SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Quality Assurance Project Plan for Rules 1180 and 1180.1 Community Air Monitoring Network

QAPP010

Revision 1.0

March 2025

South Coast AQMD, 21865 Copley Drive, Diamond Bar, CA 91765

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Revision History

Revision Number	Date	Responsible Party	Description of Changes
0	December 2020	ORS/Rule 1180, Monitoring and Analysis Division (MAD)	Initial draft South Coast AQMD QAPP for Rule 118O Community Air Monitoring Program
0.1	December 2023	ORS/Rule 1180, Monitoring and Analysis Division (MAD)	Instrument operational parameters, data completeness and acceptance criteria updated based on staff experience in operating Rule 1180 Community Air Monitoring Network. Air quality notification thresholds have been updated to reflect updated recommendations by California Office of Environmental Health Hazard Assessment.
1.0	March 2025	ORS/Rule 1180, Monitoring and Analysis Division (MAD)	Addition of monitoring for PM10/2.5, air toxic metals, and Naphthalene

Title and Approval Sheet

Document Title: South Coast Air Quality Management District Quality Assurance Project Plan for *Rule 1180 Community Air Monitoring*, Revision 0.1

Organization: South Coast Air Quality Management District, Monitoring and Analysis Division

The attached Quality Assurance Project Plan (QAPP) is hereby recommended for approval and commits the South Coast Air Quality Management District, Monitoring and Analysis Division to follow the elements described within.

APPROVALS		
Name and Position	**Signature**	**Date**
Jason Low, Ph.D. Deputy Executive Officer, Monitoring and Analysis Division		
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List of Acronyms and Abbreviations

ACS	Automated Calibration System (for Auto-GC)
ADEO	Assistant Deputy Executive Officer
AQIS	Air Quality Instrument Specialist
AQMP	Air Quality Management Plan
AQ Spec	Air Quality Specialist
AMT	Advanced Monitoring Technologies Branch
AMTIC	U.S. EPA Ambient Monitoring Technology Information Center
Basin	South Coast Air Basin
BC	Black Carbon
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CAAQS	California Air Quality Standard
CAR	Corrective Action Request
CAMP	Community Air Monitoring Plan
CARB	California Air Resources Board
CFR	Code of Federal Regulations
COC	Chain of Custody
CV	Coefficient of Variation
DEO	Deputy Executive Officer
DMS	Data Management System
DOAS	Differential Optical Absorption Spectroscopy
DQI	Data Quality Indicator
DQO	Data Quality Objective
ESC	Environmental Systems Corporation
EO	Executive Officer
FTIR	Fourier Transform Infrared Spectroscopy
GC	Gas Chromatography
H2S	Hydrogen Sulfide
HF	Hydrogen Fluoride
IM	Information Management
IP	Internet Protocol
LGR	Los Gatos Research
LPM	Liters Per Minute
MAD	Monitoring & Analysis Division
MDL	Minimum Detection Limit

MQO	Measurement Quality Objective
NAAQS	National Ambient Air Quality Standard
NARA	National Archives and Records Administration
NIST	National Institute of Standards and Technology
NOx	Nitrogen Oxides
OAG	Operation Assistance Guide
ORS-ML	Optical Remote Sensing Mobile Laboratory
PAMS	Photochemical Assessment Monitoring Stations
PE	Performance Evaluation
QA	Quality Assurance
QAA	Quality Assurance Alert
QAPP	Quality Assurance Project Plan
QC	Quality Control
South Coast AQMD	South Coast Air Quality Management District
SO2	Sulfur Dioxide
SOP	Standard Operating Procedure
STP	Standard Temperature and Pressure
TSA	Technical Systems Audit
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1 Introduction

The South Coast Air Quality Management District (South Coast AQMD) is the regional air pollution control agency with jurisdiction over the South Coast Air Basin (Basin), including all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino counties, and portions of the Riverside County desert areas in the Mojave Desert Air Basin (MDAB) and the Salton Sea Air Basin (SSAB), including the Coachella Valley. South Coast AQMD is responsible for controlling emissions, primarily from stationery and area sources of air pollution. South Coast AQMD develops and adopts Air Quality Management Plans (AQMP) (South Coast AQMD, 2022, Note: this is the most recent AQMP at the time of this writing) that delineate the regional strategy for bringing the region into compliance with the National Ambient Air Quality Standards (NAAQS), as well as the progress toward meeting California Ambient Air Quality Standards (CAAQS). To assess progress toward AQMP goals and to provide current air quality information to the public, South Coast AQMD conducts air quality measurements and laboratory analyses.

Rule 1180, originally adopted by the South Coast AQMD Governing Board on December 1, 2017, outlined a fee schedule for a refinery-related community air monitoring system to address community concerns over emissions from large petroleum refineries and the communities' potential exposure to pollutants, such as Volatile Organic Compounds (VOCs), Sulfur Oxides (SOx), Nitrogen Oxides (NOx), Hydrogen Sulfide (H2S), and selected air toxics. The original Rule 1180 adopted in December 2017, applied to seven (7) major refineries that are permitted and regulated by South Coast AQMD and established a fee schedule to be paid by the petroleum refineries for the cost of designing, developing, and installing, the Rule also required the agency to establish a fee schedule for operating, and maintaining (O&M) of community air monitoring systems for the purpose of monitoring refinery related air pollutant emissions through Rule 301. The Rule 1180 community air monitoring network, as related to seven major refineries subject to original Rule 1180 adopted in December 2017 begun its operation in January 2020. On January 5, 2024, Rule 1180 was amended to include facilities with operations related to petroleum refineries (related facilities) which are defined as any facility that has operations related to the refining process located on properties adjacent to or contiguous with a petroleum refinery subject to the original Rule 1180. The amended Rule 1180 also expanded the list of pollutants to be monitored at the fenceline and at community monitoring stations. Additionally, Rule 1180.1 was adopted on January 5, 2024, which expands the applicability of all the requirements of the original Rule 1180 to include refineries with a refining capacity of less than 40,000 barrels of crude per day, which are exempt from Rule 1180. January 2024 amendment of Rule 1180 and adoption of Rule 1180.1 also included a fee schedule for development and implementation of additional air monitoring. South Coast AQMD Rule 301 will establish annual O&M fees for this additional air monitoring. Consequently, in July 2025 – July 2026, the Rules 1180 and 1180.1 community air monitoring will be expanded to implement air monitoring for additional pollutants and establishing additional air monitoring stations. The goals of this community air monitoring program are

consistent with South Coast AQMD's mission and belief that all people who live or work under its jurisdiction have a right to breathe clean air.

South Coast AQMD management policy requires that sufficient quality assurance activities be conducted to demonstrate that all data collected by and on behalf of South Coast AQMD are scientifically and legally valid for the purposes to which they are intended. The purpose of this Rule 1180 Community Air Monitoring Program Quality Assurance Project Plan (QAPP) is to document management policy and those activities and procedures necessary for accomplishing specified program objectives for the Rule 1180 Community Air Monitoring Program. This QAPP incorporates and follows the General Quality Assurance Policies for Environmental Measurements, identified in the AQMP, so that the quality of all data reported from this program shall meet agency, State, and U.S. EPA program requirements, where appropriate. Environmental measurement activities performed by staff within South Coast AQMD or performed on behalf of South Coast AQMD by independent contractors or consultants will comply with the following general quality assurance (QA) policies:

a) The objectives of each environmental measurement program/project shall be clearly delineated during the planning stages of the program/project. These objectives shall be consistent with the mission, policies, and priorities of South Coast AQMD.
b) Acceptable limits of data uncertainty shall be identified during the planning stages of each environmental measurement program/project so that the appropriate procedures and resources may be incorporated into the design of the program/project.
c) Quality assurance (QA) and quality control (QC) activities shall be integrated into all environmental measurement programs/projects in a cost-effective manner while attaining stated quality objectives.
d) A QAPP describing how each project/program will achieve the stated objectives and required level of data reliability shall be developed for each environmental measurement program/project. Each QAPP is reviewed and approved by the manager(s) of the program/project, the Quality Assurance Manager (QA Manager-MAD), the Assistant Deputy Executive Officer for Monitoring and Analysis (ADEO-MAD), and the Deputy Executive Officer for Monitoring and Analysis (DEO-MAD).
e) Sample collection, sample chain-of-custody (COC), sample analysis, training, and data management activities shall be evaluated routinely by supervisory personnel and QA Branch staff to identify and correct deficiencies and to enhance the credibility of each environmental measurement program/project.
f) Measures shall be instituted within each environmental measurement program/project to ensure that the quality of the environmental data collected is accurately and permanently documented. These measures include data validation audits, performance audits, systems audits, corrective action requests (CARs), and quality reports to management, and others.

This QAPP was prepared using the U.S. EPA Quality Assurance regulations and guidance described in EPA-QA/R-5, *EPA Requirements for Quality Assurance Project Plans* (U.S. EPA, 2001) and the accompanying document *Guidance for Quality Assurance Project Plans* (U.S. EPA, 2002), along with the *Guide to Writing Quality Assurance Project Plans for Ambient Air Monitoring Networks* (U.S. EPA, 2018a). All pertinent elements of the regulations and guidance are addressed in this QAPP, including Project Management; Data Generation and Acquisition; Assessment and Oversight; and Data Validation and Usability. In addition, specific details on meeting the regulatory monitoring program requirements are included in the South Coast AQMD Standard Operating Procedure (SOP) documents. SOP documents are a part of this QAPP and play a significant role in supporting the South Coast AQMD Rule 1180 Community Air Monitoring Program. Specific details as to how the South Coast AQMD monitoring program is implemented, including how the monitoring requirements if any are met, can be found in the relevant SOPs and Operation Assistance Guides (OAGs) that support the Rule 1180 Community Air Monitoring Program. These SOPs are to be reviewed annually and revised at least every five years. A list of acronyms and abbreviations and a glossary of terms used in this document are provided in Appendix A and B, respectively. Appendix C shows South Coast AQMD MAD organizational charts. Appendixes D, E, and F show templates of the South Coast AQMD/MAD Corrective Action Request (CAR), Quality Assurance Alert (QAA), and Group Training Form.

2 Project Management

2.1 Distribution List

To ensure that South Coast AQMD quality assurance information, policies, and procedures are appropriately distributed and inherent in all applicable data collection and analysis processes for the Rule 1180 Community Air Monitoring Program, this QAPP is distributed as follows:

- All individuals listed in Title and Approval Sheet
- South Coast AQMD Optical Remote Sensing / Rule 1180 Implementation (ORS/R1180) Branch
- South Coast AQMD Quality Assurance Branch
- Line staff and contractors who are directly involved in any aspect of this community air monitoring program.

New staff training will include contents of this QAPP and the location of centralized documents. Periodic refresher training for all experienced staff will also summarize this this content and document locations.

The official, controlled version of this QAPP is located as an electronic pdf copy in the QA central records repository maintained by the South Coast AQMD Quality Assurance Branch and electronically as a protected Microsoft Word® document on the South Coast AQMD MAD network shared drive.

2.2 Project Organization

South Coast AQMD organizational structure and general descriptions of the administrative, management, and staff responsibilities are outlined in the South Coast AQMD's AQMP. The Rule 1180 Community Air Monitoring Program is primarily conducted by the ORS/R1180 Branch under the Office of Monitoring and Analysis (MAD) within South Coast AQMD, with oversight by the Quality Assurance (QA) Branch.

Table 1 shows upward lines of communication for all staff involved in the Rule 1180 Community Air Monitoring Program and QA responsibilities. The QA Branch maintains independence from and oversight of the advanced monitoring technology programs, working with all levels of staff and management to promote data quality. Detailed descriptions of specific quality control responsibilities for various positions are identified in the related Standard Operating Procedures (SOPs).

Table 1: South Coast AQMD Positions and Responsibilities

Position	Responsibilities	Upward Lines of Communications
Deputy Executive Officer (DEO) – MAD	Accountable for the successful accomplishment of the project objectives.	Executive Officer (EO), Executive Council (EC), and Governing Board
Assistant Deputy Executive Officer (ADEO) – MAD	Accountable for the successful accomplishment of the program objectives.	DEO – MAD, EO, EC, and Governing Board
Deputy Executive Officer (DEO) – IM	Accountable for the successful accomplishment of the project objectives.	EO, EC, and Governing Board
ORS/R1180 Manager	Responsible for Rule 1180 Community Air Monitoring and other related Special Monitoring, AB617 Air Monitoring, and other Monitoring related to rule compliance, testing, and deployment.	ADEO – MAD
Quality Assurance (QA) Branch Manager	Responsible for the implementation of QA/QC practices and procedures, safety documents as well as performance and technical systems evaluations.	ADEO – MAD
Program Supervisor, ORS/R1180	Responsible for the overall development and implementation of the Community Air Monitoring Plan (CAMP) and Quality Assurance Project Plan (QAPP); quality of the program's data; operation of Rule 1180 Community Air Monitoring Network; continued data analysis and other forms of quantitative assessment of air quality data; preparation of reports; communicating the results to the community, industry, and other stakeholders, as needed; coordinating advanced air monitoring activities; reporting to management.	ORS/R1180 Manager
Program Supervisor, QA Branch	Responsible for reviewing, developing, documenting, and overseeing the implementation of QA/QC practices and procedures, safety documents as well as the	QA manager

	implementation of performance and technical systems evaluations, tracking corrective action progress, and completion.	
Air Quality Specialist	Responsible for conducting data analysis and interpretation; developing data summary reports and presentations, maintaining records of Rule 1180 air quality notifications; contributing to development of CAMP and QAPP, performing Level 2 & 3 continuous data validation; operate advanced air monitoring equipment at Rule 1180 Community Air Monitoring sites and aboard ORS-ML, and other equipment, as needed.	Program Supervisor – ORS/R1180
Air Quality Specialist, QA Branch	Responsible for evaluating, implementing, and maintaining MAD servers, review of safety procedures and their implementation, field overview of safety document, practices, software, and databases in coordination with IM staff.	Program Supervisor – QA Branch
Senior Air Quality Instrument Specialist	Responsible for uninterrupted operation of Rule 1180 Community Air Monitoring Program equipment; equipment repair, maintenance, and calibration; coordinating activities of AQIS staff; contributing to development of CAMP and QAPP; developing SOPs and OAGs; assuring field operations in accordance to QAPP and SOPs; coordinating and ensuring field staff training and training adequacy, overseeing scheduling of field activities, maintaining equipment inventory and assuring adequate supplies, consumables, specialty gases; assuring that all field safety procedures are followed; and assist with other air monitoring activities, as needed.	Program Supervisor - ORS/R1180
Air Quality Instrument Specialist I and II	Responsible for following QAPP, SOPs, and OAGs in the data collection from field sites; Level 1 continuous data validation; low-level air monitoring data analysis; maintaining the	Senior Air Quality Instrument Specialist/Program Supervisor -ORS/R1180

	station site; conducting instrument repair, maintenance, and calibration; contributing to development of SOPs and other documentation for instrument design and operation; performing data backfill; and assist with other air monitoring activities, as needed.	
Information Management (IM) Systems and Programing Supervisor	Manages the public data reporting website and Public Notifications, and accountable for computer, software, and hardware.	Information Technology Manager
System Analyst	Website and Public Notification Development and support.	IM Program Supervisor

2.3 Background

Petroleum refineries are among the largest stationary sources of air pollution in the South Coast Air Basin (Basin). They process fuel oils, liquified petroleum gas, kerosene, lubrication oil, and feedstock for the petrochemical industry. The processing of crude oil at petroleum refineries, along with associated activities such as catalytic or thermal cracking, sulfur recovery, fluid coking, vacuum distillation, and wastewater treatment can lead to the emission of air pollutants. Fugitive emissions can also originate from equipment leaks such as from storage tanks, cooling towers, steam boilers, process furnaces and heaters, compressor engines, and through product loading/unloading operations.

The increased risk of community exposure to harmful air toxic pollutants, along with heightened community concerns over refinery incidents, have made it necessary to develop and implement a refinery-related air monitoring network that includes fenceline and community air monitoring systems.

Rule 1180 for Refinery Fenceline and Community Air Monitoring was adopted by the South Coast AQMD Governing Board in December 2017 and requires the seven major refineries in the Basin to monitor the air pollutants listed in Table 2 at their fenceline. This Rule also established a fee schedule to support a community air monitoring program to provide air quality information to the public in the communities near these refineries.

Table 2: List of Rule 1180 Community Air Monitoring Program Pollutants

Criteria Pollutants
Sulfur Dioxide
Nitrogen Oxides
Volatile Organic Compounds

Total VOCs (Non-Methane Hydrocarbons)
Formaldehyde
Acetaldehyde
Acrolein
Styrene
BTEX Compounds (Benzene, Toluene, Ethylbenzene, Xylene)
Other Compounds
Hydrogen Sulfide
Carbonyl Sulfide
Ammonia
Black Carbon
Hydrogen Cyanide
Hydrogen Fluoride (if used by the facility)

2.4 Project Description

The Rule 1180 Community Air Monitoring Plan (CAMP) outlines South Coast AQMD's strategic approach to conducting air monitoring in communities adjacent to the seven major refineries (listed in Table 3) within South Coast AQMD jurisdiction, that are subject to Rule 1180. The Rule 1180 CAMP can be found here: http://www.aqmd.gov/docs/default-source/fenceline_monitroing/r1180_draft_community_monitoring_plan_rev_2_04022020_final_use.pdf?sfvrsn=8. A Community Air Monitoring Network consisting of ten fully equipped, fixed sites (presented in Table 23) was established and is currently operated by South Coast AQMD, based on the information provided in the CAMP.

Table 3: List of Refineries Subject to Rule 1180

Refinery	Community	Address
Marathon Carson	Carson, West Long Beach	22600 S Wilmington Ave, Carson, CA 90745
Marathon Wilmington	Wilmington, West Long Beach	2101 E Pacific Coast Hwy, Wilmington, CA 90744
Torrance Refining Company	Torrance	3700 W 190th St, Torrance, CA 90504
Chevron	El Segundo, Manhattan Beach, Hawthorne, Del Aire	324 W El Segundo Blvd, El Segundo, CA 90245
Phillips 66 Carson	Carson, Wilmington	1520 E Sepulveda Blvd, Carson, CA 90745

Phillips 66 Wilmington	Wilmington	1660 W Anaheim St, Wilmington, CA 90744
Valero Wilmington	Wilmington	2402 East Anaheim, Wilmington, CA 90744

The specific objectives of the Rule 1180 refinery-related community air monitoring program include the following:

- Collect near real-time air quality information through a dedicated data portal and website.
- Provide up-to-date community public notice when concentrations of targeted pollutants exceed predetermined levels.
- Identify potential sources of non-refinery emissions affecting air quality in the community.
- Improve the public's understanding of air pollution.
- Track progress in improving community air quality.

The air monitoring equipment selected can detect typical urban variations of the target pollutants and satisfy the objectives of the Community Air Monitoring Program. The Rule 1180 Community Air Monitoring Network reports data in near real-time and employs monitoring equipment capable of high time-resolution measurements. Those analyzers include the extractive Fourier Transform Infrared analyzer (FTIR), Differential Optical Absorption Spectroscopy (DOAS), Automated Gas Chromatography, and traditional point monitors along with QC equipment such as a dilution system and a zero-air generator are installed at all Rule 1180 Community Air Monitoring sites. Additionally, Meteorological sensors measuring wind speed / wind direction (WS/WD), temperature (T), relative humidity (RH), and barometric pressure (BP) are installed at selected sites to facilitate data analysis and evaluation processes, determination of pollutant transport, dispersion, and modeling (see Tables 24, 25, and 26 for a list of instruments present at each community air monitoring site).

This QAPP details the efforts required to collect, document, and report air monitoring data under this program. Work activities pertinent to this project include field monitoring, QC/QA activities, data verification, review, validation, analysis, assessments, and reporting to the public.

The ORS/Rule 1180 Branch will be responsible for all community air monitoring network field activities and the QA Branch will provide oversight of the work and resulting data. Contractors are not typically needed for routine operations of the Rule 1180 Community Air Monitoring Network. However, specialized technical services for instrument maintenance, quality assurance activities such as independent audits and other specialized support can be contracted. Qualified contractors are carefully selected through the South Coast AQMD procurement process, which includes the evaluation of qualifications, experience, training, and verified references. Contractors or subcontractors providing work specific to the Community Air Monitoring Program are required to review and follow this QAPP and the SOPs or OAGs related to the contracted effort. Alternatively, the AMT Branch in concert with the QA Branch, reviews and approves the

contractor's SOPs. Contract non-compliance or breach is addressed through the South Coast AQMD contract corrective action process which may involve a stop-work order or a notice to cure, as well as possible contract termination.

Field activities for the Rule 1180 Community Air Monitoring Program include:

- Siting, installation, and acceptance testing of instruments and stations.
- Routine station and instrument operations and maintenance.
- QC checks such as calibrations, calibration verification checks, troubleshooting, and repair of equipment.
- Data verification, review, validation, analysis, assessment, and reporting.
- Maintain documentation and records for each station, instruments, and other site activities.
- QA assessment and oversight activities.

To satisfy the requirements of the Rule 1180, Community Air Monitoring Program, data is collected and reported to the public in near real-time via a dedicated data portal https://xappprod.aqmd.gov/Rule1180CommunityAirMonitoring/. All critical documents and records, including this and facility specific QAPPs, SOPs, training files, corrective action reports, station and instrument logbooks, electronic logs (MS-TEAMS), calibration records, user manuals, QC records, etc. are maintained by the AMT Branch.

2.5 Quality Objectives and Criteria

The South Coast AQMD Quality Management Plan (QMP) requires a quality system that sufficiently documents quality control practices, to ensure that the data produced by any program within the organization will be of the type and quality needed for its intended use. Quality control defines the procedures implemented to assure that acceptability is obtained and maintained in the generated data. The South Coast AQMD Quality Assurance Branch (QA) and the Rule 1180 Community Air Monitoring Program group are required to document and implement adequate QC/QA procedures, which when properly executed, will provide data that meet or exceed the minimally acceptable data quality objectives of the Rule 1180 program.

