Port of Los Angeles

Air Quality Monitoring Program
Monitoring Protocol

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Prepared by:

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List of Acronyms

BAM	Beta-Attenuation Monitor
BC	Black Carbon
CAAP	Clean Air Action Plan
CARB	California Air Resources Board
CFR	Code of Federal Regulations
Cl	Chlorine
CO	Carbon Monoxide
DAHS	Data Acquisition and Handling Software
DBS	Database Management System
DOP	Dioctyl Phthalate
DQA	Data Quality Assessment
DRI	Desert Research Institute
EIR	Environmental Impact Report
ESC	Environmental Systems Corporation
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GALP	Good Automated Laboratory Practices
K	Potassium
km	Kilometer
Na	Sodium
ND	Negative Declaration
NH_4	Ammonium
NO_2	Nitrogen Dioxide
NO_3	Nitric Oxide
NPAP	National Performance Audit Program
O&M	Operation & Maintenance
O_3	Ozone
PAH	Polycyclic Aromatic Hydrocarbons
PM_{10}	Particulate Matter with Aerodynamic Diameter less than 10 microns
$PM_{2.5}$	Particulate Matter with Aerodynamic Diameter less than 2.5 microns
POC	Point of Contact
Port	Port of Los Angeles
POLB	Port of Long Beach
QA	Quality Assurance
QAO	Quality Assurance officer
ROI	Region of Influence
SO_2	Sulfur Dioxide
SO_4	Sulfate
SoCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SOP	Standard Operating Procedures
T-API	Teledyne Advanced Pollution Instrumentation
TAHA	Terry A. Hayes & Associates
UFP	Ultrafine Particle
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

The Port of Los Angeles (Port) currently has an air quality monitoring program that includes comprehensive monitoring of ambient particulate matter (PM) and meteorology within its operational region of influence (ROI), as defined in the current monitoring program Work Plan (Port, 2004). The Port expanded the monitoring program in 2008 to include the following:

- Continuous measurement of ambient gaseous pollutants, including: nitrogen dioxide (NO_2), ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2) at four stations.
- Continuous measurement of ambient particulates, including: ultrafine particle (UFP) counts, particulate matter less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$), and particulate matter less than 10 microns in aerodynamic diameter (PM_{10}) at four stations.

In June 2013, the Port deployed one aethalometer (Magee Scientific Model AE-33) at the Port's Source-Dominated station to measure real-time ambient black carbon (BC) concentrations. BC is the newest air quality parameter measured in the Port's air quality monitoring program. In May 2021, the Port purchased an additional four (4) Magee Scientific Model AE-33 aethalometers for deployment at each of the Port's four (4) air monitoring stations and one (1) backup aethalometer in case any of the aethalometers required factory repair or calibration.

In 2020, the Port began the procurement process to update all the instrumentation (both air quality and meteorological parameters) in their air monitoring program. Due to supply chain issues, the receipt and installation of all instruments at each of the Port's four (4) stations were completed as the instruments were received beginning May 2021 and ending October 2023.

The monitoring stations continue to be located with the Port's ROI at:

(1) Berth 47 in the Outer Harbor area (Coastal Boundary Station),

(2) Terminal Island Treatment Plant in the center of Port operations (Source-Dominated Station),

(3) Berth 87 within the San Pedro community near the intersection of South Harbor Boulevard and 5th Street (San Pedro Community Station), and

(4) St. Peter & Paul School within the Wilmington community (Wilmington Community Station).

The locations of the monitoring stations are shown in Appendix 1, Figure 1.

This document describes the approach used to implement this program, including data collection, processing, and quality assurance (QA) procedures incorporated within the program.

2.0 ENVIRONMENTAL SETTING

2.1 Topography

The Port of Los Angeles is in the Harbor District of the City of Los Angeles in the southwestern portion of the Los Angeles air basin. The basin consists of a broad coastal plain of low relief that slopes gradually seaward (southwest and south) to the Pacific Ocean. The Port harbor is in the southern portion of San Pedro Bay, a natural embayment formed by a westerly protrusion of the coastline and the dominant onshore topographic feature, the Palos Verdes Hills. The topography of the Port is generally flat and slightly undulating.

2.2 Regional Climate and Meteorology

The climate of the Project region is classified as Mediterranean, characterized by warm, rainless summers and mild, wet winters. The major influence on the regional climate is the Eastern Pacific High (a strong persistent area of high atmospheric pressure over the Pacific Ocean), topography, and the moderating effects of the Pacific Ocean. Seasonal variations in the position and strength of the High are a key factor in the weather changes in the area.

