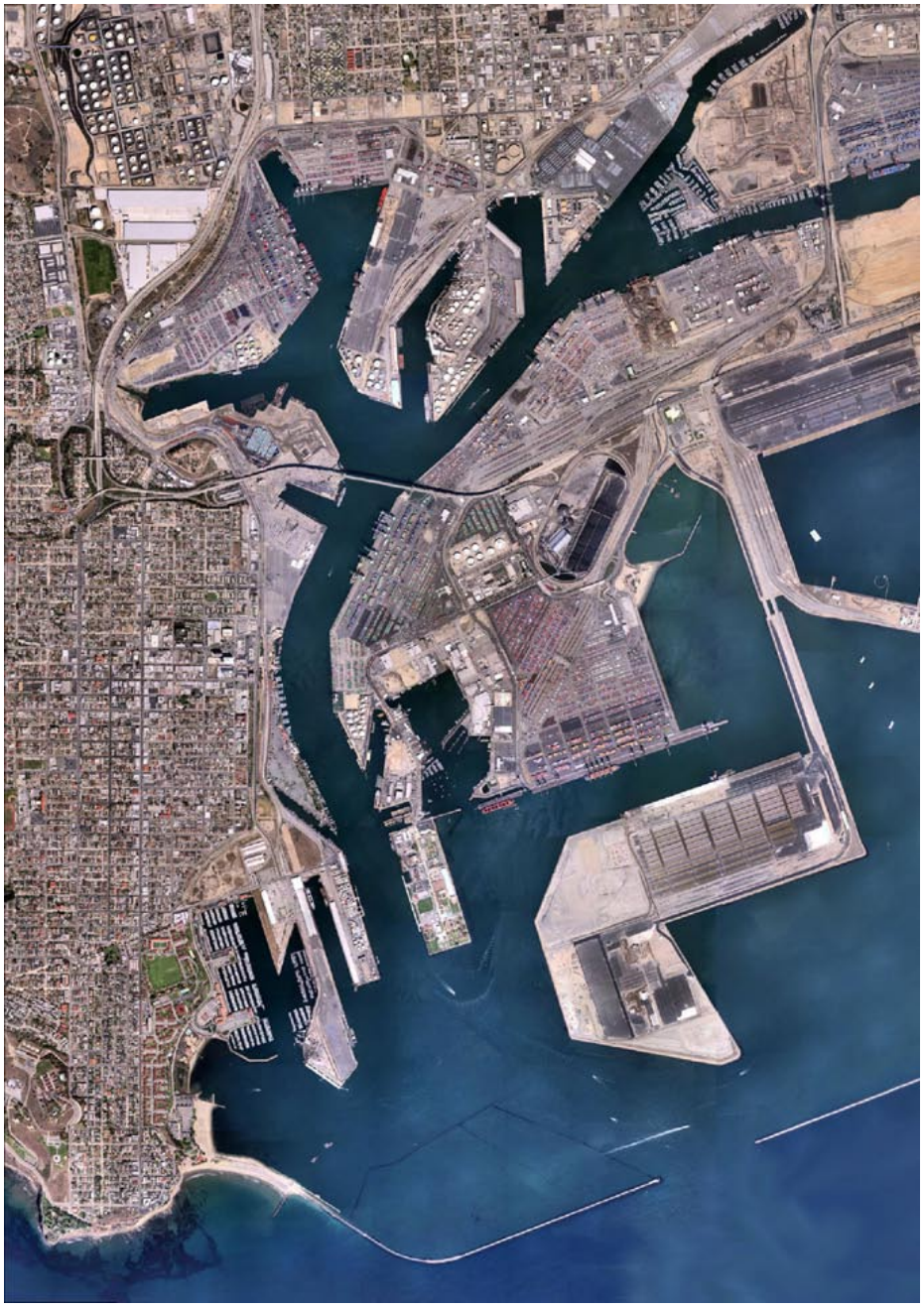
Air Quality Monitoring Program at the Port of Los Angeles

Annual Report May 2005 – April 2006



Prepared For:

Port of Los Angeles
Environmental Management Division
425 South Palos Verdes Street
San Pedro, California 90733-0151

April 2007

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TABLE OF CONTENTS

List of Figures

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1.0 INTRODUCTION

The Port of Los Angeles (Port) began an air quality monitoring program in February, 2005. Representative ambient particulate matter (PM) and meteorological data have been collected within the POLA operational region of influence (ROI) since the program began. Two sizes of particulate matter have been collected: (1) "inhalable" or coarse PM less than 10 microns in diameter (PM_{10}) and (2) "respirable" or fine PM less than 2.5 microns in diameter ($PM_{2.5}$).

One of the drivers of this program has been the increased concern over health effects from diesel particulate matter (DPM). There are no direct methods of measuring DPM. However, to address this issue, the program is analyzing particulate samples for elemental carbon (EC), which has been used as a surrogate for DPM in other studies.

The development of the program work plan and evaluation of potential monitoring sites took more than a year to complete (Port 2004 and 2005a). The final design of the air monitoring network consisted of four monitoring stations: 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 center of Port operations.

The program has a primary monitoring station located in Wilmington, an area that has the potential to experience elevated ambient impacts from POLA operational emissions, due to its proximity to POLA operations and the prevalence of onshore wind flows. This station will provide data for ongoing studies and future reference. The network of four stations will focus on improving the understanding of source/receptor relationships between DPM emissions and ambient DPM concentrations throughout the POLA ROI.

After the preliminary network design was developed, the Port held extensive discussions with the Port Community Advisory Committee (PCAC) and their technical consultants over an extended period of time to finalize the details of the program. In addition, the draft monitoring work plan was presented at a meeting 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 website: http://www.portoflosangeles.org.

1.1 Siting of the Monitoring Stations

Particular care was taken to select monitoring locations that were representative of ambient air quality conditions in the communities of San Pedro and Wilmington. In concert with the PCAC air quality consultants, short-term "validation" studies were conducted in both communities 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. A total of five sites were included in the validation study at 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) portable monitors were used at each site to collect simultaneous $PM_{2.5}$ samples at all of the sites, which were then analyzed for $PM_{2.5}$ and EC.

A total of three sites were included in the validation study at Wilmington, in an east-west line that was approximately parallel to the northern boundary of the Port. Fewer sites were used in Wilmington study because the terrain is relatively flat with less topographic features compared to San Pedro, and there were less acceptable candidate locations.

The final selected locations had the highest average measured $PM_{2.5}$ impacts in the validation program and they 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.

1.2 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 PM levels due to POLA emissions within adjacent communities. 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 for PM.

2. Each station has two PM2.5 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 filter weighing.

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

    c. Elements (approximately 60), by X-ray fluorescence.

    d. Soluble ions (nitrate, sulfate, ammonium, sodium, and potassium), by auto colorimetric, ion chromotography, and atomic absorption.

All samples were analyzed for mass concentration, EC and OC. Selected filters also were analyzed for elements and soluble ions.

3. One SFS monitor collected data according to EPA standard sampling protocol on a 24-hour basis. The other SFS monitor was programmed to sample during predicted periods of land/sea breeze air flow patterns (typically, onshore flows during the day and offshore flows at night). These wind flow patterns occur mainly in the absence of synoptic (large-scale) weather conditions such as storms, and are more common during certain seasons.

4. 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 surrounding vicinity, particularly the two nearest SCAQMD monitoring stations located in Long Beach.

5. A sampling protocol was developed for use in the operation of the monitoring network (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.

2.0 DESCRIPTION OF THE AIR MONITORING PROGRAM

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

2.1 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^{o} 46' 43.79" N, 118^{o} 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^{o} 44' 27.54" N, 118^{o} 16'48.25" W) – A second station is located at the Liberty Hill Plaza (LHP), at Harbor Boulevard & 5th Street, in the city of San Pedro. This station is designed to collect air quality levels that are representative of the residential areas of San Pedro, and is centrally located approximately 0.1 miles west of the main ship channel.
- *Coastal Boundary Station* (33^{o} 42' 50.58" N, 118^{o} 16' 27.07" W*)* – A third station is located at Berth 47 in the Port Outer Harbor. This location has the least direct exposure to emissions from Port operations.

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

- *Terminal Island Treatment Plant Station* (33° 44' 41.03" N, 118° 15' 40.13" W) – A fourth station is located on Pier 300, at the Terminal Island Treatment Plant (TITP) on Ferry Street. This station is expected to have the highest exposure to emissions from Port operations, and it is in direct proximity to terminal operations which use a large number of diesel engine sources (trucks, trains, ships, and cargo handling equipment).

2.2 The Monitoring Network

One primary monitoring station and three additional "satellite" stations have been designated within the monitoring network. The Wilmington community monitoring station was designated as the primary station for three reasons:

- The proximity of the location to Port operations.
- The prevalence of winds that transport emissions from Port operations toward Wilmington.
- The station is at an elementary school which is located within a residential area.

All four stations have the same instrumentation, which collect a comprehensive set of PM and meteorological data. In addition, the primary station has several additional instruments.

The Four Stations in the Network

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

- *Detailed 24-hour sampling* – 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 collects of samples over shorter time periods, to target specific wind regimes (onshore/offshore flows) and associated source/receptor situations.
- At the primary Wilmington 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.

The Primary Station

In addition to the instrumentation discussed above, the primary 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 National and California Ambient Air Quality Standards (NAAQS/CAAQS).

2.3 Startup of the Monitoring Program

The monitoring program began with the collection of 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. This report evaluates data collected since February 9, 2005, but it focuses on the May 1, 2005 to April 30, 2006 time period when all four stations were operational.

During the early stages of the program, numerous filter samples were lost because of inadvertent shut-down of the instruments. Review of program operations indicated that there were a number of onsite electrical problems. From February 9-28, 2005, 9.4 inches of rain fell in the area, resulting in data loss at the sites when power to the instruments was interrupted by tripped electrical circuits. Subsequent analysis revealed that the GFI electrical circuits were unduly sensitive to moisture in this outdoor application. This problem was resolved with the replacement of these circuits with non-GFI circuits.

3.0 DATA SUMMARY

This data summary is a compilation and presentation of data collected during the first fifteen months of operation, and is divided into two sections:

1. The initial set of data covers the first three months of operation (February 2005 through April 2005), when three of the four monitoring stations were running.

2. The main set of data covers the first full year of operation (May 2005 through April 2006), when all four stations were running.

Much of these data are also available on the Port's website (Port 2007b). The data summary includes three presentation types:

- Presentation of the air quality data in graphs
- Presentation of the air quality data in tables
- Presentation of wind roses, which summarize the occurrence of winds at a location, showing their strength, direction, and frequency

Data summaries are presented for three parameters: (1) $PM_{2.5}$, (2) PM_{10}, and (3) elemental carbon (EC).