This section provides a description of the Data Quality Objectives (DQOs) for the Rule 1180 Community Air Monitoring Program. DQOs are qualitative and quantitative statements that:

- Define monitoring objectives and the intended use of the data.
- Define the type of data needed.
- Specify the tolerable limits (to control measurement uncertainty).

2.5.1 Monitoring Objectives and Intended Use of the Data

The Rule 1180 Community Air Monitoring Plan (South Coast AQMD, 2020) outlines the monitoring objectives of the community air monitoring network as follows:

- Provide near real-time air quality information through a dedicated data portal and website to inform the public of current air quality conditions in their community.
- Provide up-to-date community air quality data and public notice when concentrations of targeted pollutants exceed predetermined thresholds.
- Track progress in improving community air quality.

2.5.2 Type of Data Needed

Community air monitoring data is reported in 5-minute (5-min) and 1-hour (1-hr) rolling averages updated every 5 minutes, or as hourly concentrations. Hourly and 1-hr rolling average concentrations are considered valid if measurements have been obtained over 45 minutes or more for the given 1-hour interval. The minimum quarterly data capture DQO is >90% completeness, but the desired data capture is >95%. In addition, the following requirements are applied to collected data:

- All data must be comparable, meaning all data is expected to be produced and collected in a similar manner. Adherence to the standard methodologies for sampling, calibrating, auditing, etc. found in this QAPP is expected to achieve this goal.
- All data must be representative of all pollutants being measured with respect to time, location, and conditions from which the data is obtained. This is achieved by using time synchronization protocols to ensure that all equipment and servers used to produce, poll, transmit, report, and store Rule 1180 data is time synched.

2.5.3 Limit Tolerance to Control Measurement Uncertainty

To minimize erroneous conclusions when assessing uncertainty, an acceptance criteria and tolerance limits for the quantitative portion of the Data Quality Indicators (DQIs) are established for the following data quality indicators:

- **Precision** is based on one-point QC checks for gaseous instruments. For precision, this is determined from the upper bound of the coefficient of variation (CV), which reflects the highest estimate of variability in an instrument's measurements.
- **Bias** is the systematic or persistent distortion of a measurement process which causes error in one direction. **O**ne-point QC checks will also be used to determine bias. For example, the requirements for H2S is an upper 90% confidence limit for the coefficient of variation of 10.0% for precision and an upper 95% confidence limit for the absolute bias of 10.0%.

- **Minimum Detection Limit (MDL)** is the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results. Tables 4, 6, 8, 12, 16, and 18 list the MDLs for instruments deployed at Rule 1180 Community Air Monitoring Program sites.
- **Completeness** is defined as the percentage of valid data collected from each measurement system for each Rule 1180 compound at each community air monitoring site compared to the amount that is expected in each designated time period (e.g., hourly, daily, quarterly). The minimum valid capture rate for the Rule 1180 Community Monitoring Program measurement is > 90%. However, desired completeness is > 95%. Completeness is calculated as per Equation 1:

$$C = \frac{V}{P} \times 100\% \qquad \textit{Equation 1}$$

where:

C = % completeness;
V = number of valid measurements; and
P = Expected number of samples.

- **Representativeness** is the degree to which data accurately and precisely identify and quantify concentrations of the various pollutants of interest under this program. Representativeness under the Rule 1180 Community Air Monitoring Program is achieved by adhering to the Rule 1180 Community Air Monitoring Plan site selecting criteria and the EPA network and monitoring path design requirements found in 40 CFR Part 58, Appendix D and E.
- **Comparability** is a qualitative term that expresses the measure of confidence that one data set can be compared to another using different statistical techniques. Comparability of the data is achieved by consistency in the measurement methods and data acceptance criteria throughout the community air monitoring network and by consistency in sample collection, data processing, and all quality control practices. The process of selecting monitoring sites which is consistent with the EPA's criteria for network and sampling design, is expected to facilitate meeting the comparability objective for data collected from the various Rule 1180 air monitoring sites.

2.5.4 Percent Difference

Many of the measurement quality checks start with a comparison of a known value compared to the value measured by the monitor and use percent difference comparison as per Equation 2. For each single point check, calculate the percent difference, d_i, as follows:

$$di = \frac{Measured\ Value - Known\ Value}{Known\ Value} \times 100\% \qquad \textbf{Equation 2}$$

There are numerous automatic QC checks and threshold concentrations that alert staff to check instruments for acceptable operation. These thresholds are based on station location and parameter. Additional measures include comparison to historical data for the season and location. If data appears aberrant with respect to historical measurements and current expectations, further investigation may be needed. Additional QC objectives may be used as needed.

2.5.5 Measurement Quality Objectives (MQO)

The tables in this section include Measurement Quality Objectives that are designed to evaluate and control various phases (sampling, analyzing, and reporting) of measurements to ensure that the total measurement uncertainty is within the range prescribed by the DQOs.

2.5.5.1 Extractive UV-DOAS Multi-Pollutant Analyzer

Table 4: Pollutants Measured with UV-DOAS and the Associated Operating Range in ppb*, Collection Frequency, Units, and Minimum Detection Limit (MDL)*

Pollutants	Operating Range (ppb)	Collection Frequency	MDL range (ppb)
Benzene	2 - 900	5 min and 1 hour rolling avg	2-3
m-Xylene	4 -900	5 min and 1 hour rolling avg	4-8
p-Xylene	1.5 - 900	5 min and 1 hour rolling avg	1.5-2.5
Toluene	4 - 900	5 min and 1 hour rolling avg	4-7
Ethylbenzene	4 – 2,000	5 min and 1 hour rolling avg	4-10
Styrene	3 – 1,000	5 min and 1 hour rolling avg	3-8
SO2	8 – 1,000	5 min and 1 hour rolling avg	8-20
Naphthalene	0.1 - 900	5 min and 1 hour rolling avg	1-2

Table 5: List of Multi-Point Verification Levels, Acceptable Criteria, and the Testing Frequency for Gases Measured by UV-DOAS

QC Check	Pollutant	Level (ppb)	Frequency	Criteria[1]
Verification	Benzene	60, 40, 20, 8, 4, 2	Annually	Slope: 0.8 - 1.2, Intercept: -10 – 10, R^2: 0.95
Verification	m-Xylene	60, 30, 10, 4, 0	Annually	Slope: 0.8 - 1.2, Intercept: +/- 1/2 MDL, R^2: 0.95
Verification	p-Xylene	60, 30, 10, 4, 0	Annually	Slope: 0.8 - 1.2, Intercept: +/- ½ MDL, R^2: 0.95
Verification	Toluene	60, 30, 10, 4, 0	Annually	Slope: 0.8 - 1.2, Intercept: +/- ½ MDL, R^2: 0.95
Verification	Ethylbenzene	60, 30, 10, 4, 0	Annually	Slope: 0.8 - 1.2, Intercept: +/- ½ MDL, R^2: 0.95
Verification	Styrene	60, 30, 10, 4, 0	Annually	Slope: 0.8 - 1.2, Intercept: +/- ½ MDL, R^2: 0.95
Verification	SO2	60, 30, 10, 4, 0	Annually	Slope: 0.8 - 1.2, Intercept: +/- ½ MDL, R^2: 0.95

Verification	Naphthalene	60, 30, 10, 4, 0	Annually	Slope: 0.8 - 1.2, Intercept: +/- ½ MDL, R^2: 0.95
Verification / Representativeness by (1) co-location with ORS-ML for a minimum of 8 hours, and/or (2) mobile survey within approximately 2mi of a station	Benzene, Toluene, Ethylbenzene, Xylenes, Styrene, SO2, Naphthalene	MDL. ambient concentrations	As needed	±25%

[1] The acceptable criteria indicate the acceptable percent difference between the mixing ratio delivered to the instrument and the mixing ratio reported by the instrument.

2.5.5.2 Extractive FTIR Multi-Pollutant Analyzer

Table 6: Pollutants Measured with FTIR and Their Associated Operating Range in ppb, Collection Frequency, Reporting Units, and Minimum Detection Limits (MDL)

Pollutant	Operating Range (ppb)	Collection Frequency (min)	Approximate MDL (ppb)
Acrolein	50 - 47000	5 min & 1 hour rolling Avg.	50
Ammonia	6 - 3300	5 min and 1 hour rolling avg	6
Acetaldehyde	10 - 44000	5 min and 1 hour rolling avg	10
1,3-Butadiene	18 - 6000	5 min and 1 hour rolling avg	18
Carbonyl Sulfide	2 - 1500	5 min and 1 hour rolling avg	2
Formaldehyde	4 - 13000	5 min and 1 hour rolling avg	4
Hydrogen Cyanide	38 - 1700	5 min and 1 hour rolling avg	38
Total Alkanes	15 - 7400	5 min and 1 hour rolling avg	15

Table 7: List of Multi-Point Verification Levels, Acceptable Criteria, and the Testing for Gases Measured with FTIR

QC Check	Pollutant	Level (ppb)	Frequency	Criteria[1]
Verification	Acetaldehyde	300, 150, 50, 20, 0	Annually	Slope: 0.9 - 1.1, Intercept: +/- ½ MDL, R^2: 0.95
Verification	1,3-Butadiene	300, 150, 50, 20, 0	Annually	Slope: 0.9 - 1.1, Intercept: +/- ½ MDL, R^2: 0.95
Verification	Carbonyl Sulfide	300, 150, 50, 20, 0	Annually	Slope: 0.9 - 1.1, Intercept: +/- 1/2 MDL, R^2: 0.95
Verification	Total Alkanes	300, 150, 50, 20, 0	Annually	Slope: 0.9 - 1.1, Intercept: +/- ½ MDL, R^2: 0.95
Verification / Representativeness by (1) co-location with ORS-ML for a minimum of 8 hours, and/or (2) mobile survey within approximately 2mi of a station	Total Alkanes, Acetaldehyde, Formaldehyde, Carbonyl Sulfide, Hydrogen Cyanide, Hydrogen Fluoride	MDL and ambient concentrations	As needed	±25%

[1] The acceptable criteria indicate the acceptable percent difference between the mixing ratio delivered to the instrument and the mixing ratio reported by the instrument.

2.5.5.3 Field Automated Gas Chromatography System (Field Auto-GC)

Table 8: Pollutants Measured with Field Auto-GC and the Associated Operating Range, Collection Frequency, Units, and Minimum Detection Limit (MDL)

Pollutant	Operating Range (ppbv)	Collection Frequency	MDL (ppbv)	Completeness (Quarterly)	Operating Temperature
Acrolein	0.0 - <500	1 Hour[1]	0.5	>90%	~15-35 °C
1,3-Butadiene	0.0 - <500	1 Hour[1]	0.1	>90%	~15-35 °C
Styrene	0.0 - <500	1 Hour[1]	0.1	>90%	~15-35 °C
Benzene	0.0 <500	1 Hour[1]	0.1	>90%	~15-35 °C
Toluene	0.0 - <500	1 Hour[1]	0.1	>90%	~15-35 °C

Ethylbenzene	0.0 - <500	1 Hour[1]	0.1	>90%	~15-35 °C
m, p-Xylene	0.0 - <500	1 Hour[1]	0.1	>90%	~15-35 °C
o-Xylene	0.0 - <500	1 Hour[1]	0.1	>90%	~15-35 °C

[1] ~40-minute sample collection followed by ~20-minute sample analysis

Table 9: Automated Calibration System (ACS) Concentration Levels, Acceptable Criteria, and the Testing for Gases Measured with Field Auto-GC

QC Check	Pollutant	Concentration (ppb)	Frequency	Criteria
Zero[1]	N/A	0.0	Twice per week	3 times of the MDL of the compound
1-Point Precision[2]	Acrolein		Twice per week	±30%
1-Point Precision[2]	1,3-Butadiene	10-12	Twice per week	±15%
1-Point Precision[2]	Styrene	10-12	Twice per week	±15%
1-Point Precision[2]	Benzene	10-15	Twice per week	±15%
1-Point Precision[2]	Toluene	10-15	Twice per week	±15%
1-Point Precision[2]	Ethylbenzene	10-15	Twice per week	±15%
1-Point Precision[2]	M, P-Xylene	15-20	Twice per week	±15%
1-Point Precision[2]	O-Xylene	9-12	Twice per week	±15%

[1] Nitrogen carrier gas
[2] 1-Point Precision: 2-3 sets of measurements using the known concentration of the compound, based on the standard gas cylinder certification, are performed and the average of these measured concentrations is compared with the ACS results for each Field Auto-GC.

Table 10: Multi-Point Verification/Calibration for Field Auto-GC

QC Check	Pollutant	Level (ppb)	Frequency	Criteria
Zero Check	All Rule 1180 species measured by Field Auto-GC	0 (ppb)	After each repair, Sensor module replacement, ACS and carrier gas replacement, installation or relocation	< 3 x MDL of each compound
Verification Challenge (No Adjustment)	All Rule 1180 species measured by Field Auto-GC	At a minimum 2 concentration points (low and high) using a certified gas	After each repair, Sensor module replacement, ACS and carrier gas replacement, installation or relocation	± 40% for Acrolein and Styrene, ±25% for all other compounds

Table 11: QA PE Audit Criteria for Field Auto-GC

QA Check	Pollutant*	Concentration (ppb)	Freq.	Criteria	Comments
Zero	All Rule 1180 species	0.0 to 0.1	Annually	< 3 x MDL of each compound	Additional compounds may be included, as necessary, to verify interference or to assist with data analysis
Accuracy Check (Minimum 4-point challenge)	Benzene, Toluene, m, p-Xylene, o-Xylene, Ethylbenzene, Styrene, Acrolein, 1.3-Butadiene	Levels from 0 to 10 ppb (concentration may vary by compound based on the availability)	Annually	Slope target is between 0.75 to 1.25 for all Rule 1180 compounds**.** Intercept targets are: ± 0.3 for BTEX; ± 1.5 for Acrolein.	Addition of Propene, Hexane, Acetone, 2-Butanone are recommended for challenge.**
Precision Check	Benzene, Toluene, m, p-Xylene, o-Xylene, Ethylbenzene, Styrene, Acrolein, 1.3-Butadiene	0.5 to 1.0 ppb; At least 7 replicate measurements at the same target concentration	Annually at selected community air monitoring stations (minimum 3 stations)	Standard deviation of the replicate measurements should be below the MDL for each compound.	

*Pollutants may be added/removed as appropriate.

** Propene, Hexane are used as indicators of the sensors' health. Parachlorobenzotrifluoride (PCBTF) is a currently known potentially interfering compound. Additional test(s) to challenge with known potentially interfering compounds may be performed at selected community air monitoring stations, as needed. Additional potentially interfering compounds may be added in the future based on experience or vendor recommendation.

2.5.5.4 Hydrogen Sulfide (H2S) Analyzer

Table 12: MQO's for H2S Analyzer

Measurement Method	Operating Range	Collection Frequency	MDL	Completeness 5-Min, Hourly, Quarterly	Temperature Range
UV Fluorescence	0-500 ppb	1 minute	0.4 ppb	>90%	5-40 Degree C

Table 13: QC Checks for H2S Analyzer

QC Check	Level (ppb)	Frequency	Warning Criteria	Acceptance Criteria
Zero	0	Weekly	<+/-1.0 ppb	<+/-1.5 ppb
1-point Precision	10	Weekly	>+/-10.0%	<+/-15.1 %
Mid-Point	30	Weekly	>+/-10.0 %	<+/-15.1 %

Table 14: Multi-Point Calibration for H2S Analyzer

Check	Level (ppb)	Frequency	Warning Criteria*	Acceptance Criteria
As-Is Calibration (Verification) Without Any Adjustment	0, 10, 30, 60, 80	Before final calibration or to verify performance	At a minimum, all points ≤ ± 1.0 ppb (for 0 level), >2.1% difference of best-fit straight line	At a minimum, all points ≤ ± 1.0 ppb (for 0 level), <2.1% difference of best-fit straight line
Final Calibration (After Adjustment)	0, 10, 30, 60, 80	At minimum annually and during commissioning, adjustment, repair, and relocation	At a minimum, all points ≤ ± 0.75 ppb (for 0 level), >2.1 % difference of best-fit straight line	At a minimum, all points ≤ ± 1.0 ppb (for 0 level) or <2.1% difference of best-fit straight line
Convertor Efficiency	100 ppb	During multi-point calibration	<98%	>96%

*Note: this Warning Criteria is a guidance during calibration process.

Table 15: QA PE Audit Criteria for H_2S Analyzer

QA Check	Level (ppb)	Frequency	Criteria	Note
PE Audit	0, 10, 30, 40, 60, 80	Annually	At a minimum, all points ≤ ± 1.0 ppb, <15.1%	Using independent dilution system and gas standard

2.5.5.5 Aethalometer - Black Carbon Analyzer

Table 16: MQOs for Aethalometer

Measurement Method	Operating Range	Collection Frequency	Reporting Units	Resolution	Data Completeness Goal
Optical Absorption	0.01-100 ng/m3	1 minute	ng/m3	0.03 ng/m3 at 1minute, 5.0 LPM, MDL 0.5 ng/m3	>90%

Table 17: QA/QC Criteria for Aethalometer

Requirements	Frequency	Warning Criteria	Acceptance Criteria
Flow Verification	Monthly	5 LPM <+/-7% (STP)	<+/- 10.1% (STP)
Flow Rate Calibration	Bi-annually	5 LPM <+/-7% (STP)	<+/- 10.1% (STP)
Leak Test	Bi-annually	0.5 LPM	< 0.5 LPM
Internal Clean Air Check	Bi-annually	Software Pass/Fail	Software Pass/Fail (Point to point variation C61 ~ 500ng/m3 @ 5 LPM, 1 s. time base)
Stability Test	As needed	When instrument response is very unstable (i.e. the point-to-point variation for the wavelength 880nm at the time-base set to one second is about 350 ng/m3)	ppb 61 ~ 400 ng/m3 @ 1s.

Neutral Density (ND) Validation	Bi-annually	(Instrument generated index value)	<10.1%
PE Audit via Co-location with a Certified Aethalometer Standard	Annual	.95 to 1.05 R-value using only data above 100 ng/m3 threshold	.9 to 1.1 R-Value when R-value using only data above 100 ng/m3 threshold. For a collocation of a minimum of 72 hours with a minimum data capture of 95%

2.5.5.6 Hydrogen Fluoride Analyzer

Table 18: MQO for HF Analyzer

Measurement Method	Operating Range (ppb)	Collection Frequency	Resolution (ppb)	Completeness
Integrated-cavity Output Spectroscopy	0.3-2,000	1 minute	0.1	>90%

Table 19: QA/QC for HF Analyzer

Check	Frequency	Warning Criteria	Acceptance Criteria
Zero	Daily	>1.0 ppb	<1.0 ppb
Calibration	Annually	Factory Calibration	Factory Acceptance criteria
PE Audit via Co-location with a Comparable HF analyzer	Annually	3 days Collocation (Slope <0.85 or >1.15)	3 days Collocation (Slope 0.95-1.1)

2.5.5.7 Meteorological Sensors

Table 20: MQO for Meteorological Sensors

Measurement	Measurement Method	Operating Ranges	Collection Frequency	Reporting units	Resolution	Completeness 5-Min, hourly, quarterly
Wind Speed	Propeller Anemometer	0-50 m/s (112 mph)	1 minute	mph	0.1 m/s	>90%

Wind Direction		360 Degrees	1 minute	Degrees	1 Deg.	>90%
Ambient Temperature	Platinum Resistance Detectors (RTD)	- 50 to +150F	1 minute	Deg. F	0.2 Deg. F	>90%
Relative Humidity	Rotronic Hygrometer	0-100% RH	1 minute	%	0.1 %	>90%
Barometric Pressure	Piezoresistive Module	17.72-32.48 in-HG	1 minute	in-HG	0.003 IN-HG	>90%
Shelter Temperature	Platinum Resistance Detector (RTD)	- 50 to +150F	1 minute	Deg. F	0.2 Deg. F	>90%

Table 21: Meteorological Sensors QA/QC Frequency and Criteria

Parameter	QC Check		Calibration		PE Audit	
	Frequency	Criteria	Frequency*	Criteria	Frequency	Criteria
Wind Speed	Monthly	Estimate and compare	Annually, and when newly installed, relocated, repaired	<+/- 0.2 m/s +5%	Annually	<+/- 0.2 m/s +5%
Wind Direction	Monthly	Visual inspection	Annually, and when newly installed, relocated, repaired	<+/- 5.1 deg.	Annually	<+/- 5.1 deg.
Ambient Temperature	Monthly	< +/- 2.1 Degrees C	Annually	< +/- 0.51 Deg. C	Annually	< +/- 2.1 Deg. C
Relative Humidity	Monthly	< +/-10.1 % RH	Annually	<+/- 5.1% RH	Annually	<+/- 5.1% RH
Barometric Pressure	Monthly	3 mm-HG	Annually, and when newly installed, relocated, repaired	1 mm-HG	Annually	3 mm-H-G

Shelter Temperature	Monthly	<+/- 2.1 Deg. C	Annually	< +/- 0.5 Deg. C	Annually	< +/- 2.1 Deg. C

*As recommended by the U.S. EPA QA Handbook (U.S. EPA, 2017).

