Port of Los Angeles

Quality Assurance Plan for the Air Quality Monitoring Program

THE PORT OF LOS ANGELES

January 2024 Update
Initial Report: 2021

Prepared by:

leidos

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List of Acronyms

BAM	Beta-Attenuation Monitor
BC	Black Carbon
CARB	California Air Resources Board
CFR	Code of Federal Regulations
Cl	Chlorine
CO	Carbon Monoxide
DAHS	Data Acquisition and Handling System
DBS	Database Management System
DOP	Dioctyl Phthalate
DQA	Data Quality Assessment
DRI	Desert Research Institute
EIR	Environmental Impact Report
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GALP	Good Automated Laboratory Practices
K	Potassium
km	Kilometer
Na	Sodium
ND	Negative Declaration
NH4	Ammonium
NO_2	Nitrogen Dioxide
NO_3	Nitric Oxide
NPAP	National Performance Audit Program
O&M	Operation & Maintenance
O_3	Ozone
PM_{10}	Particulate Matter with an Aerodynamic Diameter of 10 microns
$PM_{2.5}$	Particulate Matter with an Aerodynamic Diameter of 2.5 microns
Port	Port of Long Beach
QA	Quality Assurance
QAO	Quality Assurance Officer
ROI	Region of Influence
LEIDOS	Leidos, Inc.
SNL	Site Node Logger
SO_2	Sulfur Dioxide
SO_4	Sulfate
SOP	Standard Operating Procedures
TAHA	Terry A. Hayes & Associates
USEPA	United States Environmental Protection Agency
WHW	West Hills Web

1.0 INTRODUCTION

The Port of Los Angeles (Port) has developed a program to collect representative ambient air quality and meteorological data within the Port operational region of influence (ROI). The Port network consists of four (4) monitoring stations which are designed to monitor the following parameters:

- Real-time measurement of ambient air quality concentrations for criteria pollutants: nitrogen dioxide (NO_2), ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter less than 10 microns in aerodynamic diameter (PM_{10}), and particulate matter less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$).
- Specialized sampling for black carbon (BC) and ultrafine particles (UFPs).
- Filter-based sampling of ambient $PM_{2.5}$ and PM_{10} concentrations.
- Real-time measurement of meteorological parameters, including wind speed, wind direction, ambient temperature, humidity, and barometric pressure.

This document presents the Quality Assurance (QA) plan for the Port's air quality monitoring program.

2.0 PROJECT MANAGEMENT

2.1 Project/Task Organization

The development and implementation of the QA Plan requires clearly defined responsibilities and lines of communication. The responsibilities of key project personnel are described below:

Port of Los Angeles Director of Environmental Management

- Responsible for overall project management and policy for the Port.
- Communicates status and any issues to Port executive director and senior management.
- Works with Port project manager and supervisory team to resolve project issues.

Port of Los Angeles Marine Environmental Manager

- Communicates regularly with Director of Environmental Management and project team on monitoring program status.
- Works with Port project manager and supervisor to resolve project issues.

Port of Los Angeles Marine Environmental Supervisor

- Meets weekly with Project Manager on monitoring program status.
- Communicates status and any issues to Marine Environmental Manager.

Port of Los Angeles Project Manager – Ms. Amber Coluso, 310-732-3950

- Primary point of contact at the Port.
- Coordinates decisions made by the Port with respect to the monitoring program.
- Works with Leidos project manager to resolve any project issues.

Leidos Project Manager – Mr. Joel Torcolini, 760-214-0797

- Responsible for overall management of project, including Port approved budget and schedule.
- Works to ensure Leidos team resolves any technical and project related-issues.

Leidos Technical Director – Dr. Gary Bertolin, 828-200-0674

- Overall responsibility for operation of monitoring program.
- Works with Leidos project manager to meet project objectives.
- Works with Leidos team members (staff from TAHA, DRI and WHW) to ensure the success of the monitoring program.

Leidos Field Supervisor – Mr. Daniel Anzelon, 818-515-6883

- Responsible for day-to-day operations of the monitoring program.
- Works with TAHA technicians to ensure proper operation of monitoring stations.
- Responsible for performing quality assurance (QA) protocols on the air quality and meteorological data on a monthly basis.
- Works with Leidos project manager to resolve any project-related technical issues.

TAHA Operations & Maintenance (O&M) Lead – Mr. Andres Flores, 310-916-4430

- Responsible for coordinating technician support.
- Works with Leidos Project Manager to meet project objectives.
- Responsible for maintaining contact with Leidos project scientist.
- Responsible for shipments of samples to the laboratory.

2.2 Project/Task Description

The QA Plan specifies all quality assurance and quality control (QC) procedures for calibration and operation of the monitoring stations, as well as the air quality and meteorological data. All QA methods are consistent with United States Environmental Protection Agency (USEPA) requirements specified in Title 40 of the Code of Federal Regulations (CFR), Part 58[1] and the USEPA *Quality Assurance Handbook for Air*

[1] Denoted as 40 CFR Part 58.