The Eastern Pacific High attains its greatest strength and most northerly position during the summer, when the High is centered west of northern California. In this location, the High effectively shelters southern California from the effects of polar storm systems. Large-scale atmospheric subsidence associated with the High produces an elevated temperature inversion along the West Coast. The base of this subsidence inversion is generally from 1,000 to 2,500 feet (300 to 800 meters) above mean sea level (msl) during the summer. Vertical mixing is often limited to the base of the inversion, and air pollutants are trapped in the lower atmosphere. The mountain ranges that surround the Los Angeles Basin constrain the horizontal movement of air and inhibit the dispersion of air pollutants out of the region. These two factors, combined with the air pollution sources of over 15 million people, are responsible for the high pollutant concentrations that can occur in the South Coast Air Basin (SoCAB).

Marine air trapped below the base of the subsidence inversion is often condensed into fog and stratus clouds by the cool Pacific Ocean. This is a typical weather condition in the San Pedro Bay region during the warmer months of the year. Stratus clouds usually form offshore and move into the coastal plains and valleys during the evening hours. When the land heats-up the following morning, the clouds burn-off to the immediate coastline, but often reform again the following evening.

As winter approaches, the Eastern Pacific High begins to weaken and shift to the south, allowing storm systems to pass through the region. The number of days with precipitation varies substantially from year to year, which produces a wide range of variability in annual precipitation totals. The annual precipitation for the Long Beach Airport, approximately 9 miles (14.5 km) northeast of the Project site, has ranged from 2.6 to 27.7 inches (6.6 to 70.4 cm) from 1958 through 2004, with an average of 11.9 inches (30.2 cm) (Western Region Climate Center 2004). About 94 percent of the annual rainfall occurs during the months of November through April, with a monthly average maximum of 2.9 inches (7.4 cm) in February. This wet-dry seasonal pattern is characteristic of most of California. Infrequent precipitation during the summer months usually occurs from tropical air masses that originate from continental Mexico or tropical storms off the West Coast of Mexico.

The average high and low temperatures at the Long Beach Airport in August are 83°F (28°C) and 64°F (18°C), respectively. January average high and low temperatures are 67°F (19°C) and 46°F (8°C). Extreme high and low temperatures recorded from 1958 through 2004 were 111°F (44°C) and 25°F (-4°C), respectively (Western Region Climate Center 2004). Temperatures in the San Pedro Bay area are generally less extreme than inland regions, due to the moderating effect of the ocean.

The proximity of the Eastern Pacific High and a thermal low-pressure system in the desert interior to the east produce a sea breeze regime that prevails within the Project region for most of the year, particularly during the spring and summer months. Sea breezes at the Port typically increase during the morning hours from the southerly direction and reach a peak in the afternoon as they blow from the southwest. These winds generally subside after sundown. During the warmest months of the year, however, sea breezes could persist well into the nighttime hours. Conversely, during the colder months of the year, northerly land breezes increase by sunset and into the evening hours. Sea breezes transport air pollutants away from the coast and towards the interior regions in the afternoon hours for most of the year.

During the fall and winter months, the Eastern Pacific High can combine with high pressure over the continent to produce light winds and extended inversion conditions in the region. These stagnant atmospheric conditions often result in elevated pollutant concentrations in the SoCAB. Excessive buildup of high pressure in the Great Basin region can produce a “Santa Ana” condition, characterized by warm, dry, northeast winds in the basin and offshore regions. Santa Ana winds often ventilate the SoCAB of air pollutants.

The Palos Verdes Hills have a major influence on wind flow in the Port. For example, during afternoon southwest sea breeze conditions, the Palos Verdes Hills often block this flow and create a zone of lighter winds in the inner Harbor area of the Port. During strong sea breezes, this flow can bend around the north side of the Hills and end up as a northwest breeze in the inner Harbor area. This topographic feature also deflects northeasterly land breezes that flow from the coastal plains to a more northerly direction through the Port.

3.0 AIR MONITORING IN THE PORT AREA

The Port’s system was developed to expand upon other regional air monitoring efforts in the SoCAB, including those conducted by the South Coast Air Quality Management District (SCAQMD), the California Air Resources Board (CARB) and the Port of Long Beach (POLB).

4.0 MONITORING STATION DESIGN AND SPECIFICATION

4.1 Description of the Monitoring Protocol

4.1.1 Data Types

There are essentially three different types of data sets that are collected: (1) real-time pollutant data, (2) filter-based particulate matter data, and (3) meteorological data.