2.5.5.8 Calibration Equipment and Standards

Table 22: Calibration Equipment and Standards Certification Frequency and Criteria

Instrument	Certification Frequency	Certification Criteria	Certification Standard/method	Certified By
Zero Air Generator (ZAG) (Teledyne 701 H)	Every 365 days and 1/calendar year	Concentrations below LDL < 0.1 ppm aromatic hydrocarbons	Compare response with another certified ZAG	Rule 1180 Staff
Dilution System (Teledyne T700)	Every 365 days and 1/ calendar year or after failure of 1-point QC check or performance evaluation	Accuracy < + 2.1 %	NIST Traceable Flow standards (e.g. Alicat or Bios Defenders)	Rule 1180 Staff
Gas Standards	All gas cylinders	Compound specific 1-5%	NIST Traceable (e.g., EPA Protocol) or primary standard	Gas Vendor or Certified Independent Laboratory
Flow Standards	Every 365 days and 1/ calendar year	0.1 % F.S.	NIST Traceable	Manufacturer
Meteorological Sensors Standards	Every 365 days and 1/ calendar year	Same as calibration Criteria in Table 21	NIST Traceable	South Coast AQMD Meteorology Group or qualified contractor/vendor

2.5.5.9 Continuous Particulate Matter Sampler PM2.5/PM10

Table 23: MQO for Particulate Matter Sampler

Measurement Method	Operating Range (µg/m³)	Collection Frequency	Resolution (µg/m³)	Completeness
TBD	0.1 – 10,000	From 1 minute to up to 1 hour	0.1	>90%

Table 24:QA/QC for Particulate Matter Sampler

Requirements	Frequency	Warning Criteria	Acceptance Criteria
Flow Check	Monthly		±4% of transfer standard ±5% of design
System Leak Check	Before each flow rate verification/calibration and before and after PM2.5 separator maintenance	TBD	Method Specific. See operator's manual
Flow Rate Multi-Point Verification/Calibration	Bi-annually	± 8% of design flow	3 of 4 cal points within ± 10% of design flow
Design Flow Rate Adjustment	After multi-point calibration or verification	N/A	Within ± 2% of design flow
Temperature Multi-Point Verification/Calibration	Annually	Software Pass/Fail	± 2°C
Pressure Verification/Calibration	Annually	±8mm Hg	±10mm Hg

2.5.5.10 Air Toxic Metals X-Ray Florescence Monitor

Table 25: Pollutants Measured with X-Ray Florescent (XRF) Analyzer and the Associated Operating range, Collection Frequency, Units and Minimum Detection Limit (MDL)

Pollutants	Operating Range (ng/m³)	Collection Frequency	MDL range (ng/m³)

Nickel	0.17 - <2000	1 hour rolling avg	0.17
Manganese	0.25 - <2000	1 hour rolling avg	0.25
Cadmium	4.4 - <2000	1 hour rolling avg	4.4

Table 26: QA/QC requirements for XRF Multi-Metals Analyzer

Requirements	Frequency	Warning Criteria	Acceptance Criteria
Site Visit or Remote Access Instrument Check	Weekly		Verify Instrument Collecting Data
Clock Adjustment	As Needed		±2 minutes
Tape Change	Monthly		Verify Tape available
QA Upscale Tracking	Bi-Annual		±10% CES set point
Leak Check	Monthly	<120 mm Hg/min	< 150 mm Hg/min
Flow Check	Monthly		Software pass/fail
Flow Calibration	Bi-Annual		N/A
QA Blank Check	Annual		TBD
XRF Calibration Check	Bi-Annual		N/A

2.6 Training

South Coast AQMD implements appropriate training for all staff involved in all Air Monitoring Programs including field operations, support personnel, QA personnel, temporary and contract personnel, and supervisory and management personnel. This ensures that staff have adequate knowledge to perform assigned duties under the different air monitoring programs, including the ability to satisfy program and agency QA requirements. Mandatory quality assurance training is conducted within the first year of being hired, or during a major position change, and every 2-3 years thereafter. Formal QA training is conducted by the QA Branch and additional detail is provided, when needed, by each specific branch or work group. QA training is tracked by the QA Branch in a spreadsheet alongside various training records held by each branch. South Coast AQMD staff are required to be trained for the tasks to which they are assigned. A staff member experienced in a certain method serves as a mentor to the trainee.

Typically, a trainee is assigned study of the relevant portions of instrument manuals, SOPs, QAPPs, and other available documentation. The mentor trains the trainee on operation methodology and practices,

including the performance of good work techniques with an emphasis on avoiding contamination of equipment, supplies, and samples. The mentor instructs and queries the understanding of the trainee on the basic requirements of their assigned tasks, instrument operation, the contents of the SOP(s), and other relevant documents before commencing “hands-on” training (i.e., on-the-job training). The mentor trains the trainee on the task(s) to be performed and whom to contact for assistance, typically working from the relevant SOP(s) and a checklist of tasks and training goals that is attached to or included on the training record form. After training is complete, the mentor observes the trainee as they perform the assigned tasks including checking performance of operations and analytical tasks such as calibration, quality control, data treatment, system maintenance, and record keeping. Once certain that the trainee has mastered the assigned tasks (i.e., the trainee can successfully and independently perform the monitoring activities), the mentor completes a Training Record Form (see Appendix E for an example) and submits it to the branch secretary or office assistant for review and filing. The supervisor or trainer is responsible for assessing proficiency before signing the Training Record Form. This training document is filed as a PDF in a centralized location and a hard copy is filed in the employee’s training file, with summary information that is included in a branch training spreadsheet. On an annual basis, at minimum, the QA Branch will review training records for completeness of covered topics and the inclusion of relevant staff. Once the Training Record Form is filed, the trainee is deemed qualified to perform the assigned tasks independently. Even then, the trainee works under the direction of the mentor and supervisor until the mentor deems them ready to work independently.

Ongoing performance is monitored by work the group senior and/or Program Supervisor level staff through review of forms and analytical data from samples, as well as review of the results of both internal and external audits. Project staff are encouraged to attend courses, such as manufacturer’s training sessions or method-specific courses that are relevant to the assigned tasks and analytical instrumentation , and to apply principles conforming to the demonstration of capability (DOC) as described in South Coast AQMD SOP00136. Data reviewers are trained and mentored as per above in the operational properties and expectations of monitoring instrumentation, data acquisition systems, QA, and calibration and maintenance procedures. The ability to review and validate data for quality and completeness is critical for staff involved in reporting data to the public. Data reviewers are trained in data collection, analysis, review, visualization, validation, and reporting software tools and techniques utilized for data management, validation, and reporting. Related software currently used by South Coast AQMD includes Agilaire Air Vision®, Sonoma Technology Data Management System® (DMS) tools, and other commercial and in-house developed software. QA Branch staff attend staff meetings to provide information and comments intended to keep the project supervisor and general staff current on QA and monitoring-related requirements and recommendations, and to contribute to resolving QA issues that occur during performance of this program. Subject specific courses may also be arranged for and attended by staff onsite, online, or at locations such at professional meetings, instrument vendor training sites, workshops, symposia, or conferences.

All new or newly assigned South Coast AQMD field staff receive basic safety training. This training covers safety issues, including, but not limited to, the South Coast AQMD Injury and Illness Prevention Plan (IIPP), hazard recognition, proper work procedures at air monitoring sites, proper gas cylinder handling, and general South Coast AQMD safety orientation. Staff are provided with safety information through the South Coast AQMD Administrative Policies & Procedures #28: Safety and Health Guidelines Policy, South Coast AQMD IIPP, South Coast AQMD Chemical Hygiene Plan, South Coast AQMD Monitoring Station Safety Manual, and in SOPs and OAGs, as appropriate. Staff are required to attend additional safety or first-aid training relevant to their job duties.

2.7 Documentation and Records

South Coast AQMD, MAD, and QA Branch documents and records consists of entries in physical or electronic logbooks (station and instrument), instrument outputs including meta data (written, printed, and/or electronic), and reports. This information is recorded and stored electronically on local drives, shared network drives, Structured Query Language (SQL) servers, external drives, or hard copy logbooks, and other forms such as maintenance or downtime sheets or corrective action forms. Both electronic and paper records are stored in a logical order for ease of access. Retention of documents and records, including emails and records involved in litigation, are governed by the South Coast AQMD Records Retention Policy which specify retention schedules for MAD functions, including Monitoring, Source Test Engineering, Laboratory Services, Quality Control Testing, Quality Assurance Program, and Microscopy. This policy provides requirements and guidelines for managing the life cycle of all South Coast AQMD records and information. The retention times related to the community air monitoring program are generally long in duration (e.g., at minimum five years) to ensure that related data is processed, analyzed, validated, and certified with all available supporting data. Long retention times ensure that regulatory analyses and decisions are backed with enough supporting information to address any questions or issues.

The current South Coast AQMD records retention policy is limited to general retention schedules for correspondence and interoffice memoranda, related materials, and data.

Within each South Coast AQMD department or business unit, staff are delegated as Records Retention Coordinators (i.e., records custodian), with the responsibility of implementing the records retention policy within their operating unit, including but not limited to:

- Ensuring full and complete implementation of the Records Retention Schedule.
- Scheduling and coordinating one or more Records Purge Days each year.
- Evaluating the effectiveness of the retention schedules and proposing revisions.
- Maintain a Records Retention Schedule relating to the records within their responsibility.
- Working with the General Counsel's Office to periodically update the Records Retention Schedule.

- Ceasing the disposal of relevant records or information promptly upon notification by South Coast AQMD attorneys of a disposal suspension for litigation or other reasons.

MAD Branch Managers and Principal AQISs, Principal Air Quality Chemists, or Program Supervisors under each work group, and relevant staff support the management of the documents and records related to all air monitoring programs. Per the South Coast AQMD Records Retention Policy, every person in each South Coast AQMD department is directly responsible for the proper management of records, documents, files, data, and other information pertaining to South Coast AQMD's official business within their control. Knowledgeable staff typically prepare records and documents for public record requests, which are governed by the California Public Records Act (State Code Section 6250). MAD management, as well as the Records Retention Coordinator, reviews and approves public record responses. Guidelines and procedures for obtaining public records from South Coast AQMD can be found on the South Coast AQMD website. For continuous measurements, South Coast AQMD uses Agilaire LLC AirVision® software as the primary telemetry system to poll ESC data loggers in the field. The data from AirVision feeds into the Sonoma Technology, Inc. Data Management System® (DMS) for processing of continuous data streams, which supports the following program data requirements:

- Incorporation of QC checks (e.g., automated 1-point checks);
- Ongoing data verification;
- Data validation and flagging;
- Preliminary data analyses;
- Provide data security and administration to ensure data cannot be tampered with and has adequate levels of backup;
- All entries are recorded and archived. Initial entries are not erased when revisions (edits to previous entries in a different entry session) are made. This ensures a comprehensive audit trail is available for all entries.

The use of electronic recordkeeping using Microsoft Teams (MS Teams) has been implemented for Rule 1180 community air monitoring operations. The MS Teams is used to provide electronic logbooks and other relevant documentation. In addition, physical logbooks are kept in each station to keep staff entry records and other documentation not feasible via MS Teams. Electronic recordkeeping is conducted in accordance with the guidelines in the U.S. EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II (U.S. EPA, 2017).

Handwritten forms, such as maintenance sheets, are stored for a minimum of five years from the time of the latest independent audit. Completed/full station logbooks are stored onsite for a period of a minimum of one year, then returned to South Coast AQMD offices to be scanned electrically and archived by the Rule 1180 staff. Instrument logbooks serve as a permanent record of the acceptance testing, installation, relocation, repairs, calibrations, and performance audits for that instrument. The instrument logbook always remains with the instrument, wherever it is located. Older instrument logbooks are scanned

electronically and archived by the Rule 1180 staff when a new logbook is started, or the instrument is permanently removed from service. Electronic records along with physical logbook information represent the total informational picture as it relates to both the site and analyzer. Handwritten physical logbooks and maintenance sheets are retained for a minimum of 5 years after the date of completion of the last independent audit of the program, and maintain the following characteristics:

- Station and instrument logbooks are bound scientific books with pre-numbered pages and an assigned tracking number, as well as appropriate station, equipment, and/or instrument information.
- Logbook pages are not to be removed.
- Logbooks are kept in a safe place in the stations where they can be easily found.
- The name of the staff doing the work is entered in the logbook (minimum first initial and last name), along with the date the work was done (month, day, and year) and the purpose of the visit and/or work.
- Indelible ink must be used (i.e., standard blue or black ballpoint pens, no markers or pencils).
- Entries are to be clear, concise, and legible with no blank space between entries.
- If the entry is continued onto a following page, “continued” is written at the bottom of the previous page, each page has the name and date written on it, then write the name of the person making the notation and date when the notation is made on the continued page.
- Incorrect entries are corrected with a single-line strikethrough (no erasures, correction fluid or torn-out pages) so that the entry is still legible, along with initials, date of the correction, and a brief reason for the correction when needed for clarity (i.e., if the reason for the change is not likely to be obvious to future reviewers).

Quality Assurance Alert (QAA) forms are used by staff to inform the QA Branch of potential issues or changes that could impact significant amounts of data or safety. Corrective Action Requests (CARs) are issued by the QA Branch or designated QA officer for findings that could impact data quality or safety to:

- Inform impacted personnel.
- Open discussion for determining a resolution and a reasonable deadline.
- Track progress of measures taken to resolve the findings before the deadline.
- Document the problem, its resolution, and steps to prevent the issue from recurring.

Corrective action (QAA and CAR) documentation is stored by the QA Branch electronically on a MAD SharePoint drive that is write-protected and regularly backed up. Corrective action requests from outside contractors and all audit reports, both internal and external, are stored electronically by the QA Branch on the MAD SharePoint drive. These are retained long-term to facilitate the analysis of previous findings and corrective action resolutions for similar or repeated issues and as examples to assist staff in preparing for new assessments.

2.8 Project Quality Assurance Manager Independence

The QA Branch within South Coast AQMD operates independently from other branches under MAD. The QA Manager has overall quality assurance responsibility for South Coast AQMD environmental measurement programs and reports directly to the ADEO/MAD who has authority over all environmental measurement activities in conjunction with and under the direction of the DEO/MAD. In this regard, the QA Manager has primary responsibility for preparing and annually reviewing the South Coast AQMD QMP for environmental measurements and for submitting an annual quality assessment report to the ADEO/MAD. The QA Manager implements and maintains quality systems, assesses the effectiveness of quality systems, revises quality systems as necessary, and supervises QA staff specializing in controlled document review (QAPPS, SOPs, and OAGs), auditing environmental measurement programs, and practicing the corrective action process. Managers of other MAD branches do not have the authority to sign the QAPP for the Quality Assurance manager. The Quality Assurance Manager also does not have authority to sign QAPP for managers who are responsible for operating the project.

Although the QA Branch is independent, QA works closely with other MAD branches on quality assurance issues. The QA Manager has authority to speak to any staff member on data quality matters and to flag data that may be suspect based on quality assessments. The QA Manager may recommend remedial actions after discussions with line managers and a joint review of the data quality issues, and their impact on data users. A dispute resolution procedure is in place to resolve data invalidation issues where concurrence on the course of action cannot be reached at the managerial level. The QA Manager has authority to stop work when critical QA/QC failures are observed/encountered and if this happens, the responsibility to inform impacted parties, ADEO/MAD and DEO/MAD.

The QA Manager is responsible for the following: coordinating and tracking training; providing quality assurance training to staff; auditing staff training records; preparing, issuing, and updating the QMP; coordinating the preparation, revision, and issuance of QAPPs, OAGs, and SOPs; reviewing QAPPs, OAGs, and SOPs for appropriate quality assurance activities; auditing or coordinating audits of outside contractors; preparing and supervising contracts with outside auditors; reviewing CARS and corrective action resolutions; and is the South Coast AQMD liaison on all quality assurance issues to the U.S. EPA, California Air Resources Board (CARB), other federal or state agencies, and other organizations involved with quality assurance. Within any project or program, audits may be conducted solely by QA staff, by QA staff and contractor(s), or solely by certified contractor(s). Each program/project specific QAPP will identify the actual audit responsibility. In all cases, however, the QA Manager has oversight responsibility.

Annually, the QA Manager reviews staffing, funding, and resource needs in consultation with the ADEO/MAD and DEO/MAD and makes recommendations for the optimum number and level of staff to ensure that the quality system is adequately structured and funded.

QA staff reporting to the QA Manager includes a Program Supervisor (including Program Supervisor, Quality Assurance, Rule 1180), an Air Quality Specialist, a Senior Air Quality Chemist (Senior AQ Chemist), a Senior Air Quality Instrument Specialist (Senior AQIS), and an Air Quality Instrument Specialist II (AQIS II).

3 Data Generation and Acquisition

3.1 Network Description

The South Coast AQMD Rule 1180 Community Air Monitoring Network consists of ten fully equipped and two partially equipped fixed-site air monitoring stations. These stations were selected as a representative of typical air quality conditions in communities near the major refineries within the South Coast Air Basin, and they site instruments used to characterize air quality and aid in determining potential impacts resulting from refinery-related operations. Site type for the network was determined by a variety of factors such as pollutant of interest, monitoring and data quality objectives, representativeness of air quality, geographic location, and other miscellaneous considerations. The following criteria were considered in the site selection process:

- Proximity to the refinery and other potential sources;
- Proximity to the community and sensitive receptors;
- Local meteorology;
- Meeting appropriate EPA network siting requirements for air monitoring stations;
- Input from the community and other stakeholders;
- Site access, security, and long-term availability;
- Environmental justice considerations.

The locations of Rule 1180 Community Air Monitoring Program stations are listed in Table 27. The air monitoring sites are shown on the map on Figure 1 as small colored circles relative to the major refinery locations, which are depicted by refinery symbols highlighted in color.

*Table 27: Rule 1180 Community Air Monitoring Site Locations**

Site Name/Site ID	Commissioning Date	Decommission Date	Address	GPS Coordinates
Hudson/HDSN	December 10, 2019	Active	2425 Webster St, Long Beach, CA, 90810	33.802417, -118.219933
Judson/JUDS	February 25,2020	Active	451 E 223rd St, Carson, CA, 90745	33.825056, -118.268333
St. Luke/SLKE	February 7, 2020	Active	3415 Delta Ave, Long Beach, CA, 90810	33.819472, -118.211528
First Methodist/UMCW	March 4,2020	Active	928 N Lagoon Ave, Wilmington, CA, 90744	33.782233, -118.267534
Harbor Park/WILH	February 1,2020	Active	1221 N Figueroa Pl,	33.786339,

			Wilmington, CA, 90744	-118.286034
G Street/GSTR**	January 21, 2021	Active	1446 W G St, Wilmington, CA, 90744	33.777924, -118.281830
Inner Port/IPRT	February 25, 2020	Active	1200 Canal St, Long Beach, CA, 90813	33.781667, -118.213656
Leeward Bay/LEEW**	December 26 2019	Active	611 N Henry Ford Ave, Wilmington, CA, 90744	33.777482, -118.243180
Guenser Park/GUEN	April 23, 2020	Active	17800 Gramercy Pl, Torrance, CA, 90544	33.870487, -118.313445
Elm Avenue/ELMA	May 07, 2020	Active	1000 Elm Ave, Torrance, CA, 90503	33.838051, -118.331680
St. Anthony School/ANTH	April 23, 2020	Active	215 Lomita St. El Segundo, CA, 90245	33.918089, -118.408200
Manhattan Beach/MHAN	March 24, 2020	Active	1200 Pacific Ave, Manhattan Beach, CA, 90266	33.890204, -118.401439
EL Segundo/ELSG	January 16, 2020	August 13, 2020	400 Lomita St, El Segundo, CA, 90245	33.920706, -118.407071

*Note: up to 5 additional air monitoring stations will be established for Rules 1180 and 1180.1 programs by July 2026. This QAPP will be updated as station locations are finalized.

**G Street and Leeward Bay are partially equipped stations.

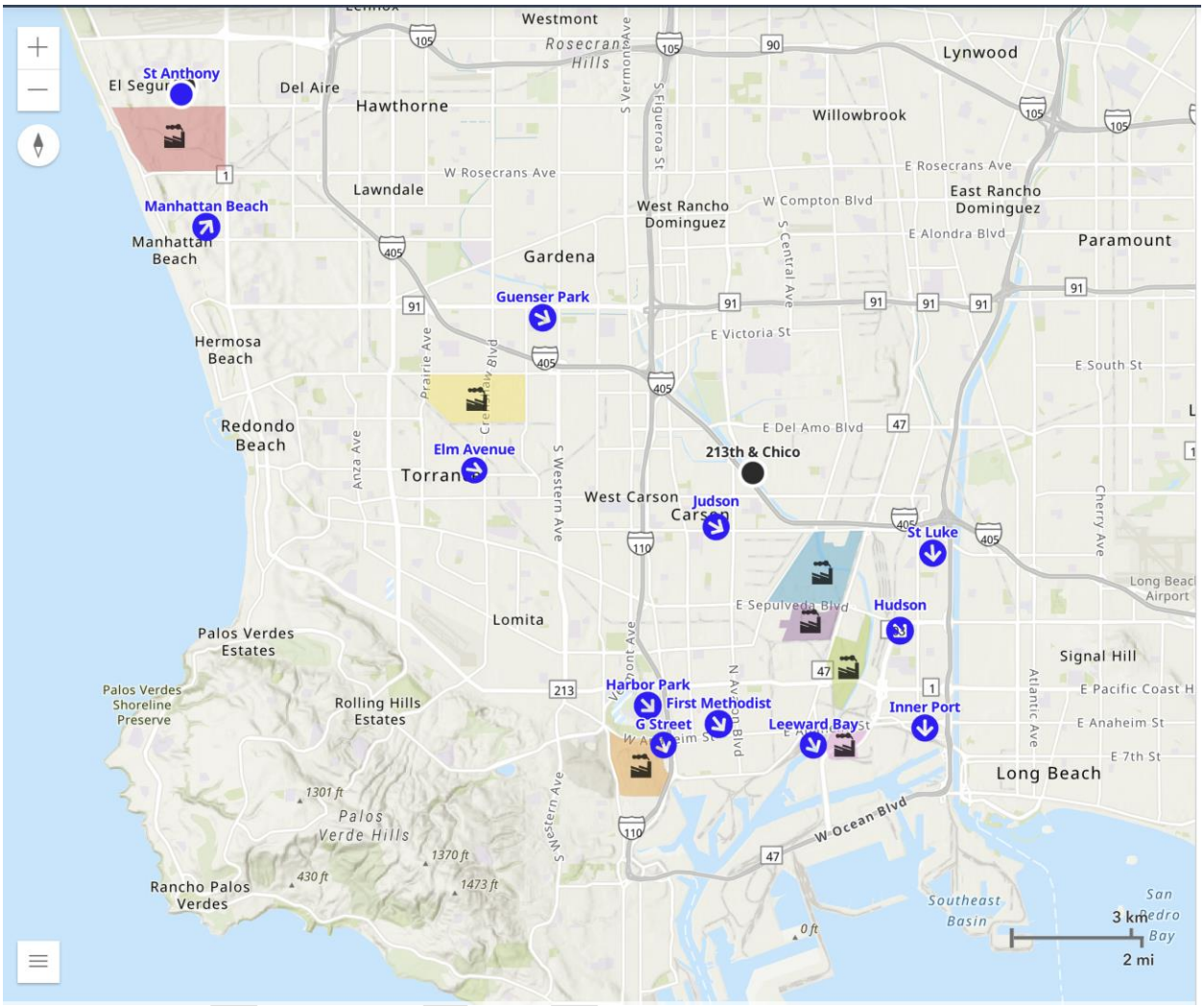

Figure 1: Map of the locations of Rule 1180 Community Air Monitoring Sites (circles) and Refineries (colored shapes). Blue circles show locations of active Rule 1180 Community Air Monitoring Program stations. Black circles show locations of decommissioned sites (Note: 213th & Chico was a temporary site established in response to the 2021 Dominguez Channel Odor Event; this station was not a part of the Rule 1180 Community Air Monitoring Network.)

