# Air Quality Monitoring Program at the Port of Los Angeles

## Summary of Data Collected During the Fourth Year - May 2008 - April 2009

***Prepared For:***

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January 2010

# TABLE OF CONTENTS

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# Air Quality Monitoring Program at the Port of Los Angeles

# Annual Report

## 1.0 EXECUTIVE SUMMARY

This report provides a summary of the data collected by the Port of Los Angeles (Port or POLA) Air Quality Monitoring Program during the most recent year (May 2008 to April 2009). The data collected during this period has been averaged and compared to the various National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) established for each pollutant. During the period, ozone, $PM_{2.5}$, and $PM_{10}$ exceeded the NAAQS or CAAQS. This is consistent with data collected at the North Long Beach (NLB) station operated by the South Coast Air Quality Management District (SCAQMD) and the attainment status of the South Coast Air Basin (SCAB), which is designated as nonattainment for ozone, $PM_{2.5}$, and $PM_{10}$.

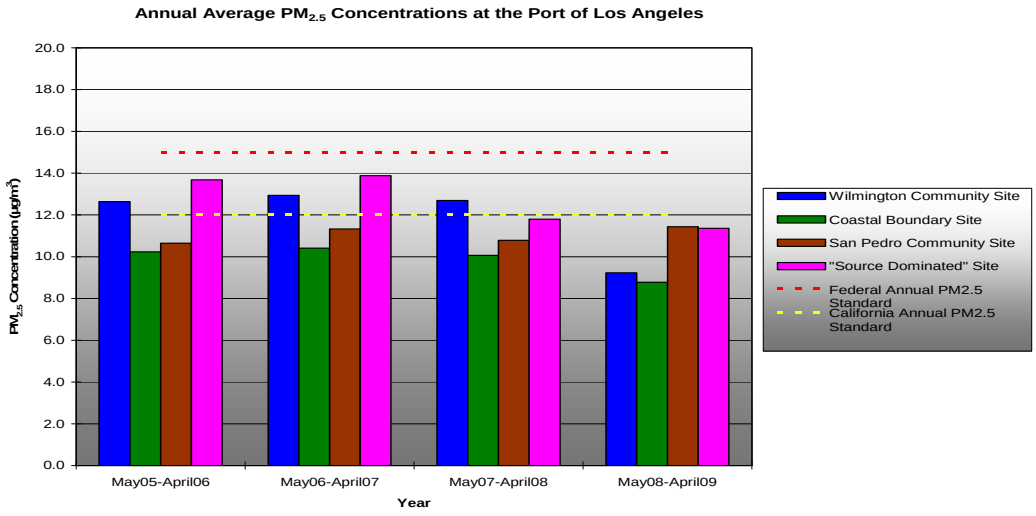
For the first time since the monitoring program began, there were no exceedances of the annual $PM_{2.5}$ NAAQS (15 $\mu g/m^3$) or CAAQS (12 $\mu g/m^3$) at any of the Port stations. However, there were a total of four exceedances of the 24-hour $PM_{2.5}$ NAAQS (35 $\mu g/m^3$) measured in the Port monitoring network. The exceedances of the short-term 24-hour standards were measured on two days: November 17, 2008 which was during the October-November 2008 wildfires; and January 1, 2009 during a Santa Ana condition. These were regional events with elevated $PM_{2.5}$ levels recorded at all of the Port stations as well as the SCAQMD's North Long Beach station.

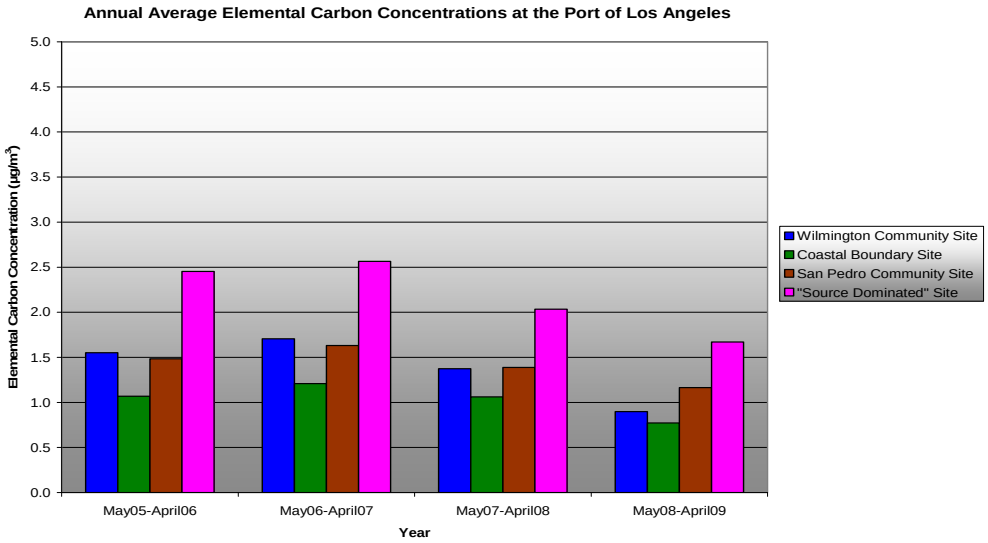
Prior to August 2008, $PM_{10}$ measurements were only made with filter-based monitors at the Wilmington Community station. On August 31, 2008 a second $PM_{10}$ monitor was installed at the Coastal Boundary station. The annual $PM_{10}$ CAAQS (20 $\mu g/m^3$) was exceeded at the Wilmington Community station (25.9 $\mu g/m^3$), and there were also four exceedances of the 24-hour $PM_{10}$ CAAQS (50 $\mu g/m^3$) recorded at this station during the 2008-2009 year. The two highest $PM_{10}$ measurements were 74.7 $\mu g/m^3$ on January 1, 2009 during a Santa Ana condition, and 70.8 $\mu g/m^3$ on May 18, 2008 during the annual weekend "carnival" held on the grounds of the Sts. Peter & Paul School (location of the Wilmington Community station). There was one exceedance (51.6 $\mu g/m^3$) of the 24-hour $PM_{10}$ CAAQS recorded by the new Coastal Boundary station $PM_{10}$ monitor during the nine-month period of record. The exceedance occurred on January 1, 2009, the same day that the Wilmington Community station recorded its highest measurement of the year.

There are four gaseous criteria pollutants measured on a real-time basis in this program: carbon monoxide (CO), nitrogen dioxide ($NO_2$), sulfur dioxide ($SO_2$), and ozone ($O_3$). With the exception of ozone, all of these pollutants were below the CAAQS and NAAQS during this 12-month period. There were no recorded exceedances of either the 8-hour $O_3$ CAAQS or NAAQS, but there were two recorded exceedances of the 1-hour $O_3$

CAAQS, one each at the coastal boundary and source-dominated stations. Both of these exceedances occurred on November 16, 2008 and were attributed to the effects of easterly Santa Ana winds transporting elevated ozone concentrations to the coastline.

The POLA air monitoring network now has a four-year data record that can be used to determine trends in the data over this period. The annual average concentrations of particulate-related pollutants ($PM_{2.5}$, $PM_{10}$, and EC) were consistently found to be highest during the second year of monitoring, from May 2006 to April 2007. The lowest annual average concentrations of these pollutants were measured in the most recent reporting year, May 2008 to April 2009 (with the exception of the annual average $PM_{2.5}$ concentration at the San Pedro Community station, which was impacted by localized construction activity near the station for a significant part of the year). Averaged across the network, the annual average $PM_{2.5}$ concentrations decreased from 2006-2007 to 2008-2009 by 14.7 percent; the annual average $PM_{10}$ concentrations decreased by 9.4 percent; the annual average EC concentrations decreased by 33 percent. The figures below present the annual average $PM_{2.5}$ and EC concentrations over the period of record.



In late May 2008, real-time $PM_{2.5}$ monitors were added to all four stations, and real-time $PM_{10}$ monitors were added to the Coastal Boundary and Wilmington Community stations. In late January 2009, real-time $PM_{10}$ monitors were added to the San Pedro Community and Terminal Island Treatment stations, so that full particulate monitoring capabilities are now available throughout the network. Graphs of the real-time data are included in an appendix of this report.

Other parameters are measured in the air monitoring program, including meteorology, elemental carbon (EC), and polycyclic aromatic hydrocarbons (PAHs) data. EC and PAHs are primarily particles of combustion, and have been suggested as surrogates for diesel particulate matter (DPM). There are currently no standards for these pollutants.

Data recovery has been very good during the program. The real-time data are available for review at the Clean Air Action Plan website: http://www.cleanairactionplan.org

# 2.0 INTRODUCTION

The Port began an air quality monitoring program in February 2005. During this initial program, representative ambient particulate matter (PM) and meteorological data were collected within the Port's operational region of influence (ROI). These PM data included two sizes of particulate matter: (1) "inhalable" PM less than 10 microns in diameter ($PM_{10}$) and (2) fine PM less than 2.5 microns in diameter ($PM_{2.5}$). In 2007 and 2008, the Port completed an expansion of the program to include continuous monitoring of four gaseous criteria air pollutants [ozone ($O_3$), nitrogen dioxide ($NO_2$), sulfur dioxide ($SO_2$), and carbon monoxide (CO)], and particulates [$PM_{2.5}$ and $PM_{10}$, ultrafine particles, and polycyclic aromatic hydrocarbons (PAH)].

The driver of this program was the increased concern over health effects from diesel particulate matter (DPM). Additionally, the expanded monitoring program provides additional data to determine compliance with air quality standards, access to real-time data and presentation of that data for public review on a website, and the opportunity to conduct additional detailed analyses and an enhanced evaluation of source-receptor relationships.

The monitoring program consists of a network of four stations located in the vicinity of the Port of Los Angeles: one each in San Pedro and Wilmington, the two communities adjacent to the Port; one near the southern coastal boundary of the Port; and one on Terminal Island, near the operational center of the Port.[1]

The design of the network was developed during 2003 and 2004. During this process, the Port held extensive discussions with the Port Community Advisory Committee (PCAC) and their technical consultants to finalize the details of the monitoring program. In addition, the draft monitoring work plan was presented at a meeting in 2003 with the South Coast Air Quality Management District (SCAQMD) and the California Air Resources Board (ARB). The monitoring work plan was revised to address comments from these groups. The final program work plan is available at the Port's web site: http://www.portoflosangeles.org.

[1] *Final Air Quality Monitoring Work Plan for the Port of Los Angeles. Port of Los Angeles, 2004.*

## 2.1 SITING OF THE MONITORING STATIONS

After the basic design of the network had been established in late 2003, monitoring locations were selected to be representative of ambient air quality conditions within the Port and the adjacent communities of San Pedro and Wilmington. Working with the PCAC's air quality consultants, short-term "validation" studies were conducted in both communities in 2004 to ensure that the best available sites were chosen. The sites selected for inclusion in the validation study were selected based on the following factors: (1) sites that met EPA criteria for locating monitoring stations (particularly unobstructed exposure to the local air flow), (2) site availability, and (3) site security.

The validation study was conducted first in San Pedro and then in Wilmington.[2] A total of five sites were included in the validation study conducted in San Pedro: four locations in a north-south direction along the main ship channel; and one further to the west on higher ground, to determine if elevated vessel plumes caused higher impacts. MiniVol (Airmetrics, Inc.) portable monitors were used at each site to collect simultaneous $PM_{2.5}$ samples at all of the sites. These samples were subsequently sent to a laboratory to be analyzed for $PM_{2.5}$ and elemental carbon (EC), a surrogate for DPM.

For the Wilmington-based validation study, three sites were selected in an east-west line that was approximately parallel to the northern boundary of the Port. Fewer sites were used in the Wilmington study due to relatively flat terrain with less topographic features than in San Pedro, and there were less acceptable candidate locations.

The final selected monitoring locations had the highest average measured $PM_{2.5}$ impacts in the validation program and are centrally located within the section of the communities closest to the Port operations. In addition, the Wilmington site is located at an elementary school, which is a sensitive receptor.

The air monitoring program was expanded to include real-time monitoring of gaseous criteria pollutants and particulates, starting in late 2007. During the planning stage of this expansion, it was discovered that two of the existing stations would have to be moved, because the rooftop locations at those sites could not support the shelters required to house the real-time monitoring instruments. The details of these moves are discussed below:

- Promenade station - The old location of the San Pedro Community monitoring station was on the roof of the Liberty Hill Plaza (LHP) Building. After an extended search, an alternate location was selected across Harbor Drive, approximately 100 yards to the northeast of the LHP site. The new site was named the Promenade location, because of the promenade walkway along Harbor Drive that passes near that site. A short-term validation study, with simultaneous $PM_{2.5}$ and EC measurements at the LHP and Promenade locations, was conducted similar to the earlier validation studies discussed above, to ensure that data from the new Promenade location would produce representative measurements in the San Pedro Community. In addition, an extended validation

[2] *Final Air Quality Monitoring Work Plan for the Port of Los Angeles – Addendum.* Supplemental Validation Air Monitoring Study at Wilmington, California, August-October 2004. Port of Los Angeles, 2005.

study was scheduled to confirm the selection of the new Promenade site. The new Promenade station started up just before the start of this reporting year.

- Terminal Island Treatment Plant station – The old location of the Terminal Island Treatment Plant station was on the roof of the Effluent Pump Building. The expanded monitoring station was relocated approximately 100 feet to the northwest, which was not expected to affect the measurement. A short-term validation study was completed by taking simultaneous $PM_{2.5}$ and EC measurements, which showed that data collected at both sites were similar.

## 2.2 DESIGN OF THE MONITORING PROGRAM

The main objective of the air monitoring program is to estimate ambient levels of DPM in proximity to the Port that are due to Port operational activities. A secondary program objective is to estimate ambient gaseous pollutants and PM levels due to POLA emissions within adjacent communities. Both of these objectives were addressed in the following ways:

1. Locate $PM_{2.5}$ monitors at each station, with a $PM_{10}$ monitor at the primary station in Wilmington. The monitors at the Wilmington and San Pedro community stations provide PM data to evaluate compliance with the National and California Ambient Air Quality Standards (NAAQS and CAAQS, respectively) for PM.

2. Each station has two $PM_{2.5}$ Sequential Filter Samplers (SFS), fabricated by the Desert Research Institute (DRI), which have the capability of collecting simultaneous samples on two filter media (Teflon and quartz). This permits the following analyses of the filters:

    a. Mass concentration, by gravimetric analysis.

    b. Elemental and organic carbon (EC and OC), by carbon analysis.

    c. In addition, detailed chemical analysis of the filters can be conducted to determine concentrations of elements, soluble nitrates and organics, as needed.

3. The SFS monitors were run according to EPA standard sampling protocol for a 24-hour period. As part of this protocol, ambient PM samples were collected at each site within the network every third day, following EPA's nationwide schedule. This allows direct comparison of the data collected within the network and at other stations in the vicinity.

4. In addition to PM filter-based samples that are collected every third day, the Port's expanded program also collects hourly PM samples [using Beta Attenuation Mass (BAM) monitors] at each station within the network. This provides near real-time data to supplement the integrated 24-hour PM averages provided by the filter-based monitors.

5. As part of the expanded monitoring program, each station is also monitoring ambient levels of the gaseous criteria pollutants (i.e., CO, $NO_2$, $SO_2$ and $O_3$). These data will be used to further identify the source/receptor relationships present in the Port's ROI.

6. A sampling protocol was developed for use in the operation of the monitoring network[3] (Port 2005b). This protocol was reviewed by the PCAC consultants and revised to address their comments. This sampling protocol specifies the detailed operation of the monitoring network and is used by the monitoring team to ensure the proper operation and documentation of the monitoring program.

# 3.0 Description of the Air Monitoring program

The following discussion presents a summary of the Port's air monitoring network.

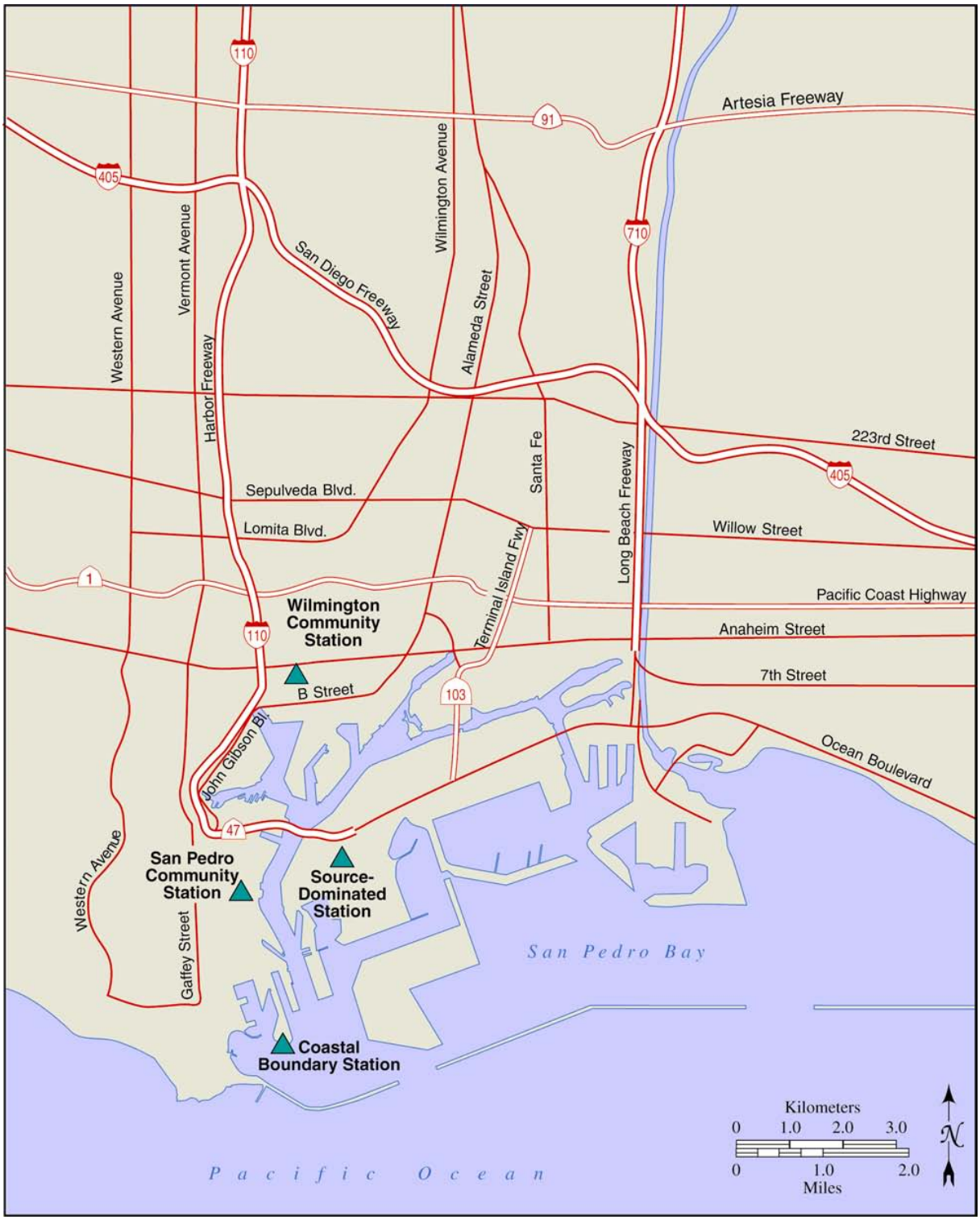
## 3.1 LOCATIONS OF THE MONITORING NETWORK

The locations of the four stations in the air monitoring network are shown in Figure 1 and include the following stations:

- *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.
- *San Pedro Community Monitoring Station* (33° 44' 27.54" N, 118° 16'48.25" W) The 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 levels that are representative of the residential areas of San Pedro, and is centrally located approximately 0.1 mile 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 (Berth 47 station) 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.

[3]Port of Los Angeles Air Quality Monitoring Protocol. Port of Los Angeles, 2005.

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



# 3.2 THE MONITORING NETWORK

All four stations have the same instrumentation, which collect a comprehensive set of integrated 24-hour average $PM_{2.5}$ and $PM_{10}$ samples, and real-time data measuring gaseous criteria pollutants, $PM_{2.5}$ and $PM_{10}$, PAH, ultrafine particle, and meteorological data. The Wilmington community station includes additional supplemental instruments, as discussed below.

## *The Four Stations in the Network*

All four stations in the Ports network have the following components:

- *Detailed 24-hour sampling for $PM_{2.5}$* – 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. A second SFS monitor at each station allows the collection of samples over shorter time periods, to target specific wind regimes (onshore/offshore flows) and associated source/receptor situations.
- 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 FRM- or FEM-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
- *Additional monitoring parameters* – Additional instruments have been added to the network during the transformation to real-time monitoring, including ultrafine particle counters (TSI model 2781) and PAH analyzers (EcoChem PAS 2000).
- *Detailed 24-hour sampling for $PM_{10}$* - At the primary Wilmington Community station, there is a third SFS monitor equipped with a $PM_{10}$ inlet. This 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.
- *Meteorological Monitoring Station* – Each station is equipped with a meteorological monitoring station, which 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 broader Port region (barometric pressure, solar radiation, and relative humidity).
- *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 sequential samplers. These data

are useful in evaluating short-term variations in $PM_{2.5}$ levels and in evaluating source/receptor relationships.

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

### *Additional Instrumentation at One Station*

In addition to the instrumentation discussed above, the Wilmington Community station has two federal reference monitors (FRMs) that have EPA design and operation certification to measure $PM_{10}$ and $PM_{2.5}$ 24-hour average concentrations for compliance with the NAAQS and CAAQS.

### *Recent Instrument Added to the Network*

Another SFS monitor equipped with a $PM_{10}$ inlet was added to the Coastal Boundary station on August 31, 2008. This 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 at the station, similar to the approach taken at the Wilmington Community Station. Although this monitoring began too late to provide a $PM_{10}$ annual average for the May 2008 – April 2009 year at this site, the data set has been added to the graph of the $PM_{10}$ data at Wilmington for comparison.