1. For $PM_{2.5,}$ two different data groupings are presented:
   - The four Port Network Stations, and
   - The two Port Community Stations and two nearby SCAQMD Stations in Long Beach (the Local Community Network), which provides a larger geographical perspective on air quality in the Ports region. This grouping includes the SPPS and LHP stations in Wilmington and San Pedro, respectively; and the two nearest SCAQMD stations located in central and north Long Beach.
2. For PM_{10}, data are presented for three stations: the SPPS Community Station and the two SCAQMD stations in Long Beach.
3. For EC, data are presented for the four Port Network Stations, as these data are not available from the SCAQMD Long Beach stations.

Since the tabular and graphic data presentations are quite extensive, they are included in Appendix A.

3.1 Air Quality Data – February through April 2005

Presentations of $PM_{2.5}$, PM_{10}, and EC concentrations for the February through April 2005 period are shown in Figures 3 through 6, located in the Appendix. The $PM_{2.5}$ concentrations are shown for the Port and Local Community Networks, the PM_{10} for the Local Community Network, and the EC concentrations are shown for the Port network. Tables 1 through 3, also located in the Appendix, present these data in tabular form. These data represent a time when only three of the four Port air monitoring stations were fully operational, so only a limited analysis of the data is given here:

- The measured 24-hour $PM_{2.5}$ concentrations for all stations are well below the 24-hour NAAQS of 65 $\mu g/m^3$.
- The 24-hour $PM_{2.5}$ concentrations at the four stations within the Port's network show good correlations. For example, on days when the measured $PM_{2.5}$ concentrations increase at one site, they typically increase at all of the sites.

3.2 Air Quality Data – May 2005 through April 2006

Presentations of $PM_{2.5}$, PM_{10}, and EC concentrations for the May 2005 through April 2006 period are shown in Figures 6 through 14. For clarity of presentation, the data are divided into two 6-month periods (May through October 2005 and November 2005 through April 2006). Graphs of the $PM_{2.5}$ data are shown for the Port Network and the Local Community Network. The PM_{10} data is shown for the Local Community Network, and the EC data are shown for the Port Network. The annual data sets for $PM_{2.5}$, PM_{10}, and EC are presented in Tables 4 through 6. A summary of the data analyses are presented below.

$PM_{2.5}$ Data

The following conclusions have been drawn about the 12 months of $PM_{2.5}$ data from May 2005 to April 2006:

- The measured 24-hour $PM_{2.5}$ concentrations for all stations are below the 2005 $PM_{2.5}$ NAAQS of 65 $\mu g/m^3$.
- The measured annual average $PM_{2.5}$ concentrations were below the NAAQS of 15 $\mu g/m^3$ for all stations, but two stations had annual averages above the CAAQS of 12 $\mu g/m^3$: the TITP and Wilmington Community stations annual averages were 13.7 and 12.7 $\mu g/m^3$, respectively. The San Pedro Community station and the Coastal Boundary station annual averages were 10.7 and 10.3 $\mu g/m^3$, respectively. During this same period, the SCAQMD central and north Long Beach stations recorded annual averages of 14.6 and 15.3 $\mu g/m^3$, respectively. One of the more interesting observations is the very good correlations among the 24-hour $PM_{2.5}$ measurements at the four stations within the Port's network and with the two Long Beach stations, which is evident in the figures presented in the Appendix. That is, on days when the measured $PM_{2.5}$ concentration increases at one site, there is typically a corresponding increase at the other sites, indicating that regional-level influences such as meteorological conditions or $PM_{2.5}$ levels are important contributors to local air quality impacts.
- The $PM_{2.5}$ concentrations within the Port network were at moderate levels and variability during the May – September period, with somewhat higher concentrations and much greater variability from October 2005 through late February 2006. This may have been due in part to a wider variety of meteorological conditions during the cooler months, including stable atmospheric conditions and the presence of occasional storms after a long, dry summer.
- There is a general tendency for the $PM_{2.5}$ concentrations to increase over the first six months of the monitoring period, which was due in part to a relatively wet spring, followed by a long dry period during the summer and fall. Lower $PM_{2.5}$ concentrations are consistently measured during and after rainfall events, because of the washout/rainout effect on ambient particulate material.

PM_{10}

The following conclusions have been drawn about the 12 months of PM_{10} data from May 2005 to April 2006:

- From May to October 2005, there were no exceedances of the California 24-hour PM_{10} standard (50 $\mu g/m^3$) recorded at either the Port community monitoring station in Wilmington or the SCAQMD station in North Long Beach. However, there were several exceedances of the State PM_{10} standard at the SCAQMD station in central Long Beach. The Long Beach station also recorded several exceedances of the California 24-hour PM_{10} standard from November 2005 to February 2006.
- There were five exceedances of the California 24-hour PM_{10} standard (50 $\mu g/m^3$) recorded at the Port community monitoring station in Wilmington from November 2005 to late February 2006. Several exceedances were also recorded at the North Long Beach monitoring station from November 2005 to February 2006.
- The gradual increase in average $PM_{2.5}$ concentrations observed over the first six months also occurs in the average PM_{10} concentrations.
- Similar to the $PM_{2.5}$ measurements, November 2005 to February 2006 shows a much larger variability in PM_{10} concentration readings than earlier in the

monitoring period. This is due to the effect of occasional rainfall events occurring during the winter season.

- The Wilmington Community station annual average PM_{10} concentration was 28.8 µg/m^3, while the North Long Beach and Long Beach SCAQMD stations measured 31.1 and 46.1 µg/m^3, respectively. The central Long Beach station recorded several high 24-hour PM_{10} concentrations (up to 131 µg/m^3), which had the effect of elevating the PM_{10} annual average for that station.

Elemental Carbon

The following conclusions have been drawn about the 12 months of EC data from May 2005 to April 2006:

- The 24-hour EC concentrations at the four stations within the Port's network show good correlations, similar to the results shown in the $PM_{2.5}$ concentrations. For example, on days when the measured EC concentrations increase at one site, they typically increase at all of the sites.
- A general tendency was observed for the EC concentrations to increase during the year, with the highest EC levels measured in the fall and early winter. The TITP station near the center of Port operations had the largest increase in EC concentrations over the year, occasionally measuring EC levels two to three times those recorded at the other Port stations, particularly during the latter half of the year.
- From May through early August, with a few minor exceptions, all four stations have EC concentration readings at or below 2.0 µg/m^3. Average EC levels tended gradually increase until January 2006, and then subsequently decrease with the onset of the relatively wet, late winter period.
- Wilmington and San Pedro Community stations have nearly the same annual average EC concentration (1.6 and 1.5 µg/m^3, respectively.) The Coastal Boundary station has the lowest annual average concentration of 1.1 µg/m^3, and the TITP station (dominated by local Port sources) has the highest annual EC concentration of 2.5 µg/m^3.

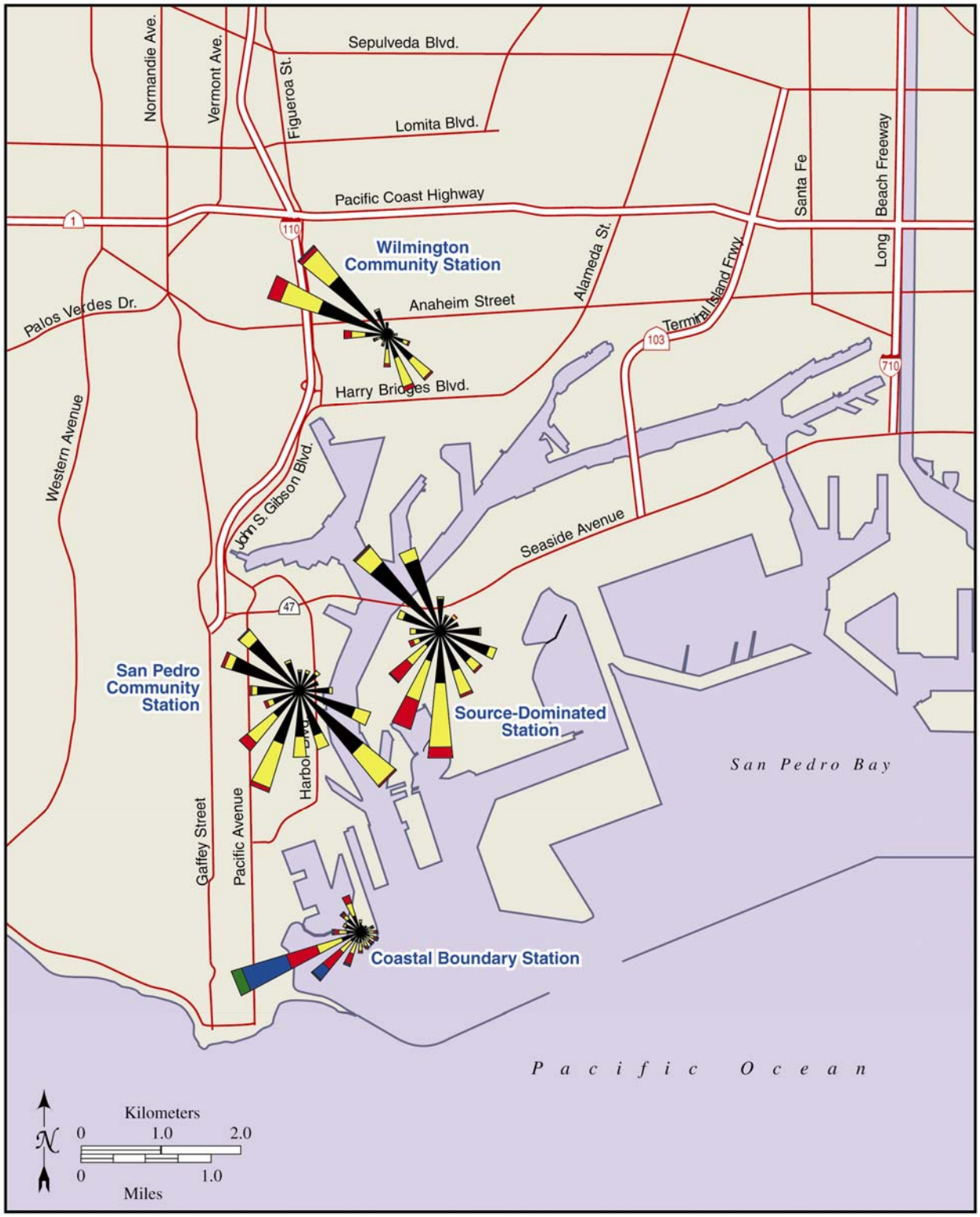
3.3 Meteorological Data

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 were created for the year of meteorological data collected at each station and are shown in Figures 15 through 18. Wind roses graphically show the frequency of occurrence of wind speed and direction at a site. They 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.