The air monitoring equipment is deployed in climate-controlled enclosures (e.g., office containers or trailers) that meet the temperature requirements for all instruments that are contained. The sites meet power supply requirements which does not vary by more than +/-10% from the supply voltage of 115 (VAC). Selected community air monitoring stations are also equipped with on-site meteorological stations.

Site access is granted to authorized community air network staff and authorized vendors/contractors. For a list of the monitors at each site, see Table 24 and 26.

3.2 Measurement Methods

Rule 1180 Community Air Monitoring Program instruments were selected to meet monitoring and data quality objectives to reliably detect and quantify the required Rule 1180 air pollutants. All required Rule 1180 pollutants are measured by continuous analyzers that perform measurements and analysis in or near real-time. Such monitoring is necessary to evaluate the impact of fugitive emissions (e.g., leaks) and other releases onto the surrounding communities. Thus, instruments require sufficient time resolution to characterize pollution levels that are changing on short time scales (e.g., minutes). The selected instruments require sensitivity sufficient to measure typical ambient variation of the targeted pollutants in an urban environment and below the Rule 1180 community notification threshold. Air monitoring equipment that can measure the number of desired compounds simultaneously, with appropriate accuracy and precision, and meets the objectives of the Rule 1180 Community Air Monitoring Program. To satisfy these objectives, Rule 1180 Community Air Monitoring Program sites are equipped with a combination of traditional point monitors and advanced air monitoring instruments such as optical multi-pollutant analyzers and Field Auto-GCs. Tables 24 and 25 outline air monitoring equipment used in the Rule 1180 community air monitoring program.

Table 28: List of Community Air Monitoring Instruments and Measured Pollutants

Site	Analyzer, Model, Manufacturer	Pollutant(s)	Collection Frequency/Data Display	MDL
All fully equipped sites	Aethalometer AE33-7, Aerosol USA (formerly McGee Scientific)	Black Carbon (BC)	1-minute / 5-minute and 1-hr rolling average	0.01 ng/m3
	T101, Teledyne API	Hydrogen Sulfide (H2S)	1-minute/5-minute and 1-hr rolling average	0.4 ppb
	Field Auto-GC MiTAP P320, Tricorntech Corporation	Acrolein, 1,3-Butadiene, Styrene, Benzene, Toluene, Ethylbenzene, m, p-Xylene	1-hour average	0.1 ppb for all except Acrolein at 0.5 ppb

	UV-DOAS Multi-pollutant Analyzer, Fluxsense Inc.	Benzene, Xylenes, Toluene, Ethylbenzene, Styrene, SO2	30 seconds/5-minute and 1-hr rolling average	See Table 3
	FTIR Multi-pollutant Analyzer, Fluxsense Inc.	Acrolein*, Ammonia, Acetaldehyde, 1,3-Butadiene, Carbonyl Sulfide, Formaldehyde, Hydrogen Cyanide	1-minute/5-minute and 1-hr rolling average	See Table 5
	Cooper Xact 625i XRF Multi-Metals Analyzer	Nickel, Cadmium, Manganese	1-hr rolling average	
	TBD	PM2.5, PM10	1-minute / 5-minute and 1-hr rolling average	
Inner Port, Guenser Park, Elm St.	927S-H2S-HF Analyzer, Los Gatos Research (LGR)	Hydrogen Fluoride	5-minute and 1-hr rolling average	0.3ppb

* Note: the MDL of commercially available FTIR optical multi-pollutant analyzers are above the OEHHA Acute REL of 1.1 ppb (OEHHA, 1999).

Table 29: List of Community Air Monitoring Meteorological Sites and Sensors

Meteorological Sensors	Parameter	Site
R.M. Young T/RH Model 41382VF	Temperature and Relative Humidity	All Sites
R.M. Young Anemometer Model 05305V	Wind Speed and Wind Direction	All, except St. Anthony

Met One Barometric Pressure Model 092	Barometric Pressure	All Sites
Indoor Temperature Model 41382VF	Shelter Temperature	All Sites

3.2.1 UV-DOAS Multi-Pollutant Analyzer

Ultraviolet Differential optical absorption spectroscopy (UV-DOAS) is used to measure ground level concentrations of BTEX compounds, Styrene, and SO_2. Ambient air is continuously drawn through a 25-liter closed cell at ~60-80 lpm. UV light is generated by a Xenon arc lamp and directed to the sample cell via external mirrors. The light beam is passed through the sample ~10 times via a curved mirror system resulting in a path length of ~100 meters. The light exits the cell and is brought to a grating spectrometer via a fiber optic cable. The spectrometer uses a grating surface (3,600 lines/mm) and a charge-coupled device (CCD) (1024x1024 pixel array) camera to disperse and detect light. The spectral analysis is conducted in real time in the 255-285 nm region, based on the DOAS technique (Platt and Stutz, 2008). Table 30 lists the compounds included in the spectral evaluation and spectral references.

Table 30: Gases Used in the Fitting Algorithm for the Spectral Analysis of the UV-DOAS Analyzer

Pollutant	Spectral Reference
Benzene	Etzkorn et al. 1999
Toluene	Fally et al. 2009
Ethylbenzene	Etzkorn et al. 1999
Xylenes (m, p)	Etzkorn et al. 1999
Styrene	Etzkorn et al. 1999
Sulfur Dioxide	Bogumil et al. 2003
Ozone	Burrows et al. 1999
Oxygen	Bogumil et al. 2003
Phenol	Etzkorn et al. 1999
1,3,5-trimethylbenzene	Etzkorn et al. 1999
1,2,4-trimethylbenzene	Etzkorn et al. 1999
Naphthalene	Grosch et al. 2015

3.2.2 FTIR Multi-Pollutant Analyzer

The Extractive FTIR system measures the concentrations of alkanes via infrared absorbance. Ambient air is drawn through a 25-liter closed cell at ~60-80 lpm while infrared light is passed through the sample volume 10 times via curved mirrors resulting in a total path length of ~100 m. The light beam is then directed into an FTIR spectrometer where light is detected with an Indium-Antimonide (InSb) and Mercury-Cadmium-Telluride (MCT) detector. Light is detected in the 2.5-5.5 µm region via the InSb detector and the 8.3-13.3 µm region via the MCT detector. The spectral analysis uses the HITRAN and PNNL database to fit various gases (Table 31) in a least-squares type fashion and the spectral analysis is conducted in real time (~1 Hz) (e.g., Griffith and Jamie, 2006)

Table 31: Gases Used in the Fitting Algorithm for the Spectral Analysis of the FTIR Multi-Pollutant Analyzer

Pollutant	Spectroscopic References
Total Alkanes	Rothman et al. 2003; Sharpe et al. 2004
Formaldehyde	Rothman et al. 2003; Sharpe et al. 2004
Acetaldehyde	Rothman et al. 2003; Sharpe et al. 2004
Acrolein	Rothman et al. 2003; Sharpe et al. 2004
1,3-Butadiene	Rothman et al. 2003; Sharpe et al. 2004
Carbonyl Sulfide	Rothman et al. 2003; Sharpe et al. 2004
Ammonia	Rothman et al. 2003; Sharpe et al. 2004
Hydrogen Cyanide	Rothman et al. 2003; Sharpe et al. 2004
Hydrogen Fluoride	Rothman et al. 2003; Sharpe et al. 2004
Nitrogen Dioxide	Rothman et al. 2003; Sharpe et al. 2004
Methane	Rothman et al. 2003; Sharpe et al. 2004
Carbon Monoxide	Rothman et al. 2003; Sharpe et al. 2004
Water Vapor	Rothman et al. 2003; Sharpe et al. 2004
Nitric Oxide	Rothman et al. 2003; Sharpe et al. 2004
Carbon Dioxide	Rothman et al. 2003; Sharpe et al. 2004

3.2.3 Field Auto-GC

The Field Auto-GC is a stand-alone system with a compact footprint, capable of fully automatic, unattended, continuous monitoring of speciated VOCs. The GC system consists of a pre-concentrator, micro-GC, Photo Ionization Detector (PID), and a control unit with display panel. The pre-concentrator draws in ambient air with an internal flow regulated pump to receive a preset air volume. The VOCs are concentrated in the pre-concentrator module for sub-ppbv level detection. The analytes are thermally injected into the micro-GC module for separation. The micro-GC separates the various analytes before entering the detector. The detector is optimized for target compounds at sub-ppbv level detection.

3.2.4 Hydrogen Sulfide Analyzer

The T101 UV Fluorescence H_2S Analyzer is a microprocessor-controlled analyzer that determines the concentration of Hydrogen Sulfide (H_2S) in sample gas drawn through the instrument (Teledyne, 2023). The H_2S in the sample gas is converted into SO_2, which is then irradiated with ultraviolet light, causing the SO_2 to become excited to SO_2*. As these SO_2* molecules decay back into SO_2, they fluoresce. The instrument measures the fluorescence to determine the amount of SO_2 present in the sample chamber and therefore H_2S present in the sample gas.

3.2.5 Aethalometer

The Aethalometer collects and analyzes aerosol particles continuously. The aerosol-laden air stream is drawn at a known flow rate through the instrument to form a spot-on filter tape. Simultaneously, a section of the filter tape not exposed to sample air is illuminated by a near infrared to a near UV light source which enables an optical detector to measure the intensity of the light transmitted through an un-exposed portion of the tape. This provides a reference for comparison to the collecting spot; hence, correcting for filter tape background. As optically absorbing material accumulates on the spot, the intensity of light transmitted through the filter tape gradually decreases. The decrease in light intensity from one measurement to the next is interpreted as an increase in the amount of collected material. The increase in amount is divided by the known air-flow volume to calculate the concentration in nanograms per cubic meter (ng/m^3). A detailed description of Aethalometer operation principle can be found in Sedlacek, 2016.

3.2.6 HF Analyzer

The HF analyzer provides sensitive measurements of hydrogen fluoride and water vapor in ambient air with high precision and sensitivity. The HF analyzer uses Off-Axis Integrated Cavity Output Spectroscopy (OA-ICOS) (ABB, 2023 and references therein). The instrument pumps the sample gas into an optical cavity composed of two highly reflective mirrors. A laser tuned to a specific wavelength generates photons that enter the optical cavity and make thousands of passes before exiting. This results in an optical path length on the order of several thousand meters, enhancing absorption by the target gases. This instrument measures the optical loss through the cavity to determine the concentration in the sample gas.

3.2.7 Particulate Matter Monitor

At the time of this writing, PM monitors are being procured through a request for quotations, and this section will be updated during the next revision of this QAPP. The PM monitors selected for this program will provide continuous measurements of PM10 and PM2.5, and will be held to QA criteria outlined in Tables 23 and 24.

3.2.8 X-Ray Fluorescence (XRF) Multi-Metals Monitor

The XRF Multi-Metals monitor is based on reel-to-reel filter tape sampling followed by nondestructive, energy dispersive (ED) X-ray fluorescence (XRF) analysis of metals in the collected PM deposit. The instrument can simultaneously measure up to 67 elements with an atomic number between that of aluminum (Al) and that of uranium (U). Sampling and analysis are performed continuously and simultaneously, except for the time required to advance the tape (~20 seconds per sample collected) and the time required for once daily automated quality assurance (QA) checks (30 minutes).

Following the programmed sampling period, the tape advances, placing the collected sample spot in the X-ray excitation and analysis section of the monitor and initiating particulate sampling onto a previously unexposed spot on the tape. Metals are characterized and quantitated based upon the wavelengths and magnitudes of X-ray fluorescence compared to the spectral library and calibration curves stored in the instrument's computer memory. The monitor incorporates sensors for temperature and atmospheric pressure and uses those data to maintain a constant volumetric sample, thus, minimizing the impact of temperature and pressure changes on metals determination.

3.3 Rule 1180 Instrument Standard Operating Procedures

The instruments listed in Table 24, 25, and 26 are operated in accordance with the manufacturer's recommendations and other tested and verified procedures to produce data that meets the monitoring objectives and the measurement data quality objectives for the Rule 1180 program. These procedures are detailed in Standard Operating Procedures (SOPs). The SOPs covered by this QAPP are presented in Table 32.

Table 32: List of Community Air Monitoring Instrument and SOP Information

Instrument Description	Pollutant(s) or Other Parameter(s)	SOP #	Title	Rev. #	Approval Date
Multi-Pollutant UV-DOAS Analyzer	BTEX, Styrene, SO2	SOP00211	Standard Operating Procedure for UV-DOAS and FTIR Multi-Pollutant Analyzers	1.0	Pending
Multi-Pollutant FTIR Analyzer	Acrolein, Ammonia, Acetaldehyde,	SOP00210	Standard Operating Procedure for UV-DOAS and FTIR Multi-Pollutant Analyzers	1.0	Pending

	1,3 Butadiene Carbonyl Sulfide, Formaldehyde, Hydrogen Cyanide				
Auto GC	VOCs	SOP00215	Standard Operating Procedure for Automated Field Gas Chromatography Analyzer	1.0	Pending
Teledyne T101	H2S	SOP00208	Standard Operating Procedure for API/Teledyne T-101 Hydrogen Sulfide Analyzer	1.0	Pending
Aethalometer AE33-7	Black Carbon	SOP00142	Operation, Maintenance, and Calibration of the Aethalometer	2.0	5-26-2020
LGR-ICOS™ Analyzer	HF	SOP00209	Recommended operating practices	1.0	Pending
Xact 625i Ambient Metals Monitoring System	Metals	SOP00177	Standard Operating Procedure for Operation, Maintenance, and Calibration of the Sailbri Cooper Xact 625i X-ray Fluorescence (XRF) Multi-metals Monitor	1.1	Pending
TBD	PM10/PM2.5	TBD	TBD	TBD	TBD
Dilution System	Mass Flow Controller (MFC) Flows	SOP00122	Teledyne T700/T700U Dynamic Dilution Calibrator Setup and Calibration	1.1	5/8/2020
Zero Air Generator	Zero Air	SOP00185	Gas Calibrations System Station Operations	1.2	5/8/2020

			(Teledyne API Mode 701H and T700)		
Data Logger	N/A	SOP00118	Data Collection System Station Operations	1.2	5/8/2020
Agilaire Digital Site Platform (DAS)	N/A	SOP00159	Agilaire Digital Site Platform Setup & Installation (Series 8872)	1.3	8/1/2023
Meteorological Sensors	WS/WD, T/RH	SOP00070	SOP00070 Operation of Meteorological Systems	2.2	5-19-2020
Data Review and Validation	N/A	SOP00212	Data Review and Validation	1.0	Pending
Annual Performance Evaluation	Rule 1180 pollutants	SOP00213	Standard Operating Procedure For Rule 1180 Annual Performance Evaluation Audit	1.0	Pending

All sampling probes in the community air monitoring network are sited in accordance with EPA Siting Criteria 40 CFR Part 58, Appendix E and/or manufacturer-recommended criteria, as appropriate. All sample train materials (e.g., lines, filters, fittings, manifolds) are of a material that is compatible with the intended analytes.

3.4 Quality Control

Specific Quality Control (QC) checks are implemented at established frequencies to verify data quality objectives are being met, assess measurement errors, and ensure that instruments are in good working order. The measurement quality objectives (MQOs) confirm that the total measurement uncertainty is within the range prescribed by the DQOs. QC procedures for each instrument are discussed in more detail in the relevant instrument-specific SOP.

The QC procedures performed by the AMT Rule 1180 Community Air Monitoring Network staff are summarized below**.**

3.4.1 Operating Range

The operating range is to be stated when determining calibration concentrations and the calibration points must not exceed the selected operating range. It is necessary for the range to be appropriate for the measurement levels.

3.4.2 Calibration

Calibration is a multi-phase process that begins with either certifying a calibration standard against NIST-traceable standards or purchasing a NIST traceable standard within certification. Then, sample measurements are compared to a calibration curve prepared from that calibration standard. A continuing calibration test or other test of continuing curve acceptability is made at an established reoccurrence frequency. If a deviation outside the specified criteria for the calibration is found, adjustments including recalibration of the instrument is performed.

Generally, the analyzer is calibrated:

- During initial field installation and at a specified interval thereafter
- Following physical relocation
- Following any major maintenance or repairs
- Whenever an instrument drifts outside of QC limits

Calibration curve generation consists of analyzing at a minimum five evenly spaced concentrations of the standard along the operating range or a user-defined calibration scale that reflects expected ambient levels of analyte.

Calibration acceptance criteria include limits on calibration curve slope and intercept as well as percent difference for each analyte concentration when response is input into the calibration formula.

As-Is verification involves challenging the analyzer with multi-point concentrations across the calibrated range and assessing the recoveries for acceptability. Data collected between as-is verifications requires flagging or invalidation when an as-is exceeds criteria. Investigation and corrective action including recalibration is necessary when the % deviation exceeds the calibration-acceptance criteria.

3.4.3 Zero, Span, and Precision (Routine) Checks of Gaseous Rule 1180 Instrumentation

Routine checks for air monitoring equipment installed at Rule 1180 Community Air Monitoring Stations are performed on a scheduled basis.

Routine QC checks for the gaseous analyzers are conducted by challenging the analyzer with a gas of known concentration in addition to a zero check at the alert level for the pollutant the analyzer measures as well as at near typical daily concentrations observed. For each concentration check, a % difference is calculated and the results are compared to the acceptance criteria specified for the analyte and associated instrument.

Scheduled QC checks for UV-DOAS and FTIR Multi-Pollutant Analyzers deployed at Rule 1180 sites are outlined in section 2.5.5.1 and 2.5.5.2, Table 5 and 7. Field Auto-GC checks are defined in section 2.5.5.3 in Table 9. Scheduled checks for the Hydrogen Sulfide Analyzer are contained in Tables 13 and 14. For

pollutants that are measured by two technologies (e.g., multi-pollutant analyzers and Auto-GCs), intercomparison between measured concentrations is also included as a part of routine checks.

3.4.4 Flow Rate Verification for the Aethalometer Black Carbon Analyzer

Flow rate verification is performed on a defined schedule and at least annually using a certified flow standard that is NIST-traceable and within certification. A % deviation is calculated to assess if the monitor is operating within specification. The flow verification specification for the Aethalometer Black Carbon analyzer is shown in Table 17.

3.5 Quality Assurance

3.5.1 Performance Evaluation (PE)

PEs are performed on a defined schedule and at least annually using certified standards, samples, or using equipment independent of that normally used in the collection of samples or sensor data. PE audits are performed by an independent party, such as someone not involved in normal operational activities of the instrument or equipment under evaluation. Typically, PEs are conducted by South Coast AQMD QA staff or a qualified approved contractor.

3.5.2 Technical Systems Audits (TSAs)

The South Coast AQMD QA Branch or approved contractor performs systems audits of the Rule 1180 program. A portion of these audits are routinely conducted annually as an ongoing process during the field performance evaluation audits which include all Rule 1180 sites. This includes assessments of documentation and recordkeeping, maintenance, calibrations, repairs, and siting criteria. This assessment also includes inspection to verify that safety procedures as specified in the South Coast AQMD Administrative Policies and Procedures #28: Safety and Health Guidelines Policy, South Coast AQMD IIPP, South Coast AQMD Chemical Hygiene Plan, South Coast AQMD Monitoring Station Safety Manual, and in SOPs and OAGs, as appropriate as followed. The QA Branch also routinely reviews work orders and timely completion of repairs, training logs, data validation concerns, collocation requirements, and data quality indicator metrics. The internal audits, or a portion thereof, may be conducted under contract with an independent consulting firm working under the oversight of the QA Branch, as needed and subject to South Coast AQMD Procurement Policy and Procedures.

3.5.3 Corrective Action

PE, TSA, and other assessments as well as a report from staff to the QA Branch, can result in issuance of a Corrective Action Report (CAR) when an issue(s) is(are) found with the sampling and measurement

systems. The assessor documents the findings, conducts root-cause analysis, proposes a deadline to resolve the issue, and provides recommendations on how to prevent or minimize future occurrences. Corrective Action Requests (CARs) are issued by the QA Branch for findings or issues that could impact data quality or safety, often in response to QAAs, to:

- Inform impacted personnel.
- Open discussion for determining a resolution and a reasonable deadline.
- Track progress in resolving the finding to achieve deadline.
- Document the problem, its resolution, and steps to keep the issue from recurring.