## 3.3 STARTUP OF THE MONITORING PROGRAM

The monitoring program began with the collection of PM data at three stations (Wilmington and San Pedro Community Stations and Coastal Boundary Station) on February 9, 2005. The fourth station at TITP was added on April 28, 2005.

The expanded monitoring program with the real-time instrumentation was rolled out at the sites over a period of time:

- Coastal Boundary and TITP stations – December 1, 2007
- Wilmington Community station – April 1, 2008
- San Pedro Community station – May 1, 2008

This report primarily focuses on the data collected during the 4$^{th}$ year of monitoring, May 2008 - April 2009 and will include data from the initial and expanded monitoring programs. The results presented here will also be compared with data from the first three monitoring periods, May 2005 - April 2006, May 2006 - April 2007, and May 2007 - April 2008, respectively.

# 4.0 Data Summary

This data summary is a compilation and presentation of data collected during the third year of sampling. Much of these data are also available on the Port's website (filter-

based data) at http://www.portoflosangeles.org, and the Clean Air Action Plan (CAAP) website (real-time data) at http://caap.airsis.com. The data summary includes the following presentations:

- Presentation of the air quality data in graphs and tables
- Presentation of the meteorological data in wind roses, which show the distribution of wind speed and direction at a site.

Data summaries are presented for seven parameters: (1) $PM_{2.5}$, (2) $PM_{10}$, (3) elemental carbon (EC), (4) $O_3$, (5) $SO_2$, (6) $NO_2$, and (7) CO.

1. For $PM_{2.5}$, EC, and the gaseous criteria pollutants ($O_3$, $SO_2$, $NO_2$, and CO), the data are presented for the four stations in the Port network.

2. For $PM_{10}$, the data are presented for the Wilmington Community Station (and for the shorter $PM_{10}$ record at the Coastal Boundary station) in a graph.

Since the tabular and graphic data presentations are quite extensive, most of the figures and many of the graphs are included in Appendix A. The figures and tables that have been included as part of Appendix A are denoted by the letter "A" in front of the number designation; for example, Figures A-1 and A-2 are in Appendix A.

# 4.1 AIR QUALITY DATA – MAY 2008 THROUGH APRIL 2009

## *$PM_{2.5}$ Data*

Table 1 shows the annual average $PM_{2.5}$ concentrations measured by the filter-based SFS monitors at the four POLA network stations during the last four years. The data are also shown in Appendix A (Figure A-1) as a bar graph.

**Table 1. Annual Average $PM_{2.5}$ Concentrations at POLA Air Monitoring Stations**

| Averaging Period | Port of Los Angeles Monitoring Stations | | | |
|---|---|---|---|---|
| | **Wilmington Community Station** | **Coastal Boundary Station** | **San Pedro Community Station** | **Terminal Island Treatment Station** |
| | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) |
| May 2005 – April 2006 | 12.6 | 10.2 | 10.6 | 13.7 |
| May 2006 – April 2007 | 12.9 | 10.3 | 11.4 | 13.8 |
| May 2007 – April 2008 | 12.7 | 10.1 | 10.6 | 11.6 |
| May 2008 – April 2009 | 9.3 | 8.9 | 11.4 | 11.4 |

The following conclusions have been drawn from the data:

- Over the four-year period of record, the annual $PM_{2.5}$ averages for all stations are well below the annual $PM_{2.5}$ NAAQS of 15 μg/$m^3$.

- All four stations were below the annual $PM_{2.5}$ CAAQS during the last year. During the first years of the monitoring program, annual $PM_{2.5}$ averages were above the annual $PM_{2.5}$ CAAQS of 12 μg/$m^3$ for two stations (the Wilmington Community and TITP Stations) and below the standard for the other two stations (Berth 47 and San Pedro Community Stations).

- Over the last two years, there has been a decrease of 14 to 28 percent in the annual average $PM_{2.5}$ concentrations at three of the stations (Wilmington Community, Berth 47, and TITP stations), but there was no change during this period at the San Pedro Community Station. This may have been a result of a significant amount of nearby construction activity during much of the May 2008 – April 2009 reporting year. Unusually high $PM_{2.5}$ readings were recorded between June and November 2008. The Port's Engineering Division confirmed that a major construction project took place near this monitoring station at this time. The project included concrete flatwork, asphalt grinding, asphalt paving, landscape, irrigation, and electrical work. The areas involved in the construction project are located as close as 100 feet southeast of the Liberty Hill Plaza air monitoring station and 300 feet south-southwest of the new Promenade air monitoring station and include:

  - The parking lot adjacent to and south of the fire station
  - The intersections of 5th, 6th, and 7th Street
  - Portions of 6th Street and Sampson Way

  According to the Engineering Division, this project started in May 2008 and tapered off in December 2008.

  Since December2008, $PM_{2.5}$ levels at the San Pedro air monitoring stations have returned to historical norms.

- The largest decrease occurred at the Wilmington Community station, approximately 28 percent over the two-year period as compared to the 2006-2007 and 2007-2008 reporting years. This decrease may reflect recent air emission decreases from the San Pedro Bay Ports CAAP measures and the reduced container throughput during the recession in this community.

- The annual $PM_{2.5}$ average for 2008-2009 at each monitoring station was at or below the averages of previous years, even though the southern California wildfires in the fall of 2008 caused higher levels of $PM_{2.5}$ during affected months (Figure A-2).

- There were a total of 4 exceedances recorded at the four monitoring stations of the 24-hour $PM_{2.5}$ NAAQS (35 μg/m3) during the 2008-2009 monitoring year. The three highest 24-hour $PM_{2.5}$ concentrations (41.4, 37.7, and 36.3 μg/$m^3$) were all recorded on January 1, 2009 during high-wind Santa Ana conditions. The other exceedance was measured in mid-November, when there were wildfires in the South Coast air basin.

- The graph of the monthly average $PM_{2.5}$ concentrations at the four stations in the network over the four-year period of record (Figure A-3) show the continued close correlation between the measured concentrations at the four stations in the network. That is, the measured concentrations at the four stations tend to increase and decrease in a similar pattern. This is because regional $PM_{2.5}$ levels and weather events (e.g., rainfall during storms) exert an influence on the $PM_{2.5}$ levels around the Port.

## *$PM_{10}$ Data*

Table 2 shows the $PM_{10}$ concentrations measured by the filter-based SFS monitors at the SPPS station during the most recent three years. The data are also shown in Figure A-4 as a bar graph.

**Table 2. Annual Average $PM_{10}$ Concentrations at POLA Air Monitoring Stations**

| Averaging Period | Port of Los Angeles Wilmington Community Station |
|---|---|
| | Conc. ($\mu g/m^3$) |
| May 2005 – April 2006 | 28.7 |
| May 2006 – April 2007 | 28.6 |
| May 2007 – April 2008 | 28.5 |
| May 2008 – April 2009 | 25.9 |

The following conclusions have been drawn from the $PM_{10}$ data:

- The annual average $PM_{10}$ concentration at the Wilmington Community station during the 2008-2009 year was 25.9 $\mu g/m^3$, which was almost a 10 percent drop from the consistent $PM_{10}$ annual averages during the three previous years. This is likely the effect of recent air emission decreases from the San Pedro Bay Ports CAAP measures and reduced container traffic.

- Annual average $PM_{10}$ levels at the station during the first years of monitoring have been very consistent, with $PM_{10}$ concentrations of 28.7, 28.6, 28.5 $\mu g/m^3$ measured during the first three years of monitoring: 2005-2006, 2006-2007, 2007-2008, respectively.

During the 2008-2009 monitoring year, there were four exceedances of the 24-hour CAAQS for $PM_{10}$ (50 $\mu g/m^3$) and zero exceedances of the NAAQS for $PM_{10}$ (150 $\mu g/m^3$). The two highest $PM_{10}$ measurements were 74.7 $\mu g/m^3$ on January 1, 2009 during a Santa Ana condition, and 70.8 $\mu g/m^3$ on May 18, 2008 during the annual weekend "carnival" held on the grounds of the Sts. Peter & Paul School, where the Wilmington Community station is located.

- The monthly average $PM_{10}$ concentrations for the 2008-2009 year are shown in Figure A-5, and are similar to the trends in the $PM_{2.5}$ data. They illustrate the gradual decrease in PM levels from the May/June period into the summer months before gradually increasing into the fall months (especially November). There is a noticeable drop in concentrations during December as a series of windy/stormy periods brought diminished concentrations. January saw a spike up in concentrations as Santa Ana conditions prevailed early in the month, elevating PM levels. Finally, there is a decrease in the February/March time period, during the rainy season.
- Figure A-6 shows a graph of the monthly average $PM_{10}$ concentrations over the four-year period of record. There are three main features evident in this figure:
    - The much less pronounced decrease in $PM_{10}$ concentrations during the 2008 early spring rainy season compared to earlier years, presumably because of the reduced rainfall in 2008, and
    - The large increase in $PM_{10}$ concentrations during fall of 2007, which reflects the influence of the wildfires.
    - Filter-based sampling commenced at the Coastal Boundary station in August 2008, and the monthly-averaged data at this station correlates very well with data from the Wilmington Community site.

## *EC Data*

Table 3 shows the EC concentrations measured by the filter-based SFS monitors at the four POLA network stations during the most recent four years. The data are also shown in Figure A-7 as a bar graph.

**Table 3. Annual Average EC Concentrations at the POLA Air Monitoring Stations**

| Averaging Period | Port of Los Angeles Monitoring Stations | | | |
|---|---|---|---|---|
| | **Wilmington Community Station** | **Coastal Boundary Station** | **San Pedro Community Station** | **Terminal Island Treatment Station** |
| | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) |
| May 2005 – April 2006 | 1.5 | 1.1 | 1.5 | 2.5 |
| May 2006 – April 2007 | 1.7 | 1.2 | 1.6 | 2.6 |
| May 2007 – April 2008 | 1.1 | 1.4 | 1.4 | 2.0 |
| May 2008 – April 2009 | 0.8 | 1.2 | 0.9 | 1.7 |

The following conclusions have been drawn from the EC data:

- There are no federal or state standards for EC, but there is interest in the data because it has been used as a surrogate for diesel PM in the South Coast Air Quality Management District's (SCAQMD) MATES-II and MATES-III studies.
- Table 3 shows that annual average EC concentrations during the 2008-2009 year have decreased at all four network stations compared to the annual averages recorded in the 2005-2006, 2006-2007 and 2007-2008 reporting years, with the exception of the Coastal Boundary station. The peak annual average concentrations occurred in the 2006-2007 year for all stations, again with the exception of the Coastal Boundary station.
- From the 2007-2008 monitoring year through the 2008-2009 monitoring year, annual average EC concentrations have decreased:
    - Wilmington Community station: -27%;
    - Coastal Boundary station: -14%;
    - San Pedro Community station: -36%;
    - Terminal Island Treatment Plant station: -15%.
- The decreases in EC levels at two stations, the Wilmington Community and Coastal Boundary stations, are consistent with the year-over-year decreases in $PM_{2.5}$ levels: Wilmington Community station (-26 %) and Coastal Boundary station (-12%). However, the decreases in EC levels at the other two stations, San Pedro Community and TITP, are more pronounced than the year-over-year decreases in $PM_{2.5}$ levels: San Pedro Community (+8%) and TITP (-2%). The most likely reasons for this are discussed below:
    - Measured EC levels should be more closely linked to emissions from diesel and fuel oil combustion than are $PM_{2.5}$ and $PM_{10}$ levels. Therefore, the effects of the CAAP measures which are focused on controlling emissions from mobile source engines could be more evident in measurements of EC concentrations than those for $PM_{2.5}$ and $PM_{10}$.
    - The increase in annual average $PM_{2.5}$ concentrations at the San Pedro Community station is probably due to special circumstances. During the 2008-2009 monitoring year, construction activity adjacent to the nearby fire station (about 100 yards from the monitoring station) likely influenced ambient $PM_{2.5}$ measurements at that site.
- The 2006-2007 monitoring year demonstrated the highest annual average EC concentrations for all four stations. A comparison of annual average EC concentrations for 2008-2009 to the 2006-2007 monitoring year, shows decreases of:
    - Wilmington Community station: 53%;
    - Coastal Boundary station: 0%;
    - San Pedro Community station: 44%;
    - Terminal Island Treatment Plant station: 35%.

- Figures A-8 and A-9 show the variability of the 24-hour average monthly EC concentrations within the Port network for the 2008-2009 year and the period of record, respectively. The figures show several interesting features that are quite consistent between the three years:
  - EC concentrations are relatively low during the first part of the sampling year (May - August), with concentrations increasing in the fall and early winter (September – January). This is followed by a significant decrease in EC concentrations in the February – April time frame.
  - There is also a dramatic increase in the variability of the EC concentrations in the September – January period, which is particularly apparent at the TITP station. The fall and early winter is generally a period of low rainfall in the southern California coastal region, with low-level inversions in the atmosphere much more common than during the summer months. When inversions are present, the dispersion of PM emissions (such as EC and $PM_{2.5}$) is significantly reduced, allowing EC levels to increase significantly. The decrease in EC concentrations typically occurs in February and March and coincides with the onset of the short rainy season.
  - Figure A-9 presents the average monthly EC concentrations for the entire period of record within the Port network (February 2005 - April 2009). The figure shows that the highest EC concentrations occur consistently during the November to January period at all stations and for all years.
  - However, the most interesting part of this figure shows that the peak fall EC levels in monitoring year 2008-2009 were considerably lower than in 2005-2006, 2006-2007 and 2007-2008; apparently showing the effect of lower PM emissions from Port operations.
  - The highest measured EC concentrations are consistently measured at the "source-dominated" TITP station, and the lowest EC concentrations at the Coastal Boundary Station. EC levels at the two community stations are intermediate between these two stations.
- Figure A-10 presents the monthly average ratio of EC to $PM_{2.5}$ concentrations at each station over the period of record. The graph shows that EC comprises approximately 10 percent of the total $PM_{2.5}$ concentrations during the spring and early summer, rising to 20 percent during the fall/early winter time frame. During the latest year, average EC concentrations reached a maximum of 27 percent of total $PM_{2.5}$ concentrations at the TITP station.
- Again, the most interesting part of Figure A-10 is the downward trend shown in the monthly average ratio of EC to $PM_{2.5}$ concentrations from the 2006-2007 monitoring year to the 2008-2009 monitoring year. Both the fall/early winter peak ratios and the lower spring/early summer ratios are decreasing since 2006-2007; apparently showing the effect of lower PM emissions from Port operations.

## *Gaseous Criteria Pollutants*

Beginning in late November 2007, the capability of each air monitoring station was expanded by adding instruments that can monitor on a real-time basis for four gaseous criteria pollutants (CO, $SO_2$, NO2, and $O_3$), particulates ($PM_{2.5}$ and $PM_{10}$), ultrafine particle counts, and PAHs. Due to the logistics involved in this large expansion, the stations began operation on a phased schedule:

- The Coastal Boundary and the TITP stations on December 1, 2007;
- The Wilmington Community station on April 1, 2008;
- The San Pedro Community station on May 1, 2008.

While there was only a limited amount of data from the real-time instruments for the 2007-2008 annual report, there is now sufficient data available for the 2008-2009 report to make a comparison with the appropriate NAAQS and CAAQS standards. Further, graphs of monthly-averaged, real-time instrument data are presented in the Appendix and demonstrate interesting preliminary trends.

The preliminary results are discussed below.

## *$O_3$ Data*

Table 4 shows the maximum 1-hour and 8-hour $O_3$ concentrations measured at the four POLA network stations for the year ranging from May 2008 to April 2009.

**Table 4. Maximum 1-hr & 8-hr Average $O_3$ Concentrations during the 2008-2009 Year at the POLA Air Monitoring Stations**

| Averaging Period | Port of Los Angeles Monitoring Stations | | | |
|---|---|---|---|---|
| | Wilmington Community Station | Coastal Boundary Station | San Pedro Community Station | Terminal Island Treatment Station |
| | Conc. (ppm) | Conc. (ppm) | Conc. (ppm) | Conc. (ppm) |
| Max 1-Hr | 0.083 | 0.097 | 0.081 | 0.091 |
| Max 8-Hr | 0.064 | 0.066 | 0.066 | 0.060 |

The following conclusions have been drawn from the data:

- During the 2008-2009 monitoring year, there were two exceedances of the 1-hour CAAQS for $O_3$ (0.090 ppm) and zero exceedances of the 8-hour CAAQS and NAAQS for $O_3$ (0.070 ppm and 0.075 ppm, respectively). Both exceedances occurred on November 16, 2008, and are primarily due to the effects of easterly Santa Ana winds transporting elevated ozone concentrations to the coastline.
- Over the year-long period, only two (TITP and B47) of the four POLA stations recorded 1-hour averages exceeding the CAAQS of 0.090 ppm.

A graph of average monthly $O_3$ concentrations at the four POLA network stations during the May 2008 – April 2009 period is shown in Figure A-11. There are three features evident from Figure A-11:

- The monthly ozone concentrations show a strong seasonal pattern with ozone concentrations typically highest during the spring and summer months (when solar radiation levels are at a maximum), and decreasing into the fall and winter months as solar radiation levels decrease. Ozone is a secondary pollutant that forms through a series of chemical reactions that occur when volatile organic compounds (VOCs) and nitrogen oxides ($NO_x$) react in the presence of solar radiation.

- Ozone concentrations at all four stations are very similar. This is also expected, because ozone typically takes several hours to form (and often ends up many miles downwind of the source area, so that even in the presence of local emission sources, increased local concentrations of ozone might not be expected).

- Throughout the year, ozone concentrations at the Coastal Boundary station are consistently higher than the other three, more-urbanized monitoring stations. This is expected, given the photochemistry of ozone formation and destruction ($NO_x$ emissions are efficient scrubbers of ozone, and $NO_X$-producing diesel-engine sources are lowest in the vicinity of the Coastal Boundary station).

## *$NO_2$ Data*

Table 5 shows the average annual $NO_2$ concentrations measured at the four POLA network stations for the year ranging from May 2008 to April 2009.

**Table 5. Annual Average $NO_2$ Concentrations at the POLA Air Monitoring Stations**

| Averaging Period | Port of Los Angeles Monitoring Stations | | | |
|---|---|---|---|---|
| | **Wilmington Community Station** | **Coastal Boundary Station** | **San Pedro Community Station** | **Terminal Island Treatment Station** |
| | Conc. (ppm) | Conc. (ppm) | Conc. (ppm) | Conc. (ppm) |
| May 2008 – April 2009 | 0.020 | 0.011 | 0.020 | 0.022 |

The following conclusions have been drawn from the data:

- The average annual $NO_2$ concentrations at the Coastal Boundary site is considerably lower (~50%) than the other three stations in the POLA monitoring network. This is likely a result of the relatively low number of diesel-engine mobile sources in the vicinity of the Coastal Boundary station, which are the biggest source of $NO_x$ emissions in the area.

- Over the year-long period, the annual $NO_2$ averages for all stations are well below the annual $NO_2$ CAAQS of 0.030 ppm and the NAAQS of 0.053 ppm.

- There were no exceedances recorded at the four monitoring stations of the 1-hour $NO_2$ CAAQS (0.180 ppm) during the May 2008 - April 2009 monitoring year.

- A graph of average monthly $NO_2$ concentrations at the four POLA network stations during the May 2008 – April 2009 period is shown in Figure A-12. During this time, the Coastal Boundary station consistently recorded lower $NO_2$ concentrations than the other three stations, which is consistent with the average annual $NO_2$ concentration data presented in Table 5.

## *$SO_2$ Data*

Table 6 shows the average annual $SO_2$ concentrations measured at the four POLA network stations for the year ranging from May 2008 to April 2009.

**Table 6. Annual Average $SO_2$ Concentrations at the POLA Air Monitoring Stations**

| Averaging Period | Port of Los Angeles Monitoring Stations | | | |
|---|---|---|---|---|
| | **Wilmington Community Station** | **Coastal Boundary Station** | **San Pedro Community Station** | **Terminal Island Treatment Station** |
| | Conc. (ppm) | Conc. (ppm) | Conc. (ppm) | Conc. (ppm) |
| May 2008 – April 2009 | 0.003 | 0.003 | 0.003 | 0.005 |

The following conclusions have been drawn from the data:

- The average annual $SO_2$ concentration at the TITP station is considerably higher (~66%) than the other three stations in the POLA monitoring network. Because ships are the primary source of $SO_2$ emissions at the Port, it is reasonable to expect that the source-dominated TITP station, located on Terminal Island near the center of Port operations, would have the highest ambient $SO_2$ concentrations.

- Over the year-long period, the annual $SO_2$ averages for all stations are well below the annual $SO_2$ NAAQS of 0.030 ppm.

- There were no exceedances recorded at the four monitoring stations of the 1-hour $SO_2$ CAAQS (0.250 ppm), the 24-hr $SO_2$ CAAQS (0.040 ppm) or the 24-hr $SO_2$ NAAQS (0.140 ppm) during the May 2008 - April 2009 monitoring year.

- A graph of average monthly $SO_2$ concentrations at the four POLA network stations during the May 2008 – April 2009 period is shown in Figure A-13. During this time, the TITP station commonly recorded higher $SO_2$ concentrations than the other three stations, which is consistent with the average annual $SO_2$ concentration data presented in Table 6.

## *CO Data*

Table 7 shows the maximum 1-hour and 8-hour CO concentrations measured at the four POLA network stations for the year ranging from May 2008 to April 2009.

**Table 7. Maximum 1-hr & 8-hr Average CO Concentrations at the POLA Air Monitoring Stations**

| Averaging Period | Port of Los Angeles Monitoring Stations | | | |
|---|---|---|---|---|
| | Wilmington Community Station | Coastal Boundary Station | San Pedro Community Station | Terminal Island Treatment Station |
| | Conc. (ppm) | Conc. (ppm) | Conc. (ppm) | Conc. (ppm) |
| Max 1-HR | 5.3 | 2.0 | 5.2 | 5.1 |
| Max 8-HR | 2.7 | 1.3 | 1.5 | 1.6 |

The following conclusions have been drawn from the data:

- During the 2008-2009 monitoring year, there were zero exceedances of the 1-hour CAAQS (20 ppm) and NAAQS (35 ppm) for CO. Further, there were zero exceedances of the 8-hour CAAQS and NAAQS (9 ppm) for CO as well.

