitoring system data will be computed for each reference method testing period and compared with those from the reference methods to determine the Relative Accuracy of the continuous monitoring system. Other tests of the continuous monitoring system will also be performed to determine Zero and Span Calibration Drift.

b. The following apparatus are required:

1. Calibration Gas Mixtures. A mixture of known concentration of pollutant gas in a diluent gas must be prepared according to EPA Traceability Protocol G-1, or equivalent. The diluent gas is to be nitrogen. A concentration of approximately 90 percent of span is required. The 90 percent gas mixture, which is referred to as the span gas, will be used to set and to check the span. Alternatively, a span gas value between 50 and 100 percent of full scale may be used.

2. Zero Gas. A gas certified by the manufacturer to contain less than 1 ppm of the pollutant gas, or ambient air, may be used.

3. Equipment for measurement of the pollutant gas concentration using the reference method specified in EPA Method 15.

4.Data Recorder. An analog chart recorder or other suitable device with input voltage range compatible with analyzer system output must be used. The resolution of the recorder's data output must be sufficient to allow completion of the test procedures within the specification.

c.The following Zero and Span Calibration Drift test procedures are to be used:

1.While the affected facility is operated at more than 50 percent of normal load, determine the magnitude of the CD once each day (24-hour interval) for seven consecutive days.

2.Normal sequence of events;

i.Introduce the zero and span calibration gases. Adjust the analyzer zero and span if necessary. Record the zero and span calibration results (after adjustment) on a standard data sheet such as the one described by Figure 2 of Appendix A.
ii.24-hours later, re-introduce the zero and span calibration gases and record the CEMS response. Note, the analyzer is not adjusted before recording the data.
iii.Calculate the Zero and Span Calibration Drift for each of the seven 24-hour periods as shown in Appendix C.

3.During the test period, zero and calibration corrections and adjustments are allowed only at 24-hour intervals or at such shorter intervals as the manufacturer's written instructions specify. Conduct the CD test immediately before these adjustments or conduct it in such a way that the CD can be determined.

d.The following Relative Accuracy test procedures are to be used:

1.Unless otherwise approved by the District, EPA Reference Method 15 or an approved alternative is the reference method for TRS. For sources that require diluent gas (O_2 or CO_2) monitoring, the system must also be performance certified for these gases using the methods outlined in Section 4.4. If moisture measurements are required, carry them out using EPA Reference Method 4.

2. Number of RM tests. Conduct a minimum of nine sets of all necessary RM tests. Conduct each set within a period of 30 to 60 minutes. The tester may choose to perform more than nine sets of RM tests. If this option is chosen, the tester may reject a maximum of three sets of the test results, so long as the total number of test results used to determine the RA is greater than or equal to nine. Data for all points must be reported, including the rejected data.

3. Sampling strategy for RM tests. Conduct the RM tests in such a way that they will yield results representative of the emissions from the source and can be correlated to the CEMS data. Although it is preferable to conduct the diluent (if applicable), moisture (if needed), and pollutant measurements simultaneously, the diluent and moisture measurements that are taken within a 30- to 60-minute period that includes the pollutant measurements, may be used to calculate dry pollutant concentration and emission rate.

4. In order to correlate the CEMS and RM data properly, mark the beginning and end of each RM test period of each run (including the exact time of the day) on the CEMS chart recordings or other permanent record of output.

5. For Method 4, make a sample traverse of at least 21 minutes, sampling for 7 minutes at each of the three traverse points as described in 4.8.3.

6. Record the results of the RM tests and the concurrent analyzer response on a data sheet similar to that shown in Figure 3 of Appendix A.

The procedures for calculating Zero and Span Calibration Drift and Relative Accuracy are described in Appendix C.

4.9 PERFORMANCE SPECIFICATIONS AND TEST PROCEDURES FOR H_2S CEMS

4.9.1 Applicability

This specification is to be used to evaluate the acceptability of each H_2S CEMS installed in the County of Santa Barbara. For certain stationary sources, the H_2S CEMS may include a diluent (O_2 or CO_2) monitor.

4.9.2 Performance Specifications

Each CEMS used to monitor H_2S in Santa Barbara County must meet the following minimum specifications:

a. The CEMS response range must include zero and a high value. For a CEMS to measure an uncontrolled emission, the high value must be between 1.25 and 2 times the average potential emission level. The facility is responsible for ensuring that the CEMS response range is adequate. If actual concentrations are such that the analyzer response is either off scale or less than 5 percent of full scale on a regular basis, the District can require that the range be changed. For a CEMS installed to measure controlled emissions or emissions that are in compliance with an applicable regulation, the high value must be between 1.5 times the pollutant concentration corresponding to the emission standard and the span value. The data recorder output must be established so that the high level value is read between 90 and 100 percent of the data recorder full scale. (This scale requirement may not be applicable to digital data recorders.)

b. Zero and Span Calibration Drift for any given 24-hour period during the seven day drift test must not deviate from the reference value of the calibration gas by more than 5 percent of the span value for six of the seven days.

c.Relative Accuracy must be no greater than 20 percent of the mean value of the RM test data in terms of the units of the emission standard or 10 percent of the applicable standard, whichever is greater.

4.9.3 Reference Method (RM) Measurement Location and Traverse Points

Select an accessible RM measurement point at least eight stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two stack diameters upstream from the effluent exhaust or control device. If no such location is available, the minimum distance is at least two stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two diameters upstream from the effluent exhaust or control device. The CEMS and RM locations need not be the same, however, the RM location must be chosen such that a representative sample can be obtained.

Select traverse points that assure acquisition of representative samples over the stack or duct cross section. The minimum requirements are as follows: Establish a "measurement line" that passes through a centroidal area in the direction of any expected stratification. If this line interferes with the CEMS measurements, displace the line up to 30 cm (or 5 percent of the diameter of the cross section, whichever is less) from the centroidal area. Locate three traverse points at 16.7, 50.0, and 83.3 percent of the measurement line. If the measurement line is longer than 2.4 meters and pollutant stratification is not expected, the tester may choose to locate the three traverse points on the line at 0.4, 1.2, and 2.0 meters from the stack or duct wall. This option must not be used after wet scrubbers or at points where two streams with different pollutant concentrations are combined. The tester may select other traverse points, provided that they can be shown, to the satisfaction of the District, to provide a representative sample over the stack or duct cross section. Conduct all necessary RM tests within 3 cm of the traverse points (but no less than 3 cm from the stack or duct wall).

4.9.4 Performance Specification Test Procedures

a.Principle: The concentration of H_2S in stack emissions and, where appropriate, the concentration of a diluent gas will be measured by a continuously operating emission measurement system. Concurrent with operation of the continuous monitoring system, the pollutant concentrations will also be measured with reference methods. An average of the continuous monitoring system data will be computed for each reference method testing period and compared with those from the reference methods to determine the Relative Accuracy of the continuous monitoring system. Other tests of the continuous monitoring system will also be performed to determine Zero and Span Calibration Drift over seven consecutive days.

b.The following apparatus are required:

1.Calibration Gas Mixtures. A mixture of known concentration of H_2S in a diluent gas must be prepared according to EPA Traceability Protocol G-1 or equivalent. The diluent shall be nitrogen. A concentrations of approximately 90 percent of span is required. The 90 percent gas mixture, which is referred to as the span gas, will be used to set and to check the span. Alternatively, a span gas value between 50 and 100 percent of full scale may be used.

2.Zero Gas. A gas certified by the manufacturer to contain less than 1 ppm of the pollutant gas, or ambient air, may be used.

3.Equipment for measurement of the pollutant gas concentration using the reference method specified in EPA Method 11.

4.Data Recorder. An analog chart recorder or other suitable device with input voltage range compatible with analyzer system output must be used. The resolution of the recorder's data output must be sufficient to allow completion of the test procedures within the specification.

c.The following Zero and Span Calibration Drift test procedures are to be used:

1. While the affected facility is operated at more than 50 percent of normal load, determine the magnitude of the CD once each day (24-hour interval) for seven consecutive days.

2. Normal sequence of events;

i. Introduce the zero and span calibration gases. Adjust the analyzer zero and span if necessary. Record the zero and span calibration results (after adjustment) on a standard data sheet such as the one described by Figure 2 of Appendix A.

ii. 24-hours later, re-introduce the zero and span calibration gases and record the CEMS response. Note, the analyzer is not adjusted before recording the data.

iii. Calculate the Zero and Span Calibration Drift for each of the seven 24-hour periods as shown in Appendix C.

3. During the test period, zero and calibration corrections and adjustments are allowed only at 24-hour intervals or at such shorter intervals as the manufacturer's written instructions specify. Conduct the CD test immediately before these adjustments or conduct it in such a way that the CD can be determined.

d. The following Relative Accuracy test procedures are to be used:

1. Unless otherwise approved by the District, EPA Reference Method 11 or an approved alternative is the reference method for H_2S. For sources that require diluent gas (O_2 or CO_2) monitoring, the system must also be performance certified for these gases using the methods outlined in Section 4.4. If moisture measurements are required, carry them out using EPA Reference Method 4.

2. Number of RM tests. Conduct a minimum of nine sets of all necessary RM tests. Conduct each set within a period of 30 to 60 minutes. The tester may choose to perform more

than nine sets of RM tests. If this option is chosen, the tester may reject a maximum of three sets of the test results, so long as the total number of test results used to determine the RA is greater than or equal to nine. Data for all points must be reported, including the rejected data.

3.Sampling strategy for RM tests. Conduct the RM tests in such a way that they will yield results representative of the emissions from the source and can be correlated to the CEMS data. Although it is preferable to conduct the diluent (if applicable), moisture (if needed), and pollutant measurements simultaneously, the diluent and moisture measurements that are taken within a 30- to 60-minute period that includes the pollutant measurements, may be used to calculate dry pollutant concentration and emission rate.

4.In order to correlate the CEMS and RM data properly, mark the beginning and end of each RM test period of each run (including the exact time of the day) on the CEMS chart recordings or other permanent record of output.

5.For Method 4, make a sample traverse of at least 21 minutes, sampling for 7 minutes at each of the three traverse points as described in 4.9.3.

6.Record the results of the RM tests and the concurrent analyzer response on a data sheet similar to that shown in Figure 3 of Appendix A.

7.In cases when the mean of the RM values is less than 20 percent of the span value of the CEMS, the District may require that a CGA be performed instead of an RATA. (This will be decided on a case by case basis.)

The procedures for calculating Zero and Span Calibration Drift and Relative Accuracy are described in Appendix C.

4.10PERFORMANCE SPECIFICATIONS AND TEST PROCEDURES FOR THC/ROC CEMS

4.10.1Applicability

This specification is to be used to evaluate the acceptability of each THC/ROC CEMS installed in the County of Santa Barbara. For certain stationary sources, the THC/ROC CEMS may include a diluent (O_2 or CO_2) monitor.