Appendix D contains the template form typically used within South Coast AQMD. Further details on the corrective action process are provided in the South Coast AQMD's OAG QA0001.

Any staff performing activity as per this QAPP can report on a measurement or data quality concern which may require corrective action. Quality Assurance Alerts (QAAs) are used by staff to inform the QA Branch of potential issues or changes that could impact the data or safety, as documented in OAG QA0002. Appendix V (Quality Assurance Alert Process) contains the QAA template form.

The QA Branch coordinates the response to assessment findings with the impacted staff and management and may issue corrective action requests (CARs) when warranted. Written reports from performance evaluations, performance audits, technical systems audits, or other evaluations are distributed to impacted staff including the supervisor(s) and/or manager(s), as appropriate.

3.5.4 Equipment and Gas Certification

Gaseous pollutant standards (cylinders of compressed gas) must be certified as traceable, to either a National Institute of Standards and Technology (NIST) Standard Reference Material (SRM) or a NIST-certified Gas Manufacturer's Internal Standard (GMIS). Flow rate measurements must be made by a flow-measuring instrument that is NIST-traceable to an authoritative volume or other applicable standard and within certification. South Coast AQMD flow rate transfer standards are NIST-traceable and are maintained within certification. All Meteorological Standards are certified as traceable to NIST standards within certification.

3.6 Equipment Testing, Inspection, and Maintenance

This section describes the testing, inspection and maintenance of equipment used in the Rule 1180 Community Air Monitoring Program.

Acceptance criteria for instruments, supplies, and consumables vary with the operation being conducted and are generally described in the relevant SOPs.

South Coast AQMD has an established Procurement Policy and Procedure in which the procedures for the purchasing of services, materials, equipment, software, supplies, and fixed assets are documented. This includes the procedures and requirements for preparation of requests for bids through a request for quotations (RFQ) or a request for proposals (RFP), and for the evaluation and award of the bids. Specifications for equipment, evaluation criteria for rating each quotation, acceptance criteria, schedules for delivery, and actions that may be taken when acceptance criteria are not met, are contained in each RFQ. Equipment specifications are prepared by staff, and approved by supervisors, management, and, when of significant fiscal impact, by the Governing Board. Final purchases are also approved similarly.

Under the Rule 1180 program, acceptance testing of new or upgraded instrumentation and sampling systems is primarily conducted by Rule 1180 staff. New instrumentation is initially inspected and evaluated to determine whether all components have been received. Then the instrument is subjected to acceptance testing to determine if it performs according to the specifications as put forth in the RFQ and/or manufacturer provided specifications. Acceptance testing includes set up, calibration, and operation of the instrument in a controlled or laboratory setting to determine instrument performance, response, and stability. Acceptance testing is documented in the instrument logbooks.

Any inconsistencies related to the quality of manufacturing or system performance are resolved with the manufacturer before equipment is deployed. All equipment, instrumentation, and supplies must pass inspection, and acceptance testing before deployment and usage. An inventory of all procured capital equipment, with a cost of $5,000 or greater, is maintained electronically by the South Coast AQMD Finance Division in the South Coast AQMD Capital Outlay and Controlled Item Inventory Database. This equipment is visually verified by Finance and MAD staff at least every two years. Additional Rule 1180 site inventory is also maintained by the Rule 1180 Sr AQIS staff for the purposes of the program-specific tracking.

Equipment specifications are prepared by staff and approved by supervisors, management, and, when of significant fiscal impact, by the Governing Board. Final purchases are similarly approved. The Rule 1180 Branch purchases new instruments, typically with a one- or two-year warranty**.** The Rule 1180 Branch repairs instruments and equipment in-house or returns them to the manufacturer or other qualified vendors for service, as deemed appropriate. Purchase orders, service contracts or maintenance agreements are used for outside services, as deemed appropriate.

Preventative Maintenance is the maintenance of equipment and instrumentation to prevent downtime, costly repairs, and data loss as well as to ensure continued safe operation. Preventive maintenance is an ongoing element of quality control and is both routine and performed on an as needed basis. In addition to routine maintenance, other scheduled activities are performed monthly, quarterly, semi-annually, and annually, as described in Tables 29 and 30. The specific instrument and method SOPs and manufacturer's operation manuals list preventative maintenance activities including their frequency for each instrument and supporting equipment. Preventive maintenance is the responsibility of the Rule 1180 staff. Senior

staff reviews the preventive maintenance work, checks maintenance is performed according to the schedule, and verifies that maintenance is being accomplished in a timely manner.

Preventive maintenance is not a static process. Procedures may require revision for reasons including but not limited to new models or types of instruments and new or updated sampling and test methods. The preventive maintenance schedule is adjusted whenever a maintenance activity is performed at an alternate time.

Station maintenance activities occur on established schedules or on an as-needed basis. Maintenance is documented in the station logbook, instrument logbooks, and online messaging platforms. If relevant, information is posted on the messaging platform (e.g., MS TEAMS) to inform the Rule 1180 group staff at large of issues and activities that could impact data quality and site operability.

Examples of station maintenance activities include but are not limited to shelter inspection and repair, security inspection (e.g., fencing, locks, lighting), visual inspection of probes and meteorological sensors, air conditioner (AC) maintenance and repair, inlet and manifold inspection, testing and cleaning of equipment, manifold exhaust blower tube, and safety inspection including ladder and guard rails if applicable. Some of these activities, such as AC service and repair, are typically arranged with vendors through purchase orders; however, staff perform basic AC maintenance such as radiator washdowns. Routine operation checks occur at specified frequencies. These duties are performed and documented to operate the monitoring network at optimal levels. Some examples of routine operation maintenance checks and assignments are listed below, and in Tables 29 and 30:

- Observe unusual conditions/events (All Visiting Staff);
- Check Exhaust/Blower/Pump Operation (Assigned Staff);
- Check Station Exterior (All Visiting Staff);
- Manifold Flow (Assigned Staff);
- Clean inlet funnel (Assigned Staff);
- Inspect tubing and clean or replace as needed (Assigned Staff);
- Inspect and clean manifold and sampling probe (Assigned Staff);
- Check HVAC systems (Assigned Staff);
- Field site supply inventory (Senior AQIS or Assigned Staff).

The Rule 1180 Principal Air Quality Instrument Specialist (PrAQIS) or Air Quality Specialist (AQS) with expertise on given instrument will provide oversight over the Rule 1180 Air Quality Instrument Specialists (AQIS) and Senior AQIS (SrAQIS) as they install, repair, and/or calibrate air monitoring equipment; tests and evaluate instrument components according to Rule 1180 specifications; installs, services, and operates instrumentation used for special meteorological and contaminant monitoring projects; and does other work as required. Tables 33 through 36 describe selected AQS, PrAQIS, SrAQIS, and AQIS II responsibilities relevant to instrument testing, operation, and maintenance as outlined in instrument-specific SOPs listed in Table 28.

Table 33: Air Quality Specialist Responsibilities per Instrument

Instrument	Weekly	Monthly	Quarterly	Annually	Ongoing
All Analyzers	Conduct data review and data analysis. Coordinate operational activities for advanced air monitoring equipment.	Verify and ensure that calibration and repair assignments to AQIS staff are complete.	Confirm and maintain data back-up.	Coordinate and review annual performance evaluations. Provide recommendations based on annual PE findings.	Provide guidance to AQIS staff on operation and maintenance of advanced air monitoring equipment. Conduct data review, analysis, and interpretation. Conduct field network assessment every five years.
H2S Analyzer	Review data and provide recommendations for AQIS team as needed.			Review and finalize annual dataset.	Review public air quality notifications and direct AQIS staff to conduct verification activities, if needed.
Black Carbon Analyzer	Review data and provide recommendations for AQIS team, as needed.			Review and finalize the annual dataset.	
Auto GC	Lead weekly meetings with AQIS staff.	Lead monthly data QC meetings, recommend actions as needed.		Review and finalize the annual dataset. Conduct annual PE; communicate the results to the team; and provide guidance to AQIS staff based on the results of the PE.	Advise on field activities and repairs. Monitor instrument performance and status of Sensor Modules. Recommend proactive repairs and consumables replacements. Work with the manufacturer on operational

					activities, as needed. Review chromatographs.
FTIR and UV-DOAS Multi-pollutant analyzers	Guide field activities of AQIS staff.	Ensure that data backup tasks are complete.	Confirm and maintain data back-up. Oversee quarterly light source replacements and other maintenance activities performed by the manufacturer.	Review and finalize the annual dataset. Conduct annual PE; communicate the results to the team; and provide guidance to AQIS staff based on the results of the PE.	Advise on field activities and repairs. Work with the manufacturer on operational activities, as needed. Review public air quality notifications and conduct spectral verification.
HF Analyzer				Review and finalize the annual dataset.	Advise on field activities and repairs. Work with the manufacturer on operational activities, as needed. Perform optical cell alignments, as needed.
Multi-Metal Analyzer	Conduct data review and analysis.			Oversee annual XRF source replacements by the manufacturer.	Advise on field activities and repairs. Work with the manufacturer on operational activities, as needed. Review public air quality notifications and conduct spectral verification.
Meteorological System	Utilize meteorological information in data analysis, as needed.			Coordinate annual audit of the met system and review its performance. Perform corrective action as necessary.	Advise on field activities and repairs. Work with the manufacturer on operational activities, as needed.

					Perform optical cell alignments, as needed.

Table 34: Responsibilities of Principal Air Quality Instrument Specialist

Instrument	Weekly	Monthly	Quarterly	Annually	Ongoing
All Analyzers	Conduct data review and a low-level data analysis.	Visit and observe the condition of each site at least once a month. Review maintenance sheets and initiate appropriate actions, as needed. Verify and ensure that calibration and repair, and other monthly tasks assigned to AQIS staff are completed and satisfactory.	Confirm and maintain data back-up, assign AQIS staff, as needed. Confirm all data is present and submitted to DMS. Assure that the instrument maintenance sheets are complete and archived. Review QC and data trends to ensure data quality. Verify that data flags are assigned appropriately. Identify any other issues that warrant further investigation.	Coordinate and review annual performance evaluations. Implement recommended annual PE findings. Review staff training forms and ensure that field staff is up-to-date on all training, including safety.	Maintain consumables and supplies including spare parts, specialty gases, and PPE. Assure specialty gases are within certification. Maintain detailed inventory of air monitoring equipment at each site and of back-up equipment. Assure that Return Merchandise Authorizations (RMA) are issued and completed in a timely manner. Assist AQIS staff with diagnostics and repairs, as needed. Assure fire, electrical, and earthquake safety at all sites. Track staff training, identify training and refresher training needs, and organize and/or conduct training

					for staff, as needed. Assess if site conditions have changed and whether site still meets siting criteria at minimum every five (5) years.
H2S Analyzer	Review automated QC reports and assign additional QC activities, as needed.				
Black Carbon Analyzer	Review Black Carbon time-series for instrument related noise.				
Auto GC	Participate in weekly instrument status meetings. Monitor data completeness and other QC parameters, conduct low-level data analysis, inform relevant Rule 1180 staff on any operational issues.	Contribute to monthly data QC meetings, and coordinate the resulting field activities, as directed by AQS or the manufacturer.			Coordinate field activities and repairs with the instrument manufacturer. Monitor status of Sensor Modules and proactively assign replacements sensor modules.
FTIR and UV-DOAS Multi-pollutant analyzers	Schedule and coordinate liquid nitrogen station deliveries for FTIR detector cooling. Inform AQS and/or instrument manufacturer of field conditions affecting data quality.	Ensure that data backup tasks assigned to AQIS staff are complete.	Confirm and maintain data back-up.		Coordinate field activities with instrument manufacturer, as needed.
HF Analyzer				Review and finalize the annual dataset.	Advise on field activities and repairs. Work with

					the manufacturer on operational activities, as needed. Perform optical cell alignments, as needed.
Multi-Metal Analyzer	Coordinate operational activities conducted by AQIS and AQS staff.			Coordinate annual XRF source replacement with the manufacturer.	Coordinate operational activities with AQS and the manufacturer, as needed.
Meteorological System	Conduct visual inspection of meteorological instruments.			Coordinate annual audit of the met system and review its performance. Perform corrective action as necessary.	Ensure Meteorological staff have the necessary training, parts, and equipment.

Table 35: Responsibilities of Senior Air Quality Instrument Specialist per Instrument

Instrument	Weekly	Monthly	Quarterly	Annually	Ongoing
All Analyzers	Conduct data review and a low-level data analysis, if needed or directed by PrAQIS. Assist and coordinate as needed deliveries of liquid nitrogen and other gasses.	Review maintenance sheets and initiate appropriate actions, as needed. Verify and ensure that calibration and repair assignments to AQIS staff are complete.	Collect and review instrument maintenance sheets and other station records.	Assist with coordination for annual performance evaluations, and with implementation recommended annual PE findings.	Assist AQIS staff with diagnostics and repairs, as needed. Maintain appropriate power back-up at all sites.
H2S Analyzer	Review automated QC reports and assign additional QC tests, as needed.				
Black Carbon Analyzer	Review Black Carbon time-series				

	for instrument related noise.				
Auto GC	Participate in weekly Auto-GC meetings. Assist AQS and PrAQIS in monitoring data completeness and other QC parameters, as needed.	Participate and contribute to monthly data QC meetings, and take actions, as appropriate.			Assist with coordination of field activities and repairs with instrument manufacturer.
FTIR and UV-DOAS Multi-pollutant analyzers	Ensure adequate liquid nitrogen supply for FTIR detector cooling. Communicate with Rule 1180 staff about data outages or field conditions affecting data quality.	Ensure that data backup tasks are complete.	Confirm and maintain data back-up.		Assist with coordination of field activities with instrument manufacturer, as needed.
HF Analyzer	Assist with operational activities as assigned by AQS or PrAQIS.				
Multi-Metal Analyzer	Assist with operational activities as assigned by AQS or PrAQIS.				
Meteorological System	Conduct visual inspection of meteorological instruments.			Participate in coordination of annual audit of the met system. Perform corrective actions, and/or assign to AQIS staff, as needed.	

Table 36: Responsibilities of Air Quality Instrument Specialist per Instrument

Instrument	Weekly	Monthly	Quarterly	Annually	As Directed or As Needed

All Analyzers	Verify data is uploading from the instrument. Review operating parameters and record them onto maintenance sheets. Note if any parameters are out of specification and require adjustments or repair. Conduct necessary repair of notify other staff as appropriate.	Collect site paperwork for review by the Sr AQIS. Perform data download for backfill and backup on DMS. Verify last calibration dates.	Verify and perform data backup and DMS backfill.	Perform annual calibration or verification.	Perform preventative and additional maintenance as needed. Perform DMS backfill, as needed. Inform other staff members about any anomalies that could impact data. Review automated texts for data outages and use this information to prioritize operations.
H2S Analyzer	Replace the sample filter.			Perform annual calibration or verification.	
AE-33 Black Carbon Analyzer		Conduct flow check. Inspect and clean cyclone. Download raw data for archiving and back-up.		Perform annual flow calibration and optical calibration. Replace “Zero” filter.	Proactively replace tape when it is near exhaustion, or as directed.
Auto-GC	Verify Auto-GC performance.	Change inlet filter. Participate in monthly data QC meetings with instrument manufacturer. Download data for archiving and back-up.		Replace sensor module (Note: sensor module status is continuously monitored by Sr AQIS, more frequent sensor module replacement may be required) and conduct 2-point verification to verify instrument performance. Replace reactants,	Replace N2 carrier gas cylinder when approaching 200 psi. Replace ACS tank when at or falls below 200 psi.

				colling fluids, and other consumables.	
FTIR/DOAS Multi-Pollutant Analyzers	Monitor liquid nitrogen levels and refill dewars as needed. Report and address, as appropriate, station temperature fluctuation or any other anomalies that may affect instrument performance.	Download raw data for archiving and back-up. Inspect and clean cyclone.	Assist with replacement of internal particulate filter, if needed.	Inspect and maintain sample lines.	
HF Analyzer	Review operational parameters.				
Multi-Metal Analyzer	Assist with operational activities as assigned by senior staff.			Verify that annual calibration is recorded.	Proactively replace tape when it is near exhaustion, or as directed.
Meteorological System	Review operating parameter values and record this information on Maintenance sheets.	Complete and review maintenance sheets.		Verify that annual calibration is recorded.	

Table 37: Multi-Pollutant DOAS and FTIR Analyzers Maintenance Schedule

Instrument	Weekly	Quarterly	Semi-annually	As needed
UV-DOAS and FTIR Multi-Pollutant Analyzers	Perform light intensity check. Check system performance indicators.	Clean/replace internal particulate filters.	UV light source replacement (normally performed quarterly, or as needed).	Confirm optical alignment and verify no or insignificant physical movement (Note: alignment is also continuously

				automatically monitored). Optimize light. Clean optics, as needed (e.g., as indicated by light intensity).

3.7 Inspection of Supplies and Consumables

Specialized supplies and consumables for each analyzer are procured directly from the instrument manufacturer. Parts lists, including replacement schedules, are provided in most manufacturers' operation manuals and are described in SOPs developed by South Coast AQMD staff.

One example of a consumable that is critical under the Rule 1180 program is the suppling of cylinders containing certified gas. These gases are supplied and certified by the gas vendor in accordance with documents such as Procedure G1 of the EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (U.S. EPA, 2012a) or other approved certifications performed using National Institute of Standards and Technology (NIST), Standard Reference Materials (SRMs), vendor Traceable Reference Material (TRM), or a NIST-certified Gas Manufacturer's Internal Standard (GMIS) as primary standards. Gas cylinder information including the bottle identifier, gas composition and concentration, and expiration date are tracked and documented in a spreadsheet on SharePoint that's available to all Rule 1180 staff.

When special materials are required (e.g., Teflon, or stainless steel for inlet lines), the specifications for these materials are confirmed on receipt, and verified, if possible. This ensures that supplies and consumables are adequate for their intended purpose. If any issues are identified, this information is presented to the vendor for correction; if necessary, the supplies or consumables are returned for replacement or refund. The list of critical supplies maintained for the Rule 1180 community air monitoring network is presented in Table 38.

Each community air monitoring site is also equipped with a set of Uninterrupted Power Supply (UPS) units designed to fully protect all equipment from fluctuations or drop-outs in the electric power grid (brownouts), and to maintain data collection and transmission for extended power outages of up to 2 hours.

Table 38: Instrument Critical Spare Parts and Spare Instruments

Instrument	Critical Spare Parts (yearly)	Minimum Quantity Maintained
Multi-Pollutant UV-DOAS Analyzer	Spectrometer	1
	UV-Lamp	5
	Valves	5
	UV mirrors	1 full set
	Fiber	3
	Pump	2
	Electronics and motors	1 full set
	Vibration mounts	1 full set
	Tubing	1 full set
Multi-Pollutant FTIR Analyzer	Spectrometer	1
	IR Lamp	3
	Laser	1
	Valves	5
	IR mirrors	1 full set
	Pump	2
	Electronics and motors	1 full set
	Vibration mounts	1 full set
	Tubing	1 full set
Field Auto-GC	Auto-GC	2
	ACS and carrier gas cylinders	2 of each kind
	Annual PE and Verification cylinders	1 of each kind
	Sensor module	5
	Tubing (internal and external), Coolant tubing assembly/coolant liquid, scrubber assembly, sample drying assembly, Inlet filter	5 full sets
Black Carbon Analyzer	BC Analyzer	2
	Tape and zero filters	24 boxes (two at each station, and the remaining stored at the Long Beach Office)
H2S Analyzer	H2S Analyzer	3
	Pump diaphragm, UV-Lamp, Sintered filter, SO2 scrubber	5 of each part

	H2S QC and calibration gas: Station QC check gas cylinders and calibration gas cylinders	5 spares, and 2 dedicated cylinders for calibration only
HF Analyzer	HF Analyzer	1
Multi-metal Analyzer	XRF light source	As needed
	Tape and filters	12 boxes (one at each station, and the remaining stored at the Long Beach Office)
Zero Air Generator	Zero Air Generator	3
Dilution System	Dilution System	3
Data Loggers	Data Logger	3
Meteorological Sensors	T/RH, Wind, and Barometric Pressure, and indoor temperature sensors	1 spare sensor for each sensor; Sensors kept with Meteorological Group in AMT, marked for Rule 1180 purposes
Other	Pumps, Filters, Tubing, Coils, Swagelok fittings, and other miscellaneous items and tools	Adequate supply as determined by Rule 1180 staff

3.8 Ancillary Data

This section identifies the types of data that South Coast AQMD does not directly generate or collect, but which may be used to support the Rule 1180 community air monitoring program. Such data may support project implementation, trend evaluations, or decision making, and includes the following:

- **Meteorological Data from other information sources** – for analysis of weather conditions to augment meteorological data collected at South Coast AQMD Rule 1180 community air monitoring sites and the agencies supplemental meteorological stations. South Coast AQMD may utilize climate and observational data from the National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA), National Centers for Environmental Information (NCEI), or Western Regional Climate Center (WRCC) for such purposes as data validation checks, instrument siting, and supplemental meteorological information for data analysis.
- **Emissions Inventory Data** – for analysis of potential air pollution concerns and hot spots as well as to help assess the adequacy of or duplication of data relative to air monitoring network design. Applicable emissions inventories include the U.S. EPA National Emissions Inventory (NEI), CARB mobile source inventories, growth, and travel activity projections from the Southern California Association of Governments (SCAG), and input from other stakeholders. The gridded regional emissions inventory and growth projections developed for SIP regulatory modeling and

performance tracking purposes from the South Coast AQMD Emissions Reporting System is also acceptable.

- **Traffic and Other Activity Data** – for analysis of air pollution trends observed at the South Coast AQMD Rule 1180 community air monitoring stations. Examples of such data sources include Performance Measurement System (PEMs) operated by Caltrans (https://dot.ca.gov/programs/traffic-operations/mpr/pems-source), or Streetlight mobility data (https://learn.streetlightdata.com/traffic-data).