- There were no exceedances recorded at the four monitoring stations of the 1-hour $NO_2$ CAAQS (0.180 ppm) during the May 2008 - April 2009 monitoring year.

- A graph of average monthly CO concentrations at the four POLA network stations during the May 2008 – April 2009 period is shown in Figure A-14. The average monthly CO concentrations at all stations were low, but the data demonstrate some seasonal tendency of higher monthly averages in the winter months. The relatively higher CO concentrations observed in November, December and January are likely due to lower atmospheric dispersion conditions due to the surface-based inversions that are commonly present during this time of year.

## *Real-Time $PM_{2.5}$ and $PM_{10}$ Data*

To complete the expanded monitoring capability of the stations, beta attenuation monitors (BAMs) were installed at each station to provide real-time measurements of particulates. By April 2008, the stations were equipped with BAM instruments as follows:

- Coastal Boundary station - $PM_{2.5}$ and $PM_{10}$ BAMs
- San Pedro Community station - $PM_{2.5}$ BAM
- Wilmington Community Station - $PM_{2.5}$ and $PM_{10}$ BAMs
- Terminal Island Treatment Plant station- $PM_{2.5}$ BAM

Beginning in late January 2009, the capabilities of the San Pedro and Terminal Island Treatment Plant stations were expanded by adding $PM_{10}$ BAM instruments for real-time measurements of particulate matter less than 10 microns. Consequently, there is only a limited amount of real-time $PM_{10}$ data for the San Pedro and TITP stations available for the 2008-2009 annual report.

While the Coastal Boundary and Wilmington Community stations have a full year of data, the San Pedro and TITP stations have only three months of data; therefore, there is insufficient data to make a comparison with the NAAQS and CAAQS standards. However, graphs of the limited $PM_{10}$ BAM data set are available in the Appendix and show some interesting preliminary trends.

## $PM_{2.5}$ BAM Data

A graph of average monthly $PM_{2.5}$ BAM concentrations at the four POLA network stations during the May 2008 – April 2009 period is shown in Figure A-15. This illustration demonstrates the close correlation between the measured concentrations at the four stations in the network. That is, the measured concentrations at the four stations tend to increase and decrease in a similar pattern. Regional $PM_{2.5}$ levels and weather events (e.g., rainfall during storms) exert a strong influence on the $PM_{2.5}$ levels around the Port.

## $PM_{10}$ BAM Data

A graph of average monthly $PM_{10}$ BAM concentrations at the four POLA network stations during the May 2008 – April 2009 period is shown in Figure A-16. This illustration demonstrates a close correlation between the measured concentrations at the Wilmington Community and Coastal Boundary stations with the Wilmington Community station demonstrating consistently higher concentrations throughout the year.

- The San Pedro Community and Terminal Island Treatment Plant stations were deployed in January 2009 and their monthly averages are also included in Figure A-16. Preliminary comparison of all four stations' monthly averaged data illustrates a strong correlation, therefore it seems likely regional $PM_{10}$ levels and weather events (e.g., changes in synoptic patterns around the LA Basin) exert a strong influence on the $PM_{10}$ levels around the Port.

## Real-Time PAH Data

PAH analyzers were installed at each monitoring station in 2007-2008, when the air monitoring network was expanded to include real-time instruments. These analyzers measure total particle-bound polycyclic aromatic hydrocarbons (PAHs). PAHs are primarily products of incomplete combustion and have been suggested as surrogates for diesel particulate matter (DPM).

These data may therefore be complimentary to the EC data that is being analyzed on the filter-based samplers, and is also considered a surrogate for DPM. PAHs are a large class of compounds, and are one of the most widespread organic pollutants. This instrument measures total organic compounds, and may be an indicator of diesel emission sources in the area.

Figure A-17 is a graph of monthly PAH concentrations during the first year of monitoring. The graph shows that the PAH levels rise during the fall season, which is also characteristic of the EC graphs. However, the PAH graph shows much higher measurements at the TITP site, especially during the fall and winter. This may be characteristic of the increased level of mobile diesel sources in the vicinity of that station; Data from subsequent years will determine whether this is a regular phenomenon.

## 4.2 METEOROLOGICAL DATA

The meteorological data collected at each of the four stations are useful in interpreting the PM data collected at the site. In addition, the meteorological data sets can be used in air dispersion modeling and other data analyses.

Wind roses, which graphically show the frequency of occurrence of wind speed and direction at a site, have been constructed using from the data collected by this program. The historical data was used to develop the wind roses that are shown projected on the Port base map in Figure 2. Wind roses were also created using the 4$^{th}$ year of meteorological data collected at each station and are shown in the Appendix, as Figures A-18 through A-21. They look very similar to previous years except for a shift in the predominant wind direction at the Wilmington Community station. Wind roses are useful in air quality analyses, because they readily indicate the directions in which emissions are most frequently transported. By convention, winds are shown in the direction from which they came; for example, a west wind blows from the west.

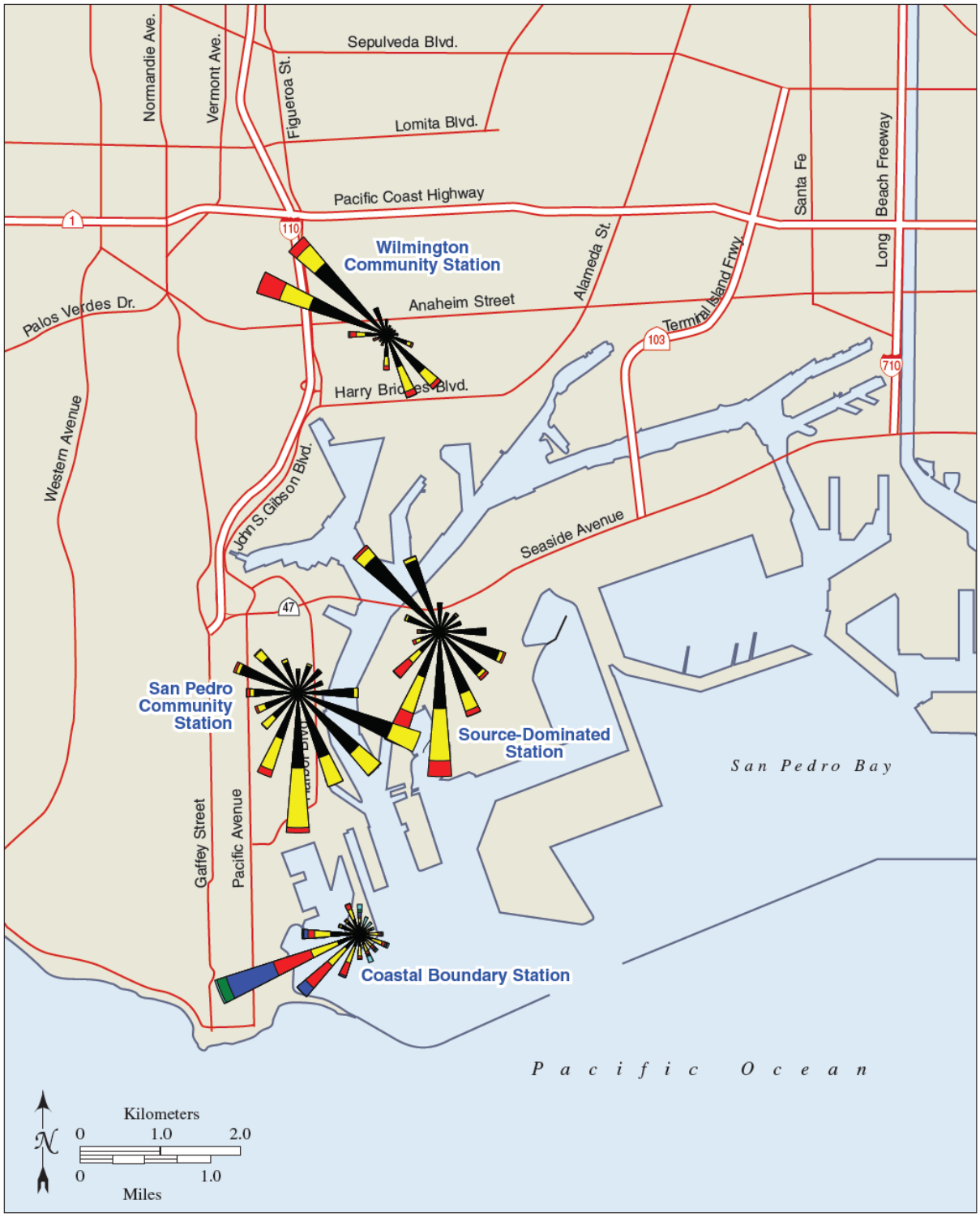
These figures indicate that the general air flow patterns during the current 2008-2009 period are very similar to the air flow patterns observed in previous years, except for the predominant wind direction at the Wilmington Community station, which has shifted from northwest to southwest during the current year. The predominant wind patterns at each station are considerably different, indicating that the Port area experiences complex air flow patterns.

## 4.3 DATA QUALITY ASSURANCE

Several quality assurance measures have been incorporated into this program. These measures include:

1. Collocated monitors at the Wilmington Community Station. The DRI SFS monitors used at each site are multi-port samplers that are not FRM monitors. Consequently, $PM_{2.5}$ and $PM_{10}$ FRM monitors were collocated with the SFS at the Wilmington Community Station to validate the operation of the SFS monitors in the Port monitoring network.
2. Field blanks were periodically taken at each station to ensure that there was no systematic contamination of the filters.
3. Monitoring checklists were routinely completed by the field technicians during every station visit, conducted on a third-day schedule.
4. Semi-annual external audit of the system was performed by an independent contractor.

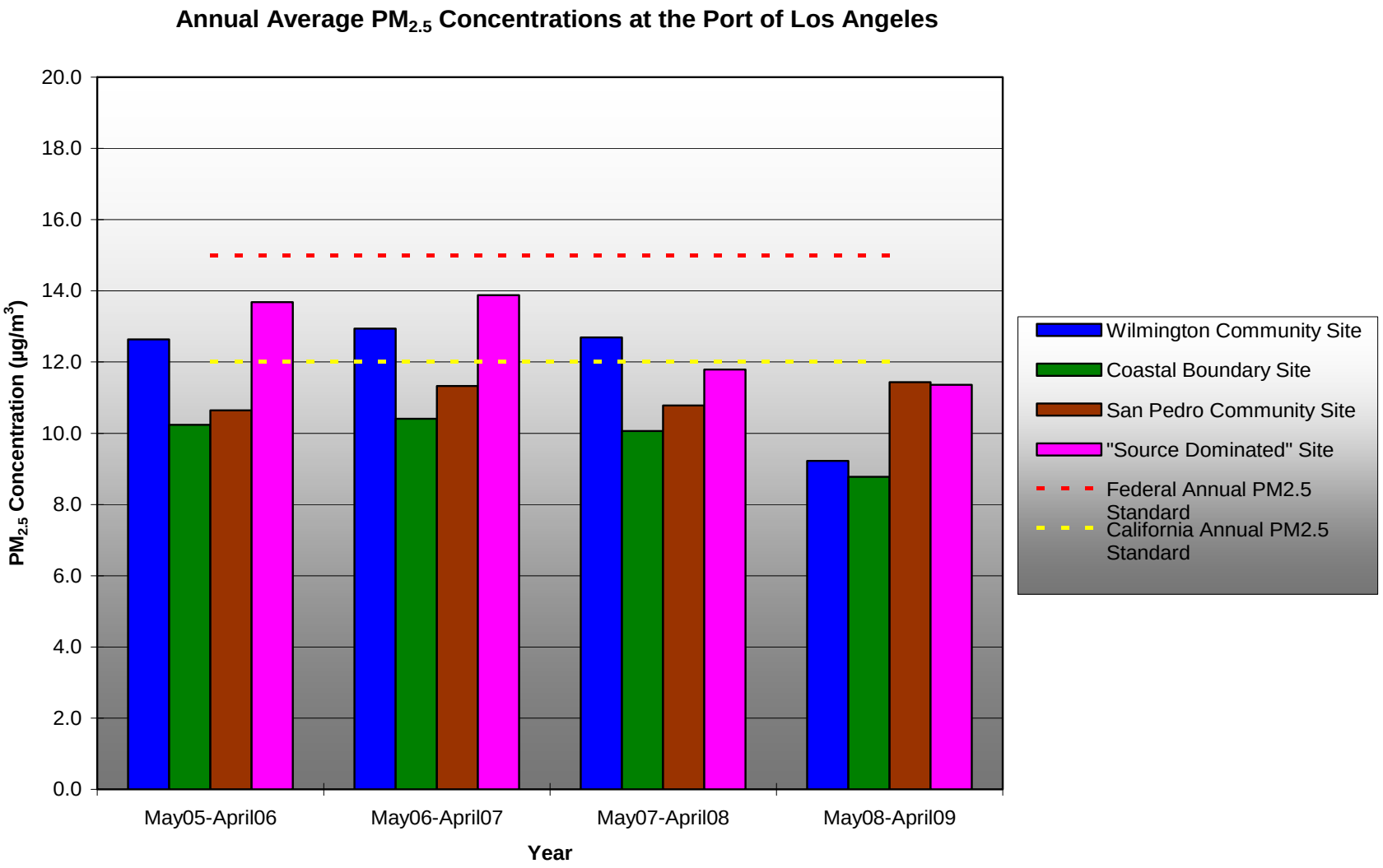
## Figure 2. Wind Roses for the Port Air Monitoring Network Stations



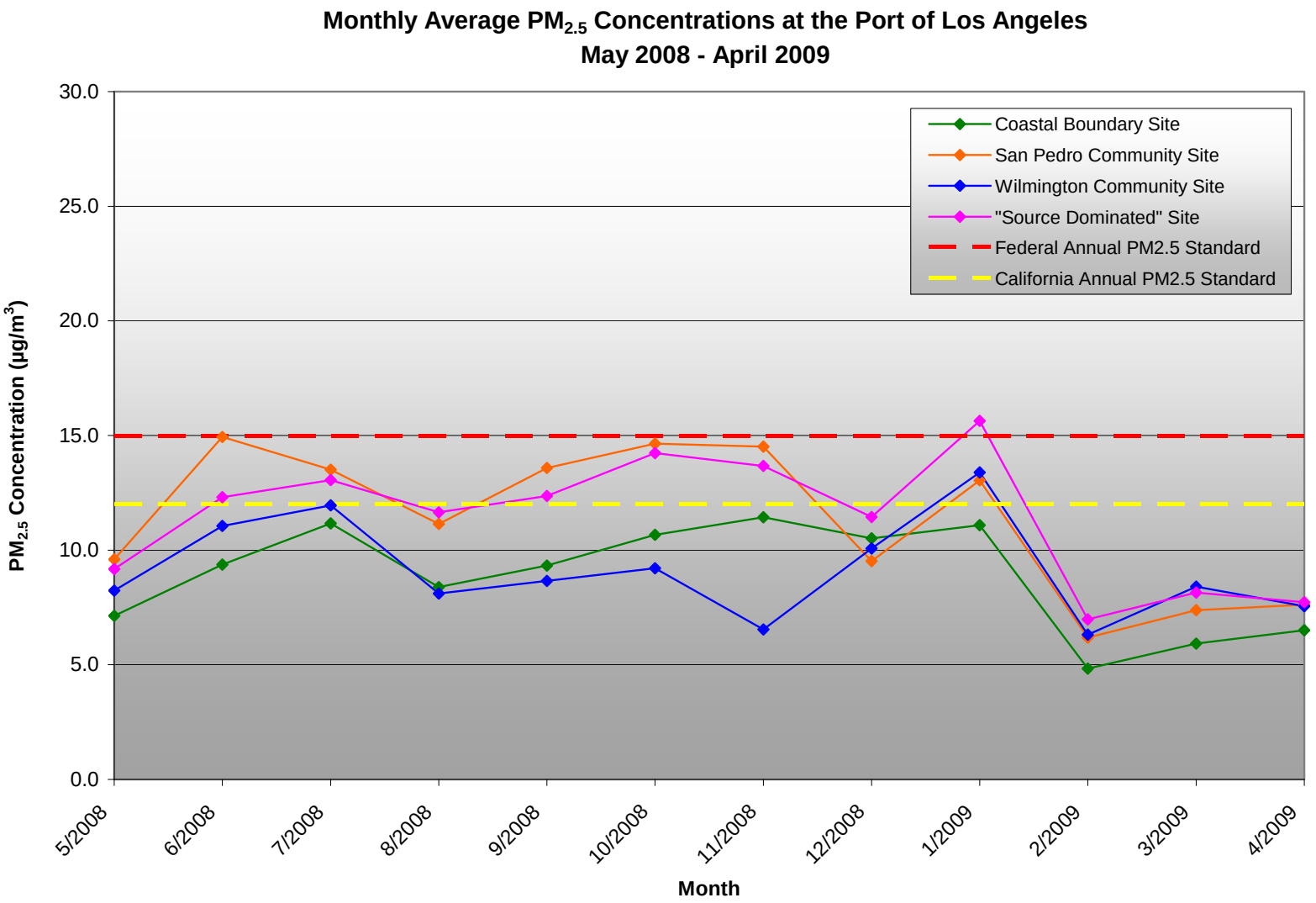
# Appendix

## FIGURES AND TABLES

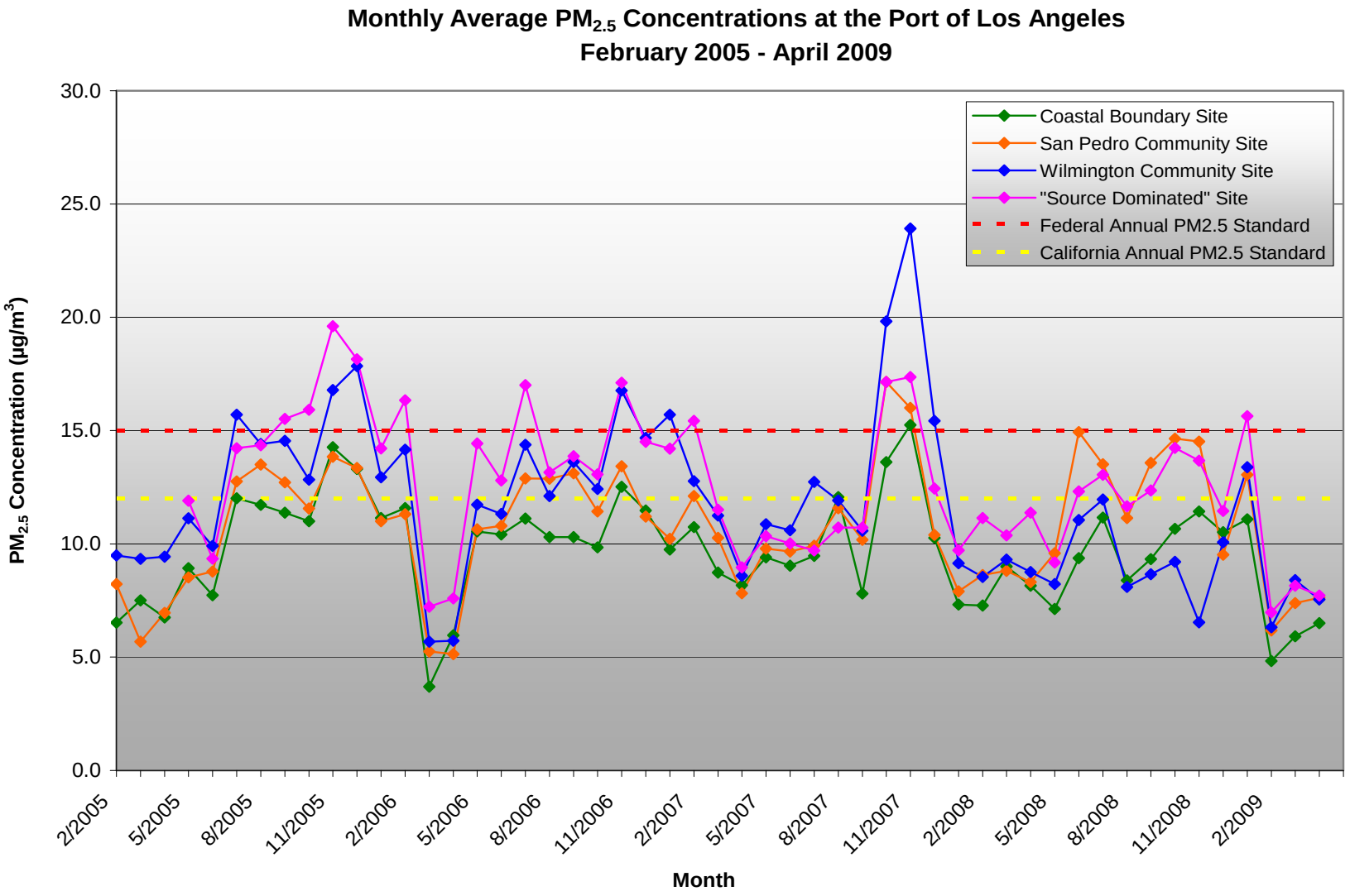
## FIGURE A-1


Annual Average PM2.5 Concentrations at the Port of Los Angeles
PM2.5 Concentration (µg/m3)
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
May05-April06
May06-April07
May07-April08
May08-April09
Year
Wilmington Community Site
Coastal Boundary Site
San Pedro Community Site
"Source Dominated" Site
Federal Annual PM2.5 Standard
California Annual PM2.5 Standard