Pollution Measurement Systems, and the California Air Resources Board (CARB) *Air Monitoring Quality Assurance Manual*.

2.3 Quality Objectives and Criteria for Measurement Data

All quality objectives and criteria for measurement data are consistent with USEPA requirements specified in 40 CFR Part 58 and the USEPA Quality Assurance Handbook, and CARB Quality Assurance Manual.

2.4 Special Training/Certification

Project personnel are trained in the proper use of all equipment and sample handling in accordance with standard operating procedures (SOPs) contained in the Monitoring Plan.

2.5 Documents and Records

All documentation and records are retained for 3 years in accordance with 40 CFR Part 31.42. The following documentation for the Port's air quality monitoring program is maintained:

- QA Plan
- Standard Operating Procedures (SOPs)
- Field and laboratory notebooks located onsite at monitoring stations.
- Sampling handling/custody records for the filter-based PM sampling.

3.0 DATA GENERATION AND ACQUISITION

3.1 Sampling Process Design

The Port's monitoring stations collect data to provide an indication of ambient air quality and meteorological conditions in the San Pedro Bay Ports complex and communities adjacent to the Port-complex. The collected data is used to support various studies, response to actions by regulatory agencies regarding air emissions at the Port, and development of environmental documents (e.g. EIRs, NDs). In order to ensure that the data generation and acquisition are appropriate for these end-uses, the locations of the monitoring stations were selected with consideration of the following four parameters:

1. Identification of monitoring objectives and appropriate data quality objectives
2. Identification of spatial scale for monitoring objectives
3. Identification of most appropriate site locations
4. Identification of specific monitoring sites

The following sections describe these four parameters in greater detail.

3.1.1 Monitoring Objectives and Data Quality Objectives

The objective of the air quality monitoring program is to provide quantitative data of ambient air quality and meteorological in the San Pedro Bay Ports complex and communities adjacent to the Port-complex. The Port's monitoring stations are designed

to measure the ambient air quality concentrations for criteria pollutants, including NO_2, O_3, CO, SO_2, PM_{10}, and $PM_{2.5}$, as well as selected specialized pollutants (BC and UFPs). Meteorological parameters are also measured, such as wind speed, wind direction, ambient temperature, relative humidity, and barometric pressure.

The data quality objectives are to have accurate and precise data recorded by each monitoring station. To achieve these objectives, the equipment is initially calibrated by the manufacturer. Any future calibrations are performed according to manufacturer specifications. The equipment is also tested and maintained according to manufacturer specifications. All air quality and meteorological data is recorded on a regular basis and analyzed for errors using appropriate QA protocols. Sampling is conducted using reference or equivalent methods as specified in the USEPA Quality Assurance Handbook. Error analyses are performed using procedures listed in the USEPA Quality Assurance Handbook as well as other appropriate documents.[2] The data is screened for errors in a consistent and appropriate manner prior to further analysis. Once the QA protocols have been applied to the data, the real-time air quality and meteorological data is uploaded on the Clean Air Action Plan (CAAP) air monitoring website on a monthly basis. Additional information regarding instrument calibrations, testing, and maintenance are contained in Sections 0, 3.10, and 3.11. Additional information regarding sampling and error analyses are discussed in Sections 3.5, 3.6, and 3.7 and in Section 5.0, respectively.

3.1.2 Monitoring Spatial Scales

The Port covers more than 4,300 acres of land. In order to satisfy the monitoring objectives described in Section 3.1.1, the monitoring spatial scale of the stations has been classified as “Neighborhood,” according to the USEPA Quality Assurance Handbook. This classification is appropriate for measuring concentrations within some extended area that has relatively uniform land use with dimensions in the 0.5-to-4.0-kilometer (km) range. This spatial scale allows the Port to obtain data representative of the San Pedro Bay Ports complex and the surrounding neighborhoods. The spatial scale classification is appropriate for each of the air pollutants being monitored.

3.1.3 Site Locations

The selection of monitoring site locations at the Port was dependent upon several criteria. These included the following:

1. Economics and resources available for the monitoring effort
2. Security of the location
3. Logistics of site access, data collection, etc.
4. Meteorological conditions

[2] The procedures listed in the USEPA Handbook include: *Data Quality Assessment: A Reviewer’s Guide*, QA/G-9R, USEPA, EPA/240/B-06/002, February 2006; Rhodes, R.C., “Guideline on the Meaning and Use of Precision and Accuracy Data Required by 40 CFR Part 58, Appendices A and B”, EPA60014-83-023, June 1983; *Selecting Sites for Carbon Monoxide Monitoring*, EPA-450/3-75-077, September 1975; and *Validation of Air Monitoring Data*, USEPA, EPA-600/4-80-030, June 1980.

