



BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

TECHNICAL SERVICES DIVISION
QUALITY ASSURANCE PROJECT PLAN
STANDARD OPERATING PROCEDURE

DATA MGT SOP 606
TOXICS 910

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Kurt Malone, Supervisor
MQA Group

Date

Mark Stoelting, QA Officer
Technical Services Division

Date

Technical Services Division 939 Ellis Street San Francisco CA 94109

STANDARD OPERATING PROCEDURE
BAAQMD Technical Services Division

Xontech 910 Toxics Data Management

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Purpose

The purpose of this Data Management Standard Operating Procedure (SOP) is to document data validation procedures for toxics monitoring used by the BAAQMD. 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.

Background

In 1985 the California Air Resources Board (CARB) set up toxics monitors at five District sites. The monitors were operated by the BAAQMD for CARB and the samples were analyzed by CARB. Later that year the BAAQMD Board of Directors passed resolutions that committed the District to setting up its own air toxics monitoring network. In May 1986 the BAAQMD set up five toxics monitoring sites. The BAAQMD toxics network grew rapidly totaling 18 stations by 1990 and thereafter fluctuated between 16 and 21 stations.

As of 2012, the BAAQMD toxics network consists of 18 sites. Samples from these stations are analyzed by the BAAQMD laboratory for 23 volatile organic toxic compounds. BAAQMD continues to operate the CARB samplers at two BAAQMD air monitoring stations in the District: San Francisco and San Jose. CARB analyzes their samples for 23 volatile organic compounds and 20 toxics particulates (heavy metals). (See Appendix for a complete list¹).

Procedure Summary

The BAAQMD toxics network samples for 23 different volatile organic toxic compounds using a Xontech 910 sampler to collect integrated 24-hour ambient samples every 12 days in stainless steel canisters.

After the samples are collected they are sent to the BAAQMD lab for analysis. Lab personnel analyze the samples, check the results, and forward the results to Meteorology and Quality Assurance (MQA) staff. MQA staff review this data monthly and archive it in the EPA AQS database.

An annual review of the toxics data is done by the Engineering Division's Toxics Section as part of its publishing of the District's annual toxics report. The report can be seen at http://www.baaqmd.gov/pmt/air_toxics/annual_reports/index.htm .

Laboratory Preparation

The Lab Technician shall:

- Setup and run canister cleaning equipment. Canisters are cleaned with nitrogen gas
- Evacuate the canisters to 30 inches of mercury
- Record the canister gauge reading on the Toxics Chain of Custody (COC) sheet

Air Monitoring Data Collection

Station operators connect the canister to the Xontech 910 instrument, assure the system is operating correctly, fill out the Toxics COC sheet and send the filled canister back to the District lab with the Toxics COC sheet.

The station operator shall²:

- Not use a canister if the canister gauge reading is 5 inches of mercury lower than the canister gauge reading recorded by the lab after the preclean test. Such a condition would suggest a canister leak. (The lab evacuates the canister to 30 inches of mercury)
- Invalidate a sample run if an instrument or canister malfunction occurs
- Invalidate a sample run if the total time of the sample is outside the range of 23 to 25 hours³
- Invalidate the sample if the sample start time begins before 23:00 or ends after 01:00
- Note in the comments section of the Toxics COC sheet if the canister pressure equals the Xontech 910's back flow pressure.

Laboratory Analysis

Samples are brought to the BAAQMD Toxics lab for analysis. Samples from the canisters are run through a Gas Chromatograph Mass Spectrometry (GC/MS) to determine the concentrations of the 23 toxic compounds.

The Lab Chemist shall:

- Notify the lab manager if:
 - The canister pressure is less than 4 psi
 - the canister is not analyzed within 30 days of the sample run
- Randomly select one canister from each batch and repeat the analysis a second time which is known as a replicate analysis
- Rerun a replicate analysis when the difference between the replicate analysis and the primary analysis is more than $\pm 25\%$, and the concentration is at least 5 times the minimum detectable limit. The source of the discrepancy and the validity of the data will be determined. Of the three analyses performed, the two closest results will be designated as the primary and replicate.

Data Review by the Lab Manager:

- Review the toxics data after the analysis and certify that the data is good by⁴:
 - Confirming that all high and low values look reasonable
 - Confirming that results from canisters analyzed more than 30 days after the sample date are valid
 - Confirming that results from canisters with less than 4 psi are valid
 - Comparing the replicate with the original value for consistency and to confirm that the data are reasonably close and unbiased
 - Comparing collocated District samples
 - Comparing CARB toxic data at collocated sites retrieved by MQA
- Authorize the archival of the data including replicate data into the District database
- Send a list of toxics samples that were invalidated to the Air Monitoring and the Meteorological Supervisor.