Real-Time Pollutant Data

Real-time data are measured for gaseous pollutants (i.e., NO_X, O_3, CO, and SO_2) using various gaseous analyzers as well as for PM_{10} and $PM_{2.5}$ using beta-attenuation mass (BAM) particulate analyzers. In addition, UFP counts are monitored using TSI Incorporated Model 3783 UFP counters, and BC measurements are conducted using Magee Scientific Model AE-33 aethalometers.

Particulate Matter Filter-based Data

These data include PM_{10} and $PM_{2.5}$ using different types of filters and specially designed equipment to collect particulate matter in specific size ranges. PM_{10} is collected using monitors equipped with a single filter. $PM_{2.5}$ is collected using two methods: single filter monitors and multi-port monitors which use filters constructed of different media (i.e., Teflon and quartz fibers, which permit different analytical techniques in the laboratory). Each of the monitors operates for a specified length of time, typically 24 hours. A technician physically removes the filters from the monitoring equipment on a regular schedule at which time they are stored in a refrigerator until they are sent to a laboratory for analysis. Extra care must be taken when handling and shipping the filters.

Meteorological Data

Meteorological data is collected on a continuous basis using an array of equipment and sensors. Measurement of meteorological parameters does not involve collection of any physical samples.

4.1.2 Sampling and Analysis Methods

Real-Time Pollutant Data

Gaseous NO_2, O_3, CO, and SO_2 concentrations and real-time PM_{10} and $PM_{2.5}$ concentrations are measured using continuous real-time analyzers. In addition, black carbon (BC) concentrations are measured using Magee Scientific Model AE-33 aethalometers and ultrafine particles (UFP) are measured using TSI Model 3783 UFP counters.

PM Filter-Based Samplers

Filter-based particulate matter (PM) concentrations are sampled using either FRMs or FEMs. FRMs are methods of sampling and analyzing the ambient air for an air pollutant or a method that have 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 have been designated as an equivalent method in accordance with 40 CFR Part 53. The FRM sampling methods that are used for PM_{10} and $PM_{2.5}$ under this program are shown below in Table 1.

Table 1. FRM Sampling Methods

Parameter	Federal Reference Method
PM_{10}	40 CFR, part 50, Appendix J
$PM_{2.5}$	40 CFR, part 50, Appendix L

The FEM sampling methods that are used for PM_{10} and $PM_{2.5}$ under this program are shown below in Table 2.

Table 2. FEM Sampling Methods

Parameter	Federal Equivalent Method
PM_{10} BAM Monitors	40 CFR, part 53
$PM_{2.5}$ BAM Monitors	40 CFR, part 53

Data from the Port's monitoring program are used to show comparative compliance relative to PM_{10} and $PM_{2.5}$ standards, and to validate data collected from the BAM and SFS monitors.

While such comparisons are presented, the Port's air monitoring program does not make any representations as to compliance with either National Ambient Air Quality Standards (NAAQS) or California Ambient Air Quality Standards (CAAQS). The U.S. Environmental Protection Agency (USEPA) makes NAAQS compliance determinations with input from state and regional air agencies. The California Air Resources Board (CARB) makes CAAQS compliance determinations.

For the SoCAB, which includes the Los Angeles metropolitan region, the SCAQMD is responsible for operating the air quality monitoring stations used for compliance demonstrations. While the Port's monitoring stations are operated in accordance with the same federal / state regulations and guidelines, the Port's stations are outside the official monitoring network and are not used in any compliance determinations.

Meteorological Data

Meteorological conditions are measured in real-time using various equipment and analyzers. No physical meteorological samples are collected.

4.1.3 Analytical Methods

Real-Time Data

As noted above, real-time measurements of gaseous NO_2, O_3, CO, and SO_2, and PM measurements, including $PM_{2.5}$, PM_{10}, BC, and UFP, are recorded by individual instruments and stored in an onsite computer with a data acquisition and handling software (DAHS), along with the meteorological data.

PM Filter-Based Samplers

Routine laboratory analyses are performed on $PM_{2.5}$ and PM_{10} sample filters for the following constituents:

- Gravimetric mass
- Elemental carbon / organic carbon

Lab analyses of $PM_{2.5}$ and PM_{10} sample filters follow the Standard Operating Procedures (SOPs) developed by the California Air Resources Board (CARB). All analyses are performed by a certified environmental laboratory in accordance with EPA and/or other applicable methods.

The following table lists the SOPs for analyzing various constituents.

Table 3. Particulate Matter Standard Operating Procedures

SOP – Version Number	Standard Operating Procedure Title
055-0.0	Determination of $PM_{2.5}$ Mass in Ambient Air by Gravimetric Analysis
065-1.0	Organic and Elemental Carbon Analysis of Quartz Microfiber Filters

Meteorological Data

Meteorological data are collected using real-time measurements and stored on an onsite computer with a data acquisition and handling software (DAHS).