5. Geographical variability
6. Pollutant considerations (e.g. ambient concentrations, existing sources, etc.)
7. If possible, locate monitors at sites that represent the nearby neighborhoods (San Pedro and Wilmington), the center of Port operations (e.g., on Terminal Island), and an Outer Harbor area.

The locations for the four (4) proposed monitoring stations are discussed in the *POLA Final AQ Monitoring* Plan. The Monitoring Plan analyzed the above criteria and described the specific rationale that was specifically used for site selection.

3.1.4 Specific Monitoring Sites

At each selected location, the monitoring stations have been located in an area that is representative of the ambient air quality environment. Proximity to obstructions, such as trees and fences, can alter air flow, and affect the air quality and meteorological measurements. It is important for the air flow around the monitoring stations to be representative of the general air flow in the area, to prevent sampling bias. Sampling bias occurs when there is a non-random difference between the conditions of a sample taken at a specific location and the average conditions over the area in which the sample is designed to represent. The specific monitoring sites are determined in the Monitoring Plan to avoid or minimize such sampling bias to the extent feasible. The plan takes into consideration the various factors in order to minimize sampling bias.

3.2 Data Types

Under the Port's monitoring program, there are essentially three different types of data sets that are collected: (1) continuous, real-time (hourly) pollutant concentrations, (2) continuous, real-time meteorological data, and (3) integrated, filter-based monitors that measure particulates ($PM_{2.5}$ and PM_{10}) on a 24-hour basis.

Continuous Pollutant Data

Continuous data are obtained for the gaseous pollutants (i.e. NO_2, O_3, CO, and SO_2) using analyzers specifically designed to detect each pollutant. In addition, $PM_{2.5}$ and PM_{10} are measured using beta-attenuation monitors (BAMs). Finally, black carbon (BC) aethalometers and ultrafine particle (UFP) counters are deployed to measure these two parameters, for which there are currently no state or federal ambient air quality standards.

Integrated, Filter-Based Particulate Matter Samplers

Filter-based $PM_{2.5}$ and PM_{10} sampling is conducted using two (2) different types of filters, Teflon and quartz, and specially designed instruments to separate the particulate matter into the appropriate sizes. $PM_{2.5}$ measurements are collected using sequential filter samplers (SFS) with multi-port capability that allows simultaneous PM sampling using both Teflon and quartz filters. The multiple filter sampling approach for $PM_{2.5}$ measurements is due to the types of analyses the Port conducts to measure $PM_{2.5}$ mass (Teflon filter) and elemental carbon (EC), which must be conducted on a quartz filter for laboratory analysis. $PM_{2.5}$ measurements are conducted at all four (4) monitoring stations following the 3-day USEPA $PM_{2.5}$ sampling schedule.

PM_{10} mass measurements are collected using a USEPA Federal Reference Method (FRM) instrument that employs a single, Teflon filter to collect the measurements following the 6-day USEPA PM_{10} sampling schedule.

Each of the filter-based samplers operates for a 24-hour period starting at midnight on each sampling day. After sampling is complete, the Port's air quality technician physically removes the filters from the SFS instrument on a regular schedule. Once the exposed filters are removed from each PM sampler, they are stored in an onsite refrigerator until they are sent to a laboratory (Desert Research Institute) for the appropriate analysis. Extra care must be taken when handling and shipping the filters.

Meteorological Data

Meteorological data is collected on a continuous basis using sonic anemometers (wind speed/direction) and temperature/relative humidity/barometric pressure instruments. Meteorological measurements do not involve collection of any physical samples.

3.3 Monitoring Stations Location and Description

There are four (4) monitoring stations in the Port's air quality monitoring program:

- Wilmington Community Station (33° 46' 43.79" N, 118° 16'10.56" W) - This station is located at the Saints Peter and Paul Elementary School (SPPS) in the City of Wilmington. This station is designed to collect air quality data that are representative of the residential areas of Wilmington. It is centrally located and is approximately 0.5 miles north of Port operations.
- San Pedro Community Station (33° 44' 30" N, 118° 16'44.75" W) - This station is located adjacent to the Promenade walkway along Harbor Drive, across the street from the intersection of Harbor Boulevard and West 3rd Street. This station is designed to collect air quality data that are representative of the residential areas of San Pedro. It is centrally located and is approximately 0.1 mile west of the main ship channel.
- Source-Dominated Station (33° 44' 41.03" N, 118° 15' 40.13" W) - This station is located on Pier 300, at the Terminal Island Treatment Plant (TITP) on 335 Ferry Street. This station is expected to have the highest exposure to emissions from Port operations, as it is in direct proximity to terminal operations which use a large number of diesel engine sources (trucks, trains, ships, and cargo handling equipment). It is also referred to as the "Source-Dominated" station, because of the predominance of on-road and off-road diesel emission sources in the area.
- Coastal Boundary Station (33° 42' 50.58" N, 118° 16' 27.07" W) - This station is located at Berth 47 in the southern end of the Port between the Cabrillo Marina and the San Pedro Breakwater. This location has the least direct exposure to emissions from Port operations.