4.10.2Performance Specifications

Each CEMS used to monitor THC/ROC in Santa Barbara County must meet the following minimum specifications:

a.The CEMS response range must include zero and a high value. For a CEMS to measure an uncontrolled emission, the high value must be between 1.25 and 2 times the average potential emission level. The facility is responsible for ensuring that the CEMS response range is adequate. If actual concentrations are such that the analyzer response is either off scale or less than 5 percent of full scale on a regular basis, the District can require that the range be changed. For a CEMS installed to measure controlled emissions or emissions that are in compliance with an applicable regulation, the high value must be between 1.5 times the pollutant concentration corresponding to the emission standard and the span value. The data recorder output must be established so that the high level value is read between 90 and 100 percent of the data recorder full scale. (This scale requirement may not be applicable to digital data recorders.)

b.Zero and Span Calibration Drift for any given 24-hour period during the seven day drift test must not deviate from the reference value of the gas cylinder, gas cell, or optical filter by more than 5.0 percent of the span value for six of the seven days.

c.Relative Accuracy must be no greater than 20 percent of the mean value of the RM test data in terms of the units of the emission standard or 10 percent of the applicable standard, whichever is greater.

4.10.3 Reference Method (RM) Measurement Location and Traverse Points

Select an accessible RM measurement point at least eight stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two stack diameters upstream from the effluent exhaust or control device. If no such location is available, the minimum distance is at least two stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two diameters upstream from the effluent exhaust or control device. The CEMS and RM locations need not be the same, however, the RM location must be chosen such that a representative sample can be obtained.

Then select traverse points that assure acquisition of representative samples over the stack or duct cross section. The minimum requirements are as follows: Establish a "measurement line" that passes through a centroidal area in the direction of any expected stratification. If this line interferes with the CEMS measurements, displace the line up to 30 cm (or 5 percent of the diameter of the cross section, whichever is less) from the centroidal area. Locate three traverse points at 16.7, 50.0, and 83.3 percent of the measurement line. If the measurement line is longer than 2.4 meters and pollutant stratification is not expected, the tester may choose to locate the three traverse points on the line at 0.4, 1.2, and 2.0 meters from the stack or duct wall. This option must not be used after wet scrubbers or at points where two streams with different pollutant concentrations are combined. The tester may select other traverse points, provided that they can be shown, to the satisfaction of the District, to provide a representative sample over the stack or duct cross section. Conduct all necessary RM tests within 3 cm of the traverse points (but no less than 3 cm from the stack or duct wall).

4.10.4 Performance Specification Test Procedures

a. Principle: The concentration of THC/ROC in stack emissions and, where appropriate, the concentration of a diluent gas will be measured by a continuously operating emission measurement system. Concurrent with operation of the continuous monitoring system, the pollutant concentrations will also be measured with reference methods. An average of the continuous monitoring system data will be computed for each reference method testing period and compared with those from the reference methods to determine the Relative Accuracy of the continuous monitoring system. Other tests of the continuous monitoring system will also be performed to determine Zero and Span Calibration Drift.

b.The following apparatus are required:

1.Calibration Gas Mixtures. A mixture of known concentration of pollutant gases in a diluent gas must be prepared. If CRMs or NBS/SRMs are available in the proper concentration range, the gas must be prepared according to EPA Traceability Protocol G-1 or equivalent. The diluent shall be air or nitrogen. Lacking the proper reference standards, the gas must be certified as accurate within ± 2%. A concentration of approximately 90 percent of span is required. The 90 percent gas mixture, which is referred to as the span gas, will be used to set and to check the span. Alternatively, a span gas value between 50 and 100 percent of full scale may be used.

2.Zero Gas. A gas certified by the manufacturer to contain less than 1 ppm THC be used.

3.Equipment for measurement of the pollutant gas concentration using the reference method specified in EPA Method 18.

4.Data Recorder. An analog chart recorder or other suitable device with input voltage range compatible with analyzer system output must be used. The resolution of the recorder's data output must be sufficient to allow completion of the test procedures within the specification.

c.The following Zero and Span Calibration Drift test procedures are to be used:

1. While the affected facility is operated at more than 50 percent of normal load, determine the magnitude of the CD once each day (24-hour interval) for seven consecutive days.

2. Normal sequence of events;

i. Introduce the zero and span calibration gases. Adjust the analyzer zero and span if necessary. Record the zero and span calibration results (after adjustment) on a standard data sheet such as the one described by Figure 2 of Appendix A.

ii. 24-hours later, re-introduce the zero and span calibration gases and record the CEMS response. Note, the analyzer is not adjusted before recording the data.

iii. Calculate the Zero and Span Calibration Drift for each of the seven 24-hour periods as shown in Appendix C.

3. During the test period, zero and calibration corrections and adjustments are allowed only at 24-hour intervals or at such shorter intervals as the manufacturer's written instructions specify. Conduct the CD test immediately before these adjustments or conduct it in such a way that the CD can be determined.

d. The following Relative Accuracy test procedures are to be used:

1. Unless otherwise approved by the District, EPA Reference Methods 18 or an approved alternative is the reference method for THC/ROC. For sources that require diluent gas (O_2 or CO_2) monitoring, the system must also be performance certified for these gases using the methods outlined in Section 4.4. If moisture measurements are required, carry them out using EPA Reference Method 4.

2. Number of RM tests. Conduct a minimum of nine sets of all necessary RM tests. Conduct each set within a period of 30 to 60 minutes. The tester may choose to perform more

than nine sets of RM tests. If this option is chosen, the tester may reject a maximum of three sets of the test results, so long as the total number of test results used to determine the RA is greater than or equal to nine. Data for all points must be reported, including the rejected data.

3.Sampling strategy for RM tests. Conduct the RM tests in such a way that they will yield results representative of the emissions from the source and can be correlated to the CEMS data. Although it is preferable to conduct the diluent (if applicable), moisture (if needed), and pollutant measurements simultaneously, the diluent and moisture measurements that are taken within a 30- to 60-minute period that includes the pollutant measurements, may be used to calculate dry pollutant concentration and emission rate.

4.In order to correlate the CEMS and RM data properly, mark the beginning and end of each RM test period of each run (including the exact time of the day) on the CEMS chart recordings or other permanent record of output.

5.For Method 4, make a sample traverse of at least 21 minutes, sampling for 7 minutes at each of the three traverse points as described in 4.10.3.

6.Record the results of the RM tests and the concurrent analyzer response on a data sheet similar to that shown in Figure 3 of Appendix A.

7.In cases when the mean of the RM values is less than 20 percent of the span value of the CEMS, the District may require that a CGA be performed instead of an RATA. (This will be decided on a case by case basis.)

The procedures for calculating Zero and Span Calibration Drift and Relative Accuracy are described in Appendix C.

4.11SPECIFICATIONS AND TEST PROCEDURES FOR STACK FLOW RATE MONITORS

4.11.1 Applicability

This specification is to be used to evaluate the acceptability of each Stack Flow Rate Monitor installed in the County of Santa Barbara.

4.11.2 Performance Specifications

Each Stack Flow Rate Monitor used in Santa Barbara County must meet the following minimum specifications:

a. The Stack Flow Rate Monitor response range must include a high value between 1.25 and 2 times the average potential flow rate level. The data recorder output must be established so that the high level value is read between 90 and 100 percent of the data recorder full scale. (This scale requirement may not be applicable to digital data recorders.)

b. Since the Stack Flow Rate Monitor may include analyzers for several measurements, the CD must be determined separately for each analyzer in terms of its specific measurement. The Zero and Span Calibration Drift for any given 24-hour period for each analyzer used for the measurement of flow rate must not deviate from either of its reference values by more than 3 percent of 1.25 times the span value for that measurement.

c. Relative Accuracy for flowrate monitors should be certified on a pollutant emission rate basis in conjunction with the applicable pollutant monitor(s). In such a case, the RA must be no greater than 20 percent of the mean value of the RM test data in terms of the units of the emission standard (e.g., lbs NOx/hr) or 10 percent of the applicable standard, whichever is greater. If certification on an emission rate basis is not possible, then the flow monitor will be certified on a flow rate basis and the RA must be no greater than 10 percent of the RM test data in terms of the reported units.

4.11.3 Reference Method (RM) Measurement Location and Traverse Points

Select an accessible RM measurement point at least eight stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two stack diameters upstream from the effluent exhaust or control device. If no such location is available, the minimum distance is at least two stack diameters downstream from the nearest control device, the point of pollutant generation, or any other point at which a change in the pollutant concentration or emission rate may occur, and at least two stack diameters upstream from the effluent exhaust or control device. The CEMS and RM locations need not be the same, however, the RM location must be chosen such that a representative flow rate can be obtained.

Select traverse points that assure acquisition of representative stack flow over the stack or duct cross section.

4.11.4 <u>Performance Specification Test Procedures</u>

a.Principle: The flow rate of stack gases and applicable pollutants will be measured by a continuously operating emissions/flow rate measurement system. Concurrent with operation of the continuous monitors, the flow rate and applicable pollutant concentration(s) will also be measured with reference methods. An average of the continuous monitoring system data will be computed for each reference method testing period and compared with those from the reference methods to determine the Relative Accuracy of the continuous emission monitoring system. Other tests of the continuous flow rate monitoring system will also be performed to determine Zero and Span Calibration Drift. Although procedures are defined in Section 4.11.4.c for a seven day drift test for flow monitors, the source may petition the District to omit this requirement based on the capabilities of the flow monitoring device. At a minimum, flow sensor calibration requirements stipulated in Section 5.3 must be met.

b.The following apparatus are required:

1.Equipment for measurement of the flow rate using the reference method specified in EPA Method 2, 2A, 2B, 2C or 2D as applicable.

c.The following Zero and Span Calibration Drift test procedures are to be used:

1.While the affected facility is operated at more than 50 percent of normal load, determine the magnitude of the CD once each day (24-hour interval) for seven consecutive days. For each of the parameters that are selectively measured by the Stack Flow Rate Monitor (e.g., velocity pressure), use two analogous values: one that represents zero to 20 percent of the high value (a value that is between 1.25 and 2 times the average potential value) for that parameter, and one that represents 50 to 100 percent of the high value.

2.Normal sequence of events;

i.Introduce, or activate internally, the reference signals to the Stack Flow Rate Monitor (these need not be certified). Adjust the monitor if necessary. Record the Stack Flow Rate Monitor response to each reference signal (after adjustment) on a standard data sheet such as the one described by Figure 2 of Appendix A.

ii.After 24-hours, re-introduce, or reactivate internally, the reference signals to the Stack Flow Rate Monitor (these need not be certified). Record the Stack Flow Rate Monitor response to each reference signal (before adjustment) on a standard data sheet such as the one in Figure 2 of Appendix A.

iii.Calculate the Zero and Span Calibration Drift for each of the seven 24-hour periods as shown in Appendix C.