3.9 Data Management

Data management describes an interrelated set of standardized processes used for data acquisition, management, review, validation, data backup and archival, and data security. The South Coast AQMD Data Management System (DMS) is designed to maintain the integrity, validity, and security of data through its entire life cycle.

This section describes how the Rule 1180 community air monitoring network data is managed, tracking the path from data generated in the field to final data use and end storage. It includes standard record keeping, data handling procedures, and the equipment used to acquire, process, compile, store, retrieve, and screen the data. All Rule 1180 monitoring data is acquired digitally using computer workstations, data loggers, telemetry system, and data servers. Also described are procedures for detecting, flagging, and correcting errors and data loss during data processing, as well as procedures for assuring that applicable information resource management requirements are satisfied.

South Coast AQMD field and office desktop and laptop PCs, data loggers, servers, the data telemetry network, internet, and email systems are managed by MAD along with IM, who provides systems support for:

- Operating system and software updates and testing
- Redundancy to minimize downtime
- Site telemetry and wireless communication
- Secure cloud-based storage
- Daily incremental backups with weekly full backups
- Security, including email and software control, updated antivirus and spyware protection

3.9.1 Data Collection and Recording

All air monitoring instruments in the Rule 1180 community air monitoring network, except for Field Auto-GCs, are continuous monitors with sampling rates ranging from 30 seconds to 1 minute (see Table 35 for sampling frequency of instrumentation installed at Rule 1180 community air monitoring sites). Field Auto-

GCs produce 1-hour averaged data. All instruments are connected to either internal and/or external data loggers (e.g., data processor or Agilaire 8872 data logger) that record air monitoring instrument outputs.

The Agilaire 8872 data logger is the primary data acquisition recorder for air monitoring instruments and automated QC check data at Rule 1180 community air monitoring sites. These data loggers also provide a backup record of monitoring data with data display capabilities. The Agilaire data logger collects and computes minute and hourly data averages. The South Coast AQMD data acquisition system polls each air monitoring station data logger and transmits the data to the DMS every 5-10 minutes.

3.9.2 Data Transmittal

Data transmittal is accomplished using a Private Internet Protocol (PIP) data network. A router at each air monitoring station links the Agilaire data loggers to the AirVision server at South Coast AQMD headquarters. This server runs the Agilaire® AirVision software for polling the stations. The continuous 1-minute or hourly data, as appropriate to the monitor, are sent from the AirVision server at South Coast AQMD headquarters to a cloud-based server which hosts the DMS.

DMS is a Microsoft cloud-based Structured Query Language (SQL) server data management system. DMS allows a user to manage, summarize, document chain-of-custody, and disseminate air monitoring data. It also streamlines data processing, performs automated QC routines, and provides basic data analysis and visualization tools. For continuous analyzers, DMS ingests 1-minute data into its database and aggregates 5-minute, 1-hour, rolling 1-hour, and 24-hour hourly average values.

Data from internal instrument data loggers are used to backfill any data missing due to communication loss, as needed. Routine data review, verification, and validation processes occur primarily in DMS. Data invalidations and data flagging are performed on the DMS server, which maintains chain-of-custody records from the original field records, including identification of the user who made the change and when. Any edits or added data flags are logged and maintained in the system, which retains the original data history. As such, data cannot be modified without a record of the changes and data deletions are not permitted. Figure 2 outlines the flow for processing the South Coast AQMD continuous Rule 1180 community air monitoring data.

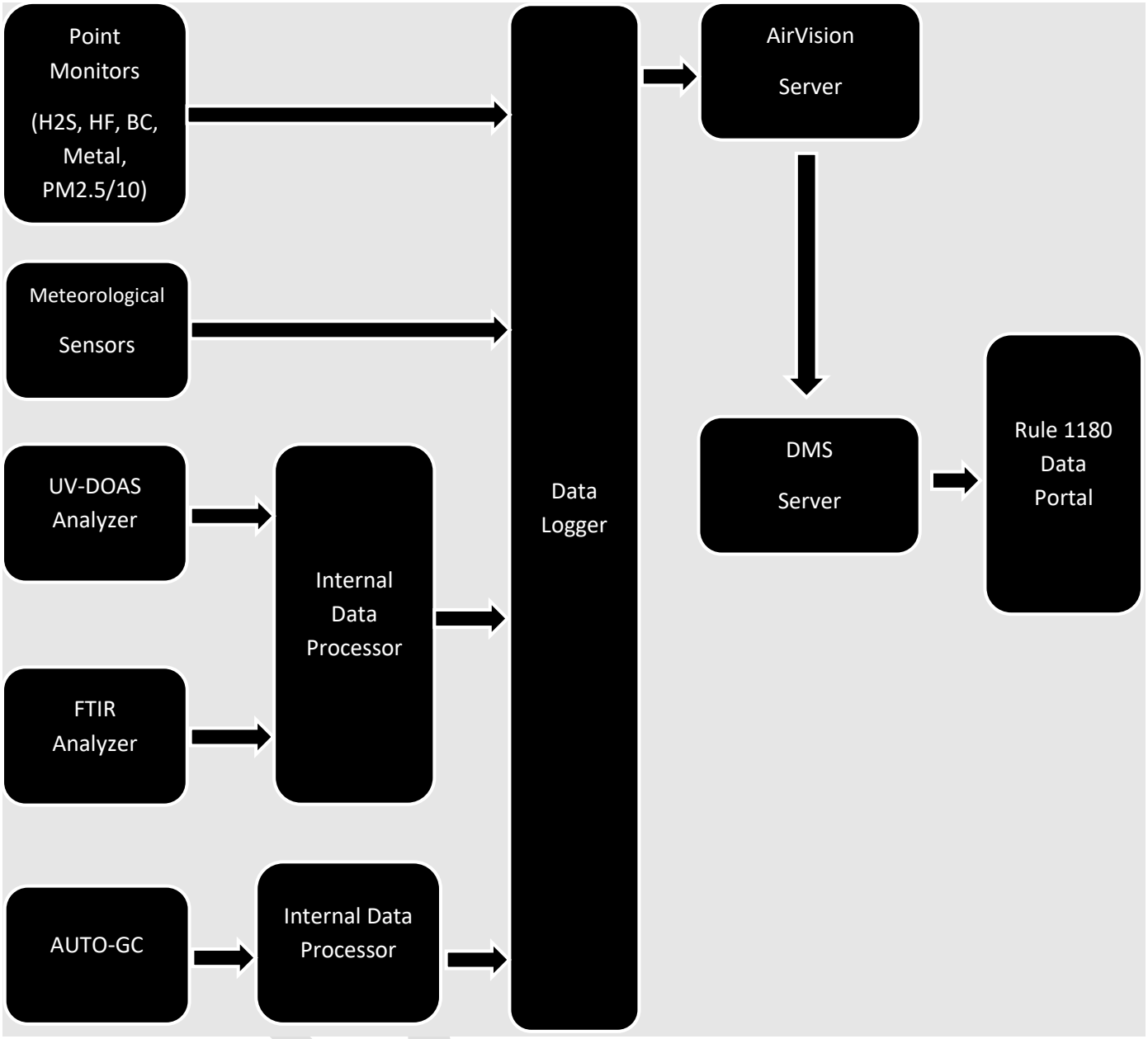

Figure 2: Diagram of Rule 1180 Community Air Monitoring Network Data Flow

3.9.2.1 Data Security and Chain of Custody

The primary data systems utilized for the Rule 1180 air monitoring network are the AirVision data acquisition system and the DMS. These systems maintain data security and chain of custody.

3.9.2.2 Data Security

Data system users are provided with a login ID and password with a level of access appropriate to their role and responsibilities. This is done to prevent unauthorized use or editing. Data entries in DMS cannot be modified or deleted without appropriate documentation. Chain of custody (COC) records are stored and maintained within the DMS.

3.9.2.3 Chain of Custody

All data changes are tracked by the DMS chain of custody (COC) feature. Modifications made to data by any user are retained in the chain of custody tables which tracks the name of the user modifying the data including the date and time of modification, along with original and revised data.

3.9.2.4 Data Management, Reporting, and Public Notifications

This section outlines data management procedures including data reporting and public air quality notifications for the Rule 1180 community air monitoring program.

3.9.2.5 Data Reporting and Display

One of the primary goals of the community air monitoring program is to provide data to the public in near real-time. All community air monitoring program data is publicly displayed within 5-15 minutes from the end of acquisition and is made available for download on the Rule 1180 Community Air Monitoring Data Portal at: https://xappprod.aqmd.gov/Rule1180CommunityAirMonitoring/.

Prior to being displayed on the web, air monitoring and meteorological data undergoes a series of real-time automated data quality checks. Rule 1180 air monitoring staff conducts an ongoing data review within 60 days after the end of each quarter to verify and confirm the validity of displayed data. As a result, the final QA/QC'd data may be different from the auto-QC'd data displayed in near real-time.

The homepage of the Rule 1180 community air monitoring data portal is displayed in Figure 3. On the left is a map identifying the locations of the Rule 1180 community air monitoring sites (shown by blue circles) and other neighboring relevant community air monitoring sites. In the example shown in Figure 3, arrows within blue circles show the direction in which wind is blowing at each station. Locations of the refineries subject to Rule 1180 are also shown.

On the right side of the Rule 1180 portal, the concentration of the pollutant with the highest concentration relative to their corresponding notification threshold for each community air monitoring site is displayed. Information on all concentrations of pollutants measured at each site can be accessed by clicking on the station circle on the map, or on the station name on the right. Each refinery's fenceline air quality data portal may be accessed by clicking on the refinery outline.

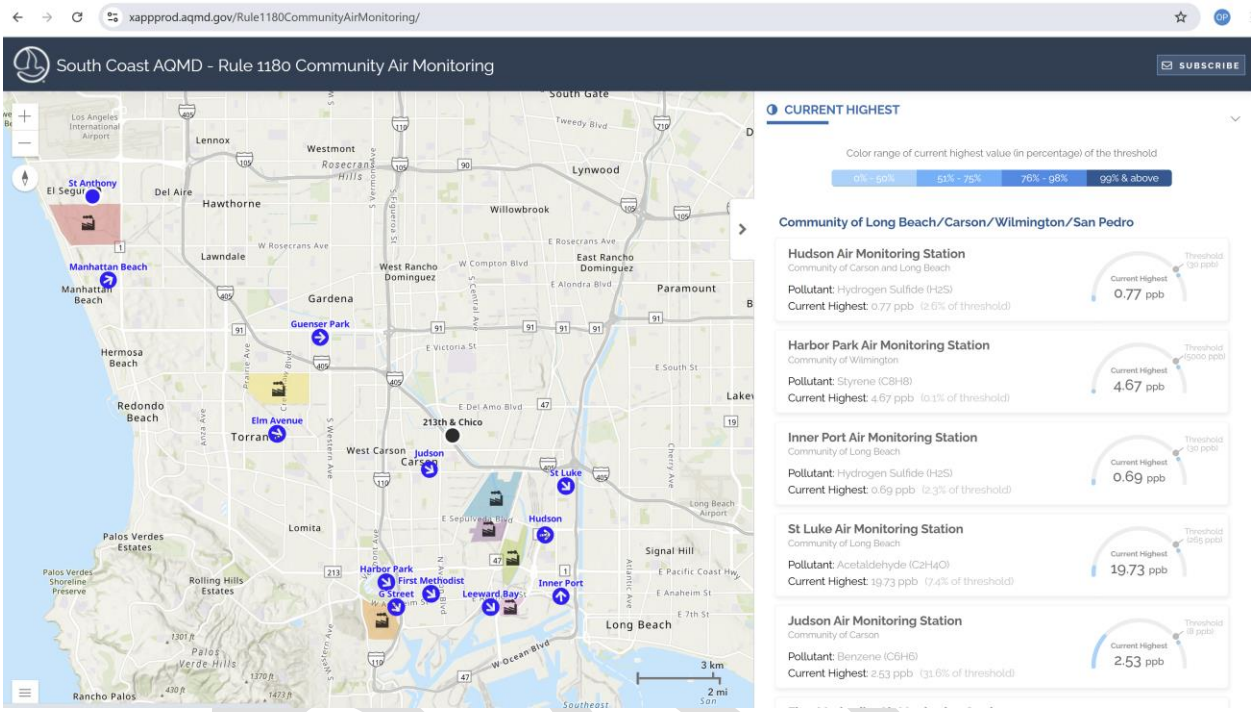

Figure 3: A Snapshot of the Rule 1180 Community Air Monitoring Data Portal Collected on 05/08/2025 at 1:49 PM PST.

To integrate, manage, and display data from Rule 1180 air monitoring sites, including the community and refineries' fenceline and other South Coast AQMD monitoring and laboratory analysis programs, South Coast AQMD is developing a cloud-based platform for building interactive data visualizations with dashboards for web-based viewing.

The development and implementation of this comprehensive cloud-based platform will occur in two main phases. Phase I will focus on the development of the back-end cloud computing architecture required for ingesting, processing, analyzing, visualizing, and storing data. The key tasks of Phase I are to design an overall system architecture to handle the functional and future capacity requirements of South Coast AQMD expanding monitoring programs, development and implementation of a database strategy, development of data processing procedures for QA/QC checks, and to provide a platform for building real-time interactive data analytics for public interfacing websites.

Phase II will integrate the data from several South Coast AQMD air monitoring data sources into the platform. During this second phase, pathways for visualizing the data stream from these multiple sources into one common platform will be developed. Phase II will integrate the refinery fenceline air monitoring data along with any other complementary environmental data and provide the ability to perform batch

data analysis workflows as needed for implementing batch processes and machine learning approaches to data treatment. A conceptual schematic of the three phases for the South Coast AQMD cloud-based data platform development is shown in Figure 4.

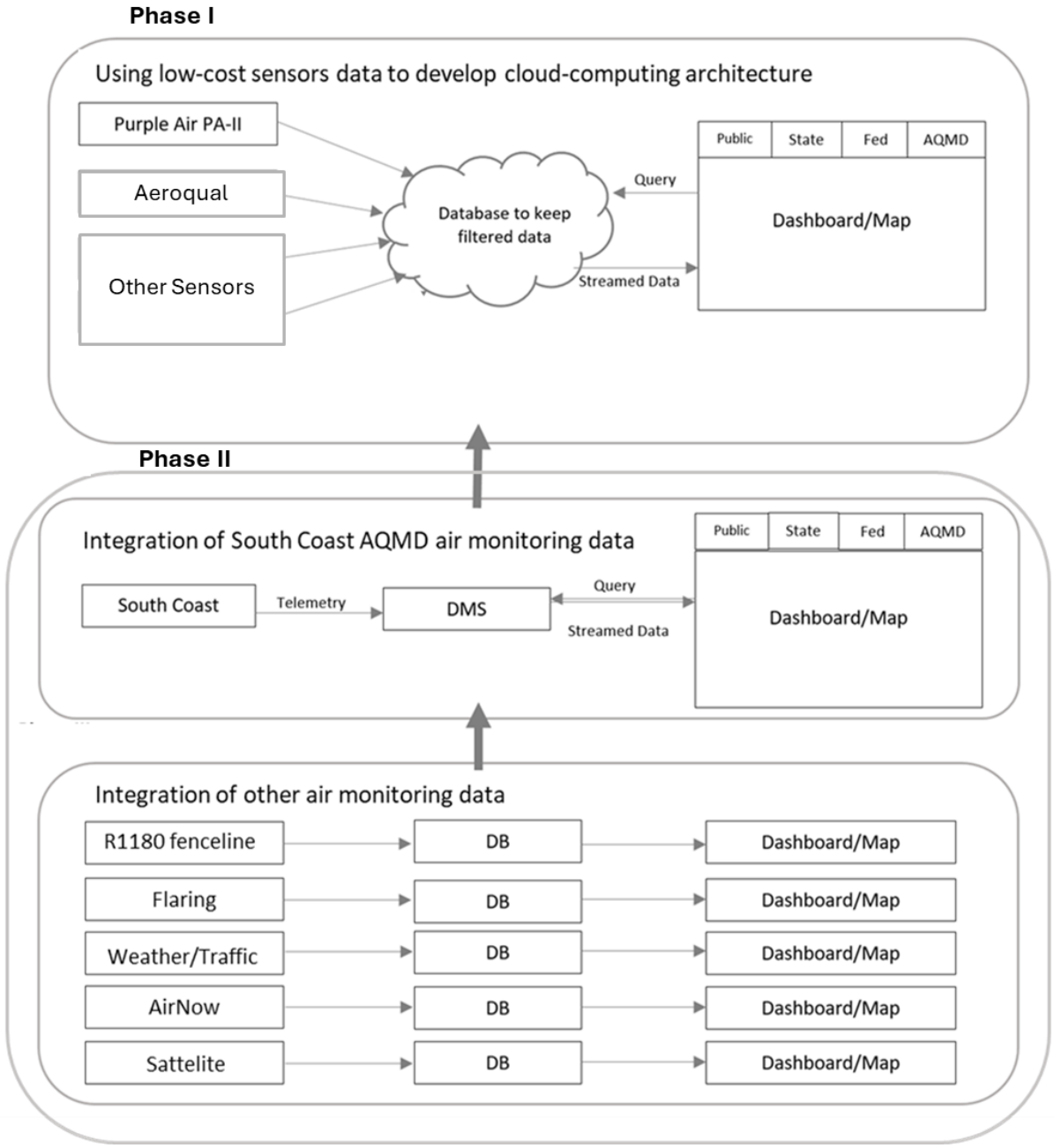

Figure 4: Schematic of Two Phases of the South Coast AQMD Cloud-Based Data Platform Development

3.9.2.6 Public Air Quality Notification

Another objective of Rule 1180 data collection is to provide the public with notifications and information when air pollutant levels in their community exceed pre-determined health-based thresholds. South Coast AQMD staff conducted a review of available air quality standards and exposure benchmarks established by various regulatory agencies for Rule 1180 pollutants. The resulting Rule 1180 air quality notification thresholds were established based on 1-hour NAAQS, CAAQS, or acute 1-hour reference exposure levels (RELs) established by the California Office of Environmental Health Hazard Assessment (EOHHA), whichever value is lowest. These thresholds are listed in Table 39. The Rule 1180 CAMP provides a detailed analysis and rationale for notification threshold selection. South Coast AQMD staff developed and implemented a community air quality notification system based on the thresholds shown in Table 39. Interested parties can sign-up for Rule 1180 community air quality notifications by clicking a "SUBSCRIBE" button on the upper right-hand side of the Rule 1180 community air monitoring data portal https://xappprod.aqmd.gov/Rule1180CommunityAirMonitoring/; or by going to http://www.aqmd.gov/sign-up. It is important to note that the Rule 1180 1-hour notifications are intended for informational purposes only, and in the event of an emergency, the public should always refer to local city or county's emergency notifications.

The public community air quality notification system is operated and maintained by South Coast AQMD Information Management team. Several diagnostic parameters, namely ambient data flags, hourly data completeness are automatically monitored with 5-minutes frequency. In addition, monthly manual data review also includes verification that notifications were issued appropriately.

In an event of a public air quality notification being issued, AQS staff conduct a thorough review of all the data collected at the site soon as possible, typically within 1 hour of notification, including all air pollutants, meteorology, and station records. Staff also review the data from other community stations and refinery fenceline air monitoring systems in the area to verify the validity of the data. Pollutants for which a notification is issued, staff reviews the auto-QC and other available information. For example, for pollutants measured by the optical multi-pollutant analyzers, a review of spectral signature is performed by South Coast AQMS staff or the manufacturer.

Table 39: Rule 1180 Community Air Quality Notification Thresholds

Air Pollutants	**Health Standard-Based Notification Threshold**	**Informational-Based Notification Threshold**
Criteria Air Pollutants		

Sulfur Dioxide	75 ppb	N/A
Nitrogen Dioxide	100 ppb	N/A
PM2.5	35 µg/m³ (24-hour avg.)	N/A
PM10	50 µg/m³(24-hour avg.)	N/A
Volatile Organic Compounds		
Total VOCs (Non-Methane Hydrocarbons)	N/A	730 ppb
Formaldehyde	44 ppb	N/A
Acetaldehyde	260 ppb	N/A
Acrolein*	1.1 ppb	N/A
1,3 Butadiene	297 ppb	
Naphthalene	N/A	N/A
Polycyclic aromatic hydrocarbons (PAHs)	N/A	N/A
Styrene	5,000 ppb	N/A
Benzene	8 ppb	N/A
Toluene	1,300 ppb	N/A
Ethylbenzene	N/A	N/A
Xylenes	5,000 ppb	N/A
Metals		
Cadmium	N/A	N/A
Manganese	0.17 µg/m³ (8-hour avg.)	N/A
Nickel	0.2 µg/m³	N/A
Other Compounds		
Hydrogen Sulfide	30 ppb	N/A
Carbonyl Sulfide	270 ppb	N/A

Ammonia	4,507 ppb	N/A
Black Carbon	N/A	30 µg/m³
Hydrogen Cyanide	309 ppb	N/A
Hydrogen Fluoride**	289 ppb	N/A

*Sensitivity of optical multi-pollutant analyzers do not allow for establishment of a reliable notification level for Acrolein.

**For facilities that use hydrogen fluoride.

3.9.3 Data Analysis

Air monitoring and meteorological data are analyzed periodically throughout the data collection and validation process. The statistical estimates of the data quality including precision, bias, and completeness are calculated. Community air monitoring data summaries, presentations, and reports are generated, as needed.