4.1.4 Description of the Monitoring Equipment

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.

As of January 2024, each of the Port's four (4) monitoring stations consist of the following equipment listed below:

Wilmington Community Station:

- 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
- Calibration Gas: Cylinder blend of SO_2, NOx and CO
- Calibration Gas: Inlet Manifold

- 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)
- Desert Research Institute (DRI): $PM_{2.5}$ Sequential Filter Samplers (SFS)
- Thermo Model 2000i-AN Partisol-FRM $PM_{2.5}$ Air Sampler 120 VAC
- Thermo Model 2000i-AN Partisol-FRM PM_{10} Air Sampler 120 VAC
- 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

San Pedro Community Station:

- 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
- Calibration Gas: Cylinder blend of SO_2, NOx and CO
- Calibration Gas: Inlet Manifold
- 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)
- Desert Research Institute (DRI): $PM_{2.5}$ Sequential Filter Samplers (SFS)
- 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

Coastal Boundary Station:

- 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
- Calibration Gas: Cylinder blend of SO_2, NOx and CO
- Calibration Gas: Inlet Manifold
- 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)
- Desert Research Institute (DRI): $PM_{2.5}$ Sequential Filter Samplers (SFS)
- 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

<u>Source-Dominated Station</u>:

- 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
- Calibration Gas: Cylinder blend of SO_2, NOx and CO
- Calibration Gas: Inlet Manifold
- 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)
- Desert Research Institute (DRI): $PM_{2.5}$ Sequential Filter Samplers (SFS)
- 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

In addition to the instrumentation listed above, the Port maintains at least one (1) spare instrument for each of the air quality parameters listed above. If any instrument in the monitoring program has operational issues requiring a resolution period of greater than 48-hours (e.g. - part order necessary, 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/).

5.0 PROJECT MANAGEMENT

5.1 Project/Task Organization

The development and implementation of the air quality monitoring program 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 Port with respect to the monitoring program.
- Work with Leidos program manager (PM) and technical director to resolve project issues.

Leidos Project Manager: Mr. Joel Torcolini, 858-826-2732

- Responsible for overall management and operation of program, including budget and schedule.

- Works with Leidos technical director to resolve technical and program issues.
- Coordinates with Port staff to ensure monitoring program objectives are met.

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

- Works with Leidos PM to meet technical and program objectives.
- Works with Leidos operations and maintenance (O&M) manager to ensure the success of the monitoring program.
- Responsible for overall quality assurance (QA) procedures for the monitoring program.

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

- Works with Leidos PM and technical director to meet technical and program objectives.
- Responsible for operating and maintaining field sampling equipment, providing instrument troubleshooting, and performing preventative maintenance tasks.

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

- Responsible for day-to-day operations of the monitoring program.
- Works closely with Leidos staff to ensure proper operation of monitoring stations.
- Work with Leidos staff to resolve any project-related technical issues.

5.2 Quality Objectives and Criteria for Measurement Data

All quality objectives and criteria for measurement data 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 Pollution Measurement Systems*, and the California Air Resources Board (CARB) *Air Monitoring Quality Assurance Manual*.

5.3 Special Training/Certification

Project personnel are trained in the proper use of all equipment and sample handling in accordance with standard operating procedures (SOPs) as presented in Section 4.0.

5.4 Documents and Records

All documentation and records will be 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
- SOPs

[1] Denoted as 40 CFR Part 58.

- Field and laboratory notebooks
- Sampling handling/custody records

6.0 DATA GENERATION AND ACQUISITION

6.1 Sampling Process Design

The Port's monitoring stations collect data to provide an indication of ambient air quality and meteorological conditions. 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). 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 the monitoring objective and appropriate data quality objectives
2. Identification of the spatial scale for the monitoring objective
3. Identification of the most appropriate site location
4. Identification of the specific monitoring sites

The following sections describe these four (4) parameters in greater detail.

6.1.1 Monitoring Objectives and Data Quality Objectives

The objective of air quality monitoring program is to provide quantitative data of ambient air quality and meteorological conditions within the Port ROI. The Port's monitoring stations are designed to measure and capture ambient air quality concentrations for gaseous NO_2, O_3, CO, and SO_2, as well as the following particulate matter parameters: UFP, BC, PM_{10} and $PM_{2.5}$. The following meteorological parameters are measured to supplement the air quality concentrations: ambient temperature, relative humidity, wind speed and wind direction.