3.4 Data Retrieval and Sampling Schedules

Under the Port's monitoring program, AQ and meteorological monitoring data is regularly collected and downloaded. Filter-based PM samples are collected following their

respective USEPA sampling schedules and shipped to a laboratory (Desert Research Institute) for the appropriate particulate matter analysis.

Continuous Air Quality Data

This data type is collected and stored by computers located onsite at each monitoring station on an hourly basis. The raw data is safely archived before any QA protocols are applied to the raw and/or any calculations are performed. QA analysis is performed as specified in the data quality objectives in Section 3.1.1.

Continuous AQ data is archived in three (3) different manners within the Port's monitoring program. Each station employs an onsite computer equipped with Agilaire's Site Node Logger (SNL) software to collect and store data from all continuous monitoring instruments at each site. Each stations' onsite computer sends real-time data to the Port's CAAP website on an hourly basis for public display. The real-time AQ data is then stored in an offsite database, which is used to query and display all current and historical monitoring data.

The last methodology for collection, storage and archiving of all continuous and filter-based data is by importing all raw AQ and meteorological monitoring data, manually performing QA protocols on the raw monitoring data, and transferring the QA'd data into a FINAL database file for easy query access and long-term storage/archiving at Leidos' southern California offices. All QA protocols applied to the raw data are performed by trained air quality professionals and reviewed by the Program's QA Officer (Dr. Gary Bertolin).

Particulate matter filter-based samplers

The sampling is conducted on a schedule in accordance with 40 CFR Part 58 Section 58.12 and Appendix D: $PM_{2.5}$ concentrations on the USEPA 3-day monitoring schedule and PM_{10} concentrations are sampled on the USEPA 6-day monitoring schedule. Procedures from the equipment manufacturer are followed as to how to properly remove, handle, and store the exposed PM filters. A new filter is installed according to manufacturer procedures immediately after safely removing and storing the used filter.

Meteorological Data

Continuous meteorological measurements are collected and QA'd similar to the procedures outlined in the continuous AQ data section above. The schedule, collection and QA protocols are applied in a similar manner to the established schedule for the continuous AQ data.

3.5 Sampling and Analysis Methods

The Port's monitoring program uses Federal Reference Methods (FRMs) and Federal Equivalent Methods (FEMs). FRMs are methods of sampling and analyzing the ambient air for an air pollutant or a method that has been designated as a reference method in accordance with 40 CFR Part 50. FEMs are methods of sampling and analyzing the ambient air for an air pollutant that has been designated as an equivalent method in accordance with 40 CFR Part 53. The data from the Port's monitoring program are used for a wide array of applications. Therefore, the sampling methods primarily utilize FRMs

to achieve maximum applicability. The FRM sampling methods that are used are shown below in Table 1 and are incorporated by reference into this document.

Table 1. FRM Sampling Methods

Parameter	Federal Reference Method
NO_2	40 CFR, part 50, Appendix F
O_3	40 CFR, part 50, Appendix D
CO	40 CFR, part 50, Appendix C
SO_2	40 CFR, part 50, Appendix A
PM_{10}	40 CFR, part 50, Appendix J
$PM_{2.5}$	40 CFR, part 50, Appendix L

The FEM sampling methods that are used are shown below in Table 2 and are incorporated by reference into this document.

Table 2. FEM Sampling Methods

Parameter	Federal Equivalent Method
$PM_{2.5}$ Beta Attenuation Mass (BAM) Monitors	40 CFR, part 53
PM_{10} BAM Monitors	40 CFR, part 53
$PM_{2.5}$ Sequential Filter Samplers (SFS)	40 CFR, part 53

3.6 Sample Handling and Custody

As mentioned in Section 3.4, samples are not retained for real-time measurements of gaseous NO_2, O_3, CO, and SO_2 , or for real-time particulate matter measurements (PM_{10}, $PM_{2.5}$, BC and UFP counts). Data for real-time measurements are captured through continuous real-time data collection from each specific analyzer.

Filter-based samples are collected for $PM_{2.5}$ and PM_{10} using FRM and FEM samplers. The FRM samplers draw ambient air at a constant flow rate into a specially shaped inlet where the suspended particulate matter is inertially separated into one or more size fractions within the proper size range. The particles are collected on a single Teflon filter over a specified time range (24-hours). The Port's monitoring program also employs FEM SFS units for $PM_{2.5}$, which work similar to an FRM sampler, but have multiple inlets allowing simultaneous measurements of $PM_{2.5}$ mass and elemental carbon (EC) on separate filters.