MQA Section Review

MQA Section staff shall:

- Review Operations Data Action Monitoring Notifications (ODAMNs) issued by the Performance Evaluation Group for invalidation of data due to a failed audit. ODAMN documents are stored in the P: \Techdata\MQA\QA\ODMAMN network directory.
- Review Toxics COC sheet for sample run within the range of 23 to 25 hours and for start/end times ± 1 hour of midnight. If outside of these ranges, do not submit to AQS and notify the Air Monitoring Manager of the discrepancy.
- Discuss with Lab Manager if questionable data are found.
- Toxics values below the SQL are flagged by the GC/MS output program using the following EPA recommended methodology⁵:

- Load all values between the SQL and MDL as the value with an SQL flag
 - Load all values less than the MDL as the value with an MDL flag
 - Load all non detects as zero with an ND flag
- Format all toxics records, including replicate and collocated records, and load into the AQS database within 90 days of the last sampling date of the month
- Review the AQS Statistical and Critical Review Report to look for outliers
- AQS toxics data collected by CARB and BAAQMD from collocated monitoring sites may be provided to the Laboratory Manager for review.

Toxics Section Review

Toxics Section Staff shall:

- Annually review BAAQMD toxics data before presenting it in the District's annual toxics report and cancer risk calculations
- Inform the Lab Manager of unusual patterns in the data.

Appendix

	BAAQMD Volatile Organic Compounds Toxics		CARB Volatile Organic Compounds Toxics		CARB Particulate (Heavy Metals) Toxics
1	Vinyl chloride	1	Methylene Chloride	1	Arsenic
2	Methylene chloride	2	Chloroform	2	Cadmium
3	Chloroform	3	Methyl Chloroform	3	Hexavalent Chromium
4	Ethylene dichloride	4	Carbon Tetrachloride	4	Antimony
5	Methyl chloroform	5	Trichloroethylene	5	Chromium
6	Carbon tetrachloride	6	Benzene	6	Cobalt
7	Trichloroethylene	7	Perchloroethylene	7	Copper
8	Benzene	8	Toluene	8	Iron
9	Ethylene Dibromide	9	1,3-Butadiene	9	Lead
10	Perchloroethylene	10	Methyl Ethyl Ketone	10	Manganese
11	Toluene	11	M/P Xylene	11	Molybdenum
12	1,3-Butadiene	12	Ethyl Benzene	12	Nickel
13	1,1,2 Trichlorotrifluoroethane	13	Acetone	13	Selenium
14	Methyl ethyl ketone	14	O-Xylene	14	Strontium
15	M/P Xylene	15	Styrene	15	Sulfur
16	Ethylbenzene	16	Acetonitrile	16	Tin
17	Acetone	17	Acrolein	17	Titanium
18	Trichlorofluoromethane	18	Acrylonitrile	18	Vanadium
19	O-Xylene	19	cis-1,3-Dicloropropene	19	Zinc
20	Ethanol	20	trans-1,3-Dicloropropene	20	Zirconium
21	Acrolein	21	Methyl Bromide	21	
22	Acetonitrile	22	Acetaldehyde	22	
23	Acrylonitrile	23	Formaldehyde	23	

Authors, Revisions, and Approvals

June 2007 (original)

July 2012 (revision: moved duties of AQIS to Lab, removed reference to Ingress database, removed Fremont as a CARB toxics monitoring site, updated number of compounds analyzed for by lab from 20 to 23, and updated the list of compounds analyzed for by CARB in the Appendix)

Prepared by: Mike Basso, Senior Air Quality Meteorologist

Approved by: Dick Duker, Meteorology and Quality Assurance Manager

Approved by: James Hesson, Laboratory Services Manager

Approved by: Eric Stevenson, Air Monitoring Manager

References

CARB's Xontech Model 910A Sampler and Xontech Model 912 Sampling Adapter
<http://www.arb.ca.gov/airwebmanual/aqsbdocs1/v2apxq.pdf>

BAAQMD Board Resolution 1775

In the Matter of a Program to Control the Emission of Toxic Air Contaminants (12/2/87)

BAAQMD Board Resolution 1777

In the Matter of Expanding the District's Program to Control the Emission of Toxic Air Contaminants (12/16/87)

EPA Air Toxics Flagging and Reporting Guidance for EPA's Air Quality System Database, Fourth and Final Draft, Version 1.3

¹ Email from Kathy Gill, Manager of CARB Organics Laboratory Section dated July 11, 2012

² BAAQMD Air Monitoring Section Xontech 910 SOP

³ Adopted by BAAQMD Air Monitoring and consistent with PM2.5 and Xontech 924 sampling

⁴ BAAQMD Lab SOP "For The Analysis of Aromatic, Halogenated, and Oxygenated hydrocarbons in Ambient Air Using Summa Canisters Sampling and Capillary Gas Chromatography with Photoionization and Electron Capture Detectors"

⁵ Air Toxics Flagging and reporting Guidance for EPA's Air Quality Systems Database Version 1.1 and amended by the 2007 Mike Jones e-mail