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 will be performed according to manufacturer specifications. The equipment is also tested and maintained according to manufacturer specifications. The data is sampled and downloaded on a regular basis and analyzed for errors using appropriate statistical methods. 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 prior to any further analysis or calculations in a consistent and appropriate manner. Additional information regarding equipment calibrations, testing, and maintenance are

[2] The procedures listed in the USEPA Handbook include: *Guidance for the Data Quality Assessment Process*, QA/G-9, USEPA, QAD EPA/600/R-96/084, July 1996; 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.

contained in Sections 6.8, 6.9, and 6.10. Additional information regarding sampling and error analyses are discussed in Sections 4.1.2, 6.5, and 6.6 and 6.7, respectively.

6.1.2 Monitoring Spatial Scales

The Port covers more than 4,000 acres of land. To satisfy the monitoring objectives described in Section 6.1.1, 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 Port ROI. This spatial scale classification is also appropriate for each of the air pollutants being monitored.

6.1.3 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. Representativeness of the location
3. Security of the location
4. Logistics of site access, data collection, etc.
5. Meteorological conditions
6. Geographical variability
7. Pollutant considerations (e.g., ambient concentrations, existing sources, etc.)

6.1.4 Specific Monitoring Sites

At each selected location, the monitoring stations are situated in an area that allows for maximal air flow. Proximity to obstructions, such as trees and fences, can alter air flow. Areas prone to ground dust may also adversely impact 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 supposed to represent. The specific monitoring sites are determined to avoid or minimize such sampling bias to the extent feasible.

6.2 Number of Monitoring Stations

There are four monitoring stations in the Port’s air quality monitoring program. Three of the stations have custom-built shelters installed to hold all equipment at Berth 47, Berth 87, and the Terminal Island Treatment Plant. The fourth station is installed in a designated spare room at the St. Peter & Paul School.

6.3 Field Procedures

Under this monitoring program, the Port is collecting data for a variety of air pollutants and meteorological parameters. Apart from the filter-based particulate matter samplers, these data will be collected using continuous, real-time analyzers. The filter-based PM samplers will collect physical samples, which require off-site analysis at a laboratory.

This section describes the data collection techniques, responsibilities of the onsite field technicians, and QA measures employed by this air quality monitoring program.

6.3.1 Monitoring Tasks

6.3.1.1 Real-Time Analyzers

Each time the onsite field technicians visit a monitoring station they will perform the following tasks:

- Technicians perform checks on the status of the meteorological monitoring station. Any abnormalities will be reported to Leidos staff.
- Technicians perform checks on the real-time air quality instrumentation, to make sure that all instrumentation is performing to manufacturer's recommendations. Any abnormalities will be reported to Leidos staff.

6.3.1.2 PM Filter-Based Samplers

Each sampling day, the following tasks will be performed by the onsite field technicians upon arrival for the PM filter-based samplers:

1) Technicians conduct routine maintenance service checks on each PM sampler following the procedures outlined in the flowchart in Appendix 1, Figure 3. Final flow rates and elapsed times are recorded on the field datasheets (Appendix 1, Figure 5), filter cartridges are exchanged, and the initial flow rate for the next sampling run is recorded on the field data sheet. A detailed step-by-step checklist for the monitors is provided in Appendix 1, Figure 4.
2) Technicians recover exposed PM_{10} / $PM_{2.5}$ filters and install new filters. Technicians also perform routine maintenance checks on each of the FRM and FEM particulate matter monitors and record any unusual conditions on the field datasheet (Appendix 1, Figure 6). A detailed service schedule for the FRM and FEM monitors is presented in Appendix 1, Figure 7.
3) After every site visit, technicians complete a "Master Monitoring Checklist" (Appendix 1, Figure 2) which summarizes the status of all instruments in the monitoring program. Upon completion, this checklist will be sent to Leidos staff by email to document the status of the monitoring program.

   If there are any problems or issues with the monitoring program, the technicians will call Joel Torcolini or Danny Anzelon (Leidos Points of Contact [POC)] to provide a more detailed update and discussion of the monitoring program status. Any necessary corrective action will be documented by the Leidos POC via email or in an Instrument Incident Report.

6.3.1.3 Meteorological Data

Each time technicians visit a monitoring station they will check the operation of the meteorological monitoring station. The technician will verify the operation by completing the real-time monitor checklist (Appendix 1, Figure 8).

6.3.2 Sampling Schedule and Frequency

6.3.2.1 Real-Time Analyzers

The real-time analyzers sample on a continuous basis.