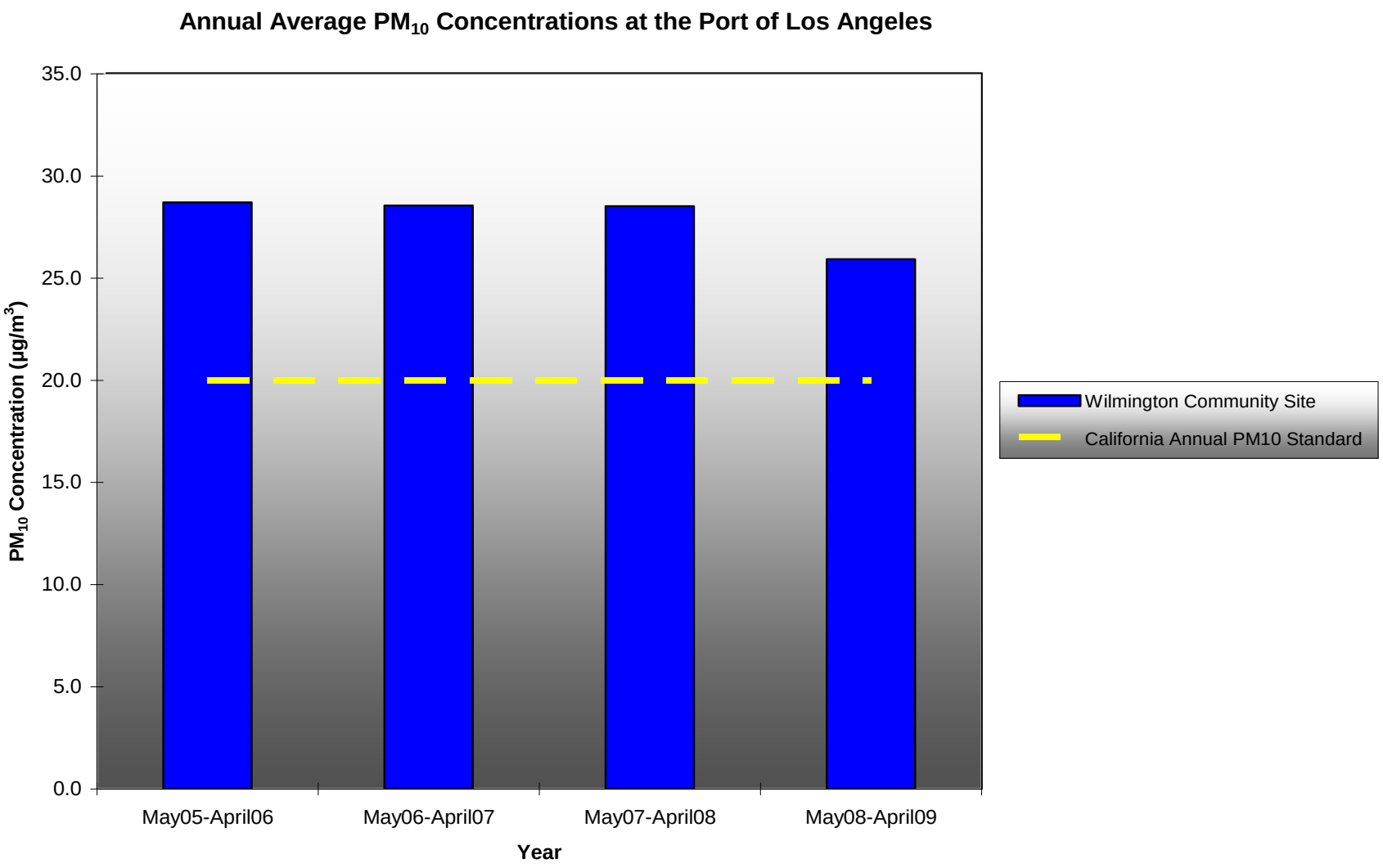
## FIGURE A-2


Monthly Average PM2.5 Concentrations at the Port of Los Angeles
May 2008 - April 2009
PM2.5 Concentration (µg/m3)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
5/2008
6/2008
7/2008
8/2008
9/2008
10/2008
11/2008
12/2008
1/2009
2/2009
3/2009
4/2009
Month
Coastal Boundary Site
San Pedro Community Site
Wilmington Community Site
"Source Dominated" Site
Federal Annual PM2.5 Standard
California Annual PM2.5 Standard

## FIGURE A-3


Monthly Average PM2.5 Concentrations at the Port of Los Angeles
February 2005 - April 2009
PM2.5 Concentration (µg/m3)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
2/2005
5/2005
8/2005
11/2005
2/2006
5/2006
8/2006
11/2006
2/2007
5/2007
8/2007
11/2007
2/2008
5/2008
8/2008
11/2008
2/2009
Month
Coastal Boundary Site
San Pedro Community Site
Wilmington Community Site
"Source Dominated" Site
Federal Annual PM2.5 Standard
California Annual PM2.5 Standard

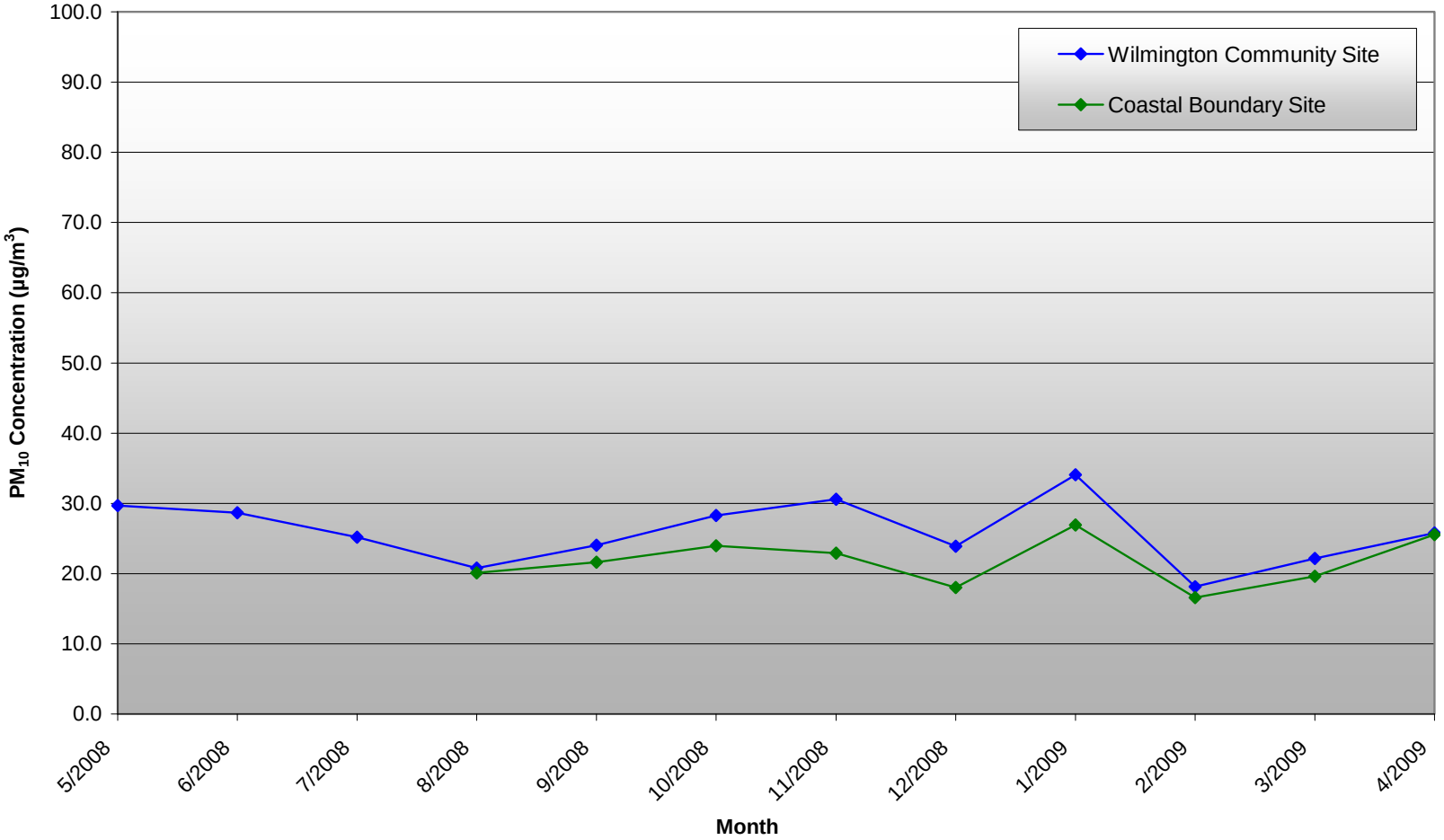
## FIGURE A-4


Annual Average PM10 Concentrations at the Port of Los Angeles
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
PM10 Concentration (µg/m3)
May05-April06
May06-April07
May07-April08
May08-April09
Year
Wilmington Community Site
California Annual PM10 Standard

## FIGURE A-5

### Monthly Average $PM_{10}$ Concentrations at the Port of Los Angeles

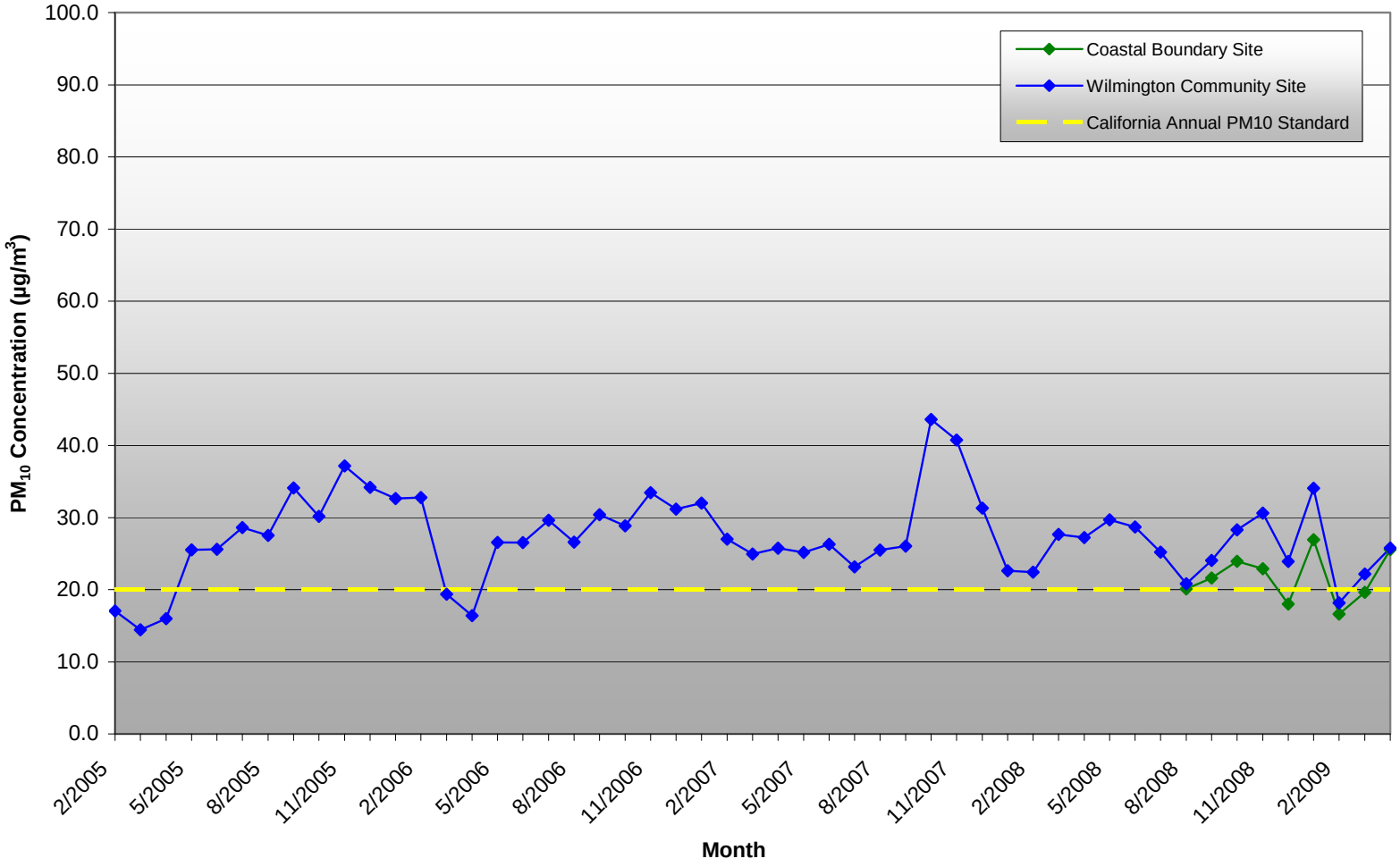
### May 2008 - April 2009



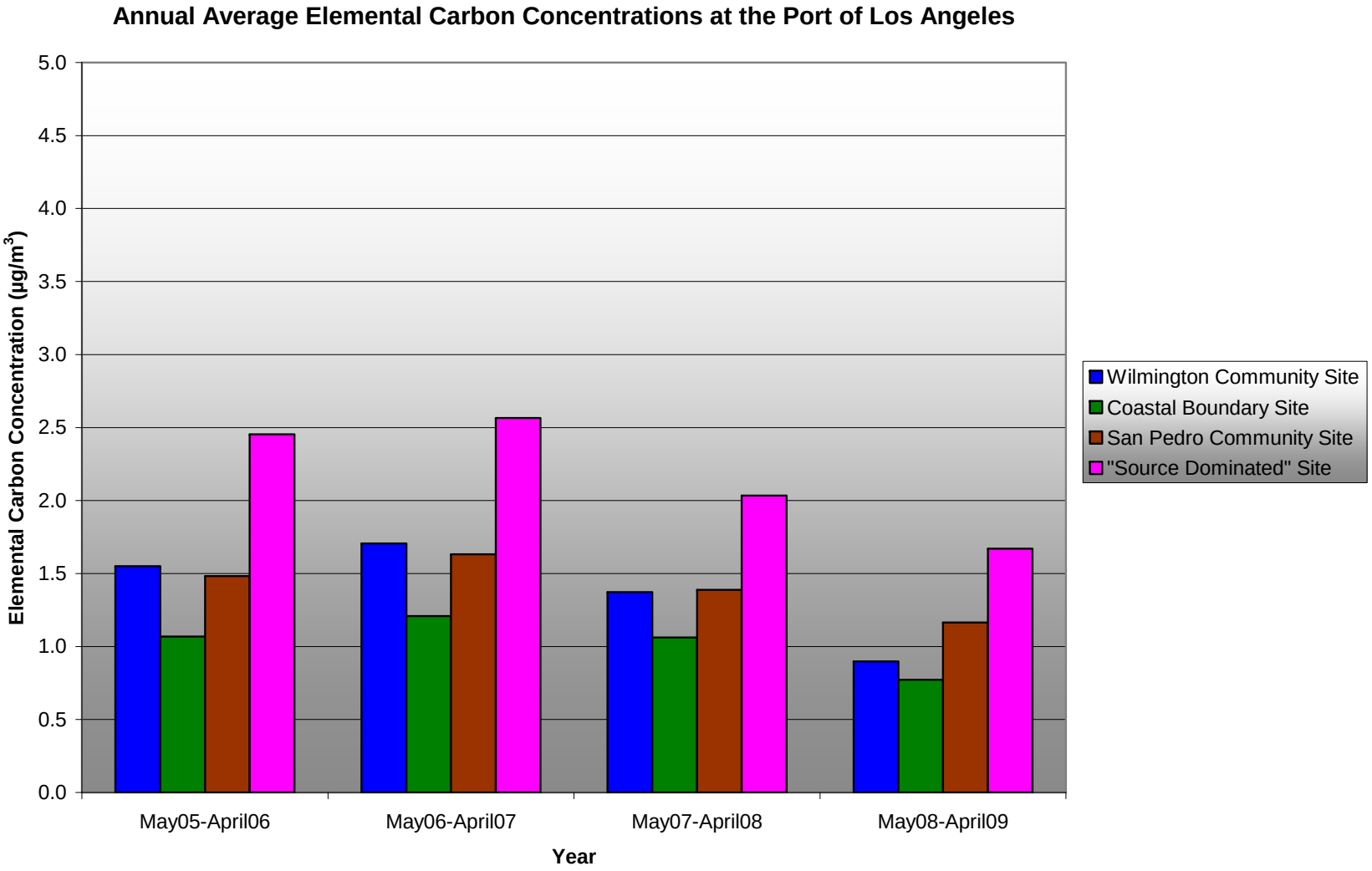
## FIGURE A-6

### Monthly Average $PM_{10}$ Concentrations at the Port of Los Angeles

### February 2005 - April 2009



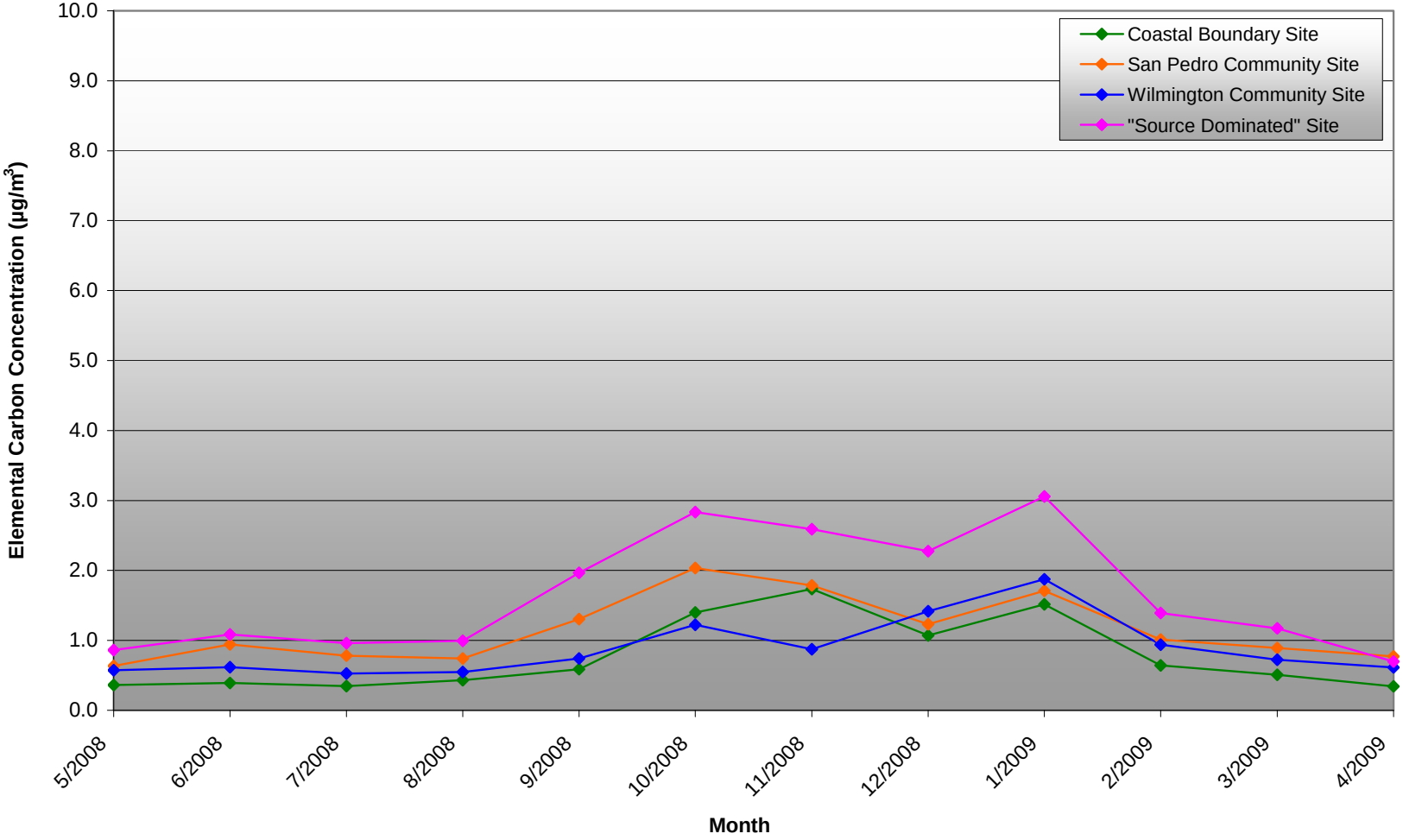
## FIGURE A-7


Annual Average Elemental Carbon Concentrations at the Port of Los Angeles
Elemental Carbon Concentration (µg/m3)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
May05-April06
May06-April07
May07-April08
May08-April09
Year
Wilmington Community Site
Coastal Boundary Site
San Pedro Community Site
"Source Dominated" Site