Particular attention must be paid to the handling of filters for particulate matter (especially $PM_{2.5}$). Handling of these samples is performed in accordance with the SOPs contained in the Monitoring Plan. SOPs are written documents that detail the method for an

operation, analysis, or action with thoroughly prescribed techniques and steps and are officially approved as the method for performing certain routine and repetitive tasks. The SOPs provide instructions for removal of the filters, packaging, labeling, storage, and transportation. Transportation SOPs include the protocol for chain of custody documents.

Generally, the handling and shipping of the particulate matter samples are performed by the O&M subcontractor, TAHA, with oversight from Leidos staff.

3.7 Analytical Methods

Analytical methods are selected based on the constituents to be measured, the tolerable measurement uncertainty, and on the type of equipment in use at the monitoring stations. All laboratory analyses are performed by a certified environmental laboratory in accordance with EPA and/or other applicable methods.

Lab analyses are performed on $PM_{2.5}$ and PM_{10} sample filters in accordance with the following CARB SOPs:

- SOP 055-0.0: Determination of $PM_{2.5}$ Mass in Ambient Air by Gravimetric Analysis
- SOP 065-1.0: Organic and Elemental Carbon Analysis of Exposed Quartz Microfiber Filters

For occasional special monitoring studies, filter-based PM samples may undergo detailed analysis such as the methods noted below:

- SOP 034-2.0: Determination of Elemental Concentrations in Ambient Air by Energy-Dispersive X-Ray Fluorescent Spectroscopy
- SOP 064-0.0: Analysis of Anions and Cations in $PM_{2.5}$ Speciation Samples by Ion Chromatography

3.8 Quality Control

Quality control refers to the overall system of technical activities that measures the attributes and performance of the Monitoring Plan against defined standards to verify that they meet the stated established objectives. Quality control is both corrective and proactive in establishing techniques to prevent the generation of unacceptable data. General quality control checks are listed in 40 CFR Part 58 Appendix A. Specific quality control checks are also listed in the FRMs in Section 3.5. Applicable checks contained in these regulations are utilized for the Port's monitoring program.

3.9 Monitoring Station Instrument Inventory

Each of the four (4) monitoring stations consists of the equipment listed below:

Monitoring Station Instruments:

- Thermo Fisher Model 49iQ: O_3 UV Photometric Analyzer
- Thermo Fisher Model 48iQ: CO Gas Filter Correlation Analyzer
- Thermo Fisher Model 43iQTL: SO_2 Pulsed Fluorescent Trace Level Analyzer
- Teledyne API Model N500: CAPS True NO_2-NO_X-NO Analyzer
- Thermo Fisher Model 146iQ: Multi-Gas Calibrator
- Thermo Fisher Model 111iQ: Zero Air Supply
- TSI Model 3783: Ultrafine Particle Counter
- Magee Scientific Model AE-33: Black Carbon Aethalometer
- Met One BAM Model 1020: $PM_{2.5}$ Beta-Attenuation Mass Monitor (BAM)
- Met One BAM Model 1020: PM_{10} Beta-Attenuation Mass Monitor (BAM)
- Met One Model 597A: Temperature Humidity Pressure Sensor
- Met One Model 30.5: Industrial Grade Sonic Anemometer (WS/WD)
- Data Collection System: Agilaire Site Node Logger Data Software

The Port procured new instrumentation and ancillary monitoring hardware for each of the four (4) stations in their monitoring network during 2021 - 2022. All new air quality and meteorological monitoring instrumentation was calibrated by the instrument manufacturer at the factory and tested prior to initial deployment in 2021 - 2023, depending on receipt of each instrument.

The table below lists approximate deployment dates for each category of instrument and hardware:

- Thermo Fisher Model 49iQ: November 2022
- Thermo Fisher Model 48iQ: April 2023
- Thermo Fisher Model 43iQTL: July 2023
- Teledyne API Model N500: October 2023
- Thermo Fisher Model 146iQ: February 2023
- Thermo Fisher Model 111iQ: February 2023
- TSI Model 3783: November 2022
- Magee Scientific Model AE-33: September 2021
- Met One $PM_{2.5}$ BAMs: August 2022

- Met One PM_{10} BAMs: August 2022
- Met One Model 597A: August 2022
- Met One Model 30.5: November 2022
- Data Logger Hardware: August 2022

During September 2022, each of the eight (8) Met One BAMs deployed in the Port's monitoring program underwent an onsite 72-hour Zero Filter Background Test to ensure that an initial background adjustment may be made, if necessary, per manufacturer's specifications.

3.10 Instrument/Equipment Testing, Inspection, and Maintenance

Inspection and periodic maintenance procedures are followed in accordance with the SOPs contained in the Monitoring Plan and with each equipment manufacturer's instruction manual(s). Following EPA's guidelines, all of the gaseous criteria pollutant analyzers undergo automatic zero and span (80% full value) calibrations on a daily basis at 2AM to verify that each gaseous instrument's performance continues to meet the manufacturer and EPA monitoring standards.