6.3.2.2 PM Filter-Based Samplers

The sampling schedule for PM filter-based samplers will follow the EPA's 3-day ($PM_{2.5}$) and 6-day (PM_{10}) monitoring schedule.

6.3.2.3 Meteorological Analyzers

The real-time meteorological instruments sample on a continuous basis.

6.3.3 End of Day Communication

Each day technicians visit the sampling sites, they fill out the Master Monitoring Checklist (Appendix 1, Figure 2) to ensure the proper operation of monitoring equipment on that sampling day. At the end of each sampling day, the Master Monitoring Checklist (MMC) is emailed to Leidos staff where the checklists are electronically archived through duration of the monitoring program.

In addition, technicians verbally (or via electronic text) update Leidos staff at the conclusion of every site visit. The status of all sampling instruments is reviewed daily, and any instrument or sampling problems are discussed in detail. Any necessary corrective actions will be worked out at that time.

At the conclusion of each sampling visit, the technician will call or text Leidos staff to report on the status of the monitoring activities. The primary point of contact at Leidos will be Mr. Joel Torcolini (Leidos PM). If Mr. Torcolini is not available, then Mr. Danny Anzelon Torcolini (Leidos Field Supervisor) is contacted to relay the status of the day's monitoring activities.

Leidos staff can be reached at the following numbers:

<u>Primary Point of Contact</u>:

Mr. Joel Torcolini	Leidos Program Manager
Office:	858-826-2732
Cell:	760-214-0797
Email:	torcolinij@leidos.com

Secondary Point of Contact:

Dr. Gary Bertolin Leidos Technical Director
Cell: 828-200-0674
Email: bertoling@leidos.com

Tertiary Point of Contact:

Mr. Danny Anzelon Leidos Field Supervisor
Cell: 818-515-6883
Email: daniel.b.anzelon@leidos.com

6.3.4 Shipping PM Filters to the Laboratory

The onsite field technicians are responsible for shipments of samples to the laboratory. Following each site visit, the plastic bag containing the exposed filter cassettes and data sheet are taken back to the storage office and stored in a clean, dry refrigerator. During filter storage, the technicians make copies of all field datasheets, monitoring checklists, and send those copies to Leidos staff at monthly intervals. At the conclusion of each month, the exposed filters are shipped to the designated laboratory for analysis.

6.4 Data Retrieval and Sampling Schedules

Under the Port's monitoring program, real-time and meteorological data are automatically recorded and stored on an onsite computer using a DAHS, while filter-based PM samples are collected manually.

Continuous Pollutant Data

This data type is recorded on an hourly basis and stored on an onsite computer using a DAHS. The raw data is archived on this onsite computer and transmitted to an offsite databased on an hourly basis. This raw database is stored separated before any validation or calculations are performed. Error analyses are performed as specified in the data quality objectives in Section 6.1.1.

Continuous pollutant data is archived in three different manners within the Port's monitoring program. Each station employs AirVision's Site Node Logger (SNL) software that collects and stores data indefinitely from all continuous monitoring equipment at each site. Each station's dataset is transmitted to an offsite computer on an hourly basis to ensure data management on multiple, redundant platforms. AirVision's SNL software remotely polls each of the Port's monitoring stations automatically, transferring the data to a central storage station at Leidos offices in San Diego, CA.

Particulate matter filter-based samplers

The sampling is conducted on a schedule in accordance with 40 CFR Part 58 Section 58.12: PM_{10} concentrations are sampled on the USEPA 6-day monitoring schedule and $PM_{2.5}$ concentrations on the USEPA 3-day monitoring schedule. The USEPA monitoring schedule is shown in Appendix 1, Figure 9. Procedures from the equipment manufacturer are followed as to how to properly remove the filter. A new filter is installed immediately after safely removing and storing the used filter according to manufacturer procedures.

Meteorological Data

Meteorological data is downloaded and stored similarly to continuous air quality data. The schedule coincides with the established schedule for the continuous pollutant data.

6.5 Sample Handling and Custody

As mentioned in Section 6.3, physical samples are not collected for real-time measurements of gaseous NO_2, O_3, CO, and SO_2 and for real-time particulate matter measurements. Data for real-time measurements are captured through continuous real-time measurement analyzers.

Filter-based samples are collected for PM_{10} and $PM_{2.5}$, using FRM and FEM samplers. A FRM sampler draws 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 specially designed filter over a specified time range. This program also uses FEM SFS units for $PM_{2.5}$, which work similarly to an FRM sampler, but have multiple inlets and can accommodate multiple filters.