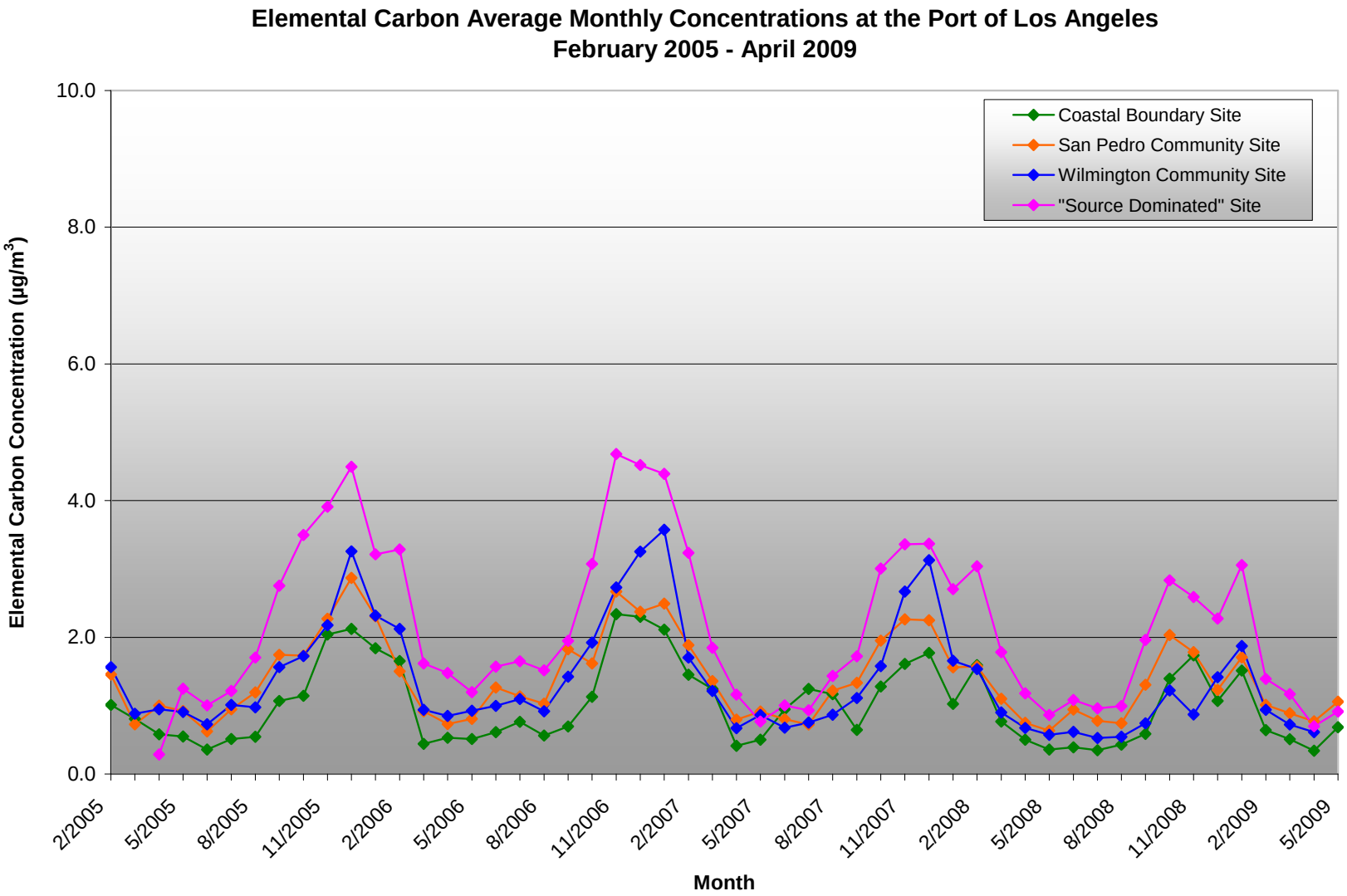
## FIGURE A-8

### Elemental Carbon Average Monthly Concentrations at the Port of Los Angeles

### May 2008 - April 2009



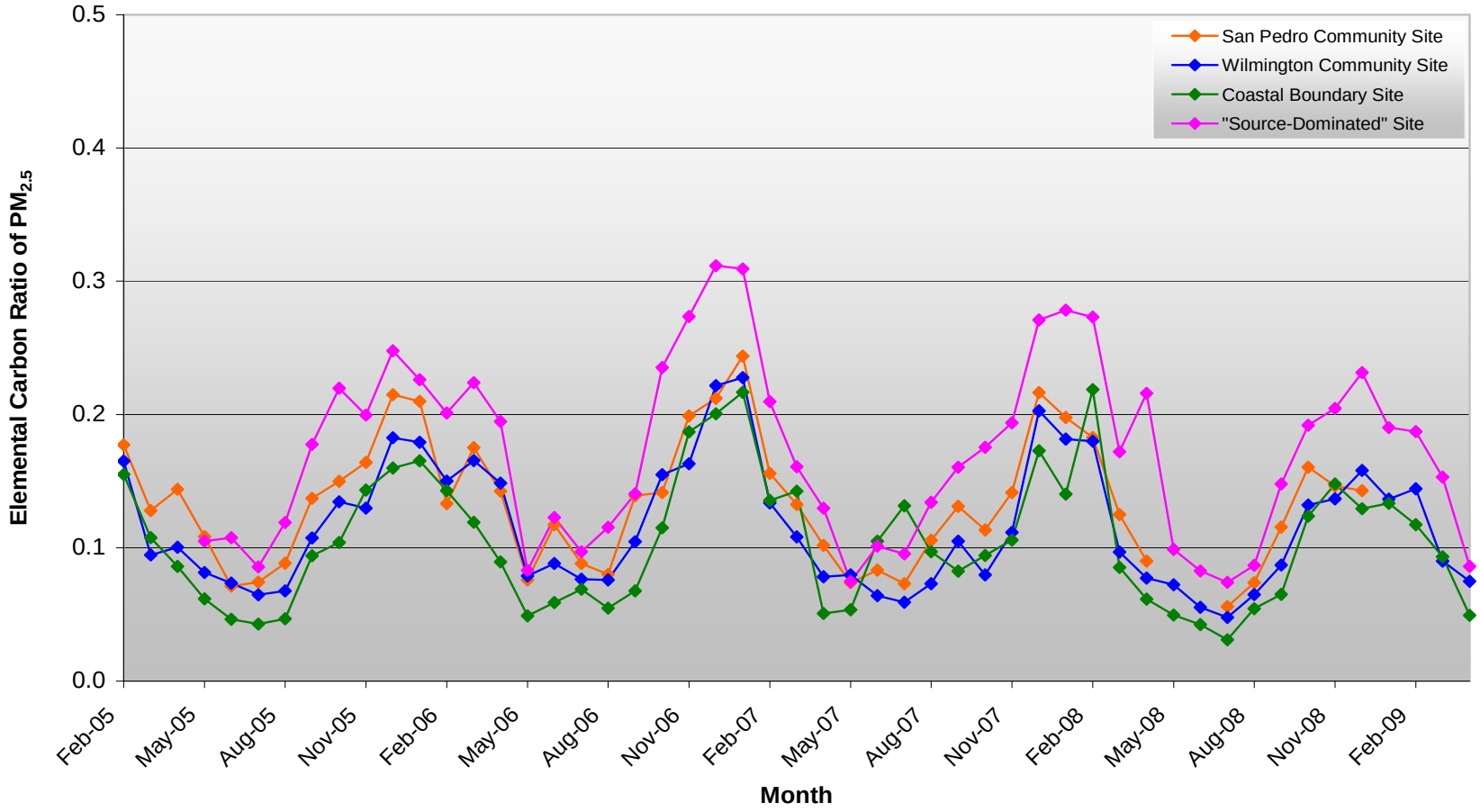
## FIGURE A-9


Elemental Carbon Average Monthly Concentrations at the Port of Los Angeles
February 2005 - April 2009
Elemental Carbon Concentration (µg/m3)
10.0
8.0
6.0
4.0
2.0
0.0
Coastal Boundary Site
San Pedro Community Site
Wilmington Community Site
"Source Dominated" Site
2/2005
5/2005
8/2005
11/2005
2/2006
5/2006
8/2006
11/2006
2/2007
5/2007
8/2007
11/2007
2/2008
5/2008
8/2008
11/2008
2/2009
5/2009
Month

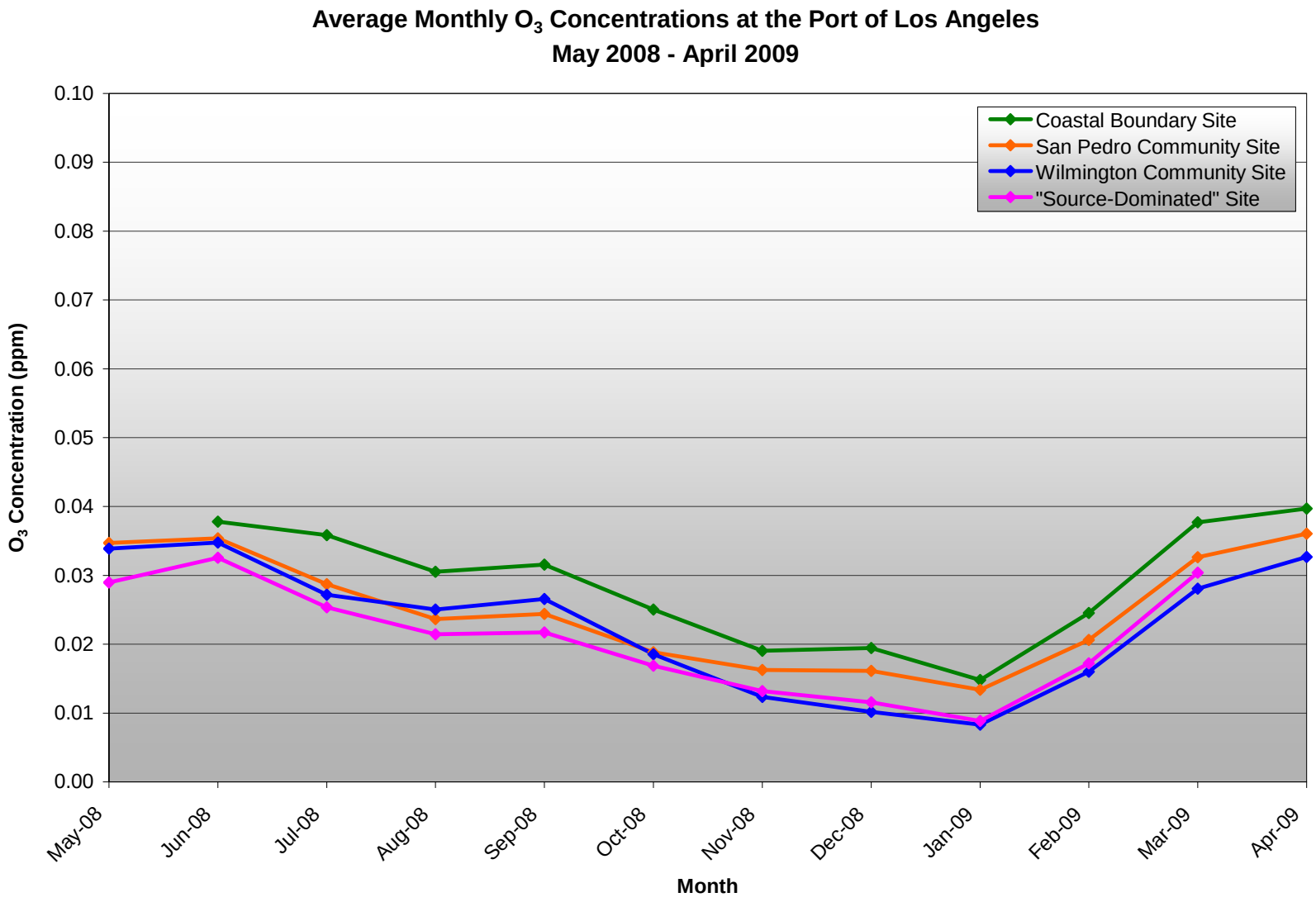
## FIGURE A-10

### Elemental Carbon Ratio of $PM_{2.5}$ at the Port of Los Angeles

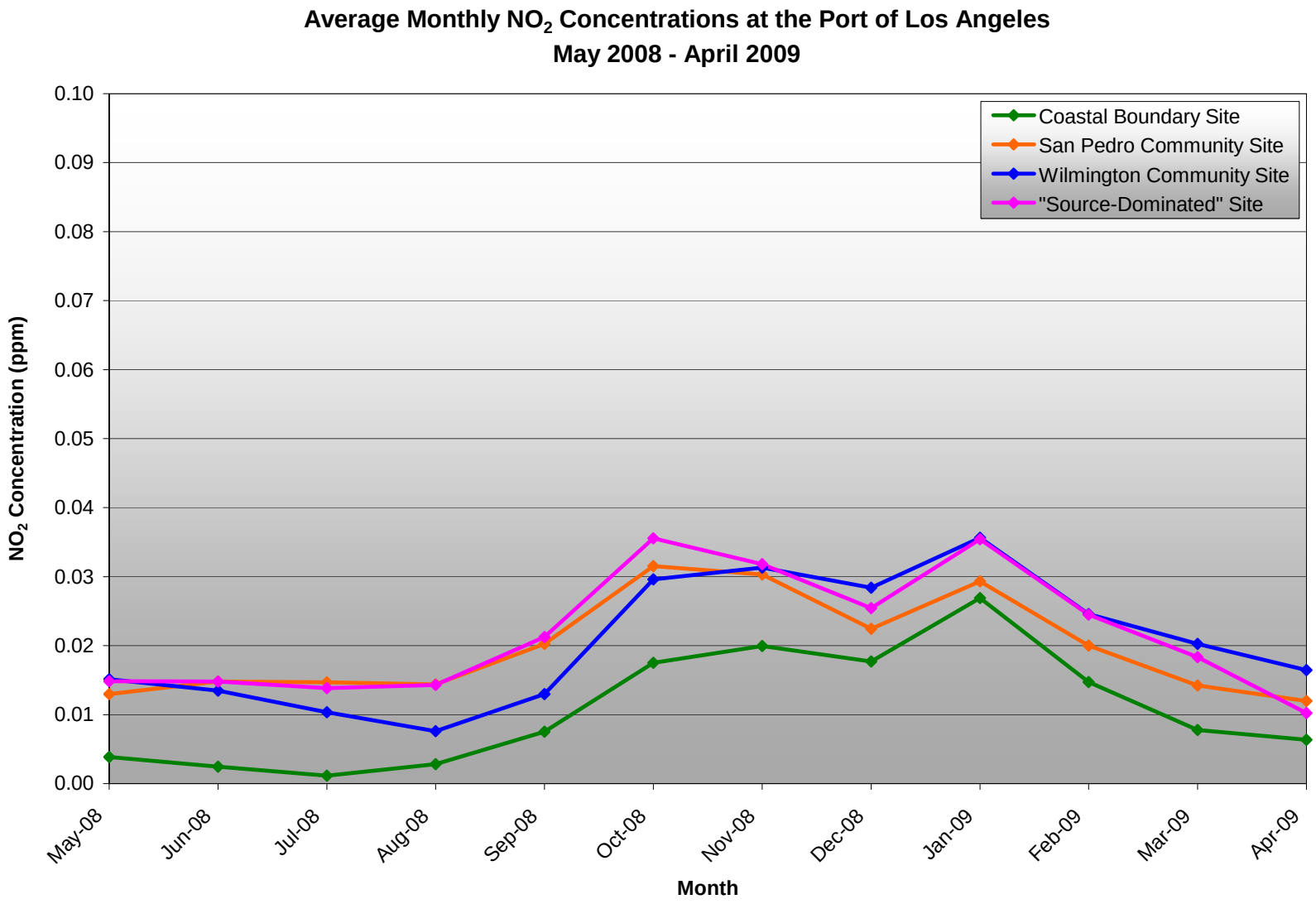
### February 2005 - April 2009



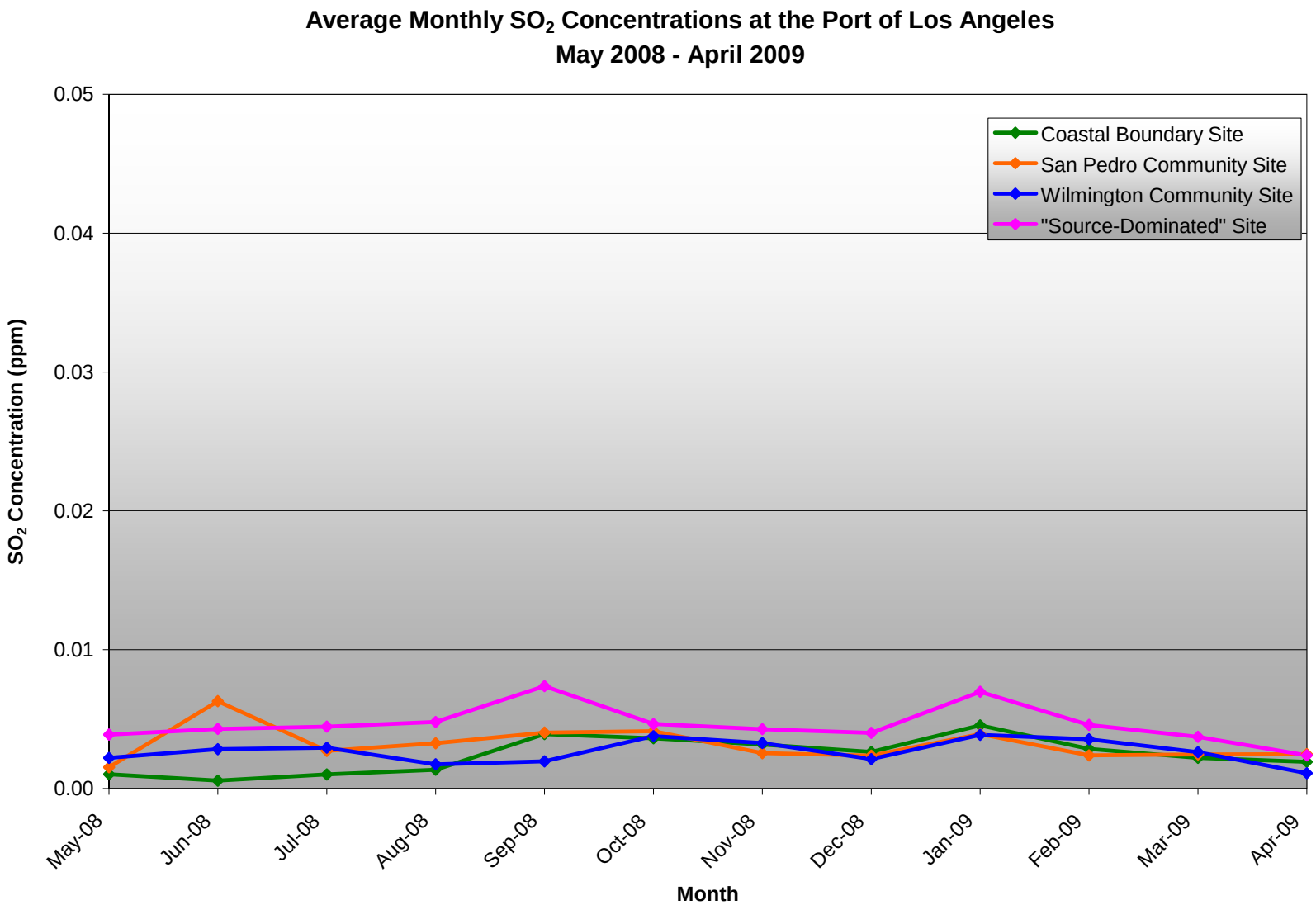
## FIGURE A-11


Average Monthly O3 Concentrations at the Port of Los Angeles
May 2008 - April 2009
O3 Concentration (ppm)
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
Month
Coastal Boundary Site
San Pedro Community Site
Wilmington Community Site
"Source-Dominated" Site

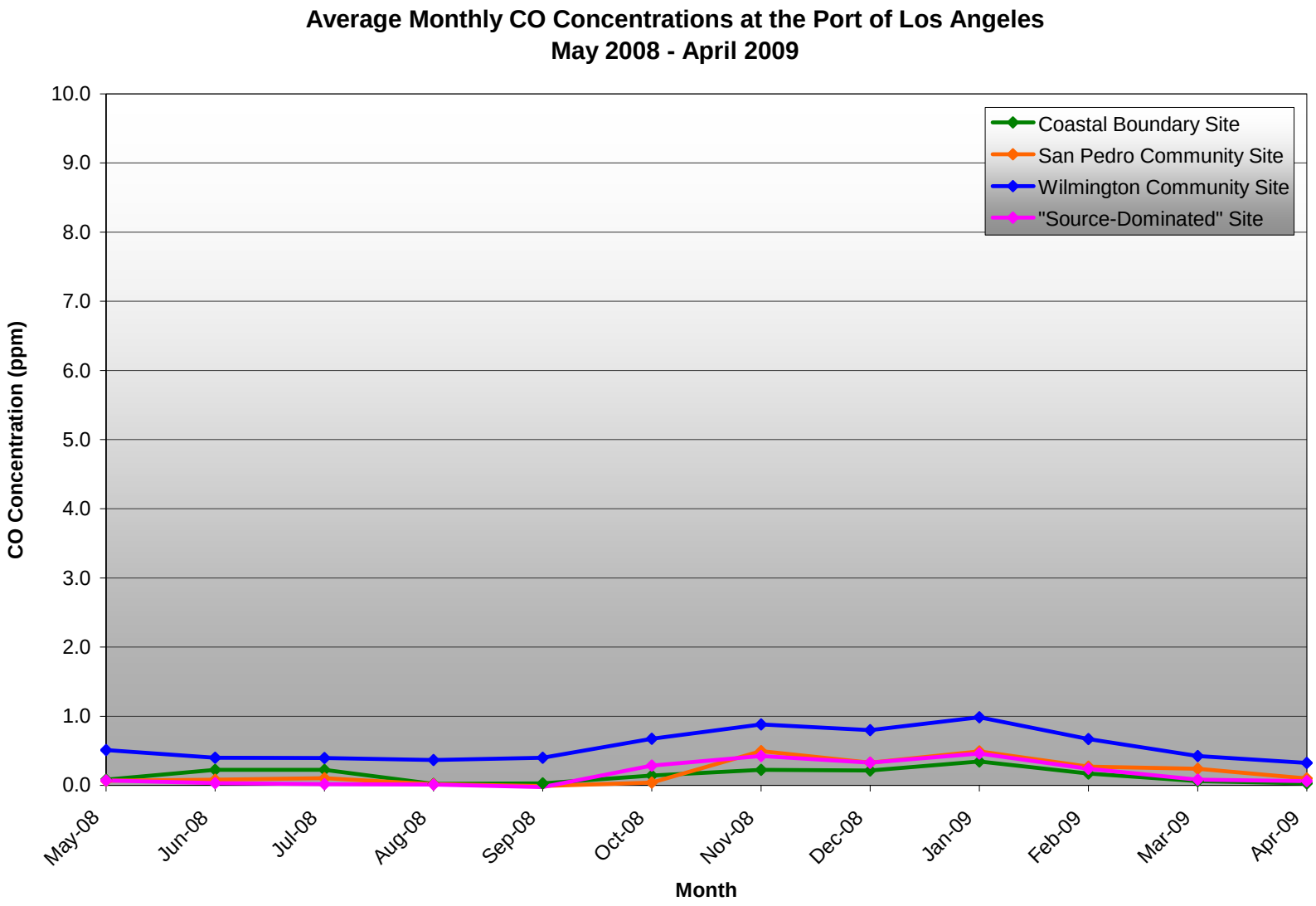
## FIGURE A-12


Average Monthly NO2 Concentrations at the Port of Los Angeles
May 2008 - April 2009
NO2 Concentration (ppm)
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
Month
Coastal Boundary Site
San Pedro Community Site
Wilmington Community Site
"Source-Dominated" Site