The wind roses for each monitoring station are projected onto the Port base map in Figure 2. A review of this figure shows that the predominant wind patterns at each station are considerably different, implying that the Port area experiences complex air flow patterns.

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



3.4 Detailed Analysis of Air Quality Data

This program also took advantage of the onshore/offshore flow patterns typical of coastal areas to set up shorter term monitoring periods when the winds would blow from a specific direction. That is, wind data collected within the Port monitoring network showed that onshore winds were common during the middle of the day, while offshore winds were often present during the night. The intent of the onshore/offshore sampling is to more easily identify the sources that impact the monitoring stations.

A second SFS monitor at each station was pre-programmed to operate during a portion of each expected onshore and offshore event during the 24-hour sampling day. In the case of the Wilmington Community Station, onshore winds would transport air to the station from Port operational areas, while offshore winds would transport air to the station from the greater Los Angeles metropolitan area.

One problem with this approach is that onshore/offshore flows are relatively weak (<5 miles per hour and are only present in the absence of larger-scale weather disturbances such as storms). In addition, at low speeds, winds tend to meander so that consistent winds from a specific direction were not as common as originally expected Filters collected on selected days when onshore/offshore flow patterns were present were subjected to detailed chemical analysis.

$PM_{2.5}$ Mass Reconstruction

For a few selected days, detailed chemical analysis was used to determine the constituents that contributed to the total $PM_{2.5}$ mass concentrations. These categories include geological or crustal materials, organics, elemental carbon, nitrate, sulfate, ammonium, and salt. The calculations used in this analysis to reconstruct the $PM_{2.5}$ mass follow the recommendations of DRI, and consist of the following:

- Geological Material = (1.89 x Aluminum [Al] concentration measured on the filter) + (2.14 x Silicon [Si] conc.) + (1.4 x Calcium [Ca] conc.) + (1.43 x Iron ([Fe] conc).
- Organics = 1.4 x measured organic carbon conc.
- Elemental Carbon = measured EC conc.
- Nitrate = measured NO_3^- conc.
- Sulfate = measured $SO_4^=$ conc.
- Ammonium = measured NH_4^+ conc.
- Salt = 2.54 x measured sodium [Na] conc. (soluble)

Notes:

1. The mass of the geological material is calculated by summing four crustal elements (aluminum, silicon, calcium, and iron) each of which is multiplied by a factor to account for the total mass of the compound typically found under natural conditions (e.g., Fe_2O_3).

2. The mass of the organics is calculated by multiplying the organic carbon concentration by 1.4 to account for the presence of oxygen, nitrogen, and hydrogen in the organic compounds.
3. The mass of salt is determined by multiplying the soluble sodium concentration by 2.54 to account for the presence of chloride in salt.
4. Another category included in the mass reconstruction is trace materials. This is primarily the metals measured in the particulate samples, which are average approximately 1 percent of the $PM_{2.5}$ mass (the metals will be used in a subsequent chemical mass balance analysis).
5. A final category is "unidentified", which typically ranges between 0 and 10 percent. This category is most likely due to some of the assumptions used in reconstructing the mass. For example, the use of a 1.4 multiplier to convert the measured OC concentration to total organics may be too high or too low in some cases.

Results

Three examples of the use of these $PM_{2.5}$ mass reconstructions are presented below, to show applications of these data. Additional analyses of the data are planned, in combination with chemical mass balance analysis, to better identify source-receptor relationships in the area.

1. *Onshore/Offshore Conditions* – On February 24, 2005, a particularly good onshore/offshore event was captured. Figures 19 through 21 show the PM2.5 mass reconstruction for the Wilmington Community Station, the San Pedro Community Station, and the Coastal Boundary Station, respectively (the Terminal Island Treatment Plant station was not operational). The Wilmington station is the most easily evaluated because of its location: it is exposed to air coming from the Los Angeles metropolitan area during offshore conditions and from coastal air passing over Port operations during onshore conditions. The most obvious features of these figures are:
    a. During onshore flows, $PM_{2.5}$ concentrations decrease by more than half compared to offshore flows (8.6 vs. 19.5 $\mu g/m^3$, respectively).
    b. During onshore flows, sulfate concentrations increase significantly (from 6 to 17 percent), compared to offshore flows.
    c. During onshore flows, nitrate concentrations decrease significantly (from 14 percent to 2 percent), compared to offshore flows.
    d. Organics constitute the largest fraction, approximately 50 percent of the $PM_{2.5}$ mass at the Wilmington station. EC represents the second largest category, approximately 16 percent of the $PM_{2.5}$ mass.
2. *Thanksgiving Day, 2005* – Samples were collected on November 24, 2005, which was Thanksgiving Day in 2005. These results present the mass reconstruction results on a day when the Port operations were greatly reduced from typical activity levels (this was confirmed by discussions with the Port Wharfingers). Since it was not a day on which there was a consistent onshore/offshore flow pattern, the mass reconstruction results are only presented for the 24-hour samples at each station, as shown in Figure 22. The following results are noted:

a. The 24-hour $PM_{2.5}$ mass concentrations were the highest or second highest measurements of the year at each station, even though activity at the Port was near the lowest levels of the year. All of the Port network stations and the two Long Beach stations had measured $PM_{2.5}$ concentrations that were more than twice their annual average, indicating that regional conditions were affecting local PM levels.

b. The largest contributor to the $PM_{2.5}$ mass at each station was organics (25–35%), followed by sulfates (17-20%), nitrates (13-19%), ammonium (11-14%), and EC (9-12%). This ranking of contributors to the $PM_{2.5}$ mass is roughly the same as given for western sites in EPA's Air Quality Criteria Document for Particulate Matter (2004), although the document cautions that there are large uncertainties in the data. Neither salt nor metals contributed more than 1 percent of the $PM_{2.5}$ mass.

3. *Santa Ana Conditions* – On Tuesday, February 7, 2006, Santa Ana conditions prevailed at all four stations, characterized by persistent northerly winds that brought warm, dry continental air into the region. Because the winds were consistently offshore, the mass reconstruction results are only presented for the 24-hour samples. The following results are noted:

   a. The major contributors to the $PM_{2.5}$ mass changed considerably from the earlier examples. Organics constituted approximately one-half of the $PM_{2.5}$ mass (43-52%), followed by EC (17-30%) and geological material (9-13%). This is the first instance where geological material was found to be an important constituent of $PM_{2.5}$ mass, which is not surprising, considering that the sampled air mass largely originated from the interior regions and was brought to the Port area by the Santa Ana conditions..

   b. The transport of material from outside the region resulted in $PM_{2.5}$ mass that had much different characteristics than measured on other days. The majority of $PM_{2.5}$ mass on this day (74 – 79%) consisted of organics, EC and geological material, with low contributions from constituents (sulfates, nitrates, ammonium) that were often present on other days. .

3.5 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. Table 7 presents the PM data monitored by the SFS and FRM monitors for the current monitoring period. These data show that:

   a. The average $PM_{2.5}$ concentration measured by the SFS monitor was within 1.3 percent of the average measured by the FRM monitor. The correlation coefficient between the two data sets, using 104 matched samples, was 0.964.

   b. The average PM_{10} concentration measured by the SFS monitor was within 4.0 percent of the average measured by the FRM monitor. The

correlation coefficient between the two data sets, using 111 matched samples, was 0.981.

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. An annual external audit of the system was performed by an outside contractor.

4.0 FUTURE PLANS FOR THE AIR MONITORING PROGRAM

The following summarizes future activities that are planned for ongoing monitoring at the Port.

- Additional detailed analysis will be conducted using chemical analyses and the onshore/offshore data. This future analysis will include detailed analysis of the metals and other constituents, to develop a source apportionment estimate at each monitoring station on selected days.
- The monitoring program will be expanded in 2007 to include a number of new real-time or near real-time instruments: gaseous criteria pollutant monitors (carbon monoxide, sulfur dioxide, nitrogen oxides, and ozone), $PM_{2.5}$ and PM_{10} beta attenuation monitors, ultrafine particle counters, and PAH analyzers. This real-time data will provide additional opportunities for detailed analysis and an enhanced evaluation of source-receptor relationships.
- The Port will work with the Port of Long Beach, the SCAQMD, and research programs conducted under the direction of the ARB to further evaluate the impact of mobile sources on residential communities in proximity to the Port.

5.0 REFERENCES

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U.S. Environmental Protection Agency, 2004. Air Quality Criteria for Particulate Matter, Volume I. EPA/600/P-99/002aF, Office of Research and Development, Research Triangle Park, NC.

Appendix A

Figure 3. $PM_{2.5}$ 24-hr. Average Concentrations at the Port of Los Angeles, February-April 2005, (POLA Community Stations & nearby SCAQMD Stations)