3.During this period, zero and calibration corrections and adjustments are allowed only at 24-hour intervals or at such shorter intervals as the manufacturer's written instructions specify. Conduct the CD test immediately before these adjustments or conduct it in such a way that the CD can be determined.

d.The following Relative Accuracy test procedures are to be used:

1.Unless otherwise approved by the District, EPA Reference Methods 2A, 2B, 2C or 2D or their approved alternatives are the reference methods for Stack Flow Rate Monitor. If moisture measurements are required, carry them out using EPA Reference Method 4 or 5. Measurement of pollutant gas concentrations should be carried out using the reference method stipulated in the appropriate subsection of Section 4.

2.Number of RM tests. Conduct a minimum of nine sets of all necessary RM tests. Conduct each set within a period of 30 to 60 minutes. The tester may choose to perform more than nine sets of RM tests. If this option is chosen, the tester may reject a maximum of three sets of the test results, so long as the total number of test results used to determine the RA is greater than or equal to nine. Data for all points must be reported, including the rejected data.

3.Sampling strategy for RM tests. Conduct the RM tests in such a way that they will yield results representative of the flow rate from the source and can be correlated to the CEMS data. Although it is preferable to conduct the pollutant, moisture (if needed) and flow rate measurements simultaneously, pollutant and moisture measurements that are taken within a 30- to 60-minute period may be used to calculate emission rate.

4.In order to correlate the Stack Flow Rate Monitor and RM data properly, mark the beginning and end of each RM test period of each run (including the exact time of the day) on the Stack Flow Rate Monitor chart recordings or other permanent record of output.

5.For Method 4, make a sample traverse of at least 21 minutes, sampling for 7 minutes at each traverse point.

6.Record the results of the RM tests and the concurrent analyzer response on a data sheet similar to that shown in Figure 3 of Appendix A.

The procedures for calculating Zero and Span Calibration Drift and Relative Accuracy are described in Appendix C.

5. QUALITY ASSURANCE

5.1OBJECTIVES

The District's CEM program has been designed to provide data that can be used to determine whether a facility is in compliance with its permit conditions. In order to ensure that the data are of high quality, certain minimum requirements must be met.

a.The data must be complete, that is, they must be obtained on a regular basis with a minimum of interruptions due to instrument failure. Data must meet the minimum capture rate of 90 percent. The data capture rate requirements are further described in Section 6.

b.The data must be representative of actual emissions from the process. This will be determined through regular audits.

c.The data must be accurate and precise, as demonstrated through regular quality control checks and accuracy audits.

d.The data must be defensible and traceable, that is, the results of quality control and quality assurance procedures must be well documented.

This section of the protocol outlines the minimum requirements of the quality assurance/quality control program that the facility must implement to ensure that these goals are met.

5.2ELEMENTS OF QUALITY ASSURANCE

In order to ensure that data quality requirements are met, each facility must develop and implement a comprehensive program of quality assurance/quality control. The terms quality assurance and quality control can be defined in several ways. In this document, quality assurance is "all those planned or systematic actions necessary to provide adequate confidence that a product or service will satisfy given needs" while quality control is "the operational techniques and the activities which sustain a quality of products or service (in this case, good quality data) that meets the needs; also the use of such techniques and activities".[1] Quality assurance programs must consider several elements, as described in the following sections.

5.2.1 Quality Assurance Personnel

In order to ensure that the quality assurance program is put into operation, it is critical that the personnel who are responsible for the program be formally identified and that they receive adequate training. Familiarity with EPA Quality Assurance Handbook for Air Pollution Measurement Systems is the minimum requirement.

5.2.2 Design Standards for CEMS

The second step in assuring that data are of sufficient quality is to choose a system that meets minimum standards of design and construction. The minimum design standards that must be met are those described in Section 3 under instrument specifications. While system cost is an important consideration in the choice of any CEM system, the maintenance and repair of a sub-standard system will rapidly eliminate any up-front cost savings.

The CEMS Quality Assurance Plan must contain Certificates of Conformance from the manufacturer that all instruments meet the minimum Section 3 design specifications. Specification sheets from the instrument operating manual will suffice as a Certificate of Conformance. However, the Certificate of Conformance does not nullify the requirement for a CEMS Performance Certification Test.

5.2.3 Representativeness of the Sample

The third element of quality assurance is the choice of an appropriate sampling location and the proper installation of the sampling probe. The choice of a representative sampling location is the responsibility of the facility. The minimum requirements for sampling location and sampling probe installation are described in Section 3, under instrument specifications.

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[1] Juran, J.M., (ed.), Quality Control Handbook. 3rd Ed. McGraw-Hill, New York, 1974. Sec. 2, pp. 4-8.

The system must be properly installed and housed in an environmentally controlled shelter to assure representative sampling and analysis.

5.2.4 Preparation of Standard Operating Procedures

A fourth element in a quality assurance program is to develop and enforce Standard Operating Procedures (SOPs). At a minimum, SOPs must be available for the items shown in Section 2.2.7.

The description must be sufficiently detailed that a person with a basic knowledge of CEM systems can carry them out. Minimum required information to be included in a SOP is also provided in Section 2.2.7.

Copies of the SOPs must be available to all personnel who are responsible for the operation of the CEMS or for the manipulation of data. Unassigned copies of the SOP must be available in the control room and in the analyzer shelter.

5.2.5 Availability of Operator Training Programs

Training programs that will prepare operators to operate, calibrate and maintain the analyzers and to follow the SOPs must be available. These must either be provided by the supplier of the equipment or must be organized by the facility.

5.2.6 Carry Out Preventive Maintenance

A sound preventive maintenance program must be in place. In this way problems can be corrected before they result in loss of data or the collection of inaccurate data.

A preventative maintenance plan must be included as part of the Quality Assurance Plan. At a minimum, it must do the following:

a. Provide the manufacturer recommended preventive maintenance procedures b.Describe the preventive maintenance procedures to be implemented, including frequency. These must meet or exceed manufacturer recommendations

c.Clarify who has unit responsibility

d.Contain all applicable daily, weekly, monthly, quarterly, etc., check forms

e.Ensure that an adequate spare parts inventory is in place. The minimum requirement is the spare parts inventory recommended by the supplier.

f.Assure that the preventive maintenance program is enforced and monitored regularly.

The plan must be reviewed and/or updated annually.

When the CEMS is down for maintenance, the CEMS data may not be used in calculating emission compliance nor toward meeting the minimum data availability as required and described in Section 6.

5.2.7 Establish Quality Control Procedures

Quality control is a set of procedures carried out routinely that are designed to control and improve the quality of data. These include routine calibrations, calibration drift assessments, preventive maintenance, and correction of any malfunctions that might occur.

5.2.8 Establish External Audit Procedures

The final component of quality assurance is an assessment of the quality of the CEM data by estimating accuracy. This, along with the quality control procedures, forms a control loop. Regular quality control procedures maintain the data at a given quality level. By estimating accuracy, the facility determines what that quality level is and whether it is adequate. If not, measures must be incorporated into the QC procedures to improve the quality until it meets the necessary criteria.

5.3 ELEMENTS OF QUALITY CONTROL

This section of this document defines the minimum requirements for routine quality control.

5.3.1 Calibration of CEM Systems

The SOP for calibration of the analyzer must be developed by the facility. The following minimum requirements must be met:

a. Calibrations are to be carried out as specified in (c) and (d) below.

b. Calibrations must not be carried out in the event that emission standards are being exceeded during the normally scheduled calibration time. The calibration must be postponed (override automatic calibration) until emissions are within the standards.

c. For concentration analyzers,

1. Monitors for NOx, SO_2, CO, CO_2, O_2, etc. will be calibrated at approximately 24-hour intervals and a 24-hour Calibration Drift will be calculated for each calibration.
2. The zero and span calibration gases must be introduced at or near the probe tip and must pass through all system components.
3. Pollutant analyzer calibration gases must be vendor certified following EPA Traceability Protocol G-1 or District approved equivalent. At a minimum, diluent analyzer calibration gases must be NBS traceable with a tolerance less than $\pm$ 2%.
4. The span calibration gas concentration must be equal to approximately 90% of the analyzer span. For example, if the analyzer span is 0-100 ppm NOx, the span calibration gas concentration must be approximately 90 ppm NOx. Alternatively, a span gas value between 50 and 100 percent of full scale may be used.
5. The calibration procedure should be automated, but it should also have a manual override.

d. For process sensors,

1.At a minimim, sensors for flow, pressure, temperature, etc. will be calibrated on a quarterly basis. Calibration Drift will be calculated for each calibration.

2.Two points will be used for the calibration. The first point will be at a value that represents zero to 20 percent of the instrument span. The second point will be at a value that represents 50 to 100 percent of the instrument span.

During any time period that an analyzer is being calibrated, the data may not be used in calculating emission compliance nor toward meeting the minimum data availability as required and described in Section 6.

5.3.2 Calibration Drift Assessment

Source owners and operators of CEMS must check, record, and quantify the Calibration Drift (CD) at two concentration values at least once daily for concentration analyzers in accordance with the method described by the manufacturer. The calibration must, at a minimum, be adjusted whenever the daily zero (or low) CD or the daily high CD exceeds two times the limits of the applicable performance specification in Section 4 of this protocol. Monitors that automatically adjust the data to the correct calibration values (e.g., microprocessor control) must be programmed to record the unadjusted concentration measured in the CD test before resetting the calibration or to record the amount of adjustment.

Source owners and operators of CEMS must check, record, and quantify the Calibration Drift (CD) at two values at least quarterly for process sensors in accordance with the method described by the manufacturer. A single 24-hour Calibration Drift determination will be performed in at least three out of the four calendar quarters. If possible, seven consecutive 24-hour Calibration Drift determinations will be performed in the other calendar quarter (same quarter the RATA is done).

5.3.3 Criteria for Excessive CD

a.For concentration analyzers:

1. If either the zero or high CD result exceeds twice the applicable drift specification in Section 4 for five consecutive daily periods, the CEMS is out-of-control.

2. If either the zero or high CD result exceeds four times the applicable drift specification in Section 4 during any CD check, the CEMS is out-of-control.

3. These criteria for excessive CD are described in Table 5-1.

b. For process sensors:

1. If either the zero or high CD results exceeds the applicable drift specification in Section 4, the CEMS is out-of-control.

2. The criteria for excessive CD are described in Table 5-1.

TABLE 5-1. Criteria for excessive calibration drift (24 hour) for each CEMS located in the County of Santa Barbara.

