

The Port Of Los Angeles Air Quality Monitoring Program

Semi-Annual Report

May – October 2007

1.0 Introduction

This report provides a summary of the operation of the four-station air monitoring network at the Port of Los Angeles (POLA), during the period from May to October, 2007. The period represents the first half of the 3rd year of operation, as the monitoring program came online with all four stations at the end of April, 2005.

The focus of this program has been to monitor for particulate matter (PM₁₀ and PM_{2.5}, or particulate matter less than 10 and 2.5 micrometers in diameter, respectively) and meteorological data. The main objectives of this report is to supplement the Program's detailed annual reports, summarize the operation of the monitoring network during the six-month time frame, and discuss planned activities for the Program over the next six months.

1.1 Monitoring Locations

The Port's air monitoring network has been designed to collect ambient air quality and meteorological measurements within a network of four monitoring stations located within the POLA's operational region of influence (ROI). The Program's monitoring sites were selected such that they measure representative ambient air quality conditions near the coast, within the adjacent communities of San Pedro and Wilmington, and near the middle of Port operations on Pier 300. The details of the station locations are provided below, and a map of the stations is provided in Figure 1.

- **Wilmington Community Monitoring 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 levels that are representative of the residential areas of Wilmington, and is centrally located approximately 0.5 miles north of Port operations. The Wilmington station has been designated as the "primary" station, because it is in a central location and measures some additional meteorological and air quality parameters.
- **San Pedro Community Monitoring Station (33° 44' 27.54" N, 118° 16' 48.25" W)** – A second station is located at the Liberty Hill Plaza (LHP), at Harbor Boulevard & 5th Street, in the city of San Pedro. This station is designed to collect air quality levels that are representative of the residential areas of San Pedro, and is centrally located approximately 0.1 miles west of the main ship channel.
- **Coastal Boundary Station (33° 42' 50.58" N, 118° 16' 27.07" W)** – A third station is located at Berth 47 in the Port Outer Harbor. This location has the least direct exposure to emissions from Port operations.

Figure 1. Locations of the Four Stations in the Port Air Monitoring Network



- **Terminal Island Treatment Plant Station (33° 44' 41.03" N, 118° 15' 40.13" W)** – A fourth station is located on Pier 300, at the Terminal Island Treatment Plant (TITP) on 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.

1.2 Monitoring Parameters

Monitors at all four stations in the POLA network:

- *PM_{2.5} filter-based monitors* – Each station is equipped with a multi-port PM_{2.5} “sequential filter sampler” (SFS) monitor that simultaneously collects samples on a 24-hour basis on two different filter media (Teflon and quartz). This allows for the analysis of samples for mass (Teflon filters) and detailed chemical speciation (quartz filters), including carbon fractions (elemental carbon/organic carbon), metals, and soluble ions.
- *Meteorological Monitoring* – Each station measures wind speed, wind direction, and temperature. The meteorological data is used to analyze the air quality monitoring data and to define periods of onshore and offshore winds. The Wilmington station also measures additional meteorological parameters that should be representative of the POLA ROI, including relative humidity, solar radiation, and barometric pressure.
- *Continuous PM_{2.5} Monitoring* – Each station is equipped with a DustTrak continuous PM_{2.5} monitor. The data collected by this instrument are used to supplement the integrated data collected by the SFS PM_{2.5} monitors. The data collected by these instruments cannot be used to determine compliance with regulatory standards, but are useful in evaluating short-term variations in PM_{2.5} levels and source/receptor relationships.

Additional monitors at the primary Wilmington station:

- *PM₁₀ Monitor* – An additional SFS monitor equipped with a PM₁₀ inlet is used to measure PM₁₀ concentrations at the Wilmington station. This monitor allows the collection of simultaneous samples of PM₁₀ mass and carbon fractions, which can be compared with the results of the PM_{2.5} monitoring.
- *Federal Reference Monitors* - In addition to the instrumentation discussed above, the Wilmington station has two federal reference monitors (FRMs) that are certified to measure PM₁₀ and PM_{2.5} 24-hour average concentrations for compliance with the National and California Ambient Air Quality Standards (NAAQS/CAAQS). The data from these instruments are used as a check and validation of the data collected by the SFS monitor

2.0 Summary of Monitoring Network Operation

While the meteorological data are collected on a continuous basis, sampling for both PM₁₀ and PM_{2.5} is conducted every three days according to the EPA nationwide schedule. All of the monitoring sites are visited by the Program's field technicians on a three-day schedule to provide routine maintenance on the monitors and to download the meteorological and DustTrak data. Exposed filters collected by the technicians are routinely sent to the Desert Research Institute (DRI) for analysis of PM₁₀, PM_{2.5}, and elemental carbon concentrations. Upon the receipt of the results from the DRI laboratory, they are reviewed, analyzed, archived and subsequently presented in the Program's annual reports.

The field technicians routinely complete a monitoring checklist during each site visit to document the operation of the program and communicate any problems, issues or observations directly to the Technical Project Manager. In addition, if the technicians identify any serious problems during their site visit, they communicate with the SAIC team immediately by cell phone.

