CLARK COUNTY DEPARTMENT OF AIR QUALITY

Monitoring Division

PROCEDURE NUMBER 300

STANDARD OPERATING PROCEDURE FOR

OPERATION OF GASEOUS ANALYZERS

Revision number 1

04/23/2015

APPROVALS:

[redacted]	4/21/2015
Monitoring Manager	Date
[redacted]	4/22/2015
Assistant Planning Manager	Date
[redacted]	04/22/2015
Monitoring Supervisor	Date
[redacted]	4/22/2015
Monitoring Supervisor	Date
[redacted]	04.22.2015
Author	Date

Revision History

No.	Date	Author	Description of Change	Affected Pages
0	12/4/13	K. Simonian	Original issuance	All
1	4/23/15	Working Group	Combined all gaseous SOPs (300, 301, 302, 303, 304) into one SOP	All

TABLE OF CONTENTS

LIST OF FIGURES

No table of figures entries found.

LIST OF TABLES

No table of figures entries found.

ACRONYMS AND ABBREVIATIONS

Acronyms

DAS	Data Acquisition System
DAQ	Clark County Department of Air Quality
QC	Quality Control
QA	Quality Assurance
NIST	National Institute of Standards and Technology
U.S. EPA	United States Environmental Protection Agency

Abbreviations

AC	Alternating Current
CO	Carbon Monoxide
DC	Direct Current
MQO	Measurement Quality Objective
NO_2	Nitrogen Dioxide
NO	Nitrogen Oxide
NO_x	Nitrogen Oxides
O_3	Ozone
SO_2	Sulfur Dioxide
ppb	parts per billion
ppm	parts per million
psig	pounds per square inch

1.0 PURPOSE

The purpose of this procedure is to establish a uniform process for field operation and verification of gaseous analyzers within the Monitoring Division of the Clark County Department of Air Quality (DAQ).

2.0 SCOPE/APPLICABILITY

This procedure provides instructions on conducting QC field operations of gaseous analyzers. Further details on these operations are found in the associated references.

3.0 DEFINITIONS

DAS - Data Acquisition System includes the central server and web page generation programs used by the Monitoring Division of DAQ to collect, control, record and display of data from each analyzer. The system handles QC Checks and Multi-level Calibrations.

4.0 ROLES AND RESPONSIBILITIES

It is the responsibility of the Quality Control (QC) Technician to conduct these operations anytime an analyzer is placed into operation, repair work is conducted on the analyzer, or the instrument is operating outside its normal operating parameters.

The QC Technician will be familiar with the equipment required to conduct these activities.

The QC Supervisor is responsible for inspecting and verifying that the work performed follows acceptable procedures.

5.0 PROCEDURE

This procedure covers calibrations, QC checks, and maintenance of gaseous analyzers. Additional information can be obtained from the product manufacturer and additional reference material listed in this document.

5.1 Summary of Method

This procedure requires an operational analyzer, properly operating station and test equipment (see Section 5.5), and a trained operator. Calibration is a two-step process: identifying known zero and span concentration levels to the analyzer, and running the formal multi-point calibration within the DAS. Operation requires routinely verifying that automatic checks are performed satisfactorily. Preventive maintenance is performed to minimize unanticipated failures.

5.2 Health and Safety Warnings

Hazards from physical activities involved in this procedure (lifting, carrying, etc.) can be minimized by using proper procedures for these types of activities.

Personnel must observe standard safety precautions whenever electrical equipment is operated, and use normal precautions when working on the inside of the analyzer with the power connected. Multiple monitoring instruments are powered by 120 volts alternating current (AC), and the analyzers are supplied with a 3-wire, grounding line cord. Under no circumstances should the analyzer be operated without an electrical ground.

Certain analyzer adjustments are required when the analyzer is in operation. Caution must be taken when working on an analyzer when energized. Some components may have minimal electrical hazards due to the low voltage direct current (DC) of some of the internal parts, but 120 volts AC is active inside the unit. As with all electrical work, precautions should be taken to avoid unnecessary exposure to electrical shocks.

Calibration gases used in the procedures should be vented out the shelter and away from any operations. The air coming out of the heated hydrocarbon scrubber is 575° Fahrenheit (300° Centigrade), and the coil and the case can be very hot. When pouring out the charcoal or Purafil®, dispose of the materials in the bag included with the kit. Whenever possible, perform this procedure outside to minimize airborne dust in the station, and use a dust mask if desired.