## FIGURE A-13

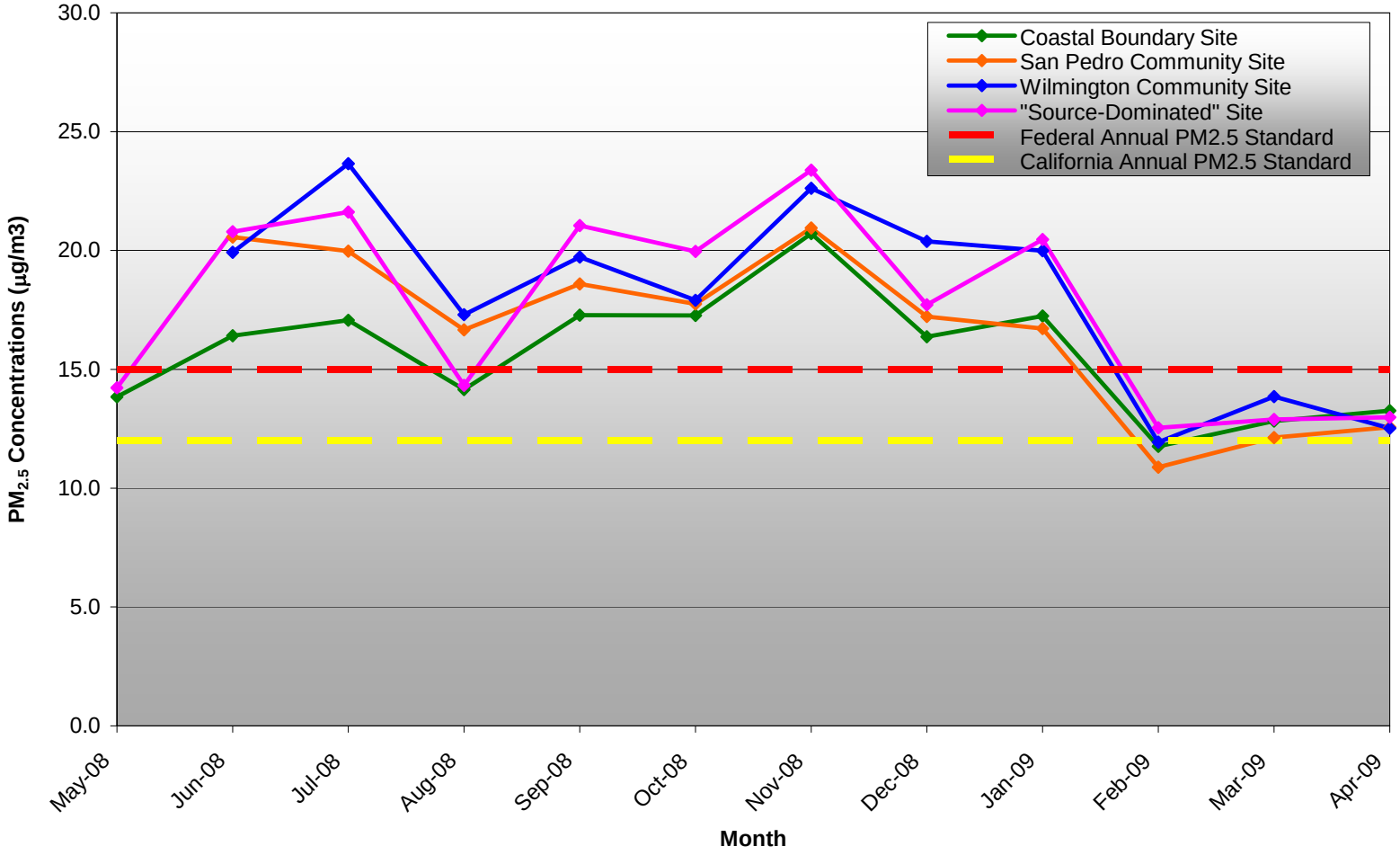

Average Monthly SO2 Concentrations at the Port of Los Angeles
May 2008 - April 2009
0.05
0.04
0.03
0.02
0.01
0.00
SO2 Concentration (ppm)
Coastal Boundary Site
San Pedro Community Site
Wilmington Community Site
"Source-Dominated" Site
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
Month

## FIGURE A-14


Average Monthly CO Concentrations at the Port of Los Angeles
May 2008 - April 2009
CO Concentration (ppm)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
Month
Coastal Boundary Site
San Pedro Community Site
Wilmington Community Site
"Source-Dominated" Site

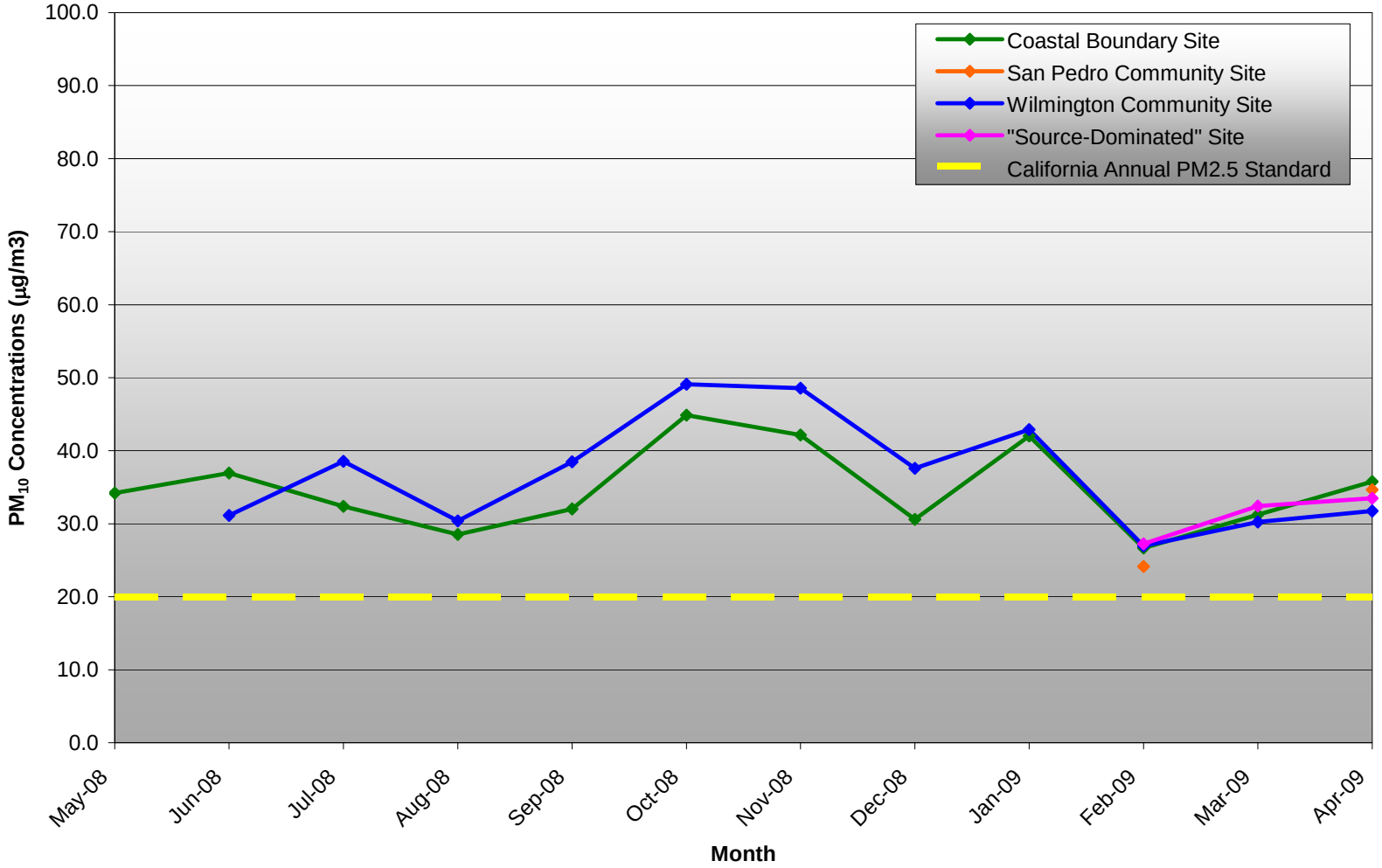
## FIGURE A-15

### Average Monthly $PM_{2.5}$ Concentrations at the Port of Los Angeles
### May 2008 - April 2009

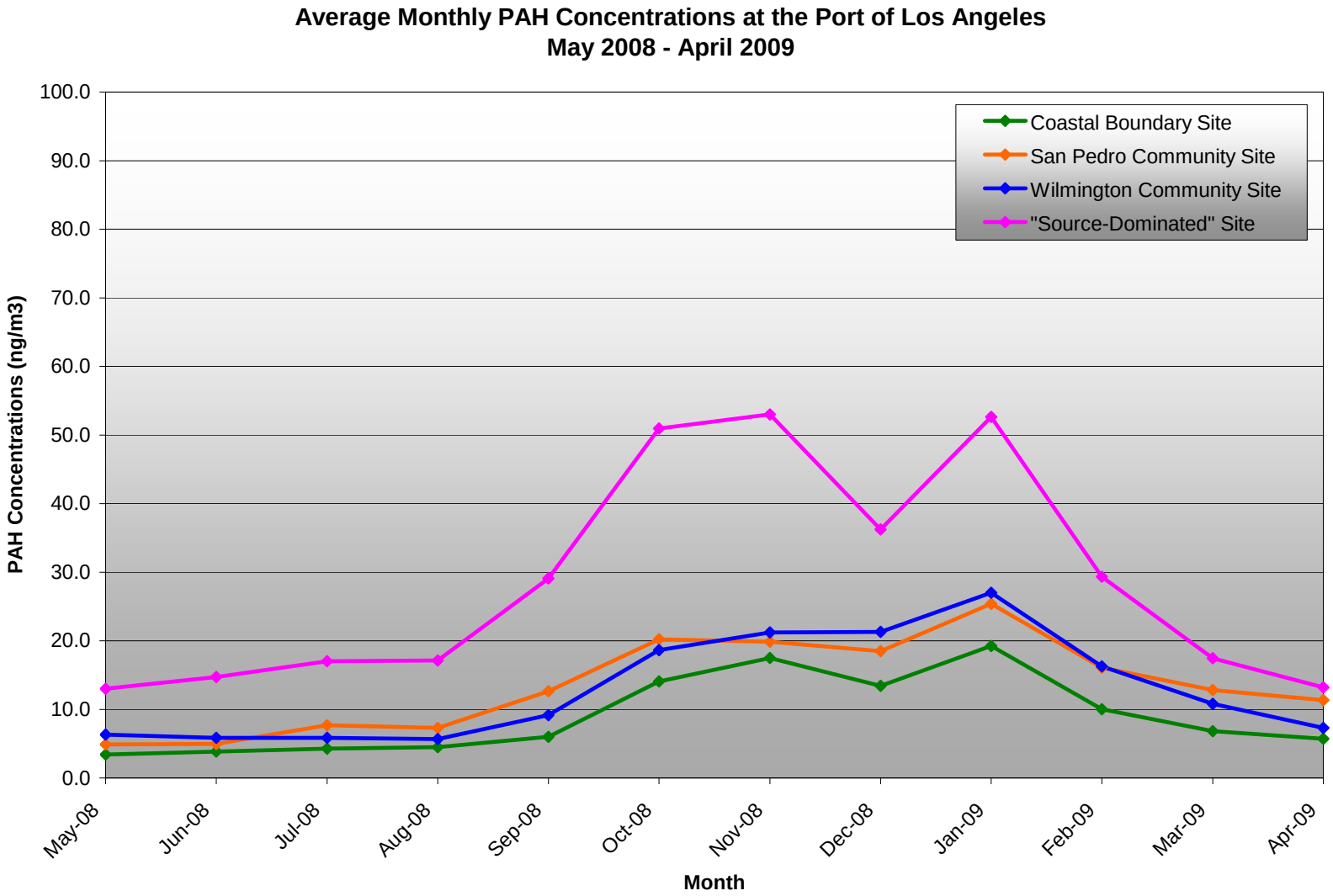


## FIGURE A-16

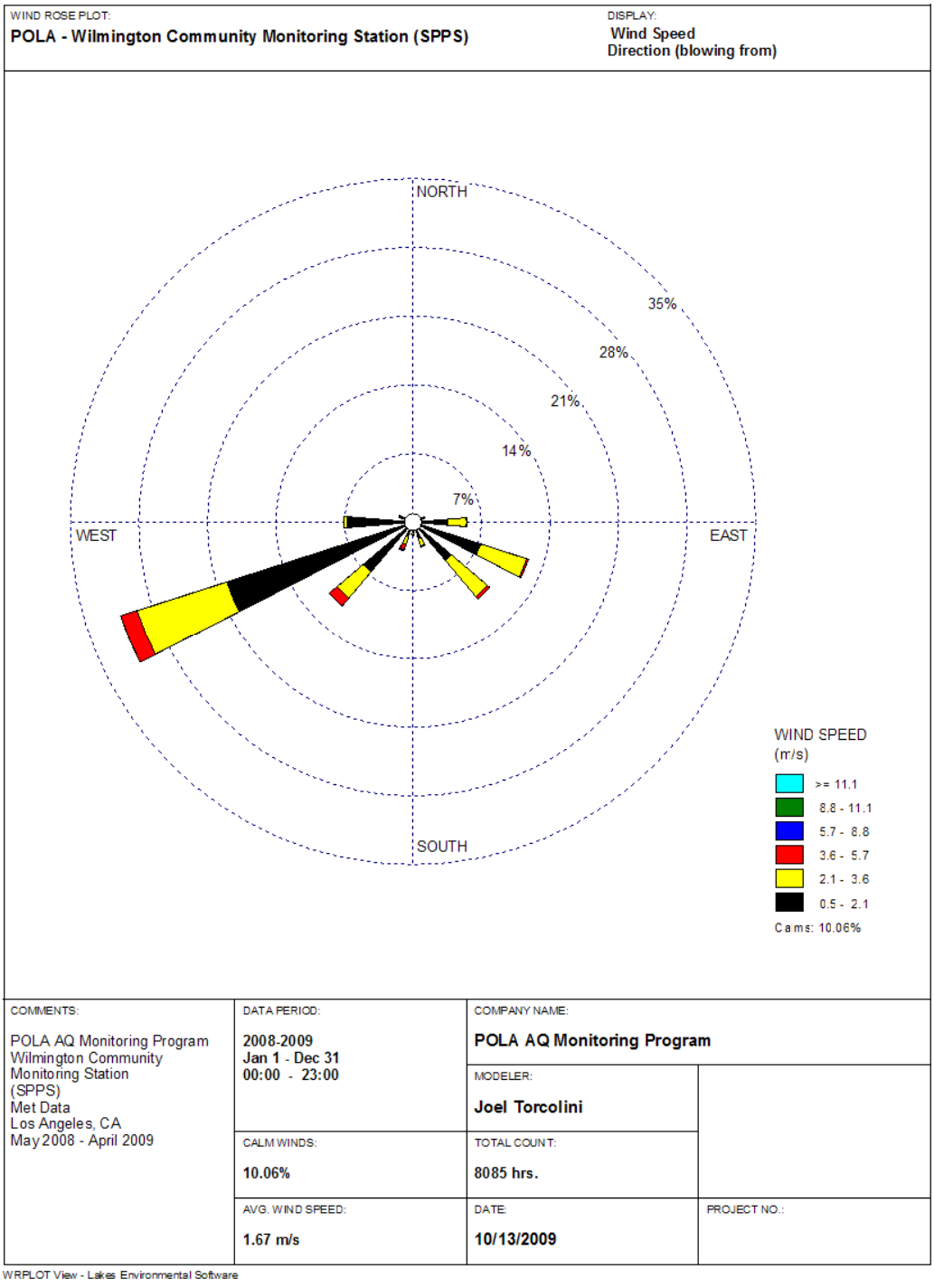
**Average Monthly $PM_{10}$ Concentrations at the Port of Los Angeles**
**May 2008 - April 2009**



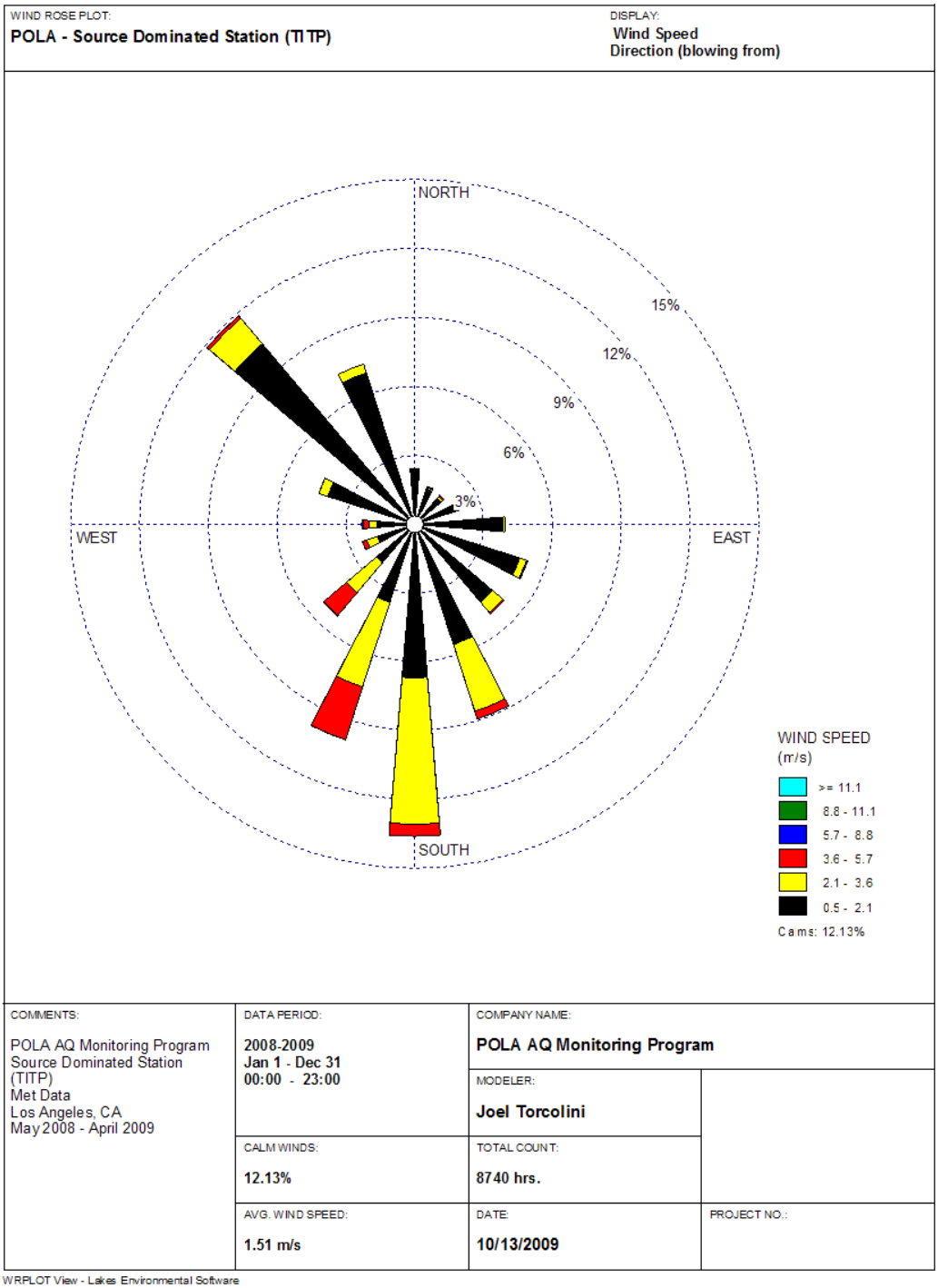
## FIGURE A-17


Average Monthly PAH Concentrations at the Port of Los Angeles
May 2008 - April 2009
PAH Concentrations (ng/m3)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
Month
Coastal Boundary Site
San Pedro Community Site
Wilmington Community Site
"Source-Dominated" Site