	CD Specification	Excessive CD (24 Hr) Criteria (Analyzer Out-of-control)	
Analyzer	24 Hour (% of span)	5 Consecutive Days (% of span)	1 Day (% of span)
NO_x	2.5	5.0	10.0
SO_2	2.5	5.0	10.0
O_2	0.5*	1.0*	2.0*
CO_2	0.5**	1.0**	2.0**
CO	5.0	10.0	20.0
TRS	5.0	10.0	20.0
H_2S	5.0	10.0	20.0
THC/ROC	5.0	10.0	20.0
Process	3.75***	7.5***	15.0***

* Percent O_2
** Percent CO_2
*** Percent of average measurement

5.3.4 Actions to be Taken

An out-of-control CEMS constitutes a state of noncompliance which may qualify as a breakdown condition. If the out-of-control occurrence is a breakdown, the facility must comply with the requirements of Rule 505. This includes the following:

a. The facility must notify the District that a breakdown has occurred as soon as possible but no later than four hours after the start of the next business day.

b. The facility must take corrective action as soon as possible.

c. Following corrective action, the CD checks must be repeated.

d.Facility operation for more than 96 hours after a CEMS breakdown without verifying the repair of the breakdown or obtaining a variance is considered a violation of District Rules and Regulations.

5.3.5Out-of-Control Period Definition

For concentration analyzers, the beginning of the out-of-control period is the time corresponding to the completion of the fifth, consecutive, daily CD check with a CD more than twice the allowable limit, or the time corresponding to the completion of the daily CD check preceding the daily CD check that results in a CD more than four times the allowable limit. The end of the out-of-control period is the time corresponding to the CD check following corrective action that results in the CD's at both the zero and high measurement points being within the corresponding allowable CD limit (i.e., either two times or four times the allowable limit in Section 4).

For process sensors, the beginning of the out-of-control period is the time corresponding to the completion of the single 24-hour CD check, or the seventh consecutive 24-hour CD check (whichever is applicable), with a CD outside the allowable limits. The end of the out-of-control period is the time corresponding to the single 24-hour CD check, or the seventh consecutive 24-hour CD check (whichever is applicable), following corrective action that results in all CD's being inside the allowable limits.

5.3.6CEM Data Status During Out-of-Control Period

During the period that the CEMS is out-of-control, the CEMS data are considered invalid and cannot be used to verify compliance with permitted emission limits.

5.4DATA ACCURACY ASSESSMENTS

5.4.1Auditing Requirements

Each CEMS, both concentration and process, must be audited once each calendar quarter. Successive quarterly audits must be no less than two months apart. The audits will be carried out as follows.

a.Relative Accuracy Test Audit

The Relative Accuracy Test Audit (RATA) must be conducted at least once every four calendar quarters. Conduct the RATA as described for the RA test procedure in the applicable Performance Specification in Section 4. A source owner or operator may petition the District to perform a CGA in lieu of a RATA if the results of a RATA or compliance source test indicate that meeting the RATA relative accuracy requirment is problematic due to actual emissions considerably less than the permitted limit.

b.Cylinder Gas Audit

A Cylinder Gas Audit (CGA) must be conducted on concentration analyzers during the three calendar quarters in which the RATA is not performed, but in no more than three quarters in succession. If a CGA is determined to be technically infeasible for a particular analyzer, a Relative Accuracy Audit (RAA) will be conducted in lieu of a CGA. To conduct a CGA:

1. Challenge the CEMS (both pollutant and diluent portions of the CEMS, if applicable) with an audit gas of known concentration at two points within the following concentration ranges:

Audit Point	Pollutant Monitors	Diluent Monitors for CO_2	Diluent Monitors for O_2
1	20 to 30% of span value	5 to 8% by volume	4 to 6% by volume
2	50 to 60% of span value	10 to 14% by volume	8 to 12% by volume

Challenge the CEMS three times at each audit point. Do not test three times consecutively at each audit point. Instead, alternate from low to high. Use the average of the three responses for each audit point in determining accuracy. Use a separate audit gas cylinder for Audit Points 1 and 2. Do not dilute gas from audit cylinders when challenging the CEMS. The monitor should be challenged at each audit point for a sufficient period of time to assure that any adsorption-desorption phenomena at the CEMS sample transport surfaces has stabilized.

2. Operate each monitor in its normal sampling mode, i.e., pass the audit gas through all filters, scrubbers, conditioners, and other monitor components used during normal sampling, and through as much of the sampling probe as is practical. At a minimum, the audit gas should be introduced at the connection between the probe and the sample line.

3. Use audit gases that have been certified by comparison to National Bureau of Standards (NBS) gaseous standard reference materials (SRMs) or NBS/EPA-approved gas manufacturer's certified reference materials (CRMs) following EPA Traceability Protocol 1. As an alternative to Protocol 1 audit gases, CRMs may be used directly as audit gases.

4.The difference between the actual concentration of the audit gas and the concentration indicated by the monitor will determine the accuracy of the CEMS.

c.Relative Accuracy Audit

The Relative Accuracy Audit (RAA) must be conducted on all appropriate process sensors in three of four calendar quarters, but in no more than three quarters in succession. To conduct an RAA:

1.Follow the procedure described in the applicable performance specification in Section 4 for the relative accuracy test, except that only three sets of measurement data are required.

2.The relative difference between the mean of the RM values and the mean of the CEMS responses will determine the accuracy of the CEMS.

5.4.2<u>Calculations for CEMS Data Accuracy</u>

a.RATA Accuracy Calculation

Follow the equations described in Appendix C to calculate the RA for the RATA. The RATA must be calculated in units of the applicable emission standard (e.g., lbs/hr). For facilities with permitted limits for both concentration and mass emission rate, the RA must be calculated in the units of both standards (i.e., ppm and lb/hr).

b.CGA Accuracy Calculation

The equation to be used in calculating the accuracy for the CGA is described in Appendix C. The accuracy is calculated in units of the appropriate concentration (e.g., ppm SO_2 or % O_2). Each component of the CEMS must meet the acceptable accuracy requirement.

c.RAA Accuracy Calculation

The equation to be used in calculating the accuracy for the RAA is described in Appendix C. The RAA must be calculated in the units of the applicable emission standard (e.g., lbs/hr).

5.4.3<u>Criteria for Excessive Inaccuracy</u>

a.If the RA, using the RATA, exceeds the specification set in Section 4, the CEMS is out-of-control.

b.If the accuracy calculated for a CGA exceeds ±15 percent, the CEMS is out-of-control.

c.If the accuracy calculated for an RAA exceeds ±15 percent or 7.5 percent of the standard, whichever is greater, the CEMS is out-of-control.

5.4.4<u>Actions to be Taken</u>

If an audit determines that an analyzer is out-of-control and the occurrence constitutes a breakdown as defined in District Rule 505, the facility must do the following:

a.Follow the breakdown procedures as required in the provisions of Rule 505.

b.Determine the nature of the problem and take corrective action.

c.Following corrective action, audit the CEMS accuracy with an RATA, CGA, or RAA to determine whether the CEMS is operating properly. A RATA must always be performed following an out-of-control period resulting from a RATA. The audit following corrective action does not require analysis of EPA performance audit samples. If the accuracy results from the audit show the CEMS to be out-of-control, the CEMS operator must report the audit showing the CEMS to be out-of-control and the results of the audit following corrective action showing the CEMS to be operating within specifications.

5.4.5 Out-of-Control Period Definition

The beginning of the out-of-control period is the time corresponding to the completion of the sampling for the RATA, RAA, or CGA. The end of the out-of-control period is the time corresponding to the completion of the sampling of the subsequent successful audit.

5.4.6 CEMS Data Status During Out-of-Control Periods

During the period the monitor is out-of-control, the CEMS data are considered invalid and may not be used to verify emission compliance nor may they be counted toward meeting minimum data availability.

The District will evaluate the validity of data obtained before the accuracy audit that demonstrated the CEMS to be out-of-control and after the last successful audit. In some cases, data generated during this entire period may be declared invalid. Such data cannot be used to demonstrate compliance with emission standards or permit conditions. It is the responsibility of the facility to provide information that can be used to determine the validity of the data or to propose a protocol for correcting such data.

5.5CEMS CONTRACTOR-SPECIFIC AUDIT PROTOCOL

A CEMS audit plan must be a part of the Quality Assurance Plan that is submitted with the CEM plan. Note that this audit plan is not contractor-specific. A detailed, contractor-specific source test plan/audit protocol must also be submitted at least 30 calendar days prior to performance of the initial CEMS certification test. This contractor-specific audit protocol is generally included as part of the contractor specific compliance source test plan and must be approved by the District before the first certification audit. The performance certification audit must be performed and the test results submitted before the end of SCDP. The District may allow applicants to perform the non-RATA quarterly audits in-house. At a minimum, the contractor-specific audit protocol must include:

a.The analyzers that will be audited
b.The procedures that will be used
c.The sample locations
d. The criteria that will be used in evaluating the audit results
e.The format of the report

The contractor-specific audit protocol must satisfy the minimum requirements described in Section 5.4 of this protocol.

6. DATA REPORTING REQUIREMENTS

6.1OVERVIEW OF THE REPORTING PROCESS

Each CEMS must be equipped with a data acquisition system (DAS) that will acquire raw data from the emission or process monitors, transform those data using appropriate calibration factors and, where appropriate, calculate emission rates. In addition to the data recorded by the CEMS DAS, the facility must maintain records of calibrations, maintenance activities, and system downtime. Some of these data must be archived by the facility in a form that will allow them to be made available to the District upon request. Other data must be transmitted to the District as a periodic report on a quarterly basis or as required by permit condition. In some cases, data will be telemetered directly to the District central computer complex (CCC).

6.2THE DATA ACQUISITION SYSTEM

6.2.1Data Acquisition

In general, continuous analyzers are required for CEM systems. The use of semicontinuous analyzers will only be allowed in specific, unique cases. Each CEMS must be equipped with a DAS that will acquire data and store it in digital form. At a minimum, the CEMS DAS must:

a.In the case of continuous measurements, acquire raw data from emission analyzers and process sensors, via a scan of the analyzers/sensors, either once every second or once every ten seconds

b.In the case of semicontinuous measurements, acquire raw data from the emission analyzers and process sensors at the end of each measurement cycle as stipulated in the facility PTO/CEMS Plan

c. Have the capability to acquire records of previous calibrations, including zero and span calibration values

d. Have the capability to acquire the analyzer status, including indications of on-line, off-line and calibration modes; Status flags to be saved with the data are defined in the District Data Logger Specifications document

If data telemetry to the District is required, the CEMS data logger must meet the specifications detailed in the Data Logger Specifications for the Santa Barbara County Air Pollution Control District Data Acquisition System. It is recommended that the CEMS have a DAS that is separate from any process control computer. If process control computers are used, they should satisfy all of the requirements for communicating the data to the District CCC. The CEMS DAS should be able to provide data even if the main process control computer fails. The process control computer can poll the CEMS data acquisition system for information, but the process control computer should not be the DAS for the CEMS.