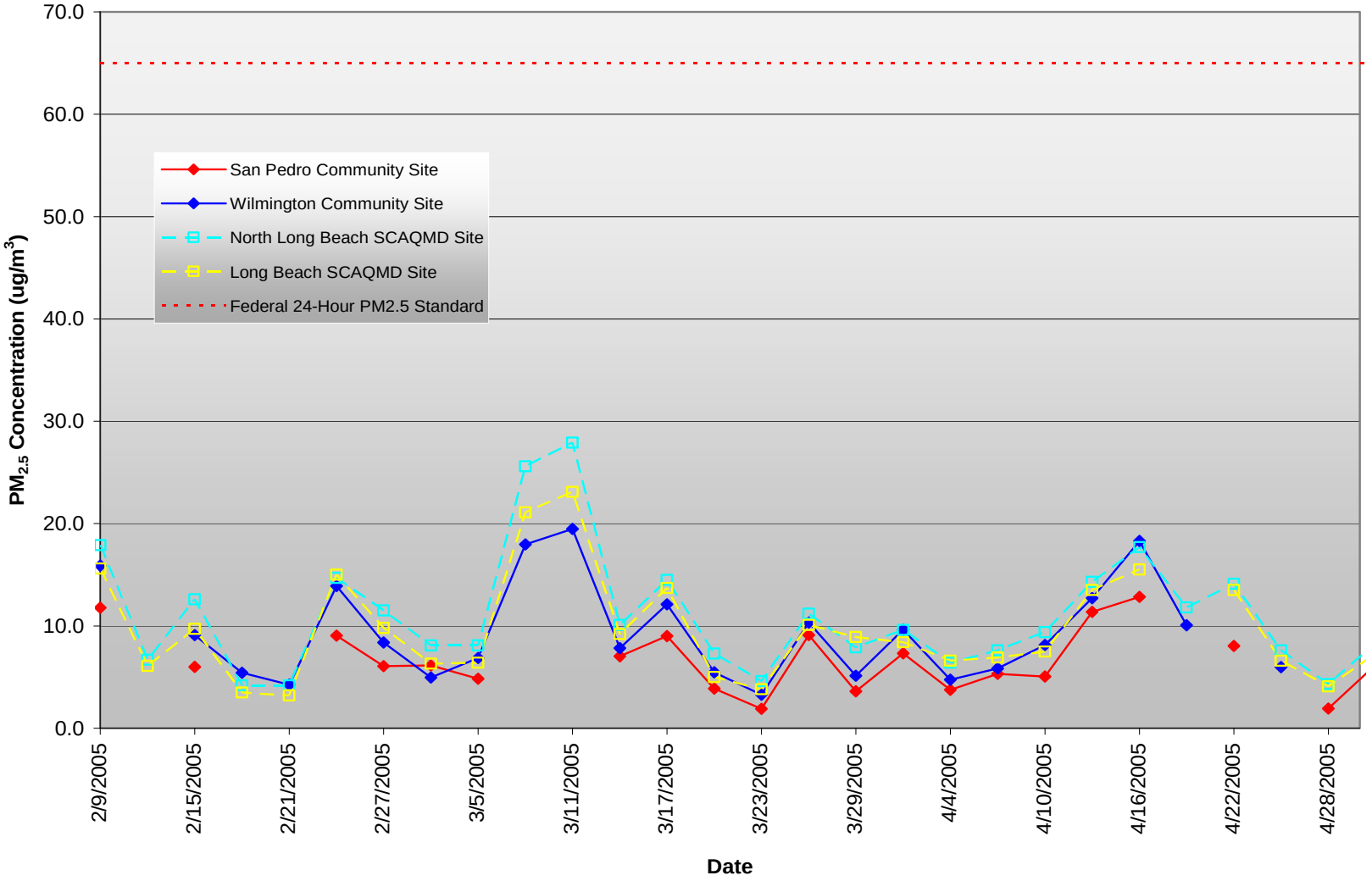


Figure 4. $PM_{2.5}$ 24-hr. Average Concentrations at the Port of Los Angeles, February-April 2005, (POLA Network Stations)

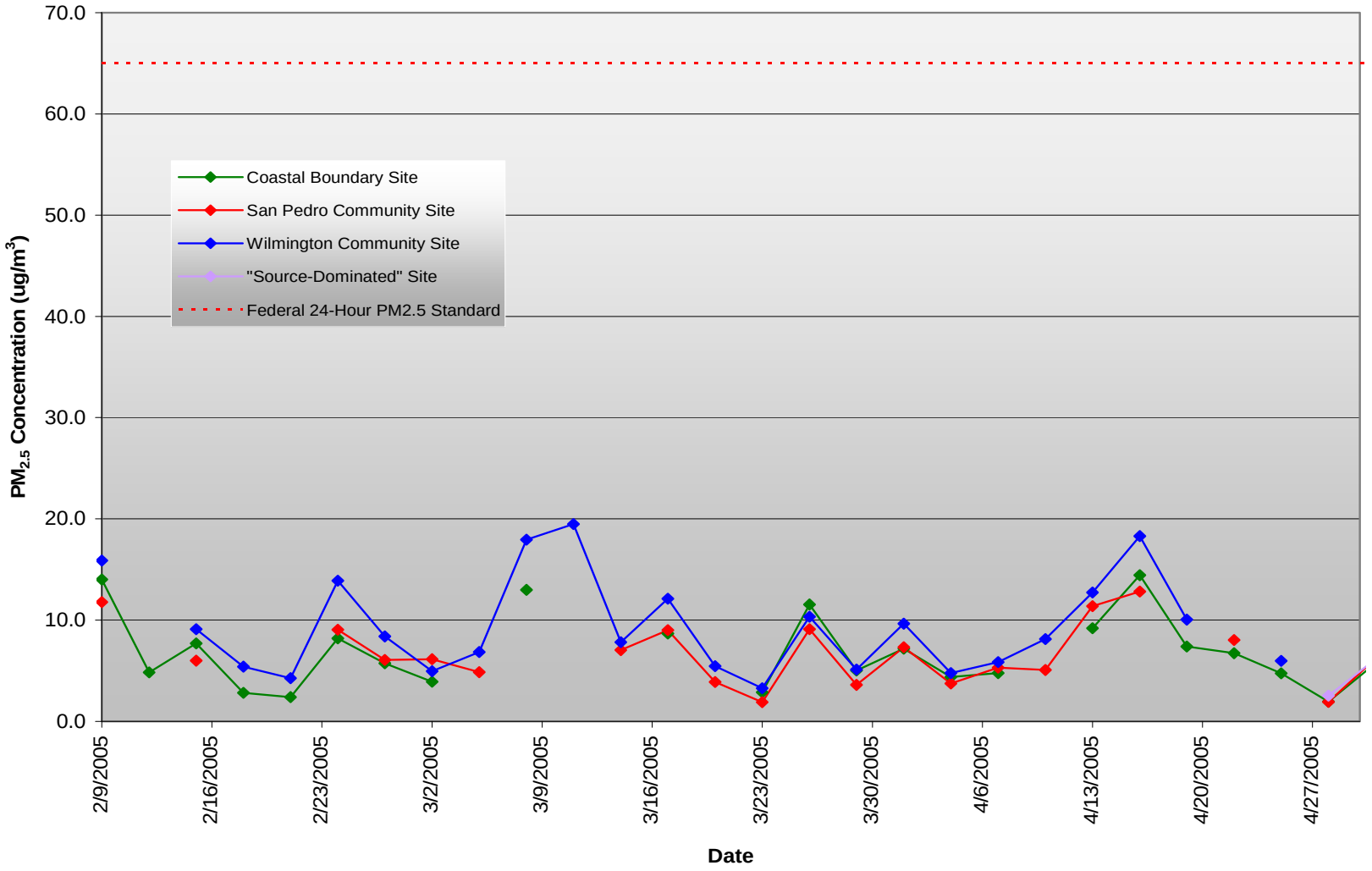


Figure 5. PM_{10} 24-hr. Average Concentrations at the Port of Los Angeles, February-April 2005

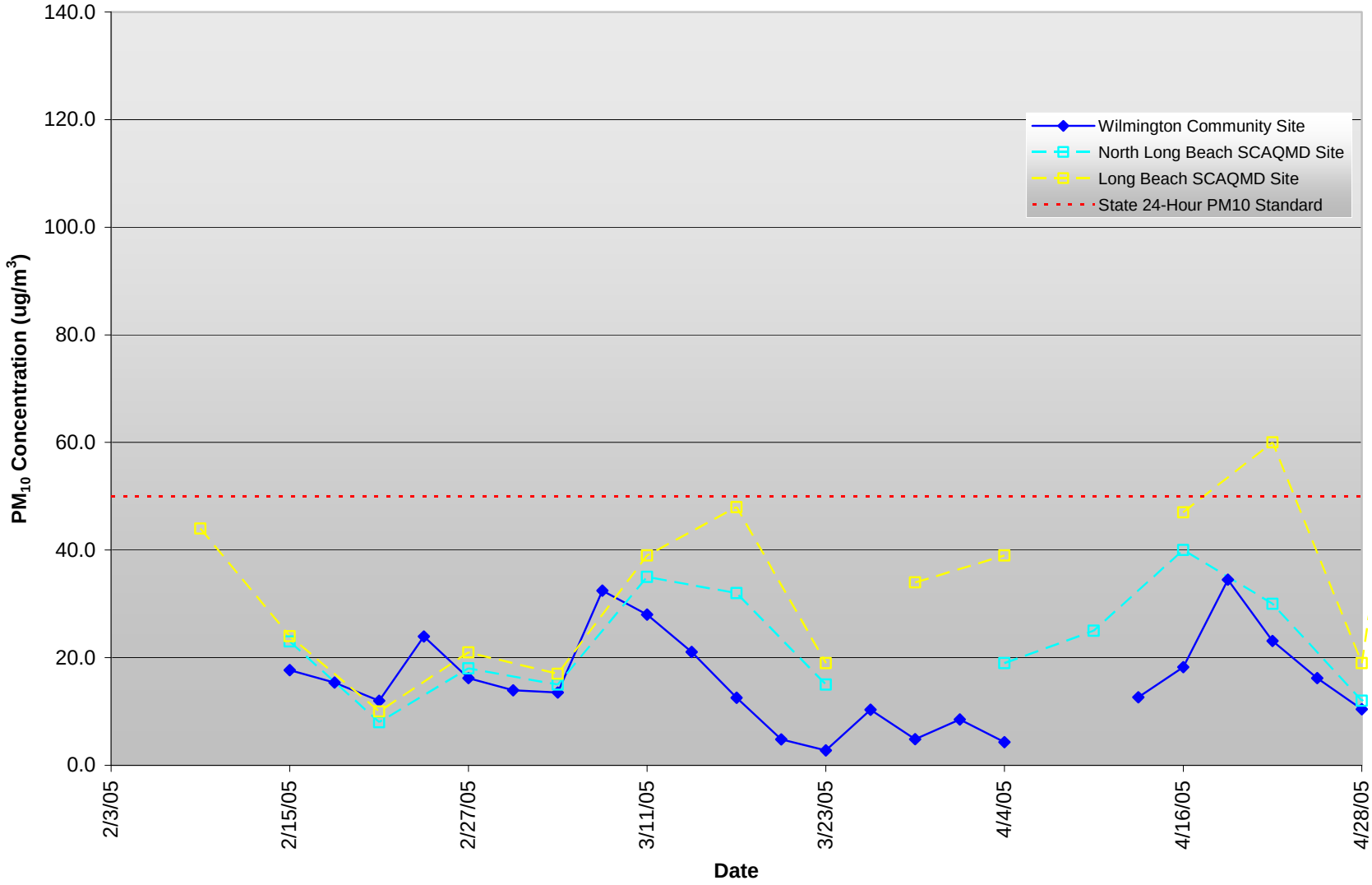


Figure 6. Elemental Carbon 24-hr. Average Concentrations at the Port of Los Angeles, February-April 2005