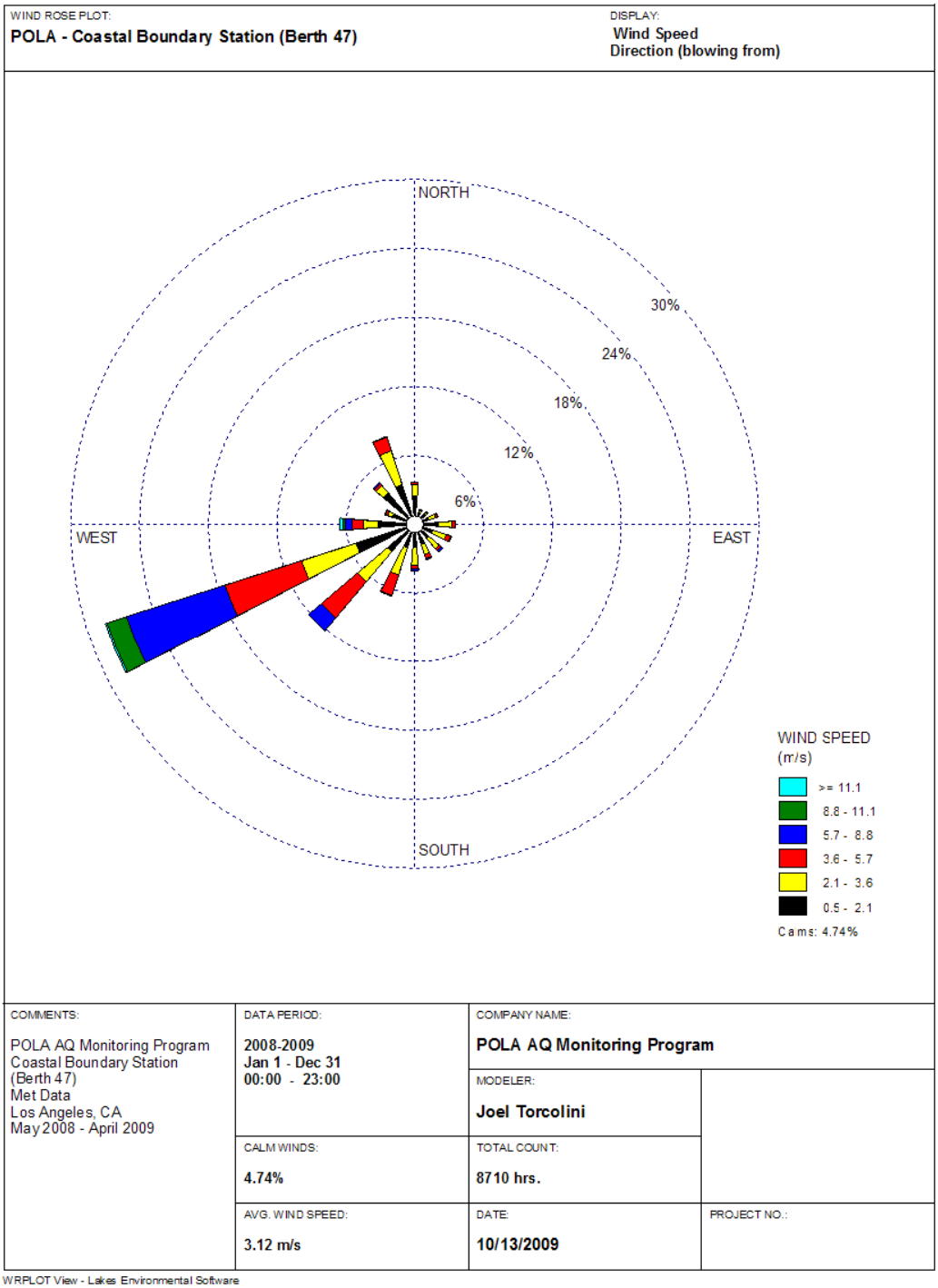
# FIGURE A-18


WIND ROSE PLOT:
POLA - Wilmington Community Monitoring Station (SPPS)
DISPLAY:
Wind Speed
Direction (blowing from)
NORTH
35%
28%
21%
14%
7%
WEST
EAST
SOUTH
WIND SPEED
(m/s)
>= 11.1
8.8 - 11.1
5.7 - 8.8
3.6 - 5.7
2.1 - 3.6
0.5 - 2.1
Calms: 10.06%
COMMENTS:
POLA AQ Monitoring Program
Wilmington Community
Monitoring Station
(SPPS)
Met Data
Los Angeles, CA
May 2008 - April 2009
DATA PERIOD:
2008-2009
Jan 1 - Dec 31
00:00 - 23:00
COMPANY NAME:
POLA AQ Monitoring Program
MODELER:
Joel Torcolini
CALM WINDS:
10.06%
TOTAL COUNT:
8085 hrs.
AVG. WIND SPEED:
1.67 m/s
DATE:
10/13/2009
PROJECT NO.:
WRPLOT View - Lakes Environmental Software

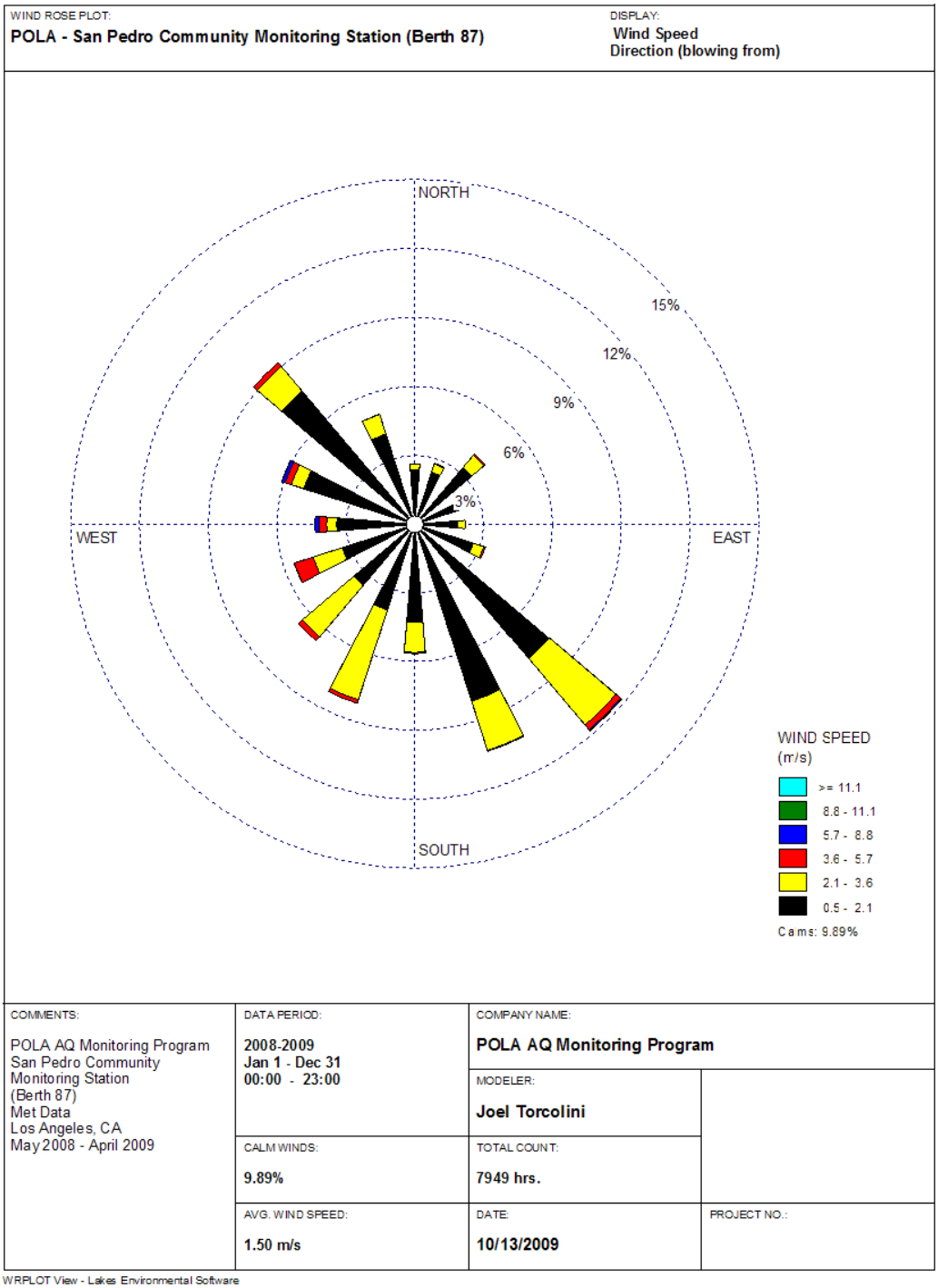
# FIGURE A-19


WIND ROSE PLOT:
POLA - Source Dominated Station (TITP)
DISPLAY:
Wind Speed
Direction (blowing from)
NORTH
EAST
SOUTH
WEST
3%
6%
9%
12%
15%
WIND SPEED
(m/s)
>= 11.1
8.8 - 11.1
5.7 - 8.8
3.6 - 5.7
2.1 - 3.6
0.5 - 2.1
Cams: 12.13%
COMMENTS:
POLA AQ Monitoring Program
Source Dominated Station
(TITP)
Met Data
Los Angeles, CA
May 2008 - April 2009
DATA PERIOD:
2008-2009
Jan 1 - Dec 31
00:00 - 23:00
COMPANY NAME:
POLA AQ Monitoring Program
MODELER:
Joel Torcolini
CALM WINDS:
12.13%
TOTAL COUNT:
8740 hrs.
AVG. WIND SPEED:
1.51 m/s
DATE:
10/13/2009
PROJECT NO.:
WRPLOT View - Lakes Environmental Software

# FIGURE A-20


WIND ROSE PLOT:
POLA - Coastal Boundary Station (Berth 47)
DISPLAY:
Wind Speed
Direction (blowing from)
NORTH
EAST
SOUTH
WEST
6%
12%
18%
24%
30%
WIND SPEED
(m/s)
>= 11.1
8.8 - 11.1
5.7 - 8.8
3.6 - 5.7
2.1 - 3.6
0.5 - 2.1
Cams: 4.74%
COMMENTS:
POLA AQ Monitoring Program
Coastal Boundary Station
(Berth 47)
Met Data
Los Angeles, CA
May 2008 - April 2009
DATA PERIOD:
2008-2009
Jan 1 - Dec 31
00:00 - 23:00
COMPANY NAME:
POLA AQ Monitoring Program
MODELER:
Joel Torcolini
CALM WINDS:
4.74%
TOTAL COUNT:
8710 hrs.
AVG. WIND SPEED:
3.12 m/s
DATE:
10/13/2009
PROJECT NO.:
WRPLOT View - Lakes Environmental Software

# FIGURE A-21


WIND ROSE PLOT:
POLA - San Pedro Community Monitoring Station (Berth 87)
DISPLAY:
Wind Speed
Direction (blowing from)
NORTH
EAST
SOUTH
WEST
3%
6%
9%
12%
15%
WIND SPEED
(m/s)
>= 11.1
8.8 - 11.1
5.7 - 8.8
3.6 - 5.7
2.1 - 3.6
0.5 - 2.1
Calms: 9.89%
COMMENTS:
POLA AQ Monitoring Program
San Pedro Community
Monitoring Station
(Berth 87)
Met Data
Los Angeles, CA
May 2008 - April 2009
DATA PERIOD:
2008-2009
Jan 1 - Dec 31
00:00 - 23:00
CALM WINDS:
9.89%
AVG. WIND SPEED:
1.50 m/s
COMPANY NAME:
POLA AQ Monitoring Program
MODELER:
Joel Torcolini
TOTAL COUNT:
7949 hrs.
DATE:
10/13/2009
PROJECT NO.:
WRPLOT View - Lakes Environmental Software

| Table A-1<br>24-Hour Average $PM_{2.5}$ Concentrations in the Vicinity of the Port of Los Angeles | | | | |
|---|---|---|---|---|
| **Sample Date** | **Port of Los Angeles Monitoring Sites** | | | |
| | **Wilmington Community Site** | **Coastal Boundary Site** | **San Pedro Community Site** | **Source-Dominated Site** |
| | **Conc. ($\mu g/m^3$)** | **Conc. ($\mu g/m^3$)** | **Conc. ($\mu g/m^3$)** | **Conc. ($\mu g/m^3$)** |
| 3-May-08 | 10.5 | 10.1 | 12.6 | 12.7 |
| 6-May-08 | 9.0 | 7.0 | 7.8 | 8.6 |
| 9-May-08 | 9.0 | 8.6 | 10.7 | 10.8 |
| 12-May-08 | 6.4 | 6.1 | - - - | 7.5 |
| 15-May-08 | 11.1 | 8.2 | 14.4 | 13.1 |
| 18-May-08 | 15.3 | 10.9 | 14.3 | 13.6 |
| 21-May-08 | 9.1 | 8.8 | 11.4 | 11.5 |
| 24-May-08 | 3.1 | 3.1 | 4.5 | 4.1 |
| 27-May-08 | 3.4 | 3.4 | 4.2 | 4.2 |
| 30-May-08 | 5.5 | 5.0 | 6.4 | 5.6 |
| 2-Jun-08 | 8.6 | 6.8 | - - - | 8.9 |
| 5-Jun-08 | 7.6 | 5.8 | 9.8 | 8.8 |
| 8-Jun-08 | 9.7 | 8.4 | 11.8 | 10.1 |
| 11-Jun-08 | 8.3 | 8.2 | 10.9 | 9.3 |
| 14-Jun-08 | 10.1 | 11.7 | 16.4 | 13.8 |
| 17-Jun-08 | 11.1 | 8.8 | 16.5 | 13.3 |
| 20-Jun-08 | 15.3 | 9.9 | 18.4 | 17.1 |
| 23-Jun-08 | 12.9 | 9.0 | - - - | 12.4 |
| 26-Jun-08 | 14.6 | 13.5 | 17.9 | 15.0 |
| 29-Jun-08 | 12.3 | 11.5 | 17.8 | 14.4 |
| 2-Jul-08 | 13.1 | 12.8 | 19.2 | 15.9 |
| 5-Jul-08 | 23.8 | 12.3 | 18.9 | 17.0 |
| 8-Jul-08 | 13.7 | - - - | 14.1 | 13.5 |
| 11-Jul-08 | 7.8 | - - - | 9.0 | 7.5 |
| 14-Jul-08 | 11.9 | 11.0 | 13.9 | 13.3 |
| 17-Jul-08 | 11.7 | 15.2 | 17.8 | 15.7 |
| 20-Jul-08 | 7.9 | 7.7 | 8.5 | 9.7 |
| 23-Jul-08 | 10.3 | 10.4 | 12.7 | 13.3 |
| 26-Jul-08 | 11.4 | 11.6 | 11.2 | 12.4 |
| 29-Jul-08 | 8.0 | 8.2 | 9.8 | 12.3 |
| 1-Aug-08 | 10.8 | 10.8 | 11.5 | 13.3 |
| 4-Aug-08 | 8.6 | 9.7 | 10.2 | 12.4 |
| 7-Aug-08 | 8.4 | 7.4 | - - - | 12.5 |
| 10-Aug-08 | 6.1 | 6.2 | - - - | 16.6 |
| 13-Aug-08 | 10.6 | 11.7 | 16.7 | 16.3 |
| 16-Aug-08 | 8.4 | 9.7 | 12.0 | 11.1 |
| 19-Aug-08 | 7.1 | 6.3 | 8.3 | 7.8 |
| 22-Aug-08 | 5.0 | 6.8 | 7.6 | 7.3 |

| Table A-1<br>24-Hour Average $PM_{2.5}$ Concentrations in the Vicinity of the Port of Los Angeles | | | | |
|---|---|---|---|---|
| Sample Date | Port of Los Angeles Monitoring Sites | | | |
| | Wilmington Community Site | Coastal Boundary Site | San Pedro Community Site | Source-Dominated Site |
| | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) |
| 25-Aug-08 | 7.0 | 6.8 | 9.8 | 10.6 |
| 28-Aug-08 | 10.7 | 9.3 | 15.1 | 12.3 |
| 31-Aug-08 | 6.4 | 7.6 | 9.1 | 7.9 |
| 3-Sep-08 | 9.0 | 10.4 | 14.9 | - - - |
| 6-Sep-08 | 9.6 | 11.5 | 16.1 | 13.5 |
| 9-Sep-08 | 9.1 | 10.0 | 11.9 | 10.4 |
| 12-Sep-08 | 6.3 | 8.5 | 10.2 | 8.9 |
| 15-Sep-08 | 11.6 | 8.9 | 16.5 | 15.6 |
| 18-Sep-08 | 9.2 | 10.0 | 13.8 | 13.4 |
| 21-Sep-08 | 5.0 | 5.6 | 7.1 | 6.2 |
| 24-Sep-08 | 11.8 | 12.8 | 18.9 | 20.0 |
| 27-Sep-08 | 7.4 | 7.6 | 13.0 | 11.3 |
| 30-Sep-08 | 7.5 | 8.0 | 13.4 | 12.1 |
| 3-Oct-08 | 5.4 | 3.8 | 6.2 | 5.4 |
| 6-Oct-08 | 8.8 | 11.2 | 14.4 | 14.1 |
| 9-Oct-08 | 10.0 | 10.0 | 13.4 | 12.0 |
| 12-Oct-08 | 5.3 | 8.7 | 10.0 | 8.6 |
| 15-Oct-08 | 10.1 | 11.7 | 14.9 | 18.5 |
| 18-Oct-08 | 7.3 | 7.5 | 14.7 | 14.4 |
| 21-Oct-08 | 11.1 | 13.0 | 18.1 | 19.1 |
| 24-Oct-08 | 11.0 | 14.3 | 16.9 | 15.5 |
| 27-Oct-08 | 12.1 | 14.9 | 23.5 | 21.9 |
| 30-Oct-08 | 11.0 | 11.5 | 14.3 | 12.7 |
| 2-Nov-08 | 1.9 | 2.4 | 4.8 | 4.0 |
| 5-Nov-08 | 5.2 | 6.5 | 8.0 | 9.1 |
| 8-Nov-08 | 8.4 | 10.9 | 10.1 | 10.5 |
| 11-Nov-08 | 7.6 | 9.8 | 11.9 | 11.8 |
| 14-Nov-08 | - - - | 16.3 | 22.4 | 23.2 |
| 17-Nov-08 | - - - | 29.2 | 35.4 | 34.9 |
| 20-Nov-08 | - - - | 13.3 | 19.7 | 17.4 |
| 23-Nov-08 | - - - | 9.6 | 12.7 | 11.1 |
| 26-Nov-08 | 4.2 | 2.3 | 3.1 | 3.9 |
| 29-Nov-08 | 12.0 | 14.1 | 17.0 | 10.8 |
| 2-Dec-08 | 17.3 | 19.9 | 15.1 | 17.5 |
| 5-Dec-08 | 18.9 | 19.9 | 16.3 | 21.3 |
| 8-Dec-08 | 9.1 | 7.7 | 9.4 | 11.7 |
| 11-Dec-08 | 11.6 | - - - | 10.3 | 13.1 |
| 14-Dec-08 | 2.8 | - - - | 2.6 | 2.3 |

| Table A-1<br>24-Hour Average $PM_{2.5}$ Concentrations in the Vicinity of the Port of Los Angeles | | | | |
|---|---|---|---|---|
| **Sample Date** | **Port of Los Angeles Monitoring Sites** | | | |
| | **Wilmington Community Site** | **Coastal Boundary Site** | **San Pedro Community Site** | **Source-Dominated Site** |
| | **Conc. ($\mu g/m^3$)** | **Conc. ($\mu g/m^3$)** | **Conc. ($\mu g/m^3$)** | **Conc. ($\mu g/m^3$)** |
| 17-Dec-08 | 4.1 | - - - | 4.5 | 5.6 |
| 20-Dec-08 | 18.2 | - - - | 17.5 | 21.0 |
| 23-Dec-08 | 5.3 | 2.9 | 5.6 | 7.1 |
| 26-Dec-08 | 5.5 | 3.0 | 4.7 | 4.2 |
| 29-Dec-08 | 7.8 | 9.7 | 9.3 | 10.8 |
| 1-Jan-09 | 37.7 | 31.2 | 36.3 | 41.4 |
| 4-Jan-09 | 11.9 | - - - | 11.0 | 14.3 |
| 7-Jan-09 | 19.3 | 19.2 | 19.7 | 21.1 |
| 10-Jan-09 | 16.6 | 9.7 | 13.5 | 16.1 |
| 13-Jan-09 | 12.7 | 8.1 | 12.7 | 15.5 |
| 16-Jan-09 | 13.1 | 13.6 | 22.0 | 15.6 |
| 19-Jan-09 | 8.7 | 7.9 | 15.1 | 10.8 |
| 22-Jan-09 | 12.3 | 10.9 | 12.8 | - - - |
| 25-Jan-09 | 3.3 | 3.1 | 3.2 | 3.8 |
| 28-Jan-09 | 8.8 | 7.6 | 8.2 | 13.7 |
| 31-Jan-09 | 8.7 | 7.8 | 7.2 | 9.5 |
| 3-Feb-09 | 10.6 | 8.4 | 10.8 | 13.9 |
| 6-Feb-09 | 2.0 | 1.2 | 1.7 | 1.6 |
| 9-Feb-09 | 2.4 | 1.5 | 1.8 | 3.2 |
| 12-Feb-09 | 4.6 | 2.3 | 3.1 | 4.1 |
| 15-Feb-09 | 7.9 | 6.6 | 8.2 | 8.3 |
| 18-Feb-09 | 5.7 | 5.6 | 5.7 | 6.8 |
| 21-Feb-09 | 11.2 | 8.9 | 11.0 | 10.9 |
| 24-Feb-09 | 6.3 | 3.9 | 6.6 | 7.3 |
| 27-Feb-09 | 6.0 | 5.1 | 6.8 | 6.6 |
| 2-Mar-09 | 7.8 | 6.7 | 8.6 | 9.8 |
| 5-Mar-09 | 2.7 | 1.6 | 2.6 | 2.3 |
| 8-Mar-09 | 7.3 | 5.1 | 8.0 | 7.1 |
| 11-Mar-09 | 5.6 | 4.2 | 5.1 | 6.4 |
| 14-Mar-09 | 8.5 | 6.6 | 7.7 | 8.2 |
| 17-Mar-09 | 15.2 | 10.6 | 12.7 | 14.8 |
| 20-Mar-09 | 15.5 | 9.9 | 12.9 | 14.7 |
| 23-Mar-09 | 5.0 | 3.3 | 3.6 | 4.5 |
| 26-Mar-09 | 8.9 | 5.8 | 6.3 | 7.2 |
| 29-Mar-09 | 7.4 | 5.4 | 6.4 | 6.5 |
| 1-Apr-09 | 8.3 | 6.7 | 7.6 | 7.7 |
| 4-Apr-09 | 8.3 | 7.2 | 8.3 | 7.7 |
| 7-Apr-09 | 7.7 | 5.5 | 6.9 | 7.3 |

| Table A-1<br>24-Hour Average $PM_{2.5}$ Concentrations in the Vicinity of the Port of Los Angeles | | | | |
|---|---|---|---|---|
| **Sample Date** | **Port of Los Angeles Monitoring Sites** | | | |
| | **Wilmington Community Site** | **Coastal Boundary Site** | **San Pedro Community Site** | **Source-Dominated Site** |
| | **Conc. (μg/m³)** | **Conc. (μg/m³)** | **Conc. (μg/m³)** | **Conc. (μg/m³)** |
| 10-Apr-09 | 5.7 | 4.8 | 5.4 | 5.7 |
| 13-Apr-09 | 8.7 | 7.1 | 8.9 | 9.3 |
| 16-Apr-09 | 6.7 | 5.7 | 6.5 | 6.2 |
| 19-Apr-09 | 9.7 | 9.1 | 11.3 | 10.5 |
| 22-Apr-09 | 9.3 | 7.3 | 9.1 | 10.0 |
| 25-Apr-09 | 4.0 | 5.0 | 5.0 | 5.4 |
| 28-Apr-09 | 7.1 | 6.4 | 7.2 | 7.5 |
| **12-month Averages** | | | | |
| May 08 - Apr 09 | 9.2 | 8.8 | 11.4 | 11.4 |
| May 07 - Apr 08 | 12.7 | 10.1 | 10.8 | 11.8 |
| May 06 - Apr 07 | 12.9 | 10.4 | 11.3 | 13.9 |
| May 05 - Apr 06 | 12.6 | 10.2 | 10.6 | 13.7 |