If any problems are identified during these daily calibrations, the TAHA technician and/or Leidos field supervisor visits the station to provide a follow-up investigation to ensure that the instrument is performing according to the manufacturer's specifications. In addition, each instrument's calibration results are transmitted in real-time (via email) to Leidos AQ monitoring staff, where they are reviewed on a daily basis. If any problems or questions arise with the calibration results or instrument operation, the TAHA technician is dispatched to provide a follow-up investigation. In this manner, the operation of the station is maintained at peak efficiency.

If any instrument in the Port's monitoring program has operational issues that require a resolution period of greater than 48-hours (e.g. – require a part order, or factory repair / calibration, etc.), the non-operational instrument will be replaced with a spare instrument within 48-hours to avoid extended periods of missing data. In addition, the operational status of each air quality instrument in the monitoring program will be updated in real-time on the Port's CAAP monitoring website (https://monitoring.cleanairactionplan.org/).

Leidos also established a Preventative Maintenance (PM) schedule for all of the instruments at the Port. This PM schedule is vital to the success of the Program and in maintaining the instruments at optimum performance. The PM schedule has been developed through review of each instrument manufacturer's maintenance schedule and Leidos staff's historical experience on maintenance of each individual instrument.

For example, there are some parts in various instruments that the manufacturer recommends for annual replacement. Leidos has a specific date in the PM schedule for replacement of these parts and maintains a supply of spare parts on hand that are used during these periodic replacements. This proactive approach maximizes instrument performance, minimizes instrument downtime, and ensures that data recovery is maintained as high as possible.

As another example of Leidos' proactive approach to station maintenance, we perform periodic flow checks, leak tests, and nozzle and vane cleaning per the manufacturer's recommendations. We also perform annual field zero background tests to ensure that the instruments are performing well, and that the data are valid.

In order to adhere to the highest standard of data collection, all maintenance activities are to be electronically documented, emailed via PDF files, and electronically archived on Leidos' servers. Information that needs to be recorded includes - date, station, description of the service activity, and start / completion times of service activity. Following this PM schedule helps to ensure the equipment is operating according to the manufacturer's guidelines.

3.11 Inspection/Acceptance of Supplies and Consumables

Management of supplies and consumables is an important aspect of the QA program. It is important that specifications are prepared for each item and the following should be provided: identity, purity, potency, source, quality and purity tests, purification needs, storage and handling procedures, and replacement dates. All standards and reagents must be maintained, stored, and handled under secure conditions.

The sampling equipment at the Port's monitoring stations require specific consumables and a regularly scheduled maintenance program to ensure quality data is collected by all samplers. The following paragraphs outline the consumables and regularly scheduled maintenance program employed at the Port's four (4) monitoring sites.

Each gaseous instrument's sampling inlet requires filtering of entrained particulate matter from the sample gas via 47-millimeter (mm) Teflon filters. These filters operate on a continuous basis for a period of two-weeks before they are replaced for optimum performance.

Daily calibrations are performed for all gaseous instrumentation at the Port's monitoring stations. These calibrations are conducted using a blended calibration gas (SO_2/NO_2/CO) and a multigas calibrator instrument. The multigas calibrator is designed to perform calibrations on each individual gaseous component (SO_2, NO_2 or CO) by removing the other gaseous components from the single calibration gas stream. To accomplish this, the multigas calibrator employs two scrubber assemblies; one containing charcoal to remove SO_2/CO, and a second containing Puri-fill, which scrubs out oxides of nitrogen (i.e., NO, NO_2, NO_x). Per manufacturer specifications, the charcoal and Puri-fill within the scrubber assemblies require replacement on a semi-annual basis. The Leidos O&M lead will change the charcoal and Puri-fill scrubber assemblies for the multigas calibrator at a six-month interval.

Analysis of the filter samples for the Port's monitoring stations are performed under subcontract by the Desert Research Institute (DRI). The weighing, purity, and analysis of the filter particulate matter samples are conducted in accordance with DRI SOPs. The chain of custody documentation provided by DRI is maintained by the Leidos O&M lead in conjunction with the TAHA technicians supporting the sampling.

The following management activities are recommended for general supplies:

Filters for sampling particulate matter ($PM_{2.5}$ and PM_{10}) must meet the acceptance criteria listed below. It is important to use a filter that is compatible with the sampler, based on manufacturer specifications.

- Collection efficiency greater than 99% as measured by Dioctyl Phthalate (DOP) Test (Check in 40 CFR Part 58) test with 0.3 micrometer particles at the sampler's operating face velocity; and
- Alkalinity less than 0.005 milliequivalent/gram of filter following at least 2 months storage at ambient temperature and relative humidity.

A visual inspection for any defects or damage should be made prior to filter installation and during laboratory pre- and post-weightings. The filters are changed on the 3-day and 6-day USEPA schedules for $PM_{2.5}$ and PM_{10}, respectively.