6.2.2 Data Transformation and Averaging

The CEMS DAS must be capable of transforming the data and calculating various averages. The system must process raw data into appropriate parameters that can be compared directly to the emission standards or permit conditions applicable to each source. The actual transformations required will depend on the particular application. The CEM plan must describe the equations that will be used.

a. In general:

1. Raw data must be converted to uncorrected concentration data by applying the applicable calibration factors.

2. Uncorrected concentration data must be corrected to standard conditions, as specified in the emission standards or permit conditions.

3. Emission rate data must be calculated from concentration, temperature and flow data.

4. Any CEMS data generated during downtime (includes calibration, maintenance, cylinder gas audits, etc.) may not be counted toward meeting minimum data recovery requirements.

5. Any CEMS data generated when the analyzer off-line or calibration status flags are engaged shall be considered invalid data.

b. In the case of continuous analyzers:

1. At the end of each clock minute, the CEMS DAS must calculate a one-minute average using the ten- or one-second data points from the previous sixty seconds for each parameter monitored by the CEMS. These one-minute averages must be used to calculate each parameter required by permit condition in the same units as the applicable standard. In the case of sources for which telemetry is required, these one-minute averages must be available for polling by the District.

   If all of the one-second or ten-second values are used to calculate a one-minute average, the one-minute average is valid, does not have to be flagged, and is used in all subsequent calculations.

   If less than all of the one-second or ten-second values are used to calculate a one-minute average, the one-minute average is considered invalid and a unique flag must be saved with the one-minute average to indicate that less than all of the one or ten-second values were used to calculate the one-minute average. Although the one-minute average is saved, it is considered invalid and is not used in any subsequent calculations (i.e., six-minute averages).

2. At the end of each six-minute period, the CEMS DAS must calculate, record, and archive the average of the valid one-minute averages taken in the previous six minutes.

   If all six one-minute averages are used to calculate a six-minute average, the six-minute average is flagged as valid and is used in all subsequent calculations.

   If there are five one-minute averages used to calculate a six-minute average, a unique flag must be saved with the six-minute average to indicate this fact. The six-minute average is still valid and is used in all subsequent calculations.

   If there are four or fewer one-minute averages used to calculate a six-minute average, a unique flag must be saved with the six-minute average to indicate this fact. Although the six-minute average is saved, it is considered invalid and is not used in any subsequent calculations (i.e. sliding-hour and clock-hour averages).

3.A sliding-hour average must be calculated by the CEMS DAS at the end or each six-minute period using all the valid six-minute averages calculated in the previous sixty minutes.

If all ten six-minute averages are used to calculate a sliding-hour average, the sliding-hour average is flagged as valid .

If there are nine six-minute averages used to calculate a sliding-hour average, a unique flag must be saved with the sliding-hour average to indicate this fact. The sliding-hour average is still valid.

If there are eight or fewer six-minute averages used to calculate a sliding-hour average, a unique flag must be saved with the sliding-hour average to indicate that less than 90% of the required number of six-minute averages were used to calculate the sliding-hour average. Although the sliding-hour average is saved, it is considered invalid.

4.At the end of each clock-hour, the CEMS DAS must calculate, record, and archive the clock-hour average of the valid six-minute averages taken in the previous sixty minutes.

If all ten six-minute averages are used to calculate a clock-hour average, the clock-hour average is valid, is flagged as valid and is used in all subsequent calculations.

If there are nine six-minute averages used to calculate a clock-hour average, a unique flag must be saved with the clock-hour average to indicate this fact. The clock-hour average is still valid and is used in all subsequent calculations.

If there are eight or fewer six-minute averages used to calculate a clock-hour average, a unique flag must be saved with the clock-hour average to indicate that less than 90% of the required number of six-minute averages were used to calculate the clock-hour average. Although the clock-hour average is saved, it is considered invalid and is not used in any subsequent calculations.

c.In general, continuous analyzers are required for CEM systems. If the specifics of a case allow the use of semicontinuous analyzers, the following apply:

1.The CEMS DAS must calculate, record, and archive the value of each parameter required by permit condition at the end of each complete analysis cycle carried out by the analyzer.

2.Sliding-hour averages must be calculated at the end of each analysis cycle carried out by the analyzer for each parameter. The sliding-hour average must be calculated using all the valid data points obtained during the previous sixty minutes. The number of valid data points required for a valid sliding-hour average for a particular analyzer system must be specified in the CEM Plan. If less than this number of valid data points are used to calculate the clock-hour average, a unique flag must be saved with the data to indicate an invalid sliding-hour average. Although the sliding-hour average is saved, it is considered invalid.

3.At the end of each hour, a clock-hour average must be calculated. The clock-hour average must be calculated using all the valid data points obtained during the previous sixty minutes. The number of valid data points required for a valid clock-hour average for a particular analyzer system must be specified in the CEM plan. If less than this number of data points are used to calculate the clock-hour average, a unique flag must be saved with the data to indicate an invalid clock-hour average. Although the clock-hour average is saved, it is considered invalid and is not used in any subsequent calculations.

6.2.3 **<u>Reporting Requirements</u>**

The facility must generate and store a series of reports prepared from the data. These reports include the following:

a.Six-minute average reports

b.Sliding hour average reports
c.Clock hour average reports
d.Excess emission reports
e.Calibration summary reports
f.Calibration log
g.Downtime log (including Data Capture)
h.Maintenance log
i.Quarterly report
j.Audit report

Additional reports may be required. These reports, and the required formats, will be specified by the District.

6.2.4<u>Six-minute Average Report (Continuous Monitors)</u>

The six-minute average report must be prepared for each day of the year and must be archived by the facility on magnetic media. It must contain the values of all six-minute averages calculated by the CEMS DAS.

The report must contain the following:

a.The month, day, and year
b.The clock time
c.For each pollutant analyzer
1.The six-minute average concentration data from the analyzer, including flags
2.Any software adjustments of the data made in lieu of analyzer recalibration
3.The stack concentration in units of applicable standard
4.The emissions in units of applicable standard
5.Any applicable limit or standard
d.For each diluent analyzer
1.The six-minute average concentration data from the analyzer, including any flags
2.Any software adjustments of the data made in lieu of analyzer recalibration
3.The stack concentration in percent
e.For each mass emission rate
1.The flow sensor six-minute average output data including any flags
2.The temperature
3.The calculated mass flow rate in units of applicable standard
4.Any applicable limit or standard
f.For each process sensor
1.The sensor six-minute average output data including any flags
2.Any software adjustments of the data made in lieu of sensor recalibration

3.The process parameter in units of applicable standard
4.Any applicable limits

The data must be stored in ASCII or Lotus 123 files. Data for each day must be stored in a separate file in chronological order. This information must be listed in separate columns starting with the date and clock time. Each column should be clearly labeled and the units specified. A hardcopy index must be provided that includes the file names, listed in chronological order, the date of the data reported, the type of data present in each file, and the name of the diskette on which the information may be found. Each file must be clearly labeled with a report title, site identifier, report start date and report end date.

The format for a typical six-minute average report is shown in Figure 4 of Appendix A.

6.2.5 N-Minute Average Report (Semicontinuous Analyzers)

A report similar to that described in 6.2.4 must be prepared for semicontinuous analyzers where N is the number of minutes required for each analysis cycle.

6.2.6 Sliding Hour Average Report

The sliding hour average report must be prepared for each day of the year and must be archived by the facility on magnetic media. It must contain the values of all sliding hour averages calculated by the CEMS DAS for all parameters that must be monitored in order to satisfy permit conditions.

The report must contain the following:

a.The month, day and year
b.The clock time
c.The most recent sliding hourly average, including the validity flag, for each applicable parameter in units of the applicable standard
d.Any applicable limit or standard

The data must be stored in ASCII or Lotus 123 files. Data for each day must be stored in a separate file in chronological order. This information must be listed in separate columns starting with the date and clock time. Each column should be clearly labeled and the units specified. A hardcopy index must be provided that includes the file names, listed in chronological order, the date of the data reported, the type of data present in each file, and the name of the diskette on which the information may be found. Each file must be clearly labeled with a report title, site identifier, report start date and report end date.

The format for a typical sliding hour average report is indicated in Figure 5 of Appendix A.

6.2.7 Clock Hour Average Report

The clock hour average report must be prepared for each day of the year and must be archived by the facility on magnetic media. It must be included in the periodic report, which must be submitted to the District. It must contain the values of all clock hour averages calculated by the CEMS DAS for all parameters that must be monitored in order to satisfy permit conditions.

The report must contain the following:

a. The month, day and year
b. The clock time
c. The most recent clock hour average, including the validity flag, for each applicable parameter in units of the applicable standard
d. Any applicable standard

The data must be stored in ASCII or Lotus 123 files. Data for each day must be stored in a separate file in chronological order. This information must be listed in separate columns starting with the date and clock time. The clock time used will be start time of the averaging period. Each column should be clearly labeled and the units specified. A hardcopy index must be provided that includes the file names, listed in chronological order, the date of the data reported, the type of data present in each file, and the name of the diskette on which the information may be found. Each file must be clearly labeled with a report title, site identifier, report start date and report end date.

The format for a typical clock hour average report is indicated in Figure 6 of Appendix A. Note that Figure 6 of Appendix A is a condensed format.

Data for one entire day (24 clock-hour averages) should fit on a single sheet of paper.

6.2.8 Daily Exceedence Log

A log must be maintained to document each period where permit limits are exceeded. Examples of exceedences include, but are not limited to, stack concentration limits, stack emission rate limits, and even fuel consumption rate limits. This log is required in addition to District requirements for facility compliance, including documentation of a breakdown condition or in conjunction with variance requests. The contents should include but not be limited to the following items.

a. The report title
b. The site identifier
c. The source identifier
d. The parameter identifier
e. The date
f. The start times of each exceedence period
g. The end times of each exceedence period
h. The value of parameter in exceedence in units of applicable standard
i. The applicable standard
j. A brief description of what caused the exceedence
k. The corrective action taken to eliminate exceedence
l. The preventive measures taken to prevent further exceedences

Figure 7 of Appendix A describes the format for a typical daily exceedence log.

6.2.9 Calibration Log

The facility must maintain a record of every calibration performed on any component of the CEMS. The log must be filled out and kept on hand at the facility, available for inspection and submitted to the District upon request.