- Annual $PM_{2.5}$ federal standard is 15 μg/m3
- Annual $PM_{2.5}$ California standard is 12 μg/m3
- 24-hour $PM_{2.5}$ federal standard is 35 μg/m3

| Table A-2<br>24-Hour Average PM10 Concentrations in the Vicinity of the Port of Los Angeles | | |
|---|---|---|
| Sample Date | Port of Los Angeles Monitoring Site | |
| | Wilmington Community Site | Coastal Boundary Site |
| | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) |
| 3-May-08 | 35.7 | - - - |
| 6-May-08 | 18.5 | - - - |
| 9-May-08 | 27.2 | - - - |
| 12-May-08 | 19.8 | - - - |
| 15-May-08 | 38.6 | - - - |
| 18-May-08 | 70.8 | - - - |
| 21-May-08 | - - - | - - - |
| 24-May-08 | 10.0 | - - - |
| 27-May-08 | - - - | - - - |
| 30-May-08 | 16.6 | - - - |
| 2-Jun-08 | 27.7 | - - - |
| 5-Jun-08 | 27.7 | - - - |
| 8-Jun-08 | 33.2 | - - - |
| 11-Jun-08 | 23.7 | - - - |
| 14-Jun-08 | 22.1 | - - - |
| 17-Jun-08 | 34.4 | - - - |
| 20-Jun-08 | 27.9 | - - - |
| 23-Jun-08 | 32.8 | - - - |
| 26-Jun-08 | 34.0 | - - - |
| 29-Jun-08 | 23.3 | - - - |
| 2-Jul-08 | 31.5 | - - - |
| 5-Jul-08 | 33.5 | - - - |
| 8-Jul-08 | 23.0 | - - - |
| 11-Jul-08 | 15.2 | - - - |
| 14-Jul-08 | 24.7 | - - - |
| 17-Jul-08 | 32.0 | - - - |
| 20-Jul-08 | 17.6 | - - - |
| 23-Jul-08 | 23.2 | - - - |
| 26-Jul-08 | 31.5 | - - - |
| 29-Jul-08 | 19.8 | - - - |
| 1-Aug-08 | 21.9 | - - - |
| 4-Aug-08 | 22.5 | - - - |
| 7-Aug-08 | 22.5 | - - - |
| 10-Aug-08 | 19.5 | - - - |
| 13-Aug-08 | 25.8 | - - - |
| 16-Aug-08 | 15.6 | - - - |
| 19-Aug-08 | 16.3 | - - - |

| Table A-2<br>24-Hour Average PM10 Concentrations in the Vicinity of the Port of Los Angeles | | |
|---|---|---|
| Sample Date | Port of Los Angeles Monitoring Site | |
| | Wilmington Community Site | Coastal Boundary Site |
| | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) |
| 22-Aug-08 | 17.1 | - - - |
| 25-Aug-08 | 21.9 | - - - |
| 28-Aug-08 | 30.2 | - - - |
| 31-Aug-08 | 15.7 | 20.1 |
| 3-Sep-08 | 23.2 | 24.8 |
| 6-Sep-08 | 25.3 | 26.0 |
| 9-Sep-08 | 23.7 | 20.2 |
| 12-Sep-08 | 20.6 | 13.1 |
| 15-Sep-08 | 33.2 | 27.1 |
| 18-Sep-08 | 28.8 | 29.4 |
| 21-Sep-08 | 14.5 | 13.9 |
| 24-Sep-08 | 25.0 | 21.1 |
| 27-Sep-08 | 19.7 | 14.9 |
| 30-Sep-08 | 26.6 | 25.5 |
| 3-Oct-08 | 17.5 | 18.8 |
| 6-Oct-08 | 27.6 | 31.1 |
| 9-Oct-08 | 32.4 | 26.5 |
| 12-Oct-08 | 21.9 | 24.8 |
| 15-Oct-08 | 31.0 | 11.1 |
| 18-Oct-08 | 20.6 | 17.3 |
| 21-Oct-08 | 36.1 | 31.6 |
| 24-Oct-08 | 36.6 | 33.8 |
| 27-Oct-08 | 33.3 | 27.1 |
| 30-Oct-08 | 25.8 | 17.4 |
| 2-Nov-08 | 11.1 | 11.9 |
| 5-Nov-08 | 20.6 | 15.6 |
| 8-Nov-08 | 28.1 | 25.6 |
| 11-Nov-08 | 30.6 | 25.6 |
| 14-Nov-08 | 45.7 | 36.7 |
| 17-Nov-08 | 61.0 | 41.1 |
| 20-Nov-08 | 42.2 | 20.9 |
| 23-Nov-08 | - - - | 18.1 |
| 26-Nov-08 | 7.4 | 7.3 |
| 29-Nov-08 | 28.6 | 26.2 |
| 2-Dec-08 | 39.8 | 19.9 |
| 5-Dec-08 | 47.6 | 39.3 |
| 8-Dec-08 | 25.5 | 18.6 |
| 11-Dec-08 | 22.7 | 19.0 |
| 14-Dec-08 | 7.5 | 6.3 |

| Table A-2<br>24-Hour Average PM10 Concentrations in the Vicinity of the Port of Los Angeles | | |
|---|---|---|
| Sample Date | Port of Los Angeles Monitoring Site | |
| | Wilmington Community Site | Coastal Boundary Site |
| | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) |
| 17-Dec-08 | 9.2 | - - - |
| 20-Dec-08 | 39.3 | 31.5 |
| 23-Dec-08 | 13.9 | 9.1 |
| 26-Dec-08 | 13.7 | 7.5 |
| 29-Dec-08 | 19.6 | 11.0 |
| 1-Jan-09 | 74.7 | 51.6 |
| 4-Jan-09 | 27.5 | 19.1 |
| 7-Jan-09 | 43.3 | - - - |
| 10-Jan-09 | 50.2 | - - - |
| 13-Jan-09 | 35.6 | - - - |
| 16-Jan-09 | 32.0 | - - - |
| 19-Jan-09 | 21.9 | - - - |
| 22-Jan-09 | 33.7 | 36.8 |
| 25-Jan-09 | 13.6 | 13.4 |
| 28-Jan-09 | 22.5 | 19.5 |
| 31-Jan-09 | 19.7 | 21.1 |
| 3-Feb-09 | 26.5 | 23.7 |
| 6-Feb-09 | 7.3 | 9.5 |
| 9-Feb-09 | 10.9 | 10.8 |
| 12-Feb-09 | 11.9 | 9.9 |
| 15-Feb-09 | 19.5 | 15.9 |
| 18-Feb-09 | 17.5 | 19.2 |
| 21-Feb-09 | 32.0 | 29.2 |
| 24-Feb-09 | 18.4 | 14.2 |
| 27-Feb-09 | 19.5 | 17.1 |
| 2-Mar-09 | 23.3 | 22.7 |
| 5-Mar-09 | 10.5 | 8.0 |
| 8-Mar-09 | 21.1 | 15.8 |
| 11-Mar-09 | 19.8 | 17.0 |
| 14-Mar-09 | 27.6 | 23.7 |
| 17-Mar-09 | 28.8 | 31.3 |
| 20-Mar-09 | 25.5 | 16.4 |
| 23-Mar-09 | 12.8 | 15.3 |
| 26-Mar-09 | 30.1 | 26.4 |
| 29-Mar-09 | 22.1 | 19.7 |
| 1-Apr-09 | 33.4 | 29.7 |
| 4-Apr-09 | 30.7 | 32.1 |
| 7-Apr-09 | 20.3 | 18.9 |
| 10-Apr-09 | 19.2 | 19.3 |

| Table A-2<br>24-Hour Average PM10 Concentrations in the Vicinity of the Port of Los Angeles | | |
|---|---|---|
| **Sample Date** | **Port of Los Angeles Monitoring Site** | |
| | **Wilmington Community Site** | **Coastal Boundary Site** |
| | **Conc. (μg/m$^3$)** | **Conc. (μg/m$^3$)** |
| 13-Apr-09 | 26.7 | 20.6 |
| 16-Apr-09 | 30.4 | 30.4 |
| 19-Apr-09 | 22.1 | 35.1 |
| 22-Apr-09 | 27.3 | 23.1 |
| 25-Apr-09 | 24.3 | 25.4 |
| 28-Apr-09 | 23.4 | 21.1 |
| **12-Month Averages** | | |
| May 08 - Apr 09 | 25.9 | - - - |
| May 07 - Apr 08 | 28.4 | - - - |
| May 06 - Apr 07 | 28.6 | - - - |
| May 05 - Apr 06 | 28.7 | - - - |
| • California Annual $PM_{10}$ is 20 μg/m3<br>• There is currently no federal annual $PM_{10}$ | | |

| Table A-3<br>24-Hour Average Elemental Carbon Concentrations in the Vicinity of the Port of Los Angeles | | | | |
|---|---|---|---|---|
| Sample Date | Port of Los Angeles Monitoring Sites | | | |
| | Wilmington Community Site | Coastal Boundary Site | San Pedro Community Site | Source-Dominated Site |
| | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) |
| 3-May-08 | 0.9 | 0.3 | 0.6 | 1.1 |
| 6-May-08 | 0.3 | 0.3 | 0.5 | 0.6 |
| 9-May-08 | 0.3 | 0.4 | 0.4 | 0.8 |
| 12-May-08 | 0.3 | 0.2 | - - - | 0.6 |
| 15-May-08 | 0.9 | 0.6 | 1.6 | 1.8 |
| 18-May-08 | 1.4 | 0.9 | 1.1 | 1.0 |
| 21-May-08 | 0.5 | 0.2 | 0.3 | 1.0 |
| 24-May-08 | 0.4 | 0.2 | 0.5 | 0.5 |
| 27-May-08 | 0.2 | 0.1 | 0.2 | 0.6 |
| 30-May-08 | 0.5 | 0.4 | 0.5 | 0.6 |
| 2-Jun-08 | 0.4 | 0.2 | - - - | 0.9 |
| 5-Jun-08 | 0.6 | 0.5 | 0.6 | 0.3 |
| 8-Jun-08 | 0.4 | 0.1 | 0.3 | - - - |
| 11-Jun-08 | 0.5 | 0.2 | 0.7 | 0.5 |
| 14-Jun-08 | 0.3 | 0.4 | 1.0 | 0.8 |
| 17-Jun-08 | 0.8 | 0.2 | 1.1 | 1.5 |
| 20-Jun-08 | 1.7 | 1.2 | 2.1 | 2.4 |
| 23-Jun-08 | 0.7 | 0.3 | - - - | 1.4 |
| 26-Jun-08 | 0.3 | 0.3 | 0.7 | 1.0 |
| 29-Jun-08 | 0.4 | 0.6 | 0.9 | 1.0 |
| 2-Jul-08 | 0.6 | 0.5 | 1.6 | 1.4 |
| 5-Jul-08 | 0.5 | 0.3 | 0.7 | 0.7 |
| 8-Jul-08 | 0.7 | - - - | 0.6 | 0.8 |
| 11-Jul-08 | 0.7 | - - - | 0.8 | 0.7 |
| 14-Jul-08 | 0.5 | 0.2 | 0.8 | 1.2 |
| 17-Jul-08 | 0.5 | 0.4 | 0.9 | 1.1 |
| 20-Jul-08 | 0.2 | 0.2 | 0.2 | 0.3 |
| 23-Jul-08 | 0.4 | 0.1 | 1.0 | 1.4 |
| 26-Jul-08 | 0.8 | 0.7 | 0.5 | 0.7 |
| 29-Jul-08 | 0.4 | 0.2 | 0.8 | 1.2 |
| 1-Aug-08 | 0.6 | 0.4 | 0.7 | 0.8 |
| 4-Aug-08 | 0.7 | 0.4 | 0.9 | 1.6 |
| 7-Aug-08 | 0.6 | 0.2 | - - - | 1.7 |
| 10-Aug-08 | 0.3 | 0.7 | - - - | 0.8 |
| 13-Aug-08 | 0.7 | 0.5 | 1.1 | 1.3 |
| 16-Aug-08 | 0.6 | 0.4 | 0.9 | 0.8 |
| 19-Aug-08 | 0.4 | 0.4 | 0.5 | 1.0 |

| Table A-3<br>24-Hour Average Elemental Carbon Concentrations in the Vicinity of the Port of Los Angeles | | | | |
|---|---|---|---|---|
| Sample Date | Port of Los Angeles Monitoring Sites | | | |
| | Wilmington Community Site | Coastal Boundary Site | San Pedro Community Site | Source-Dominated Site |
| | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) |
| 22-Aug-08 | 0.5 | 0.5 | 0.4 | 0.5 |
| 25-Aug-08 | 0.6 | 0.1 | 0.6 | 1.0 |
| 28-Aug-08 | - - - | 0.2 | 1.1 | 0.8 |
| 31-Aug-08 | 0.5 | 0.8 | 0.5 | 0.4 |
| 3-Sep-08 | 0.9 | 0.5 | 1.3 | 2.8 |
| 6-Sep-08 | 0.4 | 0.7 | 0.8 | 1.1 |
| 9-Sep-08 | 0.4 | 0.3 | 0.9 | 0.9 |
| 12-Sep-08 | 0.4 | 0.4 | 0.8 | 0.8 |
| 15-Sep-08 | 1.3 | 0.6 | 1.6 | 3.3 |
| 18-Sep-08 | 0.8 | 0.5 | 1.3 | 2.3 |
| 21-Sep-08 | 0.5 | 0.3 | 0.7 | 0.7 |
| 24-Sep-08 | 0.9 | 0.8 | 1.5 | 2.3 |
| 27-Sep-08 | 0.7 | 0.6 | 1.0 | 1.4 |
| 30-Sep-08 | 1.2 | 1.1 | 3.2 | 3.9 |
| 3-Oct-08 | 0.9 | 0.3 | 0.9 | 1.0 |
| 6-Oct-08 | 1.1 | 1.7 | 1.9 | 3.3 |
| 9-Oct-08 | 1.0 | 0.5 | 1.1 | 1.3 |
| 12-Oct-08 | 0.4 | 1.1 | 1.2 | 1.5 |
| 15-Oct-08 | 1.2 | 1.4 | 2.7 | 4.1 |
| 18-Oct-08 | 1.1 | 0.8 | 1.9 | 2.4 |
| 21-Oct-08 | 1.5 | 1.4 | 2.2 | 3.4 |
| 24-Oct-08 | 2.8 | 4.2 | 3.5 | 4.3 |
| 27-Oct-08 | 1.1 | 1.3 | 3.3 | 5.5 |
| 30-Oct-08 | 1.0 | 1.2 | 1.5 | 1.6 |
| 2-Nov-08 | 0.2 | 0.0 | 0.5 | 0.7 |
| 5-Nov-08 | 0.5 | 1.1 | 1.2 | 2.5 |
| 8-Nov-08 | 1.5 | 2.8 | 2.1 | 2.7 |
| 11-Nov-08 | 1.2 | 2.1 | 2.1 | 3.1 |
| 14-Nov-08 | - - - | 4.0 | 3.5 | 2.3 |
| 17-Nov-08 | - - - | 3.6 | 4.2 | 6.6 |
| 20-Nov-08 | - - - | 1.6 | - - - | 3.6 |
| 23-Nov-08 | - - - | 0.6 | 0.7 | 1.0 |
| 26-Nov-08 | 0.7 | 0.4 | 0.6 | 1.1 |
| 29-Nov-08 | 1.0 | 1.0 | 1.1 | 2.3 |
| 2-Dec-08 | 0.9 | 0.6 | 0.9 | 1.2 |
| 5-Dec-08 | 2.0 | 1.9 | 2.1 | 2.6 |
| 8-Dec-08 | 1.0 | 0.7 | 1.0 | 2.9 |
| 11-Dec-08 | 2.2 | - - - | 1.9 | 4.0 |
| 14-Dec-08 | 0.3 | - - - | 0.1 | 0.5 |

| Table A-3<br>24-Hour Average Elemental Carbon Concentrations in the Vicinity of the Port of Los Angeles | | | | |
|---|---|---|---|---|
| Sample Date | Port of Los Angeles Monitoring Sites | | | |
| | Wilmington Community Site | Coastal Boundary Site | San Pedro Community Site | Source-Dominated Site |
| | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) | Conc. ($\mu g/m^3$) |
| 17-Dec-08 | 1.0 | - - - | 1.0 | 1.9 |
| 20-Dec-08 | 2.9 | - - - | 1.9 | 2.8 |
| 23-Dec-08 | 1.2 | 0.4 | 1.2 | 2.5 |
| 26-Dec-08 | 0.9 | 0.5 | 0.5 | 1.0 |
| 29-Dec-08 | 1.8 | 2.1 | 1.7 | 3.5 |
| 1-Jan-09 | 2.6 | 1.4 | 1.8 | 2.4 |
| 4-Jan-09 | 1.4 | - - - | 1.0 | 2.0 |
| 7-Jan-09 | 3.4 | 2.8 | 2.7 | 5.7 |
| 10-Jan-09 | 2.5 | 1.1 | 1.5 | 3.1 |
| 13-Jan-09 | 1.9 | 1.5 | 0.2 | 4.6 |
| 16-Jan-09 | 2.4 | 2.5 | 2.9 | 3.1 |
| 19-Jan-09 | 1.3 | 1.2 | 1.6 | 2.7 |
| 22-Jan-09 | 1.8 | 1.9 | 2.1 | 3.5 |
| 25-Jan-09 | 0.2 | 0.2 | 0.0 | 0.5 |
| 28-Jan-09 | 1.8 | 1.3 | 1.8 | 3.5 |
| 31-Jan-09 | 1.3 | 1.3 | 1.5 | 2.5 |
| 3-Feb-09 | 1.8 | 1.8 | 1.9 | 3.8 |
| 6-Feb-09 | 0.3 | 0.0 | 0.3 | 0.1 |
| 9-Feb-09 | 0.2 | 0.0 | 0.2 | 0.5 |
| 12-Feb-09 | 0.5 | 0.0 | 0.3 | 1.0 |
| 15-Feb-09 | 1.4 | 0.8 | 1.2 | 1.3 |
| 18-Feb-09 | 0.8 | 1.0 | 1.1 | 1.6 |
| 21-Feb-09 | 1.7 | 1.2 | 1.9 | 1.7 |
| 24-Feb-09 | 1.1 | 0.7 | 1.3 | 1.9 |
| 27-Feb-09 | 0.4 | 0.1 | 0.9 | 0.7 |
| 2-Mar-09 | 1.4 | 1.1 | 1.5 | 2.3 |
| 5-Mar-09 | 0.2 | 0.2 | 0.5 | 0.5 |
| 8-Mar-09 | 1.1 | 0.7 | 1.2 | 1.4 |
| 11-Mar-09 | 0.6 | 0.4 | 0.6 | 1.1 |
| 14-Mar-09 | 0.3 | 0.5 | 0.8 | 0.4 |
| 17-Mar-09 | 1.7 | 1.1 | 2.2 | 3.1 |
| 20-Mar-09 | 0.5 | 0.3 | 0.7 | 0.6 |
| 23-Mar-09 | 0.5 | 0.5 | 0.4 | 1.0 |
| 26-Mar-09 | 0.7 | 0.2 | 0.5 | 0.8 |
| 29-Mar-09 | 0.3 | 0.2 | 0.6 | 0.5 |
| 1-Apr-09 | 0.5 | 0.4 | 0.6 | 0.7 |
| 4-Apr-09 | 0.6 | 0.5 | 1.0 | 0.7 |
| 7-Apr-09 | 0.3 | 0.1 | 0.7 | 0.7 |
| 10-Apr-09 | 0.2 | 0.1 | 0.3 | 0.2 |

| Table A-3<br>24-Hour Average Elemental Carbon Concentrations in the Vicinity of the Port of Los Angeles | | | | |
|---|---|---|---|---|
| **Sample Date** | **Port of Los Angeles Monitoring Sites** | | | |
| | **Wilmington Community Site** | **Coastal Boundary Site** | **San Pedro Community Site** | **Source-Dominated Site** |
| | **Conc. ($\mu g/m^3$)** | **Conc. ($\mu g/m^3$)** | **Conc. ($\mu g/m^3$)** | **Conc. ($\mu g/m^3$)** |
| 13-Apr-09 | 1.1 | 0.4 | 1.1 | 1.4 |
| 16-Apr-09 | 0.6 | 0.5 | 0.8 | 0.7 |
| 19-Apr-09 | 1.8 | 0.8 | 1.8 | 1.3 |
| 22-Apr-09 | 0.6 | 0.5 | 0.6 | 0.8 |
| 25-Apr-09 | 0.2 | 0.1 | 0.4 | 0.3 |
| 28-Apr-09 | 0.2 | 0.1 | 0.4 | 0.2 |
| **May 05 – Apr 06** | 1.5 | 1.1 | 1.5 | 2.5 |
| **May 06 – Apr 07** | 1.7 | 1.2 | 1.6 | 2.6 |
| **May 07 – Apr 08** | 1.1 | 1.4 | 1.4 | 2.0 |
| **May 08 – Apr 09** | 0.9 | 0.7 | 1.1 | 1.6 |

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