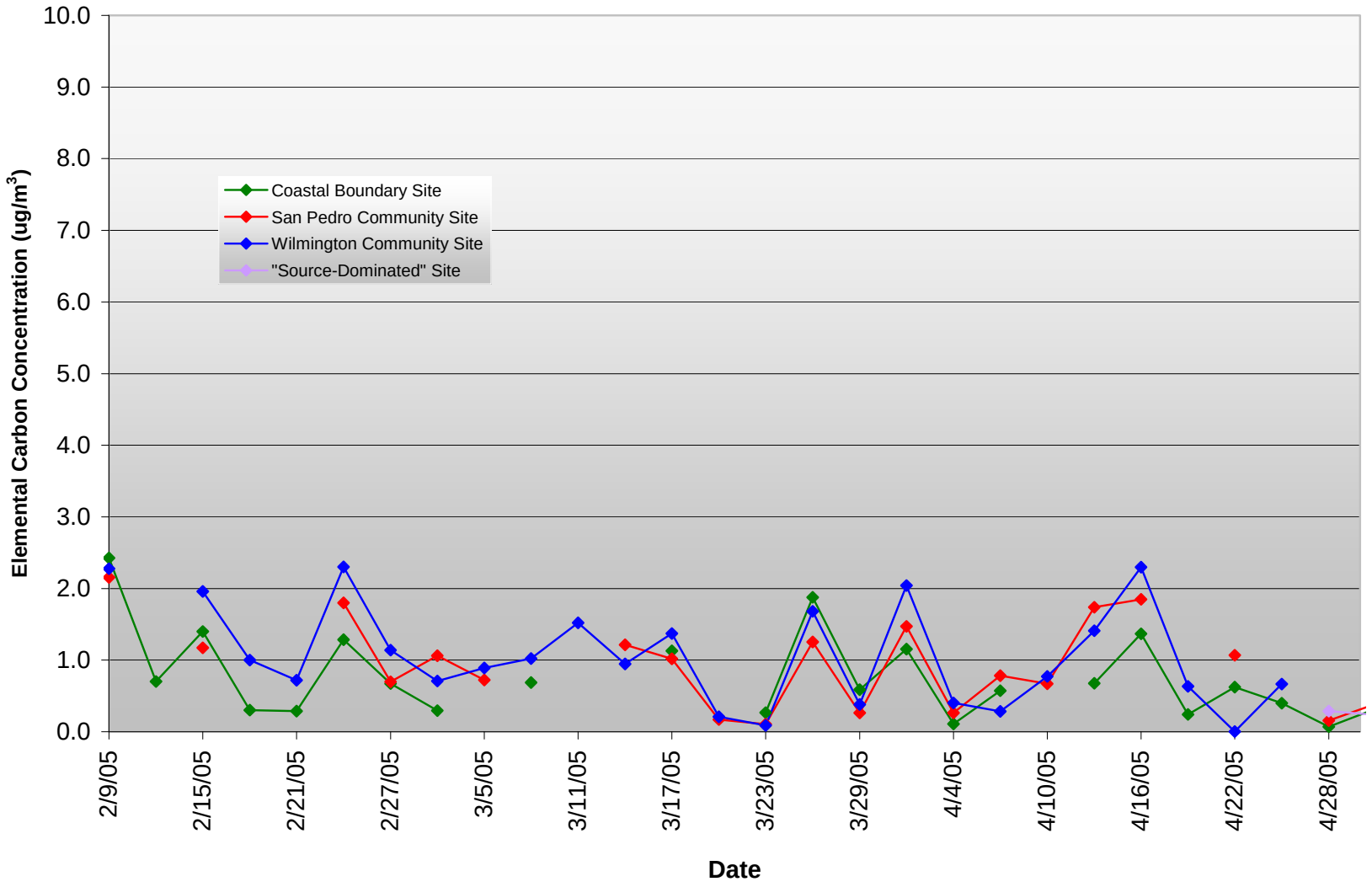


Figure 7. PM2.5 24-hr. Average Concentrations at the Port of Los Angeles, May-October 2005, (POLA Community Stations & nearby SCAQMD Stations)

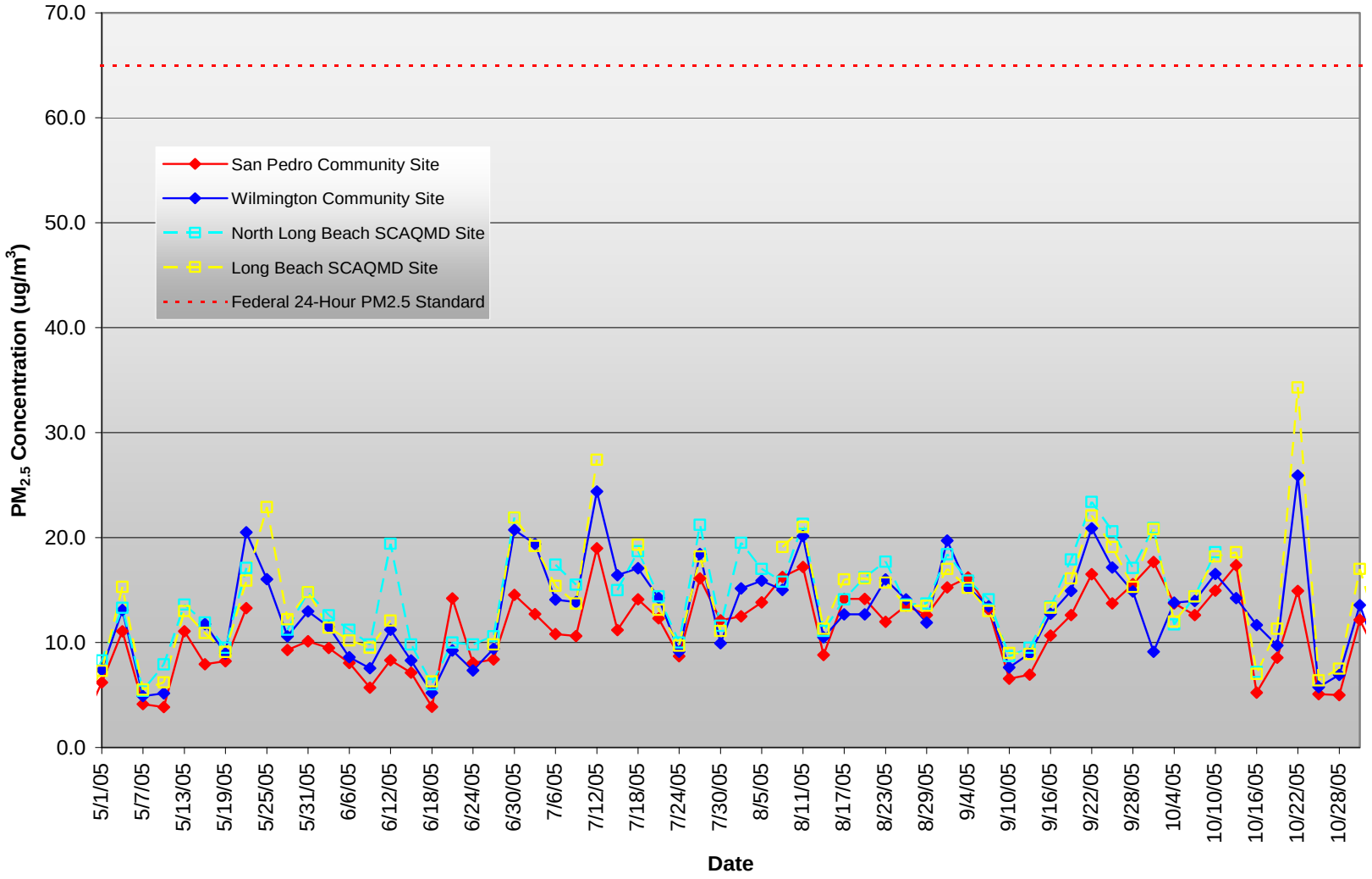


Figure 8. $PM_{2.5}$ 24-hr. Average Concentrations at the Port of Los Angeles, May-October 2005, (POLA Network Stations)

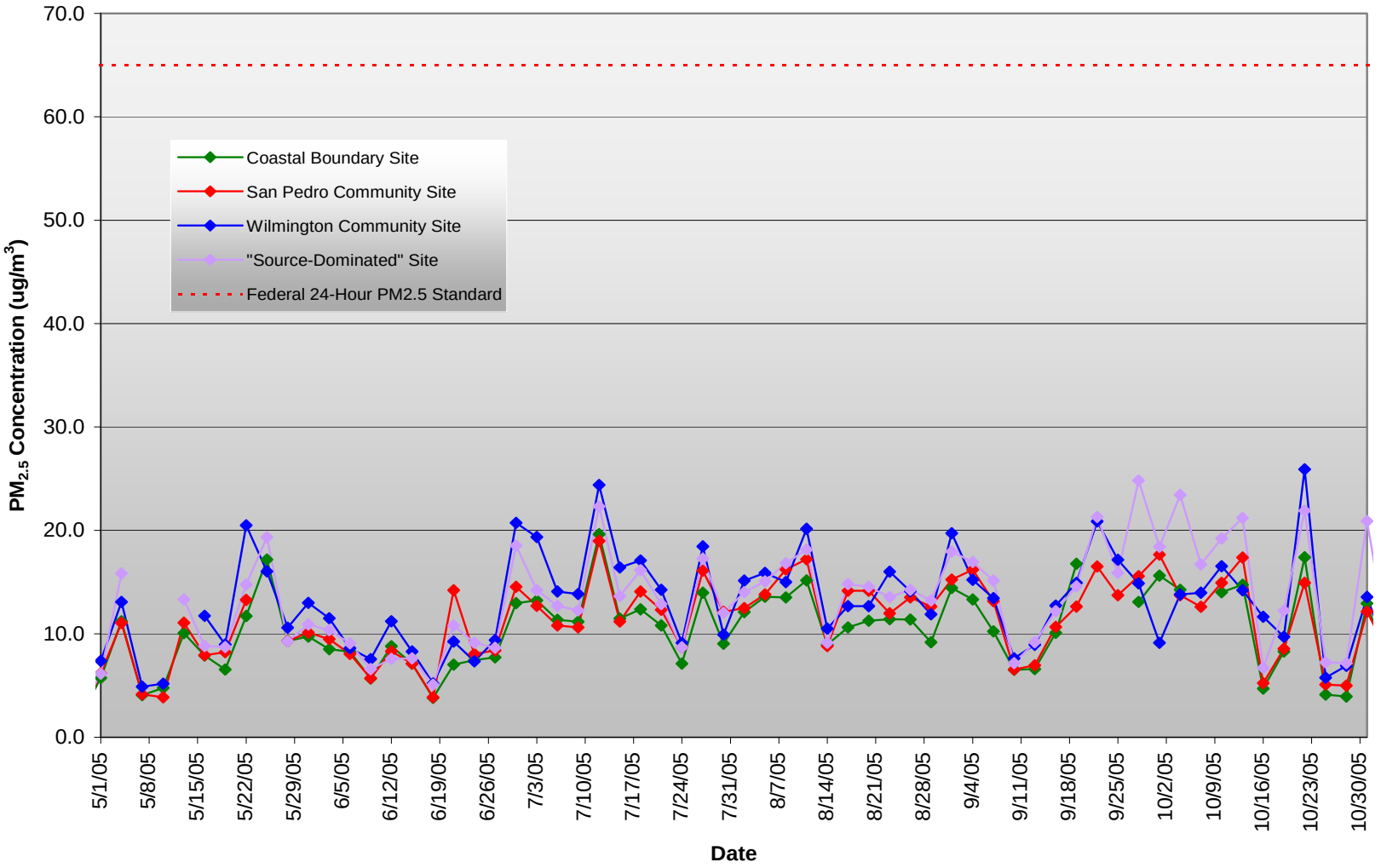


Figure 9. PM_{10} 24-hr. Average Concentrations at the Port of Los Angeles, May-October 2005