Nominal delivery pressure is 30 pounds per square inch gauge (psig). Only specially modified units require that the delivery pressure be set higher. On specially modified units never set the delivery pressure higher than 55 psig, for to do so may cause damage to the unit and injury to the operator.

Please refer to the manufacturer's equipment manual for additional safety precautions.

This list is not all inclusive of the risk involved in this procedure. Common sense, safety training, and supervisory communication are advised for any questions about safety concerns.

5.3 Cautions

Degrading of associated wiring can affect the analyzer signal by preventing a clean signal from reaching the data logger system. A damaged analyzer can also cause erratic reading within the system. Care should be taken in the handling and installation of the equipment.

5.4 Interferences

Damaged equipment and compromised data logger wiring and tubing can cause poor equipment performance. Inspection and replacement of any suspect equipment is recommended. Faulty equipment connections, loose or crimped data logger wiring, or contaminated filters, scrubbers, or tubing can alter monitoring equipment ambient air data evaluation. Certain common chemicals, such as water vapor or aromatic hydrocarbons, can also affect nominal analyzer determinations of specific ambient air criteria data.

5.5 Equipment and Supplies

Note: Not all items are needed for operations not utilizing the DAS.

Analyzer
Certified Multi-Gas Calibrator and or associated Photometer
EPA Protocol Gas
Zero Air Generator or Cylinder
Computer connected to station data system and central server (during full calibration)
Data logger system
Volt Meter (for analyzer and logger data input/output checks)
Flowmeter (for instrument flow verification)
Copy or access to this SOP
Copies or access to manuals, guides, and additional reference material (listed in this document)
Analyzer logbook (electronic or paper)

5.6 Procedure

5.6.1 Multi-Level Gas Calibration

This procedure assumes that the analyzer has been previously set up to transmit data to the DAS (refer to the Communications Setup Guide). It also assumes that all data logger wiring, sample lines, calibration gas, switching values and associated multi-gas calibration equipment has been installed at the location.

The following procedure is used to prepare and conduct a multi-level gas calibration of the analyzer in accordance with the Maintenance Calibration Certification Operations and Firmware Schedule and as needed, such as, after major maintenance.

1. Establish communication between the computer and the data logger. Select the appropriate communication screen to view the analyzers current real time readings. Place the analyzer off-line, not reporting to the central server during the initial steps. Verify that the multi-level calibration does not occur during automated QC Checks.

2. Begin introducing Zero air to the analyzer using appropriate settings in the calibrator. Allow the readings to stabilize, and record the analyzer's operating parameters as the "before values" (refer to the Instrument Acceptance Testing Setup Operating Parameters and Designations Guide and SOP 100 Station and Instrument Log Entries). "Zero" the analyzer from the calibration menu.

3. Begin introducing Span gas at the highest concentration level to the analyzer using appropriate settings in the calibrator (refer to the Calibration Limits Levels and Sequences Guide) and allow the readings to stabilize. Check that the internal Span level, stored in the analyzer, matches the Span gas concentration. "Span" the analyzer from the calibration menu.

4. Check the zero level, and reset it only if it exceeds acceptable criteria (see the Measurement Quality Objective (MQO) Guide). If zero was reset, then recheck the analyzer response at the highest Span concentration, and reset it only if it exceeds acceptable criteria. This step is complete when both zero and span results are satisfactory without further adjustment and the analyzer is reading zero gas.

5. Record the analyzer's operating parameters as the "After Values" in the instrument logbook (refer to the Instrument Acceptance Testing Setup Operating Parameters and Designations Guide and SOP 100 Station and Instrument Log Entries).

6. Place the analyzer back into service (reporting to the central server). Select and schedule a full calibration to be run by the DAS. Be careful not to schedule a time which will interfere with any other scheduled calibration or other checks by the system (refer to the Maintenance Calibration Certification Operations and Firmware Schedule).

7. Check the calibration results of data to verify that the calibration passed satisfactorily (refer to the MQO Guide and Operational QC Checks Schedule; and the following training material: Advanced Cal Span Interpretation Is this Data Good, and Manual Validation Presentations). If calibration failed, perform troubleshooting and required maintenance and recalibrate.

5.6.2 Automated Checks

This procedure assumes that the analyzer is calibrated, operating, and is connected to the DAS.

