This SOP is subject to
review and revision in 2015.

BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

TECHNICAL SERVICES DIVISION

QUALITY ASSURANCE PROJECT PLAN

STANDARD OPERATING PROCEDURE

DATA MGT SOP 601

GASEOUS POLLUTANTS

REVISION 601.2.00 8/23/2012

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Technical Services Division

STANDARD OPERATING PROCEDURE
BAAQMD Technical Services Division

Gaseous Pollutant Data Management

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Purpose

The purpose of this Data Management Standard Operating Procedure (SOP) is to document data validation procedures for gas analyzers used by BAAQMD to measure continuous hourly pollutant concentrations. These procedures apply to criteria pollutants ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2), and also to the non-criteria pollutants nitric oxide (NO), hydrogen sulfide (H_2S), methane (CH_4), and non-methane hydrocarbons (NMHC). The goal is to define the staff persons responsible for the review, a review timeline, and the specific steps and objectives of the review process to prepare a high quality data set for submission to the EPA Air Quality System (AQS) database.

Background

The District has installed many gaseous analyzers manufactured by Thermo Electron Corporation (TECO) and Teledyne Advanced Pollution Instrumentation (TAPI) to measure continuous ambient pollutant concentrations. Criteria pollutant analyzers are certified by the Environmental Protection Agency (EPA) for gaseous regulatory monitoring. All analyzers are regularly challenged with a rigorous calibration and Quality Assurance schedule of performance evaluations. Ambient hourly concentration data collected from the analyzers undergo automated checks before real-time submission of raw data to AIRNow and posting to the District's web page for the general public. Further data validation procedures outlined in this document are completed before submission of regulatory "final data" to AQS. These procedures follow guidelines established in the reference documents listed in the last section of this document.

Procedure Summary

Data review begins with the Air Monitoring Section (AM) staff that installs and maintains the analyzers. AM is responsible for following approved analyzer SOPs and is

the final authority in determining whether the instruments are operating correctly and providing valid data.

The second data review is conducted by the Meteorology and Quality Assurance Section (MQA). In general, MQA is responsible for all data review not specifically related to analyzer operation. As part of the Quality Assurance function, MQA may recommend changes concerning AM data handling and validation procedures. These changes would require agreement by the Technical Services Director and, depending on the scope, may require Quality Assurance Program Plan approval by CARB and EPA.

MQA Data Review

Meteorology and Quality Assurance (MQA) staff conducts final review of District pollutant data before uploading data into AQS on a monthly basis.

The QAO is responsible for the following Level II Data Validation tasks for continuous data:

- Monthly, validate QA Handbook Critical Criteria performance checks for all criteria pollutants
    - Prepare a DMS Export Report calculating response deviations (% from True) for all precision checks
    - Review all precision checks that exceed QA Handbook Critical Criteria acceptance limits
    - Validate precision check invalidations by AirMon when the calibration system fails, including corrective action documentation in station logs and data CoC comments
    - Validate ambient data invalidation by AirMon when the instrument fails to meet critical criteria response, including corrective action documentation in station logs and data CoC comments
    - Examine all Critical Criteria exceedances not addressed by AirMon and invalidate precision checks and/or ambient data according to QA Handbook guidance; document in station logs and CoC comments
    - Export monthly precision check data from DMS and submit to AQS
    - Validate zero/span calibration checks that exceed QA Handbook Critical Criteria acceptance limits; verify that AirMon has invalidated ambient data when limits are exceeded, adjusted/corrected the instrument problem, and documented actions in station logs and CoC comments; apply corrective actions if necessary
- Monthly, validate criteria pollutant data when shelter temperatures are outside of instrument certification ranges
    - Validate ambient data collected when shelter temperatures are out-of-range and the following three conditions are all met: 1) a precision check for the questionable data is available within 96 hours (4 days) of the temperature deviation, 2) the deviation is no more than 2°C beyond the shelter

temperature at which precision was measured, and 3) the precision deviation was no more that 5% from True.

- Validate data collected as estimated (valid) data in DMS when shelter temperatures are no more than 5 degrees out-of-range and the following conditions are all met: 1) data have no impact on NAAQS attainment status, 2) data are less than 80% of an hourly NAAQS standard or any part of a multi-hour average for CO or ozone, 3) shelter temperature out-of-range periods do not exceed 6 hours for any day, and 4) shelter temperature excursions do not occur more than twice/month.
- Invalidate any ambient criteria data that do not meet the above validation conditions or make a determination that data should remain valid (with documentation in the station log to support the action taken)

The MQA reviewer shall:

- Confirm that all 1-minute data have been reviewed by Air Monitoring staff. Notify the station operator of any unreviewed 1-minute data. When all 1-minute data have been reviewed, lock all 1-minute data and enter the statement, "Level I data review complete" in DMS. Locking of 1-minute data prevents station operators from making changes to the data and hourly data can now be reviewed.
- Using DMS time-series graphs, review 1-hour and 5-minute SO_2 data. Qualitatively cross check diurnal patterns at each monitoring site between criteria pollutants and with other local pollutant data. For example: carbon monoxide (CO), nitric oxide (NO), and hydrocarbon (HC) concentrations usually increase and decrease together; NO and ozone (O_3) cannot coexist at high concentrations; ozone concentrations are generally low overnight and peak in the early to midafternoon hours.
- Resolve whether unusually high or low values are valid by comparison with other sites and meteorological conditions.
- Determine the cause of large data gaps (audits, instrument failure, power outage, instrument maintenance or station maintenance). If a cause is not explained in the site, instrument, or chain of custody logs, then contact the site operator and the air monitoring supervisor requesting they document the cause of the gap in DMS.
- Review Operations Data Action Monitoring Notifications (ODAMNs) issued by the QA group against criteria pollutant analyzers indicating a failed Quality Assurance audit. ODAMN documents are stored at P:\techdata\mqa\qa.
- Examine concentrations spatially across each pollutant network to determine if the values appear reasonable for the meteorological conditions. Investigate any sites that appear to be abnormally high or low compared to the rest of the network.
- Investigate anomalies such as repeating values or patterns, and high rates of change. Consult with the station operator if anomalies are not supported by meteorological conditions to determine a potential cause. Recommend unsupported data invalidation of more than two consecutive hours to the QA Officer for approval.

- Report any problems to the Air Monitoring Manager and QA Officer.
- When hourly review is completed, lock all hourly records for data to be sent to AQS and enter the statement "Level II data review complete". This includes 5-minute SO_2 data.
- MQA review and posting of hourly and 5-minute SO_2 hourly maximum to AQS should be completed no later than 75 days after the end of the month.
- Most ozone satellite stations have been granted a waiver by EPA to discontinue ozone monitoring from December 1st through March 31st because of low ozone levels. Any data collected during the start-up or shut-down period (before March 31 and after November 30) are not quality assured, submitted to AQS, or archived in the District's database.

Authors, Revisions, and Approvals

June 2006 (original version)
Author: Mark Stoelting, Principal Air and Met Monitoring Specialist

References

EPA QA Handbook Vol. II, Quality Assurance Handbook for Air Pollution Measurement Systems

State and National Air Quality Standards, Table of Pollutant Standards

EPA Air Quality Standards, 40 CFR Part 50, NAAQS for Criteria Pollutants