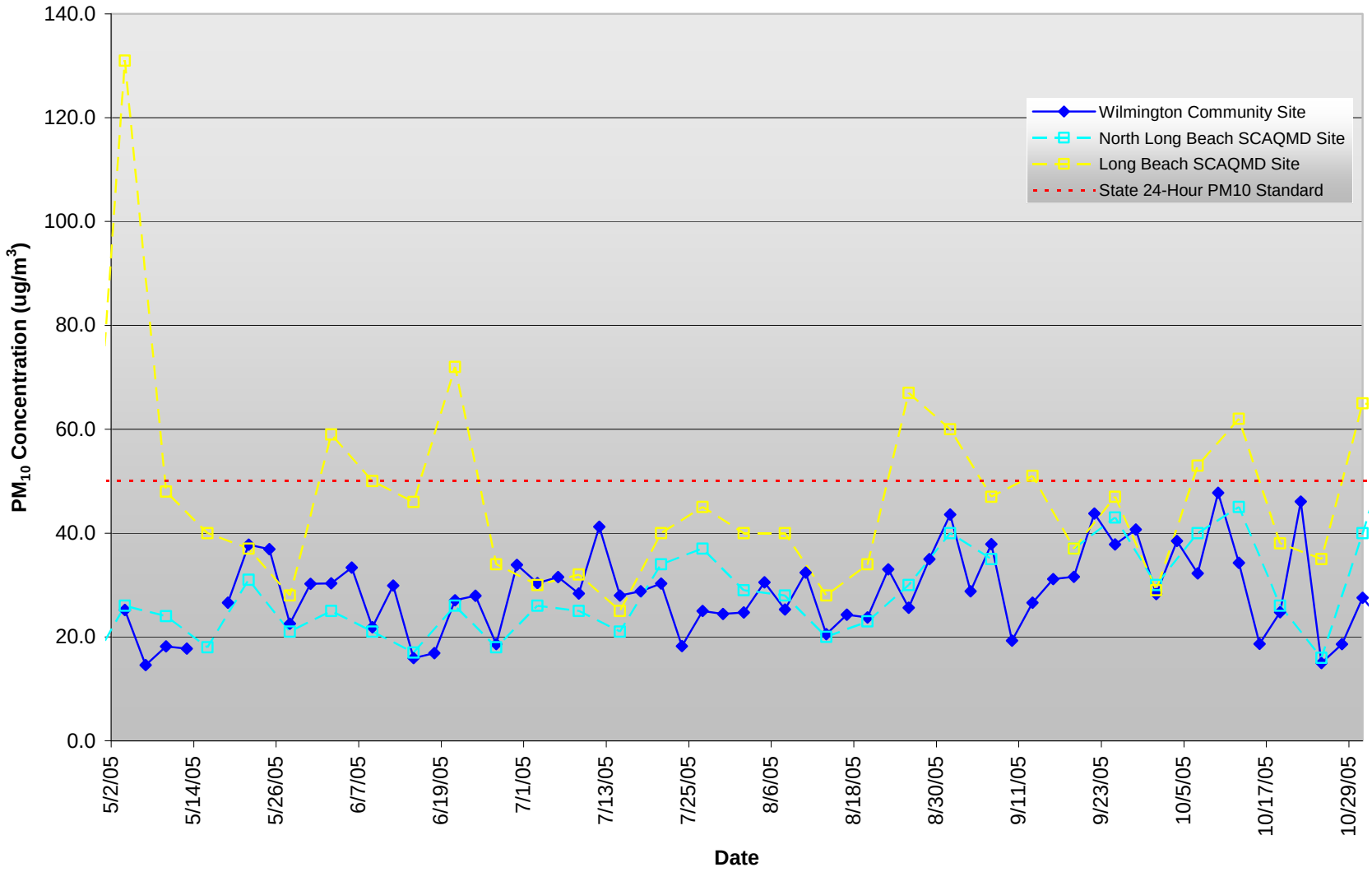


Figure 10. Elemental Carbon 24-hr. Average Concentrations at the Port of Los Angeles, May-October 2005

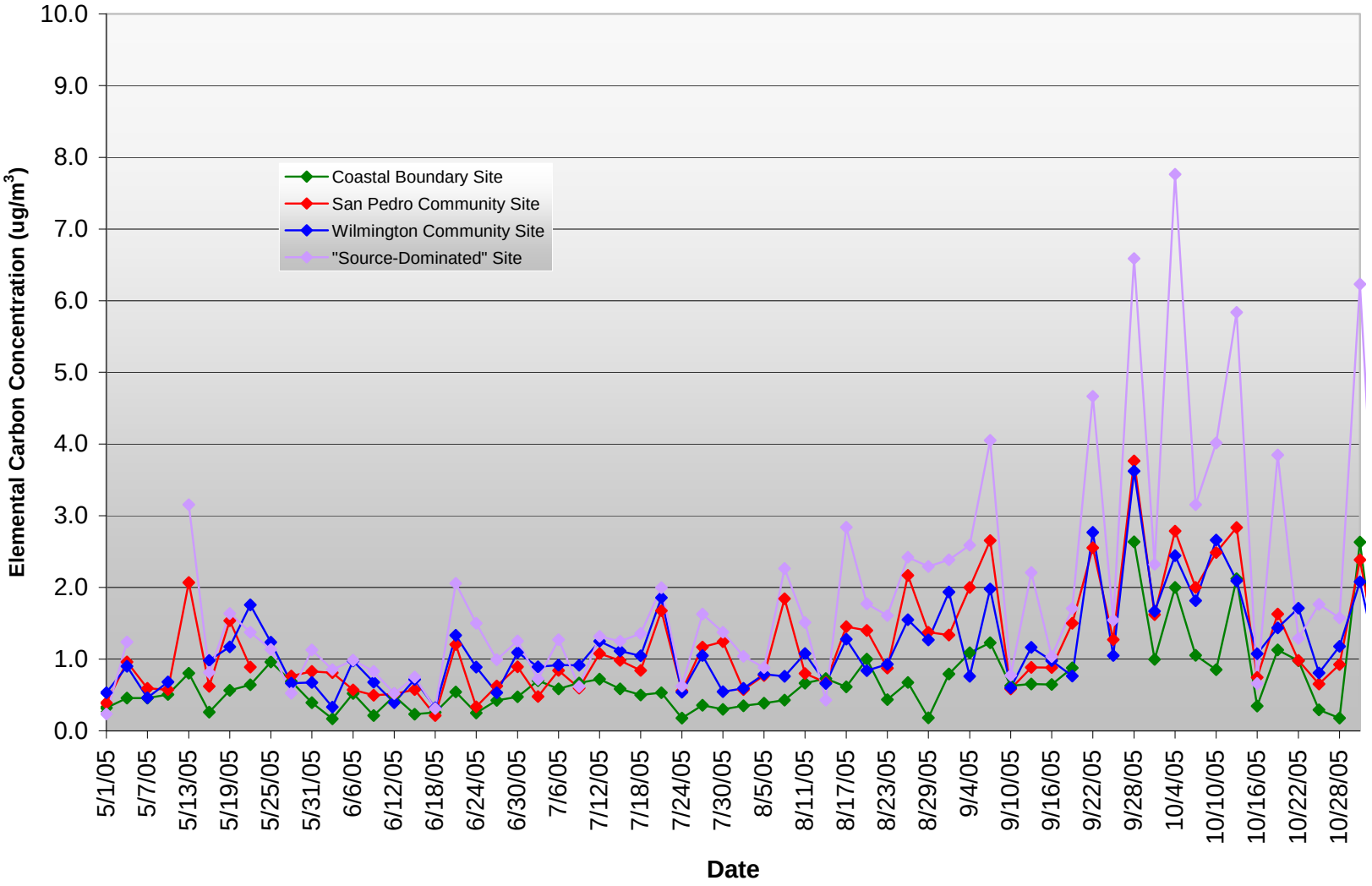


Figure 11. PM2.5 24-hr. Average Concentrations at the Port of Los Angeles, November 2005-April 2006, (POLA Community Stations & nearby SCAQMD Stations)