3.9.4 Data Storage and Retrieval

Data is stored in several ways and for varying periods of time. Initially, data is stored in the analyzers' internal data loggers. This data is transmitted to a data logger at the site, followed by transmission to Data Management System (DMS). DMS is the final repository for all data from the Rule 1180 community air monitoring program. The DMS for Rule 1180 community air monitoring program consists of a cloud-based Microsoft Asure system, and a physical back-up. Automatic data backup is performed according to South Coast AQMD data backup policy with all data servers being password protected. This ensures only authorized personnel can both access and manipulate data. In addition, the analyzers' internal raw data and metadata is stored on the instrument's internal datalogger and backed-up monthly on external hard drives. The external backup hard drives are stored at a secure location in the South Coast AQMD Long Beach Office. External hard drives are backed-up semi-annually. The Rule 1180 team is currently exploring additional options for cloud storage back-up of all Rule 1180 community air monitoring data, including raw data and metadata.

4 Assessment and Oversight

4.1 Assessment and Response Actions

Various assessments and evaluations are performed to measure the effectiveness of different elements of the Rule 1180 community air monitoring program and to ensure community air monitoring data meets or exceeds the data quality objectives. Periodic evaluations and reviews of the Rule 1180 community air monitoring network or its parts will be conducted. An assessment and review of the Rule 1180 community air monitoring network will be conducted before January 2025 to determine if the program is achieving its monitoring objectives. Modifications to the Rule 1180 community air monitoring network could be implemented in the future to ensure the data continues to meet the monitoring objectives as air monitoring technologies advance. The assessments may be conducted by qualified South Coast AQMD staff and/or a qualified contractor, as appropriate. These assessments are as follows.

4.1.1 Internal Performance Evaluation

An Internal Performance Evaluation (PE) is a quantitative comparison of measurements taken using the equipment installed at the community air monitoring stations and compared to measurements taken using certified equipment and/or NIST-traceable standards which are not part of the routine monitoring program. Internal PE procedure is described in SOP #SOP00213 (see Table 32).

Designated Rule 1180 staff who are not involved in routine operation or service of equipment under evaluation will conduct internal PE audits. The PE auditor will document any parameter that does not meet the audit acceptance criteria and will work with Rule 1180 field staff to identify the cause(s). A corrective action request (CAR) will be issued to address and resolve the issue.

4.1.1.1 Internal Performance Test

An Internal Performance Tests (PE) involving analysis of gas mixture(s) used in Internal Performance Evaluation will be performed as needed.

4.1.2 Technical System Audit

A Technical System Audit (TSA) is a review and inspection of the entire community air monitoring program. A TSA includes instrument inspections, review of documentation and records, staff interviews, review of flagging appropriateness and frequency, and tracking of a data point from generation to final reporting. Internal (by qualified South Coast AQMD staff from QA Branch of MAD) or external (by qualified contractors) TSAs will be performed after the first three years of operation of the Rule 1180 community air monitoring network, but no later than January 1, 2025. A summary report of findings and

recommendations to correct any deficiencies identified by a TSA will be issued to management and posted to the Rule 1180 website. After this initial audit, periodic TSAs will be conducted approximately every 3 years.

4.1.3 Community Air Monitoring Assessment

Pursuant to the Resolution for Public Hearing on Rules 1180 amendment and 1180.1 adoption in January 2024, no later than January 1, 2029, and every five years thereafter, a Rule 1180 community air monitoring network assessment will be conducted to evaluate whether the program is adequately meeting impacted community needs and whether there is a need for equipment or monitoring coverage upgrades.

4.1.4 Data Quality Assessment

The Rule 1180 community air monitoring network data review and evaluation is a continuous, ongoing process. Rule 1180 staff evaluates Data Quality Indicators (DQI) such as precision, bias, and completeness on an on-going basis (normally every 3-6 months) to assess whether the quality of the reported data fulfills the program's Data Quality Objectives. Additional data assessments may be also initiated in response to any issues raised from auditing or during the corrective action process.

4.2 Reports to Management and to Community/Stakeholders

The Rule 1180 data summary and monitoring assessment results will be communicated through the management chain of command to ensure that all parties involved in the program are aware of any data quality issues and of the progress made in achieving the monitoring objectives. Such communications can include meetings, emails, memos, presentations, and written reports. South Coast AQMD staff will periodically update community members and stakeholders on the status of the Rule 1180 air monitoring program and its findings by presentations at community meetings. Finally, air monitoring data generated by the Rule 1180 air monitoring network may be shared via interactive story maps, public presentations, journal articles, or technical reports, as appropriate.

5 Data Validation and Usability

5.1 Data Review, Verification, and Validation

This section provides information on data review, verification, and validation. Additional details can be found in Data Review and Validation SOP00212 for the air monitoring equipment deployed at Rule 1180 community stations, as listed in Table 32.

The Rule 1180 community air monitoring program follows a 4-level validation process that incorporates concepts such as automatic data screening, review, verification, and validation. The sections below outline the data review process and identify the staff responsible for each level of data review.

5.1.1 Automated Data Screening (Level 0 Data Review)

Rule 1180 data acquisition and management systems are configured to perform automated data QC screenings and to apply appropriate data flags. The auto-screening is designed to ensure that the best possible data is reported to the public in near real-time, and to augment, but not replace, the data review process. All auto-flagged data will be verified and/or confirmed by data validators using additional sources of supporting information. Selected automatic QC checks trigger an email to relevant staff if auto screening criteria is not met. QC flags used in the automatic screening are listed in Table 40.

Table 40. Description of DMS QC Codes

ID #	QC Code Name	Manual/Auto	Valid/Invalid	Description
0	Valid	Auto	Valid	Valid Data
5	Suspect	Manual	Invalid	Data requiring additional review
7	Insufficient Data	Auto	Invalid	Insufficient data to calculate the rolling average (<75% or less than 45 min of the given hour)
8	Missing	Auto	Invalid	No data
9	Invalid	Manual	Invalid	Data invalidated by South Coast AQMD staff during the review and validation process
12	Maintenance	Manual	Invalid	Data collected during instrument maintenance
15	Conditional Valid	Manual	Valid	Data associated with special conditions, or needing additional validation/review

80	Spike_5min	Auto	Valid	Data larger than 2-standard deviations of the hourly mean (applied to 5min data)
81	Spike_60min	Auto	Valid	Data larger than 2-standard deviations of the hourly mean (applied to 1hr rolling data)
82	Notification	Auto	Valid	Data value at or above a predetermined threshold (Note: "notification" and "threshold" referenced here are for data review and QA/QC purpose. Their values may or may not be related to Rule 1180 public air quality notifications)
83	Below MDL	Auto	Valid	Data below the minimum detection limit
84	RMS	Auto	Invalid	RMS value for optical multi-pollutant analyzer is larger than the predetermined threshold
85	Light	Auto	Invalid	Light intensity of optical multi-pollutant analyzers is lower than the predetermined threshold
87	Stuck value	Auto	Invalid	3-consecutive data at an identical value
97	Severe Negative	Auto	Invalid	Data is negative and below predetermined value
121	Over Calibration Range	Auto	Valid	Data outside the calibration range of the instrument

5.1.2 Review (1st Level Review)

Review is the process for confirming that data has been collected, averaged, recorded, transmitted, and processed correctly. In addition to other tools and techniques available for QC of the Rule 1180 data, such as configuring the data logger and DMS with alarms and flags, a daily data continuity check is conducted. Data continuity checks are designed to automate selected 1st level data review tasks. As part of the review process, DMS automatically generates 5-minute averaged, 1-hour rolling average, and 1-hour averaged data files, depending on the instrument, for all target pollutants at all Rule 1180 sites and meteorological data files. The files are stored for 24 hours in a designated folder on one of the South Coast AQMD's network drives Q:\EXCHANGE\R1180_dms with the files updated every hour. An automatic Python script generates hourly data completion summaries and basic plots for Rule 1180 compounds over the previous 24 hours. Based on these automatically generated summaries and entries in electronic logbooks, designated Rule 1180 staff issue daily (during normal working days, Tuesday - Friday) data continuity email reports. Daily continuity reports are issued at or before 3pm to allow for Rule 1180 staff to address issues

on that same day, if possible. In addition to daily continuity reports, an automated data outage system is also set up to deliver a text notification to designated Rule 1180 staff when any community stations parameters are missing for more than 4 hours. Together, daily continuity reports and automated data outage texts allow station operations to prioritize and maintain timely data delivery to the data portal, maintain data completeness, and minimize the need for backfill.

Typically, 1st Level Data Review includes the following tasks:

- Identify if readings are within the typical daily and seasonal concentrations;
- Identify data associated with instrument malfunctions;
- Identify and investigate unusually high readings;
- Review instrument QC checks (e.g., Zero, 1-PC, and Span) and identify any changes from the previous QC check;
- Compare readings from different instruments at the same site for the same pollutant (collocated or duplicate data) or the same pollutant measurements from different sites;
- Detect and investigate the cause of any missing data;
- Detect and investigate any severely negative readings;
- Identify and investigate the cause of repetitive readings (sticking values);
- Identify any sudden jumps in the measured concentration (rate of change) and confirm if the readings are real;
- Confirm that the data is flagged correctly;
- Recognize any abnormal events that may impact the data;
- Identify any power outages that may impact the data collected afterward the outage.

5.1.3 Verification (2nd level Review)

Verification is the process for assessing whether measurement and procedural requirements are met. Normally, the Principal AQIS, with assistance from AQS staff, if needed, verify that the data has been collected, recorded, transmitted, and processed accurately and in accordance with respective SOPs. Throughout the measurement and data logging process, staff are responsible for quality control, maintenance of event requirements, instrument checks, data capture rate, and identifying suspect, missing, or invalid data. The following are some of the tools used to help in determining the validity of the collected data:

- Quality Control (QC) checks: QC checks are performed routinely (daily, weekly, monthly as specified in the relevant SOP or instrument manual) to verify an instrument's performance. These checks typically have associated acceptance criteria; if any of the check results are outside the acceptance criteria, data action such as invalidation or flagging should occur. Daily zero, PC, and span; as-is calibration (verification); monthly flow verification; and converter efficiency are examples of the QC checks employed;

- Instrument diagnostic values: all instruments used in the Rule 1180 program record and display diagnostic readings that show the health of the instrument(s). Some diagnostic values are critical to the performance of the instrument and will impact the quality of the data produced, while others may need to be further investigated to assess if there is any impact on the data. Flow, temperature, pressure, lamp intensity, stability, and zero reference values are some examples of an instrument's internal diagnostic parameters;
- Automatic data screening described earlier in this QAPP also helps in the data verification process.

The 2nd level data review includes the following:

- Review issues identified by the 1st level review;
- Evaluate conformance and compliance of the data collected against the measurement specifications;
- Check data completeness rates;
- Identify diurnal and seasonal trends surrounding high/low values and exceedances;
- Apply appropriate data flags;
- Identify data patterns associated with loss of sensitivity;
- Recognize any abnormal events that may influence the data.

5.1.4 Validation (3rd level review)

Validation is the confirmation that the requirements for the data's intended use are met. Data validation extends the data verification process and addresses the validity of the data by further evaluating conformance with the MQOs and the routine quality control checks criteria. Data validation is performed by Rule 1180 data analyst staff with assistance from selected instrument manufactures (e.g., optical multi-pollutant analyzers and Auto-GC), as needed. The following data validation tasks are performed:

- Review of the data sets against the individual pollutant MQOs;
- Review data over the long-term such as over quarterly or annual time frames;
- Identify data patterns, relationships, or potential anomalies;
- Compare community air monitoring data with nearby refinery data;
- Relate community air monitoring data to known events such as refinery fenceline air quality notifications, flaring events, any non-refinery events in the area, etc.;
- Perform data analysis, prepare graphs, PowerPoint presentations, and reports.

Sections below outline data validation steps for each analyzer deployed at Rule 1180 community air monitoring stations.

5.1.4.1 Field Auto-GC Data Validation

Data validation of Field Auto-GC instruments is conducted monthly, following the steps below:

- Verify concertation values of any species that exceed 3 times the previous week's median concentrations;
- Verify concentrations of pollutants that are continuously below MDL for an extended period (e.g., >2 days);
- If the most recent ACS check fails, and the field data is compared with the last successful ACS, and if the last successful ACS is older than 2 weeks, staff are expected to work with the instrument manufacturer to investigate the cause(s) and implement necessary corrections and repairs. This assessment will also include an analysis of changes in chromatography (e.g., retention time shift) related to column efficiency and other properties change over time.

5.1.4.2 UV-DOAS and FTIR Multi-Pollutant Analyzers Data Validation

1) Rule 1180 staff will communicate with the instrument manufacturer regarding data validation monthly.
2) Monthly QC Summary, containing the following online logs will be generated:
   - Maintenance activity log;
   - Data review and validation log;
   - Data correction file, if any were performed.
3) Perform data validation based on the following criteria:
   a. Verify that reference runs were performed during the time-period when pollutant concentration(s) were at their normally observed background levels (referred as "in clean air"):
      - If reference runs were not performed "in clean air," the manufacturer is expected to re-analyze spectral retrievals using appropriate new reference spectra, and submit new data to South Coast AQMD; or provide justification for why a "clean air" reference was not taken or not feasible over the time in question.
   b. When values of any DOAS or FTIR compound exceed the notification threshold, the instrument manufacturer will perform or assist Rule 1180 staff with spectral verification, and provide graphical representation of the species spectral fit (e.g., spectroscopic software output) for all fitted reference species and residual structures;

c. When values of any DOAS or FTIR species exceed 3 times of its MDL (both in the positive and negative direction);
d. When the difference between the concentrations of benzene, ethylbenzene, toluene, m, p-xylene, styrene, and 1,3-Butadiene time-averaged to Auto-GC sample collection cycles, and the corresponding Auto-GC data is greater than the species' MDL (both in the positive and negative direction);
e. When FTIR Total Alkanes concentrations exceeds the 90th percentile (for a given station), selected FTIR compounds known to have interference with high total alkanes (e.g., NO2) will be validated manually. A short description of relevant parameters (e.g., wind direction/speed, RH, etc.), would also be included in the review report.

4) In certain instances, validation using a collocation with the South Coast AQMD Optical Remote Sensing Mobile Laboratory (ORS-ML) may be needed. During such collocation, the ORS-ML will be parked next to a community air monitoring station and perform sampling and analysis of the air mass in the vicinity of the station for a minimum of 8 hours. Sampling will be performed such that the ORS-ML sample will be similar, if not identical, to the air mass sampled by station instruments.

5.1.5 DMS Data Editing

All data editing occurs in the DMS. Valid data stored in the DMS is typically identified with QC code 0 and Op code 1; only valid data is used for all DMS aggregations. Data editing involves modifying values, QC codes, Op codes, Null Codes, and/or qualifier codes associated with suspect data. Below is a list of the DMS data coding:

- QC codes are quality control codes that provide information regarding data validity (e.g., invalid data average due to insufficient data).
- Op codes are operational codes that provide information on instrument conditions (e.g., when calibration is occurring).
- Null data codes are used to provide a reason for missing data.
- Qualifier Codes are used to describe when an event impacts the data.

QC and Op Codes are used in the DMS to facilitate data screening and assist in the review process. Any data edits made in the DMS generates an associated audit trail which stores the original and edited values, any changes made to the QC and Op codes, and the reason for the edit(s). DMS timestamps the entry and records the identity of the editor.

5.2 Reconciliation with User Requirements

South Coast AQMD is committed to ensuring that the Rule 1180 refinery community air monitoring data is scientifically and legally valid and of satisfactory quality and quantity to achieve the program's DQOs and satisfy the data's intended use. This section describes how the monitoring results will be reconciled with DQOs after review, verification, and validation against the MQOs. The DQOs are the qualitative and quantitative statements that describe the intended use of the data, the types of data needed, and sets tolerance limits on the amount of allowed uncertainty in the data sets such that decision makers can use the resulting data with a knowledge of the data's limitations. The goal of this effort is to determine whether the programmatic goals have been achieved and how on-going reassessment and improvement in data quality can be achieved.

The reconciliation with DQOs occurs, in part, during the data quality assessment process. It includes the review of DQOs in consideration with the sampling design and configuration, and data collection methodology to ensure these are consistent with DQO needs. Findings indicating that programmatic objectives have not been met trigger further review of the impacted measurement methodology, with concurrent initiation of appropriate corrective action if necessary. In the event, when data quality criteria established under this QAPP is found not to result in data meeting its intended purpose, data quality criteria will be revised to ensure data can meet programmatic DQOs and MQOs.

South Coast AQMD evaluation and reconciliation of monitoring program DQOs addresses the following questions:

- Was the data within the QC limits for the intended purpose of the measurements?
- Is the data consistent in time or in space?
- Do the monitoring results indicate a measured concentration consistently far above, far below, or near the public notification thresholds?

South Coast AQMD QAPP implementation and oversight is intended to be proactive and to prevent or address potential issues before they evolve into larger ones such as a measured pollutant not meeting its measurement DQOs. Problems growing into larger issues can result in loss of agency credibility and trigger an internal root cause analysis and investigations. Outcomes of these investigations can result in remedial or advanced staff training, stressing the importance of adhering to SOPs, OAGs and other written protocols, as well as developing processes for addressing equipment operational and maintenance problems. These investigations can also result in SOP and/or OAG revisions, as well as changes in hardware or hardware configuration. The corrective actions could include, for example, requiring enhanced training of the operators if they did not adhere to SOPs or selecting a more appropriate monitoring method, enhanced or increased frequency of instrument calibration/verification, other changes, or a combination of changes to achieve the air monitoring objectives.

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APPENDIX A: GLOSSARY OF TERMS

(Note that these definitions are for the purposes of this document only and do not affect the use of the terms for other purposes.)

Acceptance Criteria — Address the adequacy of existing information proposed for inclusion into the project. These criteria often apply to data drawn from existing sources ("secondary" data). Specified limits placed on characteristics of an item, process, or service defined in requirements documents.

Accuracy — A measure of the degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (imprecision) and systematic error (bias) components that are due to sampling and analytical operations; U.S. EPA generally recommends using the terms "precision" and "bias," rather than "accuracy," to convey the information usually associated with accuracy.

Ambient Air Quality Monitoring – This is the collection and measurement of samples of ambient air to evaluate the status of the air pollutants in the atmosphere as compared to clean air standards and historical information.

Analysis (chemical) – This is the determination of the qualitative and/or quantitative composition of a substance.

Assessment — The evaluation process used to measure the performance or effectiveness of a system and its elements. As used here, assessment is an all-inclusive term used to denote any of the following: audit, performance evaluation, performance test, management systems review, peer review, inspection, or surveillance.

Audit — A systematic and independent examination to determine whether quality activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve objectives.

Bias — The systematic or persistent distortion of a measurement process that causes errors in one direction (i.e., the expected sample measurement is different from the sample's true value).

Blank — A sample subjected to the usual analytical or measurement process to establish a zero baseline or background value. Sometimes used to adjust or correct routine analytical results. A sample that is intended to contain none of the analytes of interest. A blank is used to detect contamination during sample handling preparation and/or analysis.

Calibration — Comparison of a measurement standard, instrument, or item with a standard or instrument of higher accuracy to detect and quantify inaccuracies and to report or eliminate those inaccuracies.

Certification — The process of testing and evaluation against specifications designed to document, verify, and recognize the competence of a person, organization, or other entity to perform a function or service, usually for a specified time.

Chain of Custody (COC) — An unbroken trail of accountability that ensures the physical security of samples, data, and records.

Collocated Samples — Two or more portions collected at the same point in time and space to be considered identical. These samples are also known as field replicates and should be identified as such.

Comparability — A measure of the confidence with which one data set or method can be compared to another.

Completeness — A measure of the amount of valid data obtained from a measurement system, typically compared to the amount that was expected to be obtained under correct, normal conditions.

Conformance — An affirmative indication or judgment that a product or service satisfies the relevant specification, contract, or regulation.

Contractor — any organization or individual that contracts to furnish services or items or perform work; a supplier in a contractual situation.

Corrective Action — Any measures taken to rectify conditions adverse to quality and, where possible, to prevent recurrence.

Corrective Action Report (CAR) — A report issued by the South Coast AQMD Quality Assurance Branch to document and notify appropriate personnel of an issue or finding that may potentially impact data quality, completeness, storage, or reporting, along with the resolution. CARs can address to measurements, analyses, procedures, maintenance, documentation, training, safety, or other QA oversight components. The resolution of a CAR should document measures taken to rectify conditions adverse to quality and, where possible, to prevent recurrence. Similar to the South Coast AQMD CAR, the California Air Resources Board (CARB) QA group issues Air Quality Data Actions (AQDAs) and U.S. EPA issues Corrective Action Notices (CANs).

Criteria Pollutant — The seven pollutants (ground level ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, PM10 respirable particulate matter, PM2.5 fine particulate matter, and Pb-lead) regulated by the Clean Air Act, i.e., those pollutants associated with National Ambient Air Quality Standards (NAAQS).

Data Quality — A measure of the degree of acceptability or utility of data for a particular purpose.

Data Quality Assessment (DQA) — A scientific and statistical evaluation of a data set to determine if data obtained from environmental operations are of the adequate type, quality, and quantity to support their intended use.

Data Quality Indicators (DQIs) — The quantitative statistics and qualitative descriptors used to interpret and assess the degree of acceptability or utility of data to the user. The principal DQIs are bias, precision, accuracy (bias is preferred), comparability, completeness, representativeness, and sensitivity. In aggregate, DQIs provide an assessment that measurement systems are maintained within prescribed limits, ensuring the resulting data are of quality acceptable for the intended use.

Data Quality Objectives (DQOs) — The qualitative and quantitative statements derived from the DQO Process that clarify technical and quality objectives of a study or program, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions.

Data Quality Objective Process — A systematic planning tool based on the scientific method that identifies and defines the type, quality, and quantity of data needed to satisfy a specified use. DQOs are the qualitative and quantitative outputs from the DQO Process.

Data Reduction — The process of transforming the number of data items by arithmetic or statistical calculations, standard curves, and concentration factors, and collating them into a more useful form. Data reduction is irreversible and generally results in a reduced data set and an associated loss of detail (unless the initial raw data is also archived).