Particular attention must be paid to the handling of filters for particulate matter (especially $PM_{2.5}$). Handling of these samples will be performed in accordance with the SOPs presented in Section 4.1.3. 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 PM samples are performed by the technician O&M subcontractor, TAHA, with oversight from Leidos staff.

6.6 Analytical Methods

Analytical methods are selected based on what constituents are measured, what measurement uncertainty is tolerable 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 CARB SOPs presented in Section 4.1.3.

6.7 Quality Control

Quality control refers to the overall system of technical activities that measures the attributes and performance of the monitoring program 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 4.1.2. Applicable checks contained in these regulations are utilized for the Port's monitoring program.

6.8 Instrument/Equipment Calibration and Frequency

The equipment was provided by the manufacturer and calibrated and tested prior to initial operation to ensure the quality of the data. Once the equipment is in full operation, each analyzer is set to automatically perform a zero calibration at 2:00 am each day by pumping zero air into the analyzer. Also, each analyzer is set to automatically perform a span calibration at 2:00 am each day by introducing a known concentration of calibration gas into the analyzer. The calibration data is automatically sent to Leidos via the SNL data acquisition system. Leidos staff review the calibration data and correct any abnormalities by conducting a manual calibration. All the calibration data and related calculations are recorded in a calibration archive.

The equipment calibration documentation must be kept on-site with each analyzer and in a backup file. This documentation includes calibration data, calibration equation(s), analyzer identification, calibration date, analyzer location, calibration standards, identification of calibration equipment, and the person conducting the manual calibration.

6.9 Instrument/Equipment Testing, Inspection, and Maintenance

Inspection and periodic maintenance procedures are followed in accordance with the SOPs contained in Section 4.1.3 and with the equipment manufacturer's instruction manual.

6.10 Inspection/Acceptance of Supplies and Consumables

The management of supplies and consumables is an important aspect of quality assurance. 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 the regularly scheduled maintenance program employed at the Port monitoring sites.

The main gaseous sampling inlet requires filtering of entrained particulate matter from the sample gas via 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/CO) and a multi-gas calibrator instrument. The multi-gas calibrator is designed to perform calibrations on each individual gaseous component (SO_2, CO, or

NO) by removing the other gaseous components from the single calibration gas stream. To accomplish this, the multi-gas 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 an annual basis. The TAHA field manager changes the charcoal and Puri-fill scrubber assemblies for the multi-gas calibrator during the planned Annual Maintenance.

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

The following management activities are recommended for general supplies:

Filters for sampling particulate matter (PM_{10} and $PM_{2.5}$) 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 damages should be made prior to filter installation and during laboratory pre- and post- weightings. The filters are changed on the 6-day and 3-day USEPA schedules for PM_{10} and $PM_{2.5}$, respectively.

6.11 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

Monitoring data are gathered and stored on an onsite computer using AirVision's Site Node Logger (SNL) software. The SNL software is capable of automatically uploading data to the public website via a data transfer protocol specific to the CAAP website. Leidos implements a variety of daily, weekly, monthly, and semi-annual QA/QC protocols to review the data collected at the Port monitoring stations.

Data quality is maintained for this program using instrument checklists completed for each sampling day, routine project communications between the onsite technicians and Leidos staff, and data review procedures employed during the air quality monitoring program. Furthermore, data quality and instrument performance is maintained by independent, semi-annual audits.

7.0 ASSESSMENTS AND OVERSIGHT

7.1 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.

7.2 Network Reviews

Annual network reviews are performed to determine the monitoring network's ability to meet its monitoring objectives. The review determines whether the network should be modified and, if necessary, provides a list of specific modifications, so that the network continues to meet its objectives.

The network reviewer determines 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 (Probe Siting Requirements) are evaluated. In general, the network review can cover the following topics:

- Relocation of monitors
- Siting criteria problems and suggested solutions
- Problems with data submittals and data completeness
- Maintenance and replacement of monitors and related equipment
- QA problems

A written network evaluation is prepared upon completion of the network review. The evaluation includes any deficiencies identified in the review, corrective actions, and a schedule for implementing the corrective actions.

7.3 Performance Evaluations

Annual performance evaluations are performed to verify and evaluate the quality of data from a measurement phase using samples that produce a known effect. These samples can be used to control and evaluate bias, accuracy, and precision.

The Port program undergoes semi-annual Performance Evaluations in accordance with the requirements specified at 40 CFR Part 58 Appendix A, the USEPA Quality Assurance Handbook Volume I (EPA-600-9-76-005) and Volume II (EPA-600/4-77-027a), and applicable USEPA Meteorological Monitoring Guidelines. The evaluations use independent audit analyzers, flow standards, and meteorological audit devices (traceable to NIST standards) to assess monitoring network performance.