1. Schedule routine automated checks in accordance with the Calibration and Verification Frequency Table.

2. Each workday morning, review and verify that the recent automated QC checks ran and produced complete and satisfactory results (refer to the MQO Guide and Operational QC Checks Schedule; and the following training material: Advanced Cal Span Interpretation Is this Data Good, and Manual Validation Presentations).

3. When check results in the previous step indicate incorrect operation or results that exceed acceptable criteria, identify the source of the error and perform corrective measures. Follow the maintenance instructions in Section 5.6.4 of this SOP, if needed. Document the corrective steps in the Station Log and Instruments Logs if applicable. For problems that are not readily corrected, notify the supervisor and/or other technicians responsible for the site operation.

5.6.3 Monthly Operational Checks

1. At a minimum, check of the analyzer operating parameters on a monthly basis (refer to the Maintenance Calibration Certification Operations and Firmware Schedule and Operational QC Checks Schedule).

2. Compare the instrument's test parameters, to the test parameters recorded in the Instrument Logbook (refer to SOP 100 Station and Instrument Log Entries) from the latest calibration. Assess parameters' drift, and ensure the instrument is operating within specification. Document and take corrective action where needed. CARs will be generated where needed per SOP 101 QA Field Audits and CARs.

3. Record findings in the Station Logbook and the Instrument Logbook (refer to SOP 100 Station and Instrument Log Entries).

5.6.4 Maintenance

Note: Many problems are due to leaks in the pneumatic connections or bad signal wiring.

1. Ensure that the analyzer is in the maintenance mode with respect to reporting to the central server.

2. Perform preventive maintenance described in the appropriate maintenance schedule. Record the results in the instrument logbook, and that the work was performed in the Station Log.

3. Perform corrective maintenance as needed. When work involves repairs beyond routine replacement of components, such as filters, perform a multi-level calibration using Section 5.6.1 upon completion of repair. Consult with other Monitoring Technicians, Senior Monitoring Technicians, Monitoring Supervisor or Equipment Vendors for additional assistance with troubleshooting if needed.

6.0 RECORDS MANAGEMENT

Document work conducted as noted in appropriate instrument and station electronic logs.

Any documentation of work conducted on the analyzer should be saved at the proper location on the division's centralized designated storage area under the proper naming convention.

All electronic records stored in the divisions centralized designated storage area are considered to be the official record of activity.

This location allows for review by Monitoring Seniors, Supervisors, QA Officer, and Management.

7.0 QUALITY ASSURANCE/QUALITY CONTROL

QC activities are designed to allow self-verification of the quality and consistency of work. The appropriate QC procedures (self-checks, such as calibrations, zero/span checks, three point precision checks) and QA material (such as replicates, splits, and performance evaluation samples) are required to demonstrate successful performance of the method. Specific criteria for each include: the frequency of required calibration and QC checks, the limits/criteria for QC or QA data/results and actions required when data exceeds QC or QA limits or appear in the warning zone, and the procedures for reporting QC data and results.

Management and Supervision have determined that following the proper procedures for analyzer calibration and operation falls within the United States Environmental Protection Agency (U.S. EPA) guidelines and rules for these analyzers.

The QA Officer has the ability to review all procedures and equipment operations set forth in this SOP.

8.0 REFERENCES

U.S. EPA Quality Assurance Handbook for Air Pollution Measurement Systems Volume II: Ambient Air Quality Monitoring Program (December 2008), located at http://www.epa.gov/ttnamti1/files/ambient/pm25/qa/QA-Handbook-Vol-II.pdf

Teledyne API Communications Software (API Comm), located at http://www.teledyne-api.com/software/

Additional Documents:

Guides
Calibration Limits, Levels and Sequences Guide
Communications Setup Guide
Instrument Acceptance Testing, Setup & Operating Parameters, and Designations Guide
Instrument Manuals
MQO Guide (all instruments)
Station Temperature Calibration (Zeno and Sutron) Guide
Sutron Guide *(under development as of 4/17/15)*
Volt Meter Verification Guide
Zero Air Generator Verification Guide
Zeno Guide

Schedules
Maintenance Calibration Certification Operations and Firmware Schedule
Operational QC Checks Schedule

SOPs
100 Station and Instrument Log Entries
101 QA Field Audits and CARs
102 Residence Time Calculations and Sample Line Replacement

Training Material
Advanced Cal Span Interpretation
Is The Data Good
Manual Validation Presentations