2.1 Summary of Monitoring Results

There was one extraordinary event that affected the data during this period – a series of wildfires that erupted in southern California in late October, 2007. Wildfires are very inefficient combustion sources, which release huge quantities of PM_{2.5} and PM₁₀ emissions. The heat from large fires also produces large thermal updrafts that transport the particulates vertically to elevated levels, so that they typically disperse over large distances before settling out of the atmosphere. Consequently, a series of wildfires, such as occurred in October of 2007, can result in elevated levels of particulates over a large region.

The particulate data collected during these wildfires is presented and discussed below.

PM₁₀ concentrations – There were two exceedances of the California 24-hour ambient air quality standard for PM₁₀ (50 µg/m₃) during this period: 169.2 and 54.0 µg/m₃ on October 21st and October 24th, respectively. This is a large increase over the PM₁₀ concentration of 27.5 µg/m³ measured on October 18th, two days before the fire outbreaks.

PM_{2.5} concentrations – Table 1 shows the measured concentrations of PM_{2.5} in the POLA network before and after the start of the wildfires on October 20, 2007. There was a dramatic increase (by a factor of 3 to 7) in the measured PM_{2.5} concentrations from just before the wildfires (October 18) until just after the start of the wildfires (October 21). With the exception of the Coastal Boundary station, all of the stations exceeded the national 24-hour ambient air quality standard (NAAQS) for PM_{2.5} (35 µg/m³). By October 24th, the PM_{2.5} concentrations at all four stations were near or slightly above the NAAQS. By October 27, PM_{2.5} concentrations had returned to more normal levels.

Elemental Carbon Concentrations – In contrast to the increases in PM_{2.5} and PM₁₀ concentrations observed on the day after the start of the wildfires (October 21), the measured elemental carbon (EC) concentrations on that day actually dropped slightly, to just below 2.0 µg/m³. On October 24, the concentrations increased by a factor of 2 to 3, but overall the effect of the wildfires on EC levels was much less than on other measures of particulates. This may be due to the emission characteristics of wildfires, or to the greater dispersion of EC during transport from the wildfire regions.

All exceedances of the PM_{2.5} and PM₁₀ standards measured during this six-month period occurred when the southern California wildfires were active. There are no federal or state standards for EC.

Table 1. 24-hour Average PM_{2.5} Concentrations Measured at the Port's Stations Around the Start of the California Wildfires on October 20, 2007 (µg/m³)

Station	Date			
	October 18	October 21	October 24	October 27
Wilmington Community Station	9.2	69.2	41.1	21.5
San Pedro Community Station	10.7	55.5	32.5	16.5
Coastal Boundary Station	7.5	30.7	31.9	14.4
Source-Dominated Station	13.4	42.3	34.8	18.0

2.2 Data Recovery

Data recovery during the six-month reporting period for the particulate monitoring program is presented in Table 2. As shown in the table, data recovery was very good for all parameters.

Meteorological data recovery was also excellent, with one exception - toward the end of the period, there were difficulties in retrieving the data at Berth 47 from the special-purpose meteorological data logger used since the implementation of this program at each of the stations. Extensive discussions with the manufacturer (Met One) were only moderately successful in improving the operation of the data logger. We believe that the problem resulted from the extreme exposure of the meteorological station at Berth 47 – it is not far from the open ocean, and is exposed to winds and occasional salt spray than can seriously degrade the performance of the electronic components in the data logger.

Table 2. Data Recovery in the Port of Los Angeles Air Monitoring Network May – October 2007

Station	PM _{2.5} Data	PM ₁₀ Data	Elemental Carbon Data
Wilmington Community Station	100 %	98.4 %	100 %
San Pedro Community Station	98.4 %	n/a	100 %

Coastal Boundary Station	95.1 %	n/a	95.1 %
Source-Dominated Station	93.4 %	n/a	95.1 %

This data recovery problem was resolved shortly after the end of this period, by the reconfiguration of the meteorological data collection system, which was accomplished as part of the expansion of each monitoring station in the POLA network. More details are provided below.

3.0 Upcoming Events

The expansion of the monitoring program at each station, which will include real-time instrumentation (carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, PM_{2.5}, PM₁₀, polycyclic aromatic hydrocarbons, and ultrafine particulates) began in November, 2007, just after the end of this reporting period. A great deal of planning and work by the POLA Environmental Management Division's staff and the SAIC team went into the expansion program, and this will provide a much more comprehensive picture of the air quality within the Port's ROI. All of the new instrumentation, along with a data logger to collect and store the data, will be housed in a climate-controlled shelter located at each site. In addition, the data will be automatically transmitted back to SAIC's offices for review, analysis, and archiving. The data will also be displayed in real time on a public website.

The first sites to be expanded will be the Source-Dominated and Coastal Boundary stations, in November 2007. At each station, the meteorological sensors will be rerouted from the special purpose meteorological data loggers to the new system data loggers located in the shelter. This change should alleviate the meteorological data collection/retrieving problem at Berth 47.