The Port Of Los Angeles Air Quality Monitoring Program
Semi-Annual Report
November 2007 – April 2008

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 November 2007 to April 2008. The period represents the second half of the 3rd year of operation, as the monitoring program came online with all four stations at the end of April, 2005.

The initial focus of this program has been to monitor for particulate matter (PM_{10} and $PM_{2.5}$, or particulate matter less than 10 and 2.5 micrometers in diameter, respectively) and meteorological data. During the months leading up to November 2007, a great deal of planning and work by the POLA Environmental Management Division's Staff and the SAIC team was done toward a phased expansion of the initial Program. As a result, the expanded Program will include the continuous monitoring of gaseous criteria pollutant monitors (carbon monoxide, sulfur dioxide, nitrogen oxides, and ozone), $PM_{2.5}$ and PM_{10}, ultrafine particle counters (UFP) and polycyclic aromatic hydrocarbon (PAH) analyzers.

The first of this three-phase expansion started in November 2007, and included the start-up of the Source-Dominated and Coastal Boundary stations. The remainder of the monitoring program expansion included the start-up of the Wilmington station in March, 2008 and the start-up of the San Pedro station in April, 2008.

The main objectives of this report are to supplement the Program's detailed annual reports, briefly 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.

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

- *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 measure air quality levels that are representative of the residential areas of San Pedro, and is 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.

- *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.

- Continuous Gaseous Pollutant Monitoring – Each station is equipped with analyzers to determine real-time air pollutant concentrations for the gaseous pollutants (i.e. NO-NO$_2$-NO$_x$, O$_3$, CO, and SO$_2$). These analyzers are federal reference method or federal equivalent method designated monitors and include the following:

  - Pulsed Fluorescence SO$_2$ Analyzer
  - Chemiluminescent NO-NO$_2$-NO$_x$ Analyzer
  - Gas Filter Correlation CO Analyzer
  - U.V. Photometric Ozone (O$_3$) Analyzer

- *Continuous Monitoring of PM* – In addition to the detailed 24-hr PM sampling described above, the Port's monitoring stations are now equipped to continuously monitor PM_{10} and $PM_{2.5}$ on a continuous and real-time basis. These data are collected with Beta Attenuation Monitors (BAMs) that measure real-time PM_{10} and $PM_{2.5}$ concentration at hourly intervals.

Additional monitors at the primary Wilmington station:

- *PM_{10} filter-based monitor* – An additional SFS monitor equipped with a PM_{10} inlet is used to measure PM_{10} concentrations at the Wilmington station. This monitor allows the collection of simultaneous samples of PM_{10} 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 PM_{10} 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

All of the equipment needed for the expanded monitoring Program is housed in a climate-controlled shelter. At each station, the existing meteorological sensors were rerouted and incorporated into the new data logging system which also operates the new monitoring instruments. As discussed above, the new shelters and real-time monitoring instruments were brought online during the course of this six-month period. Data from the new data logging system is automatically transmitted to SAIC's offices for review, analysis and archiving and to a public website for preliminary review.

Filter-based sampling for both PM_{10} and $PM_{2.5}$ is conducted every three days according to the EPA nationwide schedule; however, the expanded monitoring parameters are continuously collected on a real-time basis. As before, 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 PM_{10}, $PM_{2.5}$, 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 serous problems during their site visit, they communicate with the SAIC team immediately by cell phone.

2.1   Summary of Monitoring Results

The effects of the wildfires that erupted in southern California in late October, 2007 were still evident in November. Elevated particulate levels were still being measured, but they were lower than at the height of the wildfires. There was one exceedance of the 35 µg/m^3 federal $PM_{2.5}$

standard (37 µg/m^3), which occurred on November 2, 2007. There were also 4 exceedances of the 50 µg/m^3 California PM$_{10}$ standard measured in November and early December, all of which were between 50 and 60 µg/m^3. Elemental carbon concentrations were roughly equivalent to levels found during a typical fall season, and there are no federal or state standards for elemental carbon.

2.2   Data Recovery

Data recovery during the six-month reporting period for the filter-based particulate monitors is presented in Table 2. As shown in the table, data recovery was very good for all parameters except for the PM$_{2.5}$ monitor at Berth 47, which had instrument problems.

Data recovery was not calculated for the new real-time gaseous criteria and particulate instruments, because they were all installed, calibrated, and brought online at different times during the course of this six-month period.

Meteorological data recovery at Berth 47 during this six-month period suffered from two problems:
- Intermittent problems with the special-purpose meteorological data logger used at Berth 47, which were first discovered at the end of the last six-month period. This data recovery problem was resolved near the beginning of this six-month 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. The meteorological instruments are now connected directly to the new station data logger, and there have been no data recovery issues since that time.
- At the beginning of this period, the sonic anemometer used to measure wind speed and direction at Berth 47, also started exhibiting intermittent problems. The instrument was replaced twice with other sonic anemometers (one from the Met One and one from another POLA network station), but the problems continued. The problem was finally resolved after the installation of Met One's new version of the sonic anemometer (a "low-power" sonic), that is specially designed for use in coastal environments. This new instrument has been operating for 12 months at Berth 47 without any problems.

These problems with the meteorological instrumentation and particulate monitors at Berth 47 that have occurred over the last six months highlight the difficulties in operating delicate instruments in a coastal environment, most likely from a combination of moisture and potential corrosion from the salt water. With the recent reconfiguration of the station, these problems should diminish.

Table 2: Data Recovery in the Port of Los Angeles Air Monitoring Network November 2007 – April 2008.

Station	Filter-PM$_{2.5}$ Data	Filter - PM$_{10}$ Data	Elemental Carbon Data
Wilmington Community Station	95.1%	98.4%	95.1%
San Pedro Community Station	91.8%	n/a	91.8%

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Coastal Boundary Station	82.0%	n/a	83.6%
Source-Dominated Station	98.4%	n/a	98.4%

3.0   Upcoming Events

The focus over the next six months will be to continue to improve the operation of the newly expanded monitoring program.

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