3.12 Data Management

Data collected through automated systems must be managed in accordance with the USEPA's Good Automated Laboratory Practices (GALP). Data must be collected and managed to ensure that the data meet the following criteria:

- Reliable
- Easily accessible to a variety of users
- Of known quality

All real-time monitoring data are collected and stored on a centralized database on each monitoring station's onsite computer using Agilaire's Site Node Logger software. The Site Node Logger software is configured to automatically (on an hourly basis) transmit the hourly data collected at each station to the CAAP website, developed and hosted by subcontractor West Hills Web (WHW). Leidos staff perform monthly QA/QC review of all real-time air quality and meteorological monitoring data collected at the Port monitoring stations. After QA review, Leidos staff uploads the QA'd real-time data to the Clean Air Action Plan (CAAP) website on monthly basis to ensure the most representative monitoring data is provided for public consumption.

Data quality is maintained on this program by daily data checks completed each sampling day by Leidos staff, instrument checks by the TAHA technician during site visits for the 3-day EPA filter-based sampling schedule, daily project communications between the TAHA onsite technician and Leidos program management staff, and data review by multiple Leidos staff (Leidos PM, Technical QA officer, and O&M Lead).

Further, data quality assurance is provided though an independent, semi-annual audit on each air quality and meteorological monitoring instrument in the Port's network. This ensures an independent measure of instrument performance through evaluation of performance versus manufacturer and USEPA guidelines. The semi-annual audits are performed by qualified technicians at the Desert Research Institute. Semi-annual audit reports are promptly provided to Leidos the program manager after each audit to ensure any corrective actions required are addressed in a timely manner.

See Section 4.3 for additional details on the semi-annual audit process.

4.0 ASSESSMENTS AND OVERSIGHT

4.1 Assessments and Response Actions

Assessments are performed to measure the performance and effectiveness of the Port's monitoring program. The following types of assessments are performed: network reviews, performance evaluations, technical systems audits, and data quality assessments. Each assessment is discussed in greater detail in the following sections.

4.2 Network Reviews

Quarterly network reviews are performed through consultation with Port staff and the Leidos program manager to determine the network's ability to meet its monitoring objectives. Leidos' communication generally provides Port staff with information on instrument performance, instrument issues, and consultation on whether the network may require modification or repair. If necessary, Leidos will provide Port staff with a list of specific modifications, timelines, and cost to Port staff so that the Port's objectives can continue to be met by the monitoring network.

Leidos staff determine the adequacy of the network in accordance with 40 CFR Part 58 Appendix D (Network Design Requirements). In addition, compliance with 40 CFR Part 58 Appendix E (Instrument Siting Requirements) are evaluated. In general, the network review can cover the following topics:

- Instrument performance, issues and suggested solutions
- Problems with data submittals and data completeness
- Maintenance and replacement of monitors and related equipment
- Data communications issues, and/or QA problems
- Funding

This is generally an ongoing process by Leidos staff, where network evaluation and recommendations are provided to Port staff upon completion of network review. The evaluation includes any deficiencies identified in the review, corrective actions, and a schedule for implementing the corrective actions.

4.3 Performance Evaluations

Independent, semi-annual audit performance evaluations are performed to verify and evaluate the quality of data from a measurement phase through the use of samples that produce a known effect. These samples can be used to control and evaluate bias, accuracy, and precision.

The Port program utilizes semi-annual Performance Evaluations performed in accordance with the requirements specified at 40 CFR Part 58 Appendix A, the USEPA Quality Assurance Handbook for Pollution Measurement Systems Volume I (EPA-600/R-94/038a) and Volume II, and applicable USEPA Meteorological Monitoring Guidelines. The evaluations use independent audit analyzers, flow standards, and meteorological audit devices that are traceable to NIST standards to assess the performance of the monitoring network.

The evaluations are performed using a variety of audit systems to generate pollutant concentrations and flowing air streams which are introduced into the sampling system. The outputs from the sampler that result from the use of the audit system are recorded on a data form and compared to the concentration or flow rate that should have been generated by the audit system under the environmental conditions at the site. The following table lists the acceptance criteria. A description of each criterion is listed in the USEPA Quality Assurance Handbook (Volume II, Section 15).

Table 3. NPAP Acceptance Criteria

Criteria	Federal Reference Method
High Volume/PM_{10} (SSI)	% difference ≤ 15% for 1 or more flows
Dichot (PM_{10})	% difference ≤ 15% for 1 or more flows
SO_2, NO_2, and CO	Mean absolute % difference ≤ 15%
O_3	Mean absolute % difference ≤ 10%

While this approach is consistent with Prevention of Significant Deterioration (PSD) requirements and the USEPA National Performance Audit Program (NPAP), ***the Port network is not subject to PSD or the NPAP***. Participation in the NPAP is required for USEPA and state and local agencies that operate SLAMS, NAMS, PAMS or PSD monitors pursuant to Section 2.4 of 40 CFR Part 58, Appendix A. The Port program is not covered by any of those groups and is applying this approach as a best practice.