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 (Part 1, Section 15).

Table 4. NPAP Acceptance Criteria

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

While this approach is consistent with Prevention of Significant Deterioration (PSD) requirements and USEPA National Performance Audit Program (NPAP), the Port network is not subject to PSD or 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.

7.3.1 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 *Guidance for the Data Quality Assessment Process*, EPA QA/G-9[3]. These assessments will be performed as part of the semi-annual Performance Evaluation.

7.4 Leidos Deliverables and Reports to Port Management

Leidos produces an annual summary report that includes:

- Summaries of the annual period of air quality data.
- Comparison of the annual data set with data from prior years.
- Interpretation of monitoring results.
- Evaluation of specific air quality events, such as elevated air quality concentrations and select onshore/offshore flow patterns.
- Evaluation of source-receptor relationships with the use of onshore / offshore analyses, detailed PM analysis, meteorological data, and advanced modeling techniques
- Estimates of annual DPM concentrations
- Recommendations for modifications to the program sampling / analyses techniques, based upon current program knowledge.

[3] *Guidance for the Data Quality Assessment Process*, QA/G-9, USEPA, QAD EPA/600/R-96/084, July 1996.

QA reports are provided to the Port. The types of reports generated, and the reporting dates are shown below in Table 4. A calendar of the reporting dates for the QA reports are also shown in Appendix 1, Figure 10.

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 program 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.

7.5 Data Review Methods

Leidos staff perform daily QA/QC review of continuous data collected at the monitoring stations and monthly QA/QC review of the particulate filter analytical results. Leidos staff perform reviews prior to performing any calculations or analyses and, in the case of filter analysis results, prior to uploading such QA'd data to the Port's website.

Data from the continuous instruments (pollutant and meteorological) are subjected to an automated data processing system, where the SNL software is programmed to scan data values for extreme values, outliers, or ranges. The software flags data values to indicate a possible error. In addition to the automated data QA measures, Leidos staff employ other (automated and manual) data processing and QA/QC protocols to complete the required review.

7.6 Data Verification Methods

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 have been fulfilled.

7.7 Data Validation Methods

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

Table 5. Reporting Frequency of QA Reports to Management

Type of QA Report to Management	Person(s) Responsible for Report Preparation	Contents	Reporting Dates												
			Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25
Instrument Incident Reports	TAHA: Andres Flores	Description of problem; recommended action required; resolution of problem	X	X	X	X	X	X	X	X	X	X	X	X	X
Control Chart with Summary	TAHA: Andres Flores DRI: Steve Kohl	Repetitive field or lab activity; control limits. Prepare whenever new QA check or calibration are used	X	X	X	X	X	X	X	X	X	X	X	X	X
Annual Summary Report	Leidos: Joel Torcolini and technical staff	Summaries of the annual period of air quality data and evaluation							X						
Annual System Audits	DRI: Steve Kohl	Summary of system audit results; recommendations for action, as needed					X						X		

7.8 Data Quality Assessment

It is important to evaluate the data obtained from the monitoring equipment against the data quality objectives discussed in Section 6.1.1. This evaluation is called the Data Quality Assessment (DQA). The DQA process involves five steps:

1. Review Data Quality Objectives and Sampling Design – data quality objectives should be reviewed to assure that they are still applicable to the overall monitoring program. The data, sampling design, and collection protocol should be reviewed for consistency with the data quality objectives (i.e. tolerable limits, error handling, etc.).
2. Conduct Preliminary Data Review – This step involves the review of QA/QC reports. All QA/QC reports should be reviewed to identify trends, relationships, or anomalies. Basic statistics about the data sets, including graphs of data, may be used to assist in the data review.
3. Select the Statistical Test – Based on the reviews of the data quality objectives, sampling design, and the preliminary data review, a statistical test shall be employed to summarize and analyze the data using the most appropriate methodology. Statistical tests for each pollutant can be found in the associated FRMs listed in Table 1.
4. Verify Assumptions of Statistical Test – Evaluate whether the assumptions are valid for each statistical test performed in the previous step. Assumptions may include those associated with the development of the data quality objectives in addition to the bias and precision assumptions. Data verification should be based on as much data as are available. Refer to Section 18 of the USEPA Quality Assurance Handbook for a sample evaluation.
5. Draw Conclusions from the Data – The performance of the monitoring program, including the data/sampling design and collection protocol, shall be evaluated. The plan should be evaluated against the monitoring and data quality objectives, noting any corrective actions or changes. The results of the statistical tests should reinforce any conclusions.

8.0 REFERENCES

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