Data Usability — The process of ensuring or determining whether the quality of the data produced meets the intended use of the data.

Data Validation — An analyte- and sample-specific process that extends the evaluation of data beyond method, procedural, or contractual compliance (i.e., data verification) to determine the analytical quality of a specific data set.

Data Verification — The process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual specifications.

Design — The specifications, drawings, design criteria, and performance specifications. Also, the result of deliberate planning, analysis, mathematical manipulations, and design processes.

Detection Limit — A measure of the capability of an analytical method to distinguish samples that do not contain a specific analyte from samples that contain low concentrations of the analyte; the lowest concentration or amount of the target analyte that can be determined to be different from zero by a single measurement at a stated level of probability. DLs are analyte- and matrix-specific and may be laboratory-dependent.

Document — Written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, or results.

Document Control — The policies and procedures used by an organization to ensure that its documents and their revisions are proposed, reviewed, approved for release, inventoried, distributed, archived, stored, and retrieved securely in accordance with the organization's specifications.

Environmental Conditions — The description of a physical medium (for example, air, water, soil, sediment) or a biological system expressed in terms of its physical, chemical, radiological, or biological characteristics.

Environmental Data — Measurements or information that describe environmental processes, location, or conditions; ecological or health effects and consequences; or the performance of environmental technology. For U.S. EPA, environmental data include information collected directly from measurements, produced from models, or compiled from other sources such as data bases or the literature.

Environmental Data Operation — Work performed to obtain, use, or report information pertaining to environmental processes and conditions.

Environmental Monitoring — The process of measuring or collecting environmental data.

Environmental Process — A manufactured or natural process that produces discharge to, or that impacts, the ambient environment.

Environmental Programs — Work or activities involving the environment, including but not limited to characterization of environmental processes and conditions; environmental monitoring; environmental research and development; the design, construction, and operation of environmental technologies; and laboratory operations on environmental samples.

Environmental Technology — An all-inclusive term used to describe pollution control devices and systems, waste treatment processes and storage facilities, and site remediation technologies and their components that may be used to remove pollutants or contaminants from, or to prevent them from entering, the environment. Examples include wet scrubbers (air), soil washing (soil), granulated activated carbon unit (water), and filtration (air, water). Usually, this term applies to hardware-based systems; however, it can also apply to methods or techniques used for pollution prevention, pollutant reduction, or containment of contamination to prevent further movement of the contaminants, such as capping, solidification or vitrification, and biological treatment.

Field Blank — A clean analyte-free sample which is carried to the sampling site and then exposed to sampling conditions, returned to the laboratory, and treated as an environmental sample. This blank is used to provide information about contaminants that may be introduced during sample collection, storage, and transport and to provide information about contaminants that may be introduced during sample collection, storage, and transport.

Financial Assistance — The process by which funds are provided by one organization (usually governmental) to another organization for the purpose of performing work or furnishing services

or items. Financial assistance mechanisms include grants, cooperative agreements, and governmental interagency agreements.

Graded Approach — The process of applying managerial controls to an item or work according to the intended use of the results and the degree of confidence needed in the quality of the results.

Guidance — A suggested practice that is not mandatory, intended as an aid or example in complying with a standard or specification.

Holding Time — The period a sample may be stored before analysis. While exceeding the holding time does not necessarily negate the veracity of analytical results, it causes the qualifying or "flagging" of any data not meeting all of the specified acceptance criteria.

Independent Assessment — An assessment performed by a qualified individual, group, or organization that is not a part of the organization directly performing and accountable for the work being assessed.

Inspection — The examination or measurement of an item or activity to verify conformance to specifications.

Management System — A structured, non-technical system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for conducting work and producing items and services.

Matrix Spike Sample — A sample prepared by adding a known amount of the target analyte to a specified amount of a matrix. Spiked samples are used, for example, to determine the effect of the matrix on a method's recovery efficiency.

Measurement Quality Objectives (MQOs) — The individual performance or acceptance goals for the individual Data Quality Indicators, such as precision or bias.

Measurement Uncertainty — A term used to describe deviations from a true concentration or estimate that are related to the measurement process and not to spatial or temporal population attributes of the air being measured.

Metadata — Information that describes the data and the quality criteria associated with their

generation.

Method — A body of procedures and techniques for performing an activity (for example, sampling, chemical analysis, quantification), systematically presented in the order in which they are to be executed.

Method Blank — A blank prepared to represent the sample matrix as closely as possible and analyzed exactly like the calibration standards, samples, and quality control (QC) samples. Results of method blanks provide an estimate of the within-batch variability of the blank response and an indication of bias introduced by the analytical procedure.

National Ambient Air Quality Standards (NAAQS) — Primary and secondary federal air quality standards for Criteria Pollutants, established by the Clean Air Act with periodic review and revision. ***Primary standards*** set limits to protect public health, including the health of "sensitive" populations such as those with heart or lung disease, children, and older adults. ***Secondary standards*** set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

Operation Assistance Guide - Operation Assistance Guides (OAGs) are South Coast AQMD documents intended for use by a trained operator to perform a specific task that is part of a routine procedure. It can be used for guidance, training or review and as a supplement to a standard operational procedure (SOP).

Outlier — An extreme observation that is shown to have a low probability of belonging to a specified data population.

Parameter — A quantity, usually unknown, such as a mean or a standard deviation characterizing a population. Commonly misused for “variable,” “characteristic,” or “property.”

Participant — When used in the context of environmental programs, an organization, group, or individual that takes part in the planning and design process and provides special knowledge or skills to enable the planning and design process to meet its objective.

Particulate Matter (PM) —Any material, except uncombined water, which exists in a finely divided form as a liquid or solid aerosol at standard conditions. **PM10** means the particulate matter with an aerodynamic diameter smaller than or equal to 10 microns as measured by applicable state and federal reference test methods. **PM2.5** means the particulate matter with

an aerodynamic diameter smaller than or equal to 2.5 microns as measured by applicable state and federal reference test methods.

Performance Criteria — Address the adequacy of information that is to be collected for a project. These criteria often apply to new data collected for a specific use ("primary" data).

Performance Evaluation — A type of audit in which the quantitative data generated in a measurement system are obtained independently and compared with routinely obtained data to evaluate the proficiency of an analyst or laboratory.

Performance Test - A type of audit from which data collected by execution of a particular test method is used to assess compliance with an applicable regulation.

Precision — A measure of mutual agreement among repeated individual measurements of the same property, usually under prescribed similar conditions; expressed generally in terms of the Standard Deviation. Other metrics, such as Relative Percent Difference, are typically used when there are too few data points to determine a valid standard deviation.

Procedure — A specified way to perform an activity.

Primary Quality Assurance Organization (PQAO) — A monitoring organization or a group of monitoring organizations that share a number of common quality assurance factors, such as: (1) operation by a common team of field operators according to a common set of procedures; (2) use of a common QAPP or standard operating procedures; (3) common calibration facilities and standards; (4) oversight by a common quality assurance organization; and (5) support by a common management, laboratory, or headquarters.

Process — A set of interrelated resources and activities that transforms inputs into outputs. Examples of processes include analysis, design, data collection, operation, fabrication, and calculation.

Proficiency Test — A type of assessment in which a sample, the composition of which is unknown to the analyst, is provided to test whether the analyst/laboratory can produce analytical results within the specified acceptance criteria.

Quality — The totality of features and characteristics of a product or service that bears on its ability to meet the stated or implied needs and expectations of the user.

Quality Assurance (QA) — An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the customer or user.

Quality Assurance Alert (QAA) — A South Coast AQMD report generated from staff to inform the QA Branch of an issue that affects or potentially affects data quality or safety. The QA Branch may issue a Corrective Action Report (CAR) as a result to document the finding and its resolution.

Quality Assurance Manager — The individual designated as the principal manager within the organization having management oversight and responsibilities for planning, documenting, coordinating, and assessing the effectiveness of the quality system for the organization.

Quality Assurance Project Plan (QAPP) — A formal document describing in comprehensive detail the necessary quality assurance procedures, quality control activities, and other technical activities that need to be implemented to ensure that the results of the work performed will satisfy the stated performance or acceptance criteria. The QAPP components are divided into four groups of elements: (A) Project Management; (B) Data Generation and Acquisition; (C) Assessment and Oversight; and (D) Data Validation and Usability. QAPP requirements and preparation guidance can be found in EPA QA/R-5 (U.S. EPA, 2001) and QA/G-5 (U.S. EPA, 2002 and U.S. EPA, 2018).

Quality Control (QC) — The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the specifications established by the customer or user; operational techniques and activities that are used to fulfill requirements for quality. The system of activities and checks used to ensure that measurement systems are maintained within prescribed limits, providing protection against "out of control" conditions and ensuring the results are of acceptable quality.

Quality Control Sample — An uncontaminated sample matrix spiked with known amounts of analytes from a source independent of the calibration standards. Generally used to establish intra-laboratory or analyst-specific precision and bias or to assess the performance of all or a portion of the measurement system.

Quality Management — That aspect of the overall management system of the organization that determines and implements the quality policy. Quality management includes strategic planning,

allocation of resources, and other systematic activities (e.g., planning, implementation, documentation, and assessment) pertaining to the quality system.

Quality Management Plan — A document that describes the quality system in terms of the organization's structure, the functional responsibilities of management and staff, the lines of authority, and the interfaces for those planning, implementing, and assessing all activities conducted.

Quality System — A structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out quality assurance procedures and quality control activities.

Readiness Review — A systematic, documented review of the readiness for the start-up or continued use of a facility, process, or activity. Readiness reviews are typically conducted before proceeding beyond project milestones and before initiation of a major phase of work.

Record — A completed document that provides objective evidence of an item or process. Records may include photographs, drawings, magnetic tape, and other data recording media.

Recovery — The act of determining whether the methodology measures all the analyte contained in a sample.

Representativeness — Representativeness is a measure of the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.

Self-Assessment — The assessment of work conducted by individuals, groups, or organizations directly responsible for overseeing and/or performing the work.

Sensitivity — An analytic technique's ability to detect very low concentrations of a given substance.

Specification — A document stating requirements, and which refers to or includes drawings or other relevant documents. Specifications should indicate the means and the criteria for determining conformance.

Spike — A substance that is added to an environmental sample to increase the concentration of the target analyte by known amount; used to assess measurement accuracy (spike recovery). Spike duplicates are used to assess measurement precision.

Split Samples — Two or more representative portions taken from one sample in the field or in the laboratory and analyzed by different analysts or laboratories. Split samples are quality control samples that are used to assess analytical variability and comparability.

Standard Operating Procedure (SOP) — A written document that details the method for an operation, analysis, or action with thoroughly prescribed techniques and steps to be followed. It is officially approved as the method for performing certain routine or repetitive tasks.

Supplier — An individual or organization furnishing items or services or performing work according to a procurement document or financial assistance agreement. This is an all-inclusive term used in place of any of the following: vendor, seller, contractor, subcontractor, fabricator, or consultant.

Surveillance (quality) — Continual or frequent monitoring and verification of the status of an entity and the analysis of records to ensure that specifications are being fulfilled.

Technical Assessment – The evaluation process used to measure the performance or effectiveness of a technical system and its elements with respect to documented specifications and objectives. Such assessments may include qualitative and quantitative evaluations. A technical assessment may either be performed by those immediately responsible for overseeing and/or performing the work (i.e., a technical self-assessment) or by someone other than the group performing the work (i.e., a technical independent assessment).

Technical Assistance Audit (TAA) – A thorough, systematic, on-site, qualitative audit of facilities, equipment, personnel, training, procedures, record keeping, data validation, data management, and reporting aspects of a technical system which also includes training and discussion that ensures staff can perform the activity meeting programmatic requirements.

Technical Systems Audit (TSA) — A thorough, systematic, on-site qualitative audit of facilities, equipment, personnel, training, procedures, record keeping, data validation, data management, and reporting aspects of a system.

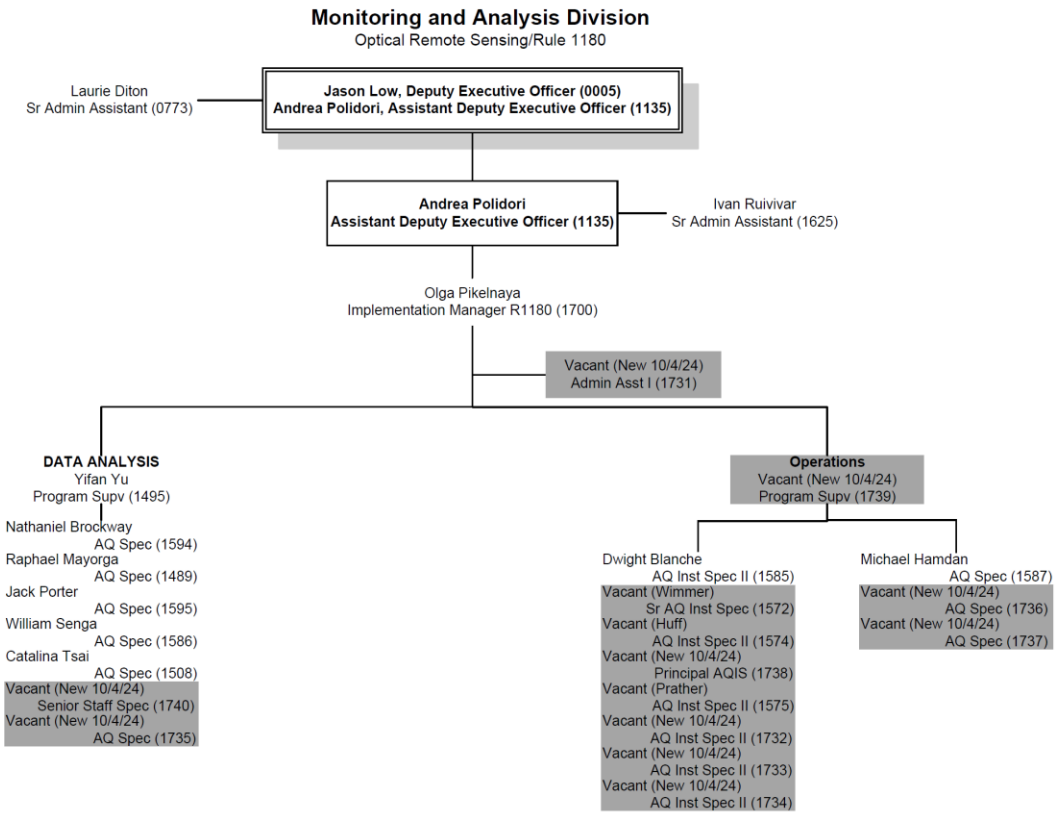
Uncertainty — A parameter associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurand.

Validation — An analyte- and sample-specific process that extends the evaluation of data beyond method, procedural, or contractual compliance (i.e., data verification) to determine the analytical quality of a specific data set. Confirmation by examination and provision of objective evidence that the requirements for a specific intended use are fulfilled.

Verification — The process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual specifications. Confirmation by examination and provision of objective evidence that specified requirements have been fulfilled. In design and development, verification concerns the process of examining a result of a given activity to determine conformance to the stated requirements for that activity.

APPENDIX B: ORGANIZATION CHART

South Coast Air Quality Management District



APPENDIX C: CORRECTIVE ACTION REQUEST (CAR) TEMPLATE

South Coast Air Quality Management District
Monitoring and Analysis Division

Corrective Action Request
Version 2.2

South Coast AQMD CORRECTIVE ACTION REQUEST (CAR)

To: _____ **Date:** _____ **Assessor:** _____

Location: _____ **Assessment Date:** _____ **CAR #:** _____

Expected Deadline: _____ **Instrument:** _____ **S/N:** _____

FINDINGS:

RECOMMENDATIONS: 1. revise SOP
2.

Please indicate the corrective action taken below, save, and return this form to:
Quality Assurance Branch Senior AQ Chemist, Sr. AQIS, or AQ Specialist
and also copy this CAR electronically to your supervisor, manager, and the QA Manager

CORRECTIVE ACTION TAKEN INCLUDING REOCCURRANCE PREVENTION/MINIMIZATION:

By: _____ **Date:** _____

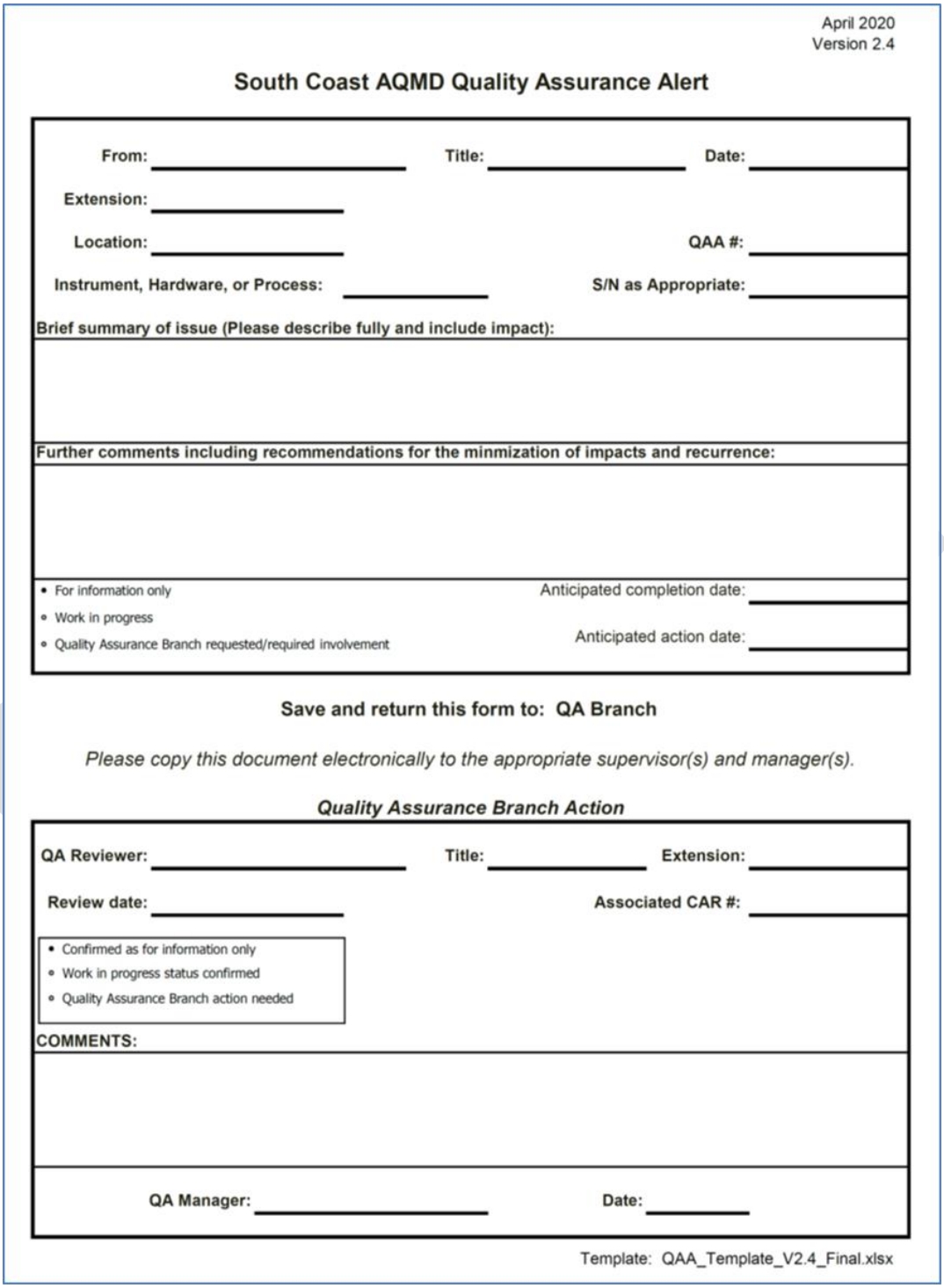
REVIEWER/QA MANAGER COMMENTS

QA Reviewer (Title): _____ **Date:** _____

QA Manager: _____ **Date:** _____

Template: CAR_Template_v2.2

APPENDIX D: QUALITY ASSURANCE ALERT (QAA) TEMPLATE



April 2020
Version 2.4

South Coast AQMD Quality Assurance Alert

From: _____ **Title:** _____ **Date:** _____

Extension: _____

Location: _____ **QAA #:** _____

Instrument, Hardware, or Process: _____ **S/N as Appropriate:** _____

Brief summary of issue (Please describe fully and include impact):

Further comments including recommendations for the minmization of impacts and recurrence:

- For information only
- Work in progress
- Quality Assurance Branch requested/required involvement

Anticipated completion date: _____

Anticipated action date: _____

Save and return this form to: QA Branch

Please copy this document electronically to the appropriate supervisor(s) and manager(s).

Quality Assurance Branch Action

QA Reviewer: _____ **Title:** _____ **Extension:** _____

Review date: _____ **Associated CAR #:** _____

- Confirmed as for information only
- Work in progress status confirmed
- Quality Assurance Branch action needed

COMMENTS:

QA Manager: _____ **Date:** _____

Template: QAA_Template_V2.4_Final.xlsx

APPENDIX E: GROUP TRAINING FORM TEMPLATE

South Coast Air Quality Management District
Monitoring and Analysis Division

Group Training Class Form

CLASS/TRAINING TITLE: _____

SOP TITLE OR # (if applicable):_____**VERSION:**_____

DATE(S) OF INSTRUCTION:_____

PERSON/ORGANIZATION CONDUCTING INSTRUCTION:

_____

SHORT DESCRIPTION OF TRAINING/SKILLS ACQUIRED:

_____

_____

_____

Name (Please Print)	Position	Signature

INSTRUCTOR SIGNATURE _____ **DATE** _____

SUPERVISOR SIGNATURE _____ **DATE** _____

QA REVIEW SIGNATURE _____ **DATE** _____

COMMENTS:

_____

_____

_____