4.3.1 Data Quality Assessments

A data quality assessment is the statistical analysis of data to determine whether the quality of data is adequate to support the decisions based on the information. The assessment procedures are described in detail in *Data Quality Assessment: A Reviewers Guide,* EPA QA/G-9R[3]. These assessments will be performed as part of the semi-annual Performance Evaluation.

5.0 DATA REVIEW, VERIFICATION, AND VALIDATION

Data review, verification, and validation techniques are used to accept, reject, or qualify data. Data verification is the confirmation that specific requirements and data quality objectives of the Monitoring Plan have been fulfilled whereas data validation is the confirmation that the information obtained from the data meets the requirements for its intended end-use. The following sections discuss in greater detail data review, verification, and validation methods.

[3] *Data Quality Assessment: A Reviewers Guide*, QA/G-9R, USEPA, EPA/240/B-06/002, February 2006.

5.1 Data Review Methods

Leidos performs monthly QA/QC review of continuous data collected at the monitoring stations and the quarterly QA/QC review of the particulate filter results, as the analytical results are received by Leidos from DRI staff (generally on a quarterly basis). Leidos performs the reviews prior to data archiving, performing any analyses, fulfilling any public-data requests and, in the case of filter analysis results, prior to uploading such data to the Port's website.

Data from continuous instruments (pollutant and meteorological) are subjected to an automated data processing system in the Site Node Logger software, where data logging software is programmed to scan the raw data for data outliers. The program flags data values to indicate a possible error(s). This automated data processing is helpful to ensure that non-representative data is not transmitted to the CAAP website.

5.2 Data Verification Methods

The methods for verifying the data obtained from the monitoring equipment are included in the SOPs. The SOPs define the method, responsibilities, and frequency for ensuring that the specific requirements and data quality objectives of the Monitoring Plan have been fulfilled.

5.3 Data Validation Methods

The methods for validating the data obtained from the monitoring equipment are included in the SOPs. The SOPs define the method, responsibilities, and frequency for ensuring that the data meets the requirements for its intended end-use.

5.4 Data Quality Assessment

It is important to evaluate the data obtained from the monitoring instrumentation against the data quality objectives discussed in Section 3.1.1. This evaluation is called the Quality Assessment (QA) process. The QA process involves five steps:

1. Collection of Raw Data - The collection of real-time air quality and meteorological data must initially fall within the ranges specified by the automated data processing system in the Site Node Logger software. Each instrument has data quality ranges programmed to assure that non-representative data (i.e. - negative concentrations, full-scale values, etc.) are flagged and not reported to the CAAP website. In certain instances, this raw data may still be applicable to the overall monitoring program as the data may be corrected (i.e. - incorrect background set, calibration adjustment, etc.). This data is stored in raw format to ensure QA protocols are well-documented and raw data is available in troubleshooting steps. Data collection protocols are continuously reviewed for consistency with the data quality objectives (i.e. tolerable limits, error handling, etc.).
2. Conduct Preliminary Data Review - This step is performed by Leidos staff on a daily basis through checks of daily instrument reports and daily calibration results for the gaseous instruments. All QA/QC reports are reviewed to identify trends, determine any relationships between similar data from nearby regulatory agency monitors, or data anomalies based on historical trends or unusual events. Basic

assessment of the hourly data sets, including graphs of data, is used to assist the data review.

3. Adjustment of Raw Monitoring Data - Based on EPA QA protocols, instrument calibration results, known instrument performance, and/or data quality assessment versus other monitoring stations' data (both other Port stations and regulatory agency stations' data), Leidos' qualified air quality professionals may make adjustment to, or potentially exclude, specific data points in the raw monitoring data, if necessary. This QA analysis is performed using USEPA methodologies and protocols to ensure the most representative air quality and meteorological data is available for research analysis and public consumption via the CAAP website.
4. Transmission of QA'd Data to CAAP Website - On a monthly basis, all real-time air quality and meteorological data that have undergone the QA protocols are uploaded to the CAAP website to ensure the most accurate data is available for public consumption. On a quarterly basis, all filter-based PM measurements are uploaded to the CAAP website reporting monthly and annual results for EC, $PM_{2.5}$ mass and PM_{10} mass analyzed by the Desert Research Institute.
5. Data Archiving - All real-time and filter-based monitoring data are archived on a monthly (real-time) and quarterly (filter-based PM) basis for long-term storage and any public data requests.
6. Annual Data Reporting - On an annual basis, the Port provides a monitoring report detailing the monitoring program's results for the prior monitoring year. Evaluation of data results compared to California and National Ambient Air Quality Standards are provided, as well as trend analysis over the program's period of record.

6.0 REFERENCES

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