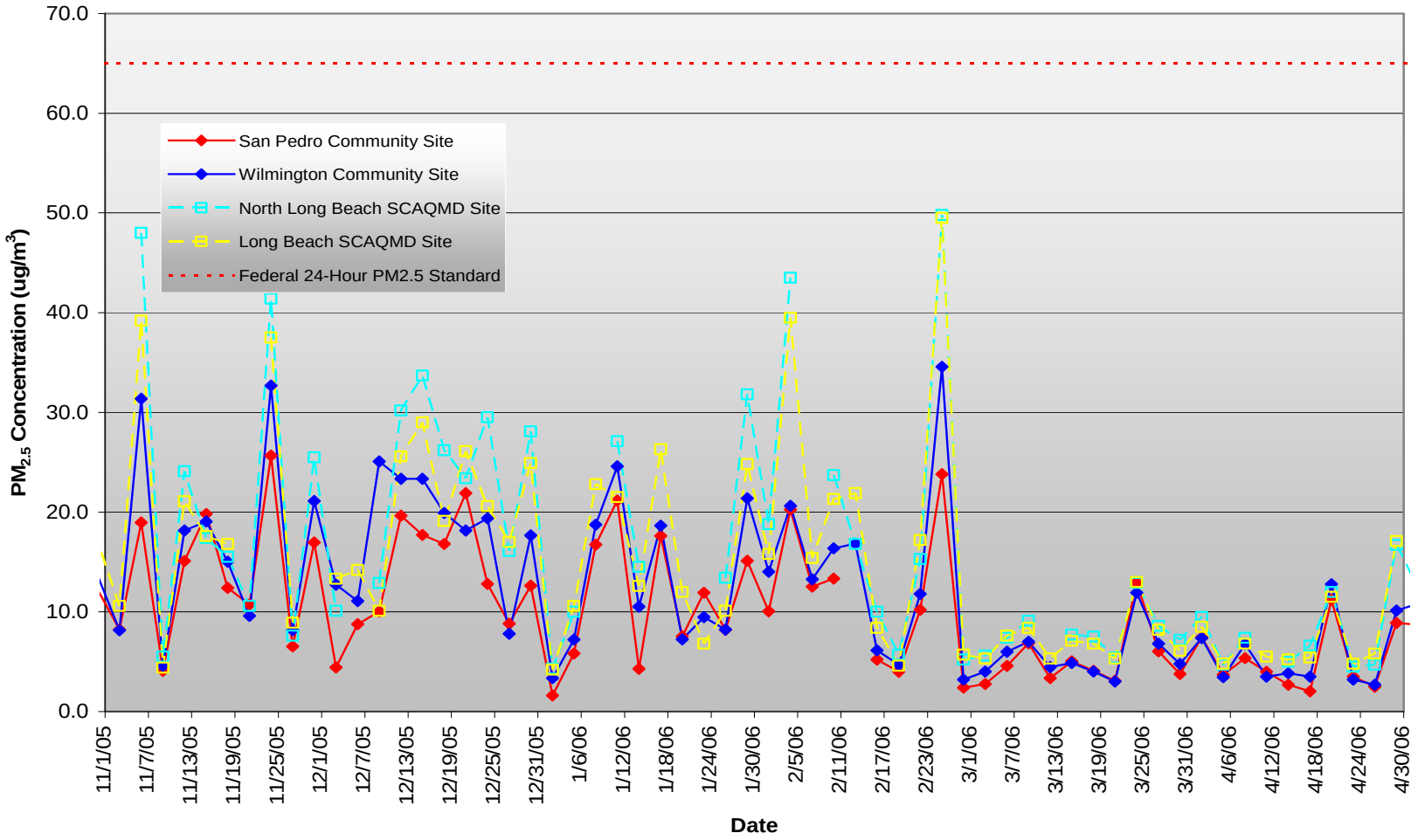


Figure 12. $PM_{2.5}$ 24-hr. Average Concentrations at the Port of Los Angeles, November 2005-April 2006, (POLA Network Stations)

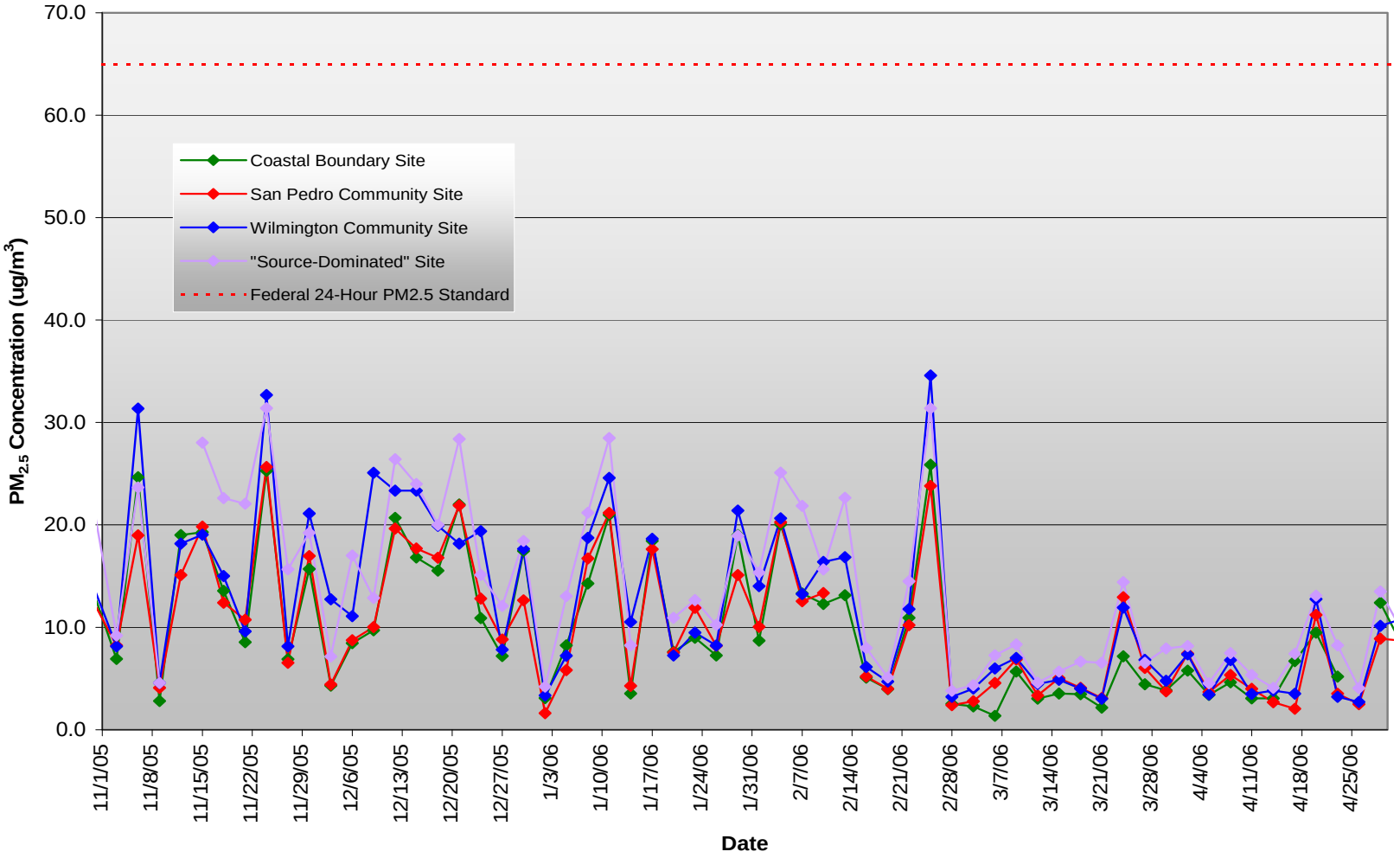


Figure 13. PM_{10} 24-hr. Average Concentrations at the Port of Los Angeles, November 2005-April 2006

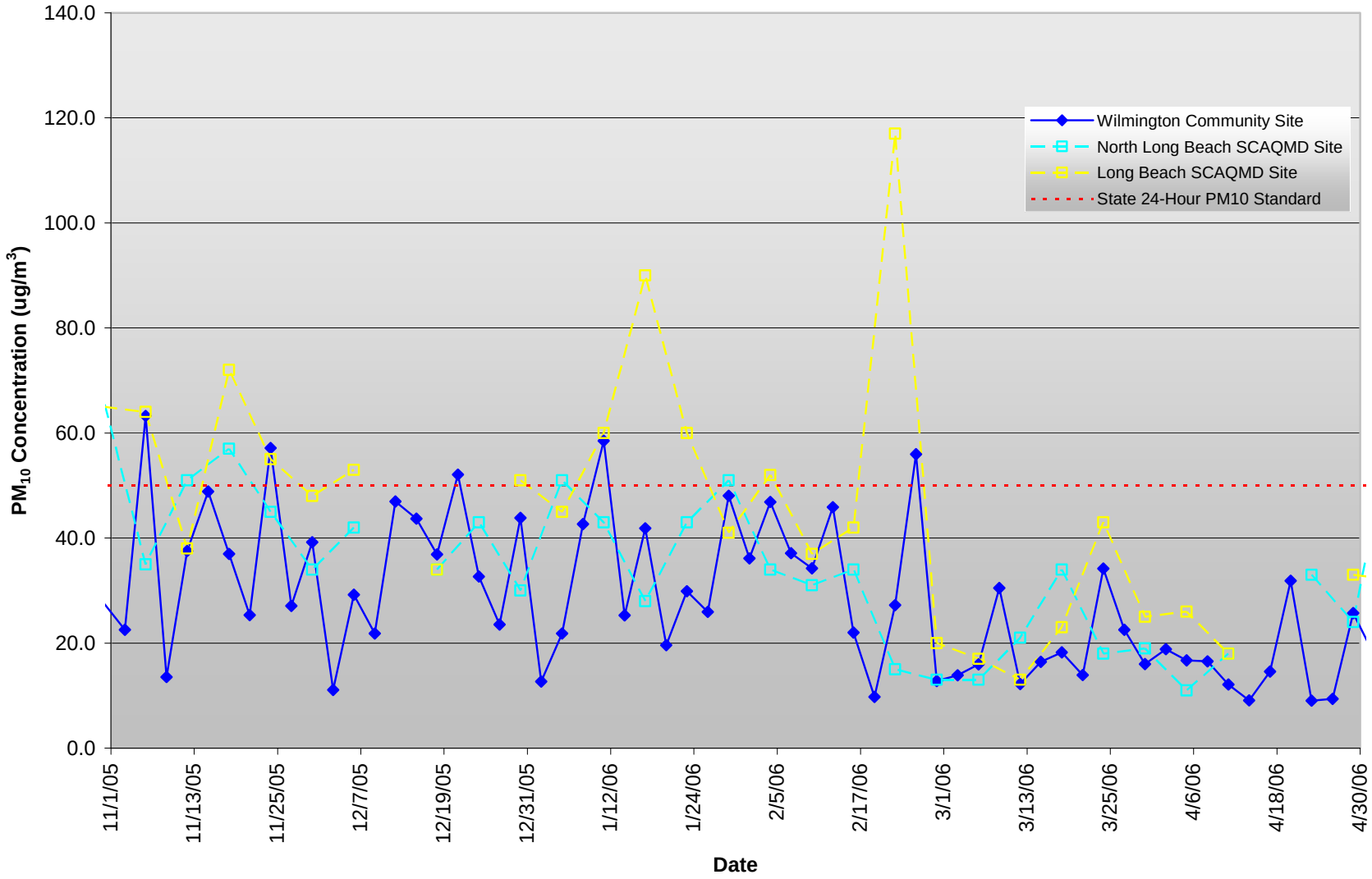


Figure 14. Elemental Carbon 24-hr. Average Concentrations at the Port of Los Angeles, November 2005-April 2006