The log must contain the following information:

a. The report title

b.The site identifier
c.The source identifier
d.The parameter identifier
e.The date
f. For each calibration gas used:
   1. The cylinder number
   2. The expiration date
   3. The concentration (ppm)
   4. The delivery pressure (psi)
   5. The cylinder pressure (psi)
g. The calibration start time
h. The zero reading (before adjustment)
i. The span reading (before adjustment)
j. The zero reading (after adjustment)
k. The span reading (after adjustment)
l. The zero drift
m. The span drift
n. The calibration stop time
o. Any other adjustments
p. Any other maintenance
q.For manual calibrations or any logging of automatic calibrations, the signature of the technician performing the calibration

Figure 8 of Appendix A is a typical calibration log.

6.2.10 Calibration Failure Summary

A calibration failure summary must be maintained by the facility, submitted with the quarterly report, and include the following:

a.The report title
b.The site identifier
c.The source identifier
d.The parameter identifier
e. The date of the failed calibration
f.The zero drift on that day
g.The permissible zero drift
h.The span drift
i.The permissible span drift
j.The number of successive failed calibrations
k.The summary of out-of-control periods

l.Diagnosis of problem and corrective action taken

Figure 9 of Appendix A is a sample calibration failure summary.

6.2.11 CEMS Downtime Log

The facility must maintain a downtime log that documents all periods of downtime (excluding calibration time). At a minimum, the downtime log must include the following:

a.The report title
b.The site identifier
c.The source identifier
d. The date
e.The start and end time of each period of downtime
g. The reason for downtime (maintenance, component failure, loss of power, etc.)
h. The action taken to correct the cause of the downtime
i. The signature of instrument technician

Figure 10 of Appendix A is a sample downtime log.

6.2.12 Maintenance Log

The facility must maintain a maintenance log that describes all preventative and breakdown maintenance work carried out on the analyzer.

a.Preventative maintenance is that routine maintenance required by the analyzer to keep it in working order. The nature and frequency of preventative maintenance must be described in the CEM Plan. Also, the District must be notified whenever preventative maintenance is scheduled.

b.Breakdown maintenance is any maintenance that is not routine. This type of maintenance is usually unscheduled and is in response to an unexpected failure of the analyzer. All of the District rules covering breakdowns must be followed in this type of case.

At a minimum, the maintenance log must include the following:

a.The report title

b.The site identifier
c.The source identifier
d. The date
e. The start time of the maintenance activity
f.The stop time of the maintenance activity
g.The total downtime due to maintenance
h. A description of the maintenance carried out
i. The reason for carrying out the operation (preventative, breakdown, etc.)
j.The signature of maintenance technician

Figure 11 of Appendix A is a sample maintenance log.

6.2.13 Data Capture Requirements

Each analyzer or process measurement must maintain a 90% data capture rate on a quarterly basis.

Data capture rate or Data Recovery Efficiency (DRE) is to be calculated on a quarterly basis as follows:

$$DRE = [(\Sigma hrs_{valid} - \Sigma hrs_{exempt})/(\Sigma hrs_{total} - \Sigma hrs_{exempt})] \times 100\%$$

where, DRE = Data Recovery Efficiency
Σhrs_{valid} = Total number of valid clock-hour averages
Σhrs_{total} =Total number of hours in reporting period
Σhrs_{exempt} =Total number of facility downtime hours (shutdown due to facility (not CEMS) breakdown or maintenance) and variance-protected hours

Any CEMS data generated during CEMS downtime (includes calibration, maintenance, auditing, breakdown, etc.) which is not due to facility downtime or granted relief via a variance may not be counted toward meeting minimum data recovery requirements. Expeditious resolution of any breakdown condition and avoidance of recurrent breakdowns in conjunction with a coordinated calibration and maintenance program will ensure that CEMS meet the 90% data recovery requirement.

6.3QUARTERLY REPORT

Each facility must submit CEM data to the District on a quarterly basis or as required by permit conditions.

6.3.1Format of the Report

Each quarterly report should contain each major section listed below in its own separate, tabbed and labeled section of the report.

a.Cover page
b.Signature page
c.Quarterly Operations Summary
d.Quarterly Emission Summary
e.Quarterly Downtime Summary
f.Daily Operation Summary
g.Daily Emission Summary
h.Daily Downtime Summary
i.Calibration Summary
j.Daily Excess Emissions Log
k.Daily Downtime Log
l.Daily Maintenance Log

When several pages of forms or tables are submitted, they are to be ordered chronologically. If no information is available for a particular parameter, a notation must be made giving the reason for the missing data. Invalid data must be clearly marked as such.

In general, daily summaries that are reported by hour may be submitted to the District on magnetic media, in either Lotus 123 or ASCII files on double-sided, double-density (720 Kb) 3.5-inch diskettes, rather than in hard copy format. Double-sided, high-density (1.4 Mb) 3.5-inch diskettes are also acceptable. Two copies of each diskette must be submitted. Each type of summary file for each day must be contained in a separate file; a hard copy index must be provided that includes the file names, date of the data reported, and type of data present in each file. This information should be listed in chronological order and should also include the name of the diskette on which the information may be found. The hard copy index should be inserted into the report in the section where the hard copy information would normally be found. For all days with monitor downtime (calibration time excluded) or exceedances, hard copies of the daily summaries must be provided in addition to magnetic media submissions.

6.3.2 Cover Page

The cover page must include the name of the permit holder company, the District permit number, the document title, and the name(s) of the emission source(s) to be monitored.

6.3.3 Signature Page

The signature page must contain an endorsement by the permit holder company representatives.

6.3.4 Quarterly Operations Summary

The quarterly operations summary must describe all parameters dealing with the facility operations that must be reported in order to satisfy permit conditions. The following information must be submitted in a tabular form for each source for each month of the quarter.

a.Header:
1.Source identification
2.Quarter and year
3.Month summarized
b.Column labels:
1.Date of operation
2.Operating parameters as required
3.Units
c.At the bottom of each column:
1.Monthly totals for each applicable column
2.Daily averages for each applicable column
3.Running quarterly totals for each applicable column

See Figure 12 of Appendix A for a suggested format. Note that Figure 12 of Appendix A is a condensed format. Data for one entire month should fit on a single sheet of paper.

6.3.5 Quarterly Emissions Summary

The quarterly emissions summary should describe all facility emissions that must be reported in order to satisfy permit conditions. The following information must be submitted in a tabular form for each source for each month of the quarter.

a.Header:
1.Source identification
2.Quarter and year
3.Month summarized
c.Column labels:
1.Date of operation
2.Emission parameters (as required)
3.Units
d.At the bottom of each column:
1.Monthly Uptime Emissions (based on valid clock-hour averages)
2.Monthly Emissions Estimate for clock-hours with invalid data
3.Monthly Total Emissions
4.Running Quarterly Emissions

Emissions will also be inventoried and reported for all clock hours during which the reported data was invalid. Unless otherwise specified in the permit, emissions during invalid clock hours will be calculated by taking the maximum permitted hourly emission rate and multiplying it by the total number of instrument specific invalid clock-hours. The District reserves the right to use an alternative methodology to determine analyzer downtime emissions if so warranted.

See Figure 13 of Appendix A for a suggested format. Note that Figure 13 of Appendix A is a condensed format. Data for one entire month should fit on a single sheet of paper.

6.3.6 Quarterly Downtime Summary

This report must present the monthly downtime, the estimated emissions for the downtime, and the data capture rate for each analyzer in the CEMS as well as for the entire CEMS. It must include the following:

a.Header:
1.Source identification
2.Quarter and year
3.Month summarized
b.Column labels:
1.Date of operation
2.Downtime in hours
3.Calibration time in hours
4.Total off-line time
c.Monthly totals at the bottom of each column
d. Monthly data capture rates as defined in 6.2.13.

See Figure 14 of Appendix A for a suggested format. Note that Figure 14 of Appendix A is a condensed format. Data for one entire month should fit on a single sheet of paper.

6.3.7 <u>Daily Operations Summary</u>

The daily operations summary should describe all parameters dealing with the facility operations that must be reported in order to satisfy permit conditions. The following information must be submitted in a tabular form for each source for each day of the quarter.

a.Header:
1.Source identification
2.Quarter and year
3.Day summarized
b.Column labels:
1.Clock time
2.Operating parameters as required
3.Units

See Figure 6 of Appendix A for a suggested format. Note that Figure 6 of Appendix A is a condensed format. Data for one entire day should fit on a single sheet of paper.

6.3.8 Daily Emissions Summary

The daily emissions summary should describe all facility emissions that must be reported in order to satisfy permit conditions. The following information must be submitted in tabular form for each source for each hour of the day.

a.Header:
1.Source identification
2.Quarter and year
3.Day summarized
b.Column labels:
1.Clock time
2.Emission parameter (as required)
3.Units

See Figure 6 of Appendix A for a suggested format.

6.3.9 Daily Downtime Summary

This report must present the downtime summary for each analyzer in the CEMS. It must include the following:

a.Header
1.Source identification
2.Quarter and year
3.Day summarized
b.Column labels
1.Clock time
2.Monitor downtime (as required)

See Figure 15 of Appendix A for a suggested format.

6.3.10 Calibration Failure Summary

The content of this report is described by Section 6.2.10 of this protocol.

6.3.11 Daily Exceedence Log

The content of this report is described in Section 6.2.8 of this protocol.

6.3.12 Daily Maintenance Log

The content of this report is described in Section 6.2.12 of this protocol.

6.3.13 Due Dates

Unless stated otherwise in a permit condition, Quarterly Reports are due at the District 45 calendar days after the last day of the quarter.

6.3.14 Acceptance of Data by the District

All data presented to the District must be examined for conformance with this protocol, completeness, accuracy and acceptability. If the data meet these criteria, they will become part of the Santa Barbara County air quality data base. The following will apply:

a. The District will review and assess the results of quality assurance audits and quality control procedures to ensure that the data are valid. Performance specifications, including calibration drift and relative accuracy, must be satisfied.

b. All data submitted to the District must have been collected in conformance with the specifications established by the District and described in the approved CEM plan. The data must be complete and must include all applicable logs and records.

c. In order to be considered valid, all data must have been collected with a minimum data capture rate as specified in Section 6.2.2.

6.3.15 Review Procedures

The District will review quarterly reports to make sure all items conform to the requirements of the CEM protocol and approved CEM plan.

6.4 QUARTERLY AUDIT AND ANNUAL PERFORMANCE CERTIFICATION TEST REPORTS

The facility must submit a final report on the results of any quarterly audit or annual performance certification test performed on the CEMS within thirty (30) calendar days after completion of the audit or test unless specified otherwise in a permit condition. Each final audit report should contain each major section listed below in its own separate, tabbed, and labeled section of the report.

a.Cover page
b.Signature page
c.Introduction
d.Audit Procedures
e.Audit Results
f.Conclusions and Recommendations

In addition to the final audit report, the facility must submit a preliminary audit report within two (2) working days after the completion of any audit or performance certification test procedure. This preliminary report must contain only enough information to perform a preliminary assessment of the status of the analyzer. Each preliminary audit report shall contain the major sections listed below.

a.Cover page
b.Signature page
c.Audit Results

6.4.1 Cover Page

The cover page must include the name of the permit holder company, the SBCAPCD permit number, the document title, and the name(s) of the emission source(s) to be audited.

6.4.2 Signature Page

The signature page must contain an endorsement by the permit holder company representatives.

6.4.3 Introduction

This section of the audit report must describe the audit program and its purposes. Reference must be made to the requirements of the audit plan submitted as part of the CEM plan.

6.4.4 Audit Procedures

This section must describe the audit procedures carried out for each CEMS. It must include the following:

a.The reference methods used
b.The number of tests carried out
c.The chain-of-custody procedures
d.Calibration gas and its concentration

6.4.5Audit Results

This section must report the results of the audit. The accuracy or relative accuracy must be compared to the applicable performance specifications.

6.5TELEMETRY

The District may require the facility to telemeter data directly to its CCC. The CEMS DAS must acquire data and format it for transmission to the CCC. If sufficient data is telemetered, the CCC may repair some Section 6.3 reports. In such a case, source reporting requirements may be relaxed. If telemetry is required, each facility will be required to do the following:

a.Acquire and install all communications equipment
b.Program and install all CEMS interfaces at the facility
c.Program and install all interfaces to the District CCC consistent with the requirements of the Data Logger Specifications for the Santa Barbara County Air Pollution Control District Data Acquisition System. A copy of this document is available from the District upon request.
d.Ensure that all specified data are available to the CCC.

6.6DATA ARCHIVING

The facility must archive all data from the CEMS for a period of at least two years. Data on magnetic media must be archived for at least five years. Items to be archived include the following:

a. Hardcopy from the primary CEMS DAS
b. Strip chart records from the backup CEMS DAS
c.Six-minute average reports
d.Sliding hour average emission reports

e. Calibration logs
f. Downtime logs
g. Maintenance logs
h.Quarterly reports
i.Audit reports

APPENDIX A: FIGURES

FIGURE 1:OUTLINE FOR A CEM PLAN SUITABLE FOR SUBMISSION TO THE SANTA BARBARA COUNTY AIR POLLUTION CONTROL DISTRICT

Cover Page
Signature page

1. Introduction
    - i. Objectives of the Program
    - ii. Applicable Permit Conditions
    - iii. Organization of the Plan

2. Project Description
    - i. Project Ownership
    - ii. Geographic Location
    - iii. Facility Description
    - iv. Process Description
    - v. Emission Description

3. CEM Program Description
    - i. Parameters to be Monitored
    - ii. Project Organization
    - iii. Project Personnel
    - iv. Equipment Suppliers

4. Instrument Descriptions
    - i. Sampling System
    - ii. Analyzer(s)
    - iii. Dilution System
    - iv. Calibration gases
    - v. Continuous Emission Rate Monitors
    - vi. Process Sensors
    - vii. Data Acquisition Systems
    - viii.Telemetry Devices

5. Standard Operating Procedures
    - i. Procedures
    - ii. Distribution
    - iii. Procedures for Revision

6. Performance Certification Test Plan
    - i. Objectives

FIGURE 1 (continued)

ii. Performance Specifications
iii. Procedures for CD Determination
iv. Procedures for RA Determinations
v. Report Format

7. Data Acquisition and Reporting
   i. Description of Data Acquisition Process
   ii. Data Acquisition
   iii. Data Transformation
   iv. Data Recording
   v. Data Reporting
   vi. Data Validation
   vii. Quarterly Report Format
   viii.Audit Report Format
   ix. Telemetry
   x. Data Archiving

8. Quality Assurance/ Quality Control
   i. Overview of Program
   ii. CEMS Design Features
   iii. Sampling Location Selection
   iv. Operator Training Programs
   v. Routine and Preventative Maintenance
   vi. Quality Control Procedures
   vii. Audit Procedures
   viii. Audit Plan

24-HOUR CALIBRATION DRIFT DATA SHEET

FACILITY ____________ SOURCE ___________ ANALYZER TYPE __________
ANALYZER ID# ________ ANALYZER SPAN ____
ZERO CAL CONC _______ SPAN CAL CONC ____

	INITIAL CALIBRATION				CALIBRATION AFTER 24 HOURS				CALIBRATION DRIFT* (24-hour)	
Test No.	Date	Time	Reading		Date	Time	Reading			
			Zero	Span			Zero	Span	Zero	Span
1										
2										
3										
4										
5										
6										
7										

* See Appendix B and C for definitions and calculation methodology

FIGURE 2:24-HOUR CALIBRATION DRIFT DATA SHEET

RELATIVE ACCURACY DATA SHEET

FACILITY ____________SOURCE _________________
ANALYZER TYPE _______ ANALYZER ID# ___________
ANALYZER SPAN _______

Run No	Date	Time		Analyzer Response	Reference Method	Diff.
		Start	End			
1						
2						
3						
4						
5						
6						
7						
8						
9						
		AVERAGES				

STANDARD DEVIATION OF DIFFERENCES* ______________________________

95% CONFIDENCE COEFFICIENT* _____________________________________

RELATIVE ACCURACY* ____

* See Appendix B and C for definitions and calculation methodology

FIGURE 3:RELATIVE ACCURACY DATA SHEET

CONDENSED SIX-MINUTE AVERAGE REPORT

FACILITY ____________SOURCE _____________
ANALYZER ID# ________ DATE _______________

Time	Flags	Stack Concentration				Stack Emissions	
		Unadjusted	Calibration Adjustment Factor	Reported Stack Conc.	Permitted Limits	Reported Emission Rate	Permitted Emission Rate
hh/mm		i.e. ppm	i.e. ppm	i.e. ppm @ 15% O_2	i.e. ppm @ 15% O_2	i.e. lbs/hr	i.e. lbs/hr
00:06							
00:12							
00:18							
00:24							

FIGURE 4:SAMPLE FORMAT OF A CONDENSED SIX-MINUTE AVERAGE REPORT

CONDENSED SLIDING-HOUR AVERAGE REPORT

FACILITY ____________SOURCE _____________
ANALYZER ID# ________ DATE ________________

Time	Flags	Stack Concentration		Stack Emissions	
		Reported Stack Conc	Permitted Limit	Reported Emission Rate	Permitted Limits
hh/mm		i.e. ppm @ 15% O_2	i.e. ppm @ 15% O_2	i.e. lbs/hr	i.e. lbs/hr
00:00					
00:06					
00:12					
00:18					

FIGURE 5:SAMPLE FORMAT OF A CONDENSED SLIDING-HOUR AVERAGE REPORT

CONDENSED CLOCK-HOUR AVERAGE REPORT

FACILITY ____________SOURCE _____________
ANALYZER ID# ________ DATE ________________

Time	Flags	Stack Concentration		Stack Emissions	
		Reported Stack Conc	Permitted Limit	Reported Emission Rate	Permitted Limits
hh/mm		i.e. ppm @ 15% O_2	i.e. ppm @ 15% O_2	i.e. lbs/hr	i.e. lbs/hr
00:00					
01:00					
02:00					
03:00					

FIGURE 6:SAMPLE FORMAT OF A CONDENSED CLOCK-HOUR AVERAGE REPORT

DAILY EXCEEDENCE LOG

FACILITY ____________SOURCE _____________
ANALYZER ID# ________ DATE ________________

	Event #1	Event #2	Event #3
Start Time of Exceedence	________	________	________
End Time of Exceedence	________	________	________
Reported Exceedence Level	________	________	________
Permitted Limit	________	________	________

CAUSE (Brief description of what caused exceedence)

____

____

____

CORRECTIVE ACTION (What action was taken to eliminate the exceedence)

____

____

____

PREVENTATIVE MEASURES (What preventative measures will be implemented to prevent future exceedences?)

____

____

TECHNICIAN SIGNATURE ____________________

FIGURE 7:SAMPLE FORMAT OF DAILY EXCEEDENCE LOG

CALIBRATION LOG

FACILITY ____________SOURCE _____________
ANALYZER ID# ________ DATE ________________

CYLINDER CALIBRATION GAS	
Cylinder No	
Analysis Date	
Expiration Date	
Contents	
Delivery Pressure (psi)	
Cylinder Pressure (psi)	

ANALYZER CALIBRATION	
Start Time	
Stop Time	
Zero Reading (before adjustment)	
Zero Reading (after adjustment)	
Zero Drift*	
Span Reading (before adjustment)	
Span Reading (after adjustment)	
Span Drift*	
Any other adjustments	
Any other maintenance	
Technician Signature	

*See Appendix B for definitions and calculation methodology

FIGURE 8:SAMPLE FORMAT OF CALIBRATION LOG

CONDENSED QUARTERLY CALIBRATION FAILURE SUMMARY

FACILITY ____________ SOURCE _____________
ANALYZER ID# ________ QUARTER _____________

Day	Zero Drift %	Standard %	Span Drift %	Standard %	# of Successive Failed Calibrations	Is Analyzer Out-of-Control?

FIGURE 9:SAMPLE FORMAT OF A CONDENSED QUARTERLY CALIBRATION FAILURE SUMMARY

DAILY DOWNTIME LOG

FACILITY ____________SOURCE _____________
ANALYZER ID# ________ DATE ________________

	Event #1	Event #2	Event #3
Start Time of Downtime	________	________	________
End Time of Downtime	________	________	________

REASON (Explanation for downtime; i.e. maintenance, component failure, power loss, etc.)

____

____

____

ACTION (What action was taken to bring analyzer back on-line?)

____

____

____

PREVENTATIVE MEASURES (What preventative measures will be implemented to prevent future breakdowns of this type?)

____

____

TECHNICIAN SIGNATURE ______________________________

FIGURE 10:SAMPLE FORMAT OF DAILY DOWNTIME LOG

MAINTENANCE LOG

FACILITY ____________SOURCE _____________
ANALYZER ID# ________ DATE ________________
ANALYTE

Start Time of Maintenance ____________________

End Time of Maintenance ____________________

REASON (Explanation for maintenance; i.e. preventative, breakdown, etc.)

____

____

____

ACTION (What maintenance action was taken?)

____

____

____

TECHNICIAN SIGNATURE ____

FIGURE 11:SAMPLE FORMAT OF MAINTENANCE LOG

CONDENSED QUARTERLY OPERATIONS SUMMARY

FACILITY ____________ SOURCE _____________ EQUIPMENT ___________
EQUIPMENT ID# ________ QUARTER _____________ MONTH _______________

Day of Operation	Fuel Type Used	Turbine-Hr on Fuel	SCF of Nat. Gas Used	Gal of Oil Used	Water/Fuel Ratio	% Sulfur in Fuel
Monthly Total						
Daily Average						
Running Quarterly Total						

FIGURE 12:SAMPLE FORMAT OF A CONDENSED QUARTERLY OPERATIONS SUMMARY

CONDENSED QUARTERLY EMISSIONS SUMMARY

FACILITY ____________ SOURCE _____________ EQUIPMENT ___________
EQUIPMENT ID# ________ QUARTER _____________ MONTH _______________

Date	SCF of Nat Gas Used	Pollutant Emissions in Pounds	XS Pollutant Emissions in Pounds	Gal of Oil Used	Pollutant Emissions in Pounds	XS Pollutant Emissions in Pounds
Uptime Total						
Downtime Total						
Monthly Emissions Total						
Running Quarterly Emissions						

Total						

FIGURE 13:SAMPLE FORMAT OF A CONDENSED QUARTERLY EMISSIONS SUMMARY

CONDENSED QUARTERLY DOWNTIME SUMMARY

FACILITY ____________ SOURCE _____________ EQUIPMENT ___________
ANALYZER ID# ________ QUARTER _____________ MONTH _______________

Date	Natural Gas Fuel			Oil Fuel		
	Downtime in hours	Calibration time in hours	Total off-line time	Downtime in hours	Calibration time in hours	Total off-line time
Totals						

MONTHLY DATA CAPTURE RATE _______________________

FIGURE 14:SAMPLE FORMAT OF A CONDENSED QUARTERLY DOWNTIME SUMMARY

CONDENSED DAILY DOWNTIME LOG

FACILITY _____________ SOURCE ______________ ANALYZER TYPE _______
ANALYZER ID# _________ DATE _________________

Date	Natural Gas Fuel			Oil Fuel		
	Downtime in min	Calibration time in min	Total off-line time	Downtime in min	Calibration time in min	Total off-line time
Totals						

DAILY OFF-LINE TIME _________________________

FIGURE 15:SAMPLE FORMAT OF A CONDENSED DAILY DOWNTIME LOG

APPENDIX B:

ABBREVIATIONS, ACRONYMS AND GLOSSARY OF TERMS

Appendix B

ABBREVIATIONS AND ACRONYMS

ATC	Authority to Construct
CCC	Central Computer Complex
CD	Calibration Drift
CEM	Continuous Emission Monitoring
CEMS	Continuous Emission Monitoring System
CGA	Cylinder Gas Audit
CO	Carbon Monoxide
CO_2	Carbon Dioxide
DAS	Data Acquisition System
District	Santa Barbara County Air Pollution Control District
H_2S	Hydrogen Sulfide
NO_x	Oxides of Nitrogen
O_2	Oxygen
PTO	Permit to Operate
QA	Quality Assurance
QC	Quality Control
RA	Relative Accuracy
RAA	Relative Accuracy Audit
RATA	Relative Accuracy Test Audit
ROC	Reactive Organic Compounds
RM	Reference Method
SBCAPCD	Santa Barbara County Air Pollution Control District
SCDP	Source Compliance Demonstration Period
SO_2	Sulfur Dioxide
SOP	Standard Operating Procedures
THC	Total Hydrocarbons
TRS	Total Reduced Sulfur

GLOSSARY OF TERMS

Calibration Drift (CD): The difference in the CEMS output readings from the established reference value after a stated period of operation during which no unscheduled maintenance, repair or adjustment took place.

Central Computer Complex (CCC): The SBCAPCD facility computer systems, telecommunications systems, and associated software.

Centroidal Area: A concentric area that is geometrically similar to the stack or duct cross section and is no larger than one percent of the stack or duct cross-sectional area.

Continuous Emissions Monitoring Systems (CEMS): The total equipment required for the determination of a pollutant gas concentration or emission rate in a source effluent. The terms CEMS and continuous emission rate monitoring system (CERMS) are analogous. Continuous monitoring systems consist of major subsystems that can include a sampling interface, pollutant analyzer, diluent analyzer, flow rate sensor and data acquisition systems.

Data Acquisition System (DAS): That portion of the continuous monitoring system that provides a permanent record of the output signal in terms of the applicable units. The data acquisition system may include automatic data reduction capabilities.

Diluent Analyzer: That portion of the CEMS that senses the diluent gas (e.g., CO_2 or O_2) and generates an output proportional to the gas concentration.

Flow Rate Sensor: That portion of the CEMS that senses the volumetric flow rate and generates an output proportional to the flow rate. The flow rate sensor must have provisions to check the CD for each flow rate parameter that it measures individually (e.g., velocity pressure).

Humidity Range: The range of humidities over which an instrument can operate and still meet all other specifications.

Lag Time: The time interval between a step change in analyzer input concentration and the first observable corresponding change in response.

Linearity: The difference between the response of an instrument and the value derived from a linear curve determined from the response of the instrument to zero and mid-level calibration gases expressed as a percent of the span value.

Noise: Spontaneous short duration deviations in output, about the mean output, which are not caused by input concentration changes. Noise is determined as the standard about the mean and is expressed in concentration units.

Normal Operating Range: The range of temperatures over which an instrument can operate and still meet all other performance specifications.

Operational Test Period: A minimum period of time over which a measurement system is expected to operate within certain performance specifications without unscheduled maintenance, repair, or adjustment.

Pollutant Analyzer: That portion of the continuous monitoring system that senses the pollutant gas and generates a signal output that is a function of the pollutant concentration.

Path CEMS: A CEMS that measures the gas concentration along a path greater than 10 percent of the diameter of the stack or duct cross section.

Point CEMS: A CEMS that measures the gas concentration either at a single point or along a path equal to or less than 10 percent of the diameter of the stack or duct cross section.

Precision: Variation about the mean of repeated measurements of the same pollutant concentration, expressed as one standard deviation about the mean.

Process Sensors: Sensors used to monitor process parameters such as flow, temperature and pressure.

Relative Accuracy (RA): The absolute mean difference between the gas concentration or emission rate determined by the CEMS and the value determined by the RMs plus the 2.5 percent error confidence coefficient of a series of tests divided by the mean of the RM tests or the applicable emission limit.

Response Time: The time interval from a step change in pollutant concentration at the sample probe to the time at which 95 percent of the corresponding final value is reached, as displayed on the continuous monitoring system data recorder.

Sample Probe: That portion of an extractive continuous monitoring system that performs one or more of the following operations: acquisition, transportation, and conditioning of a sample of the source effluent; or that portion of an in-situ continuous monitoring system that protects the analyzer from the effluent.

Span Drift: The percent change in response to an up-scale pollutant concentration over a 24 hour period of continuous unadjusted operation.

Span Value: The value of pollutant concentration at which the continuous monitoring system is set to produce the maximum data display output.

Stratification: A condition identified by a difference in excess of 10 percent between the average concentration in the duct or stack and the concentration at any point more than 1.0 meter from the duct or stack wall.

Zero Drift: The change in response to zero pollutant concentration over a 24 hour period of unadjusted operation.

APPENDIX C: CALIBRATION DRIFT AND RELATIVE ACCURACY

Appendix C

CALCULATION OF CALIBRATION DRIFT AND RELATIVE ACCURACY

C.1ARITHMETIC MEAN

Calculate the arithmetic mean of the difference, d, of a data set as follows

Install Equation Editor and double-click here to view equation. Equation (1)

where,

Install Equation Editor and double-click here to view equation. 1is the arithmetic mean of the difference, d, in the data set

n is the number of data points

Install Equation Editor and double-click here to view equation. 2is the algebraic sum of the individual differences d_i

C.2STANDARD DEVIATION

Calculate the standard deviation, S_d, as follows:

Install Equation Editor and double-click here to view equation. Equation (2)

where,

S_d is the standard deviation

n is the number of sample points

Install Equation Editor and double-click here to view equation. 3is the algebraic sum of the square of the individual differences d_i

Install Equation Editor and double-click here to view equation. 4is the algebraic sum of the individual differences d_i

C.3CONFIDENCE COEFFICIENT

Calculate the 2.5 percent error confidence (one tailed), CC, as follows:

Install Equation Editor and double-click here to view equation. Equation (3)

where,

$S_d$is the standard deviation

nis the number of samples

$t_{0.975}$is the t-value from the following table

Values for $t_{0.975}$

n	$t_{0.975}$
2	12.706
3	4.303
4	3.182
5	2.776
6	2.571
7	2.447
8	2.365
9	2.306
10	2.262
11	2.228
12	2.201
13	2.176
14	2.160
15	2.145
16	2.131

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

C.4RELATIVE ACCURACY FOR RATA

Calculate the relative accuracy of a set of data as follows:

Install Equation Editor and double-click here to view equation. Equation (4)

where,

RA is the Relative Accuracy

Install Equation Editor and double-click here to view equation. 5is the absolute value of the mean of the differences (from Equation 1)

Install Equation Editor and double-click here to view equation. 6is the absolute value of the confidence coefficient (from Equation 3)

Install Equation Editor and double-click here to view equation. 7is the average reference method (RM) value or applicable standard

C.5 ACCURACY FOR RAA OR CGA

Calculate the accuracy of the data set as follows:

Install Equation Editor and double-click here to view equation. Equation (5)

where,

A is the accuracy of the CEMS, %

$C_m$is the average CEMS response during audit in units of applicable standard or appropriate concentration

C_a is the average audit value (CGA-certified value or three-run average for RAA) in units of applicable standard or appropriate concentration

C.6 24-HOUR CALIBRATION DRIFT, NON-DILUENT ANALYZERS, ZERO AND SPAN

Using the zero concentration and the span concentration values measured every 24 hours during the field test, calculate the zero and high level Calibration Drift using the following formula for non-diluent analyzers:

Install Equation Editor and double-click here to view equation. Equation (6)

Where,

CD_{nd} is the 24-hour Calibration Drift for non-diluent analyzers in percent

CAL_{ref} is the calibration reference value supplied by the cylinder gas in units of applicable standard or appropriate concentration

CAL_f is the calibration reading after 24-hours, but prior to any readjustment of analyzer, in units of applicable standard or appropriate concentration

Span is the analyzer span in units of applicable standard or appropriate concentration

C.7 24-HOUR CALIBRATION DRIFT, DILUENT ANALYZERS, ZERO AND SPAN

Using the zero concentration and the span concentration values measured every 24 hours during the field test, calculate the zero and high level Calibration Drift using the following formula for diluent (O_2 and CO_2) analyzers:

Install Equation Editor and double-click here to view equation. Equation (7)

Where,

CD_d is the 24-hour Calibration Drift for diluent analyzers in percent O_2 or CO_2

CAL_{ref} and CAL_f are the same as in B.6

APPENDIX D: DISTRICT RULES PERTAINING TO CEMS