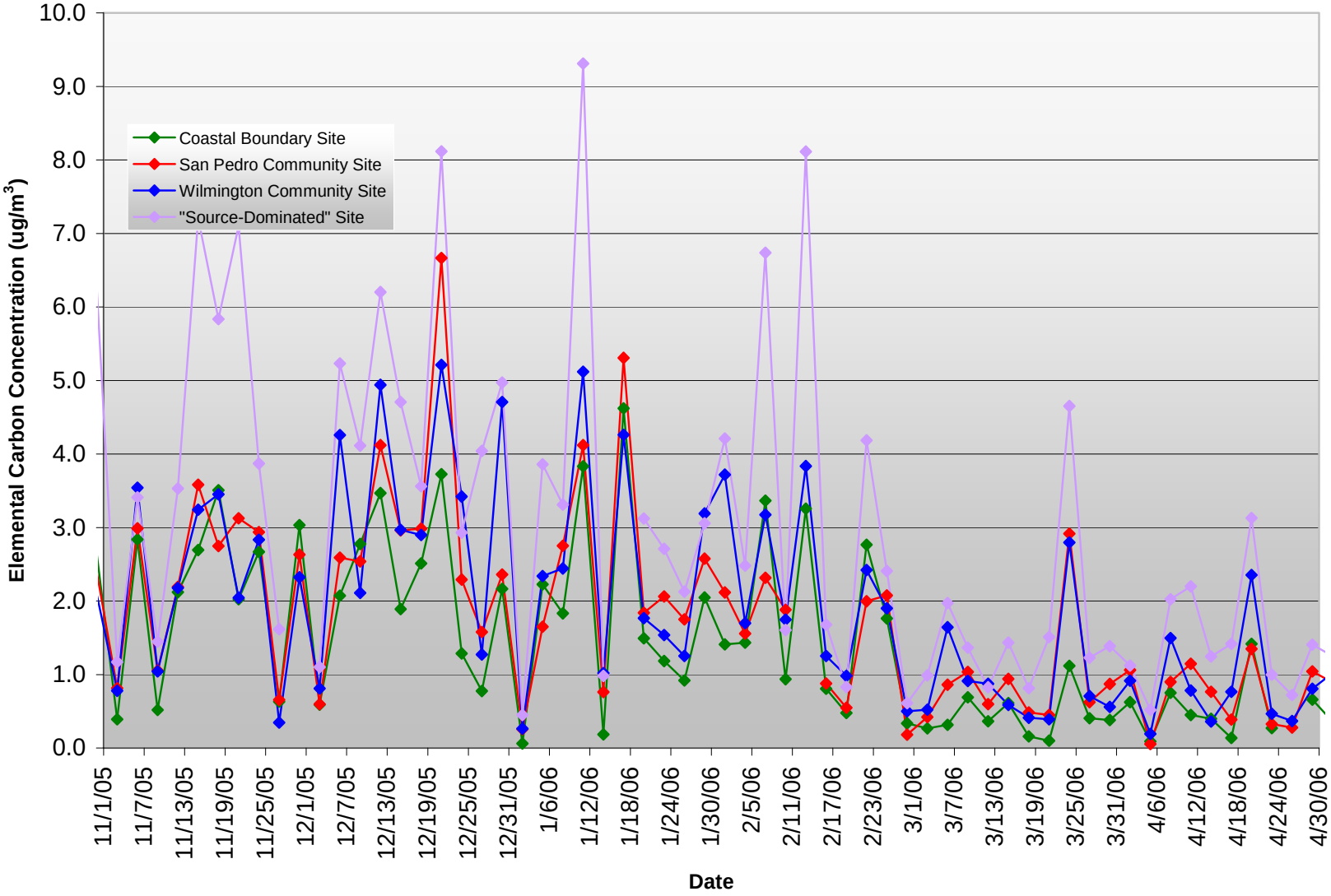


Table 1. $PM_{2.5}$ 24-Hour Average Concentrations at the Port of Los Angeles, February-April 2005

Sample Date	Port of Los Angeles Monitoring Sites				SCAQMD Monitoring Sites	
	Wilmington Community Site	**Coastal Boundary Site**	**San Pedro Community Site**	**Source-Dominated Site**	**North Long Beach**	**Central Long Beach**
	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)
9-Feb-05	15.9	14.0	11.8	- -	17.9	15.6
12-Feb-05	- -	4.8	- -	- -	6.7	6.1
15-Feb-05	9.1	7.7	6.0	- -	12.6	9.7
18-Feb-05	5.4	2.8	- -	- -	4.2	3.5
21-Feb-05	4.3	2.4	- -	- -	4.2	3.2
24-Feb-05	13.9	8.2	9.1	- -	14.7	15.0
27-Feb-05	8.4	5.7	6.1	- -	11.5	9.8
2-Mar-05	4.9	3.9	6.1	- -	8.1	6.3
5-Mar-05	6.9	- -	4.9	- -	8.1	6.4
8-Mar-05	18.0	13.0	- -	- -	25.6	21.1
11-Mar-05	19.5	- -	- -	- -	27.9	23.1
14-Mar-05	7.8	- -	7.0	- -	10.1	9.2
17-Mar-05	12.1	8.7	9.0	- -	14.5	13.7
20-Mar-05	5.5	- -	3.9	- -	7.3	5.0
23-Mar-05	3.3	2.9	1.9	- -	4.6	3.8
26-Mar-05	10.3	11.5	9.1	- -	11.2	10.1
29-Mar-05	5.1	5.0	3.6	- -	7.9	8.9
1-Apr-05	9.6	7.2	7.3	- -	9.6	8.4
4-Apr-05	4.8	4.4	3.7	- -	6.4	6.6
7-Apr-05	5.9	4.8	5.3	- -	7.6	6.9
10-Apr-05	8.1	- -	5.1	- -	9.4	7.5
13-Apr-05	12.7	9.2	11.4	- -	14.3	13.5
16-Apr-05	18.3	14.4	12.8	- -	17.7	15.5
19-Apr-05	10.1	7.4	- -	- -	11.8	- -
22-Apr-05	- -	6.7	8.0	- -	14.1	13.5
25-Apr-05	6.0	4.7	- -	- -	7.6	6.6
28-Apr-05	- -	1.9	1.9	2.5	4.3	4.1
Average	**9.4**	**6.9**	**6.7**	**2.5**	**11.1**	**9.7**

Notes:

- Average $PM_{2.5}$ concentrations shown above have different record lengths:
  - Coastal Boundary Site: 3-month average
  - San Pedro Community Site: 3-month average
  - Wilmington Community Site: 3-month average
  - "Source-Dominated" Site: 0-month average
  - SCAQMD N. Long Beach Site: 3-month average
  - SCAQMD Long Beach Site: 3-month average
- Source-dominated station added on April 28, 2005.

Table 2. PM_{10} 24-Hour Average Concentrations at the Port of Los Angeles, February-April 2005

Sample Date	Port of Los Angeles Monitoring Sites				SCAQMD Monitoring Sites	
	Wilmington Community Site	**Coastal Boundary Site**	**San Pedro Community Site**	**Source-Dominated Site**	**North Long Beach**	**Central Long Beach**
	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)
9-Feb-05	- -	- -	- -	- -	- -	44.0
12-Feb-05	- -	- -	- -	- -	- -	- -
15-Feb-05	17.7	- -	- -	- -	23.0	24.0
18-Feb-05	15.4	- -	- -	- -	- -	- -
21-Feb-05	12.0	- -	- -	- -	8.0	10.0
24-Feb-05	23.9	- -	- -	- -	- -	- -
27-Feb-05	16.2	- -	- -	- -	18.0	21.0
2-Mar-05	13.9	- -	- -	- -	- -	- -
5-Mar-05	13.5	- -	- -	- -	15.0	17.0
8-Mar-05	32.5	- -	- -	- -	- -	- -
11-Mar-05	28.0	- -	- -	- -	35.0	39.0
14-Mar-05	21.1	- -	- -	- -	- -	- -
17-Mar-05	29.7	- -	- -	- -	32.0	48.0
20-Mar-05	22.1	- -	- -	- -	- -	- -
23-Mar-05	14.2	- -	- -	- -	15.0	19.0
26-Mar-05	23.9	- -	- -	- -	- -	- -
29-Mar-05	19.0	- -	- -	- -	- -	34.0
1-Apr-05	23.6	- -	- -	- -	- -	- -
4-Apr-05	15.7	- -	- -	- -	19.0	39.0
7-Apr-05	- -	- -	- -	- -	- -	- -
10-Apr-05	23.8	- -	- -	- -	25.0	- -
13-Apr-05	39.7	- -	- -	- -	- -	- -
16-Apr-05	45.6	- -	- -	- -	40.0	47.0
19-Apr-05	34.5	- -	- -	- -	- -	- -
22-Apr-05	23.1	- -	- -	- -	30.0	60.0
25-Apr-05	16.2	- -	- -	- -	- -	- -
28-Apr-05	10.4	- -	- -	- -	12.0	19.0
Average	**22.3**	**- -**	**- -**	**- -**	**22.7**	**32.4**

Notes:
- Ambient PM_{10} data are only collected at the Wilmington Community site in the Port of Los Angeles network.

Table 3. Elemental Carbon 24-Hour Average Concentrations at the Port of Los Angeles, February-April 2005

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. ($\mu g/m^3$)
9-Feb-05	2.3	2.4	2.1	- -
12-Feb-05	- -	0.7	- -	- -
15-Feb-05	2.0	1.4	1.2	- -
18-Feb-05	1.0	0.3	- -	- -
21-Feb-05	0.7	0.3	- -	- -
24-Feb-05	2.3	1.3	1.8	- -
27-Feb-05	1.1	0.7	0.7	- -
2-Mar-05	0.7	0.3	1.1	- -
5-Mar-05	0.9	- -	0.7	- -
8-Mar-05	1.0	0.7	- -	- -
11-Mar-05	1.5	- -	- -	- -
14-Mar-05	0.9	- -	1.2	- -
17-Mar-05	1.4	1.1	1.0	- -
20-Mar-05	0.2	- -	0.2	- -
23-Mar-05	0.1	0.3	0.1	- -
26-Mar-05	1.7	1.9	1.3	- -
29-Mar-05	0.4	0.6	0.3	- -
1-Apr-05	2.0	1.2	1.5	- -
4-Apr-05	0.4	0.1	0.3	- -
7-Apr-05	0.3	0.6	0.8	- -
10-Apr-05	0.8	- -	0.7	- -
13-Apr-05	1.4	0.7	1.4	- -
16-Apr-05	2.3	1.4	2.3	- -
19-Apr-05	0.6	0.2	- -	- -
22-Apr-05	0.0	0.6	1.1	- -
25-Apr-05	0.7	0.4	- -	- -
28-Apr-05	- -	0.1	0.2	0.3
Average	**1.1**	**0.8**	**1.0**	**0.3**

Notes:

- Average $PM_{2.5}$ concentrations shown above have different record lengths:
  - Coastal Boundary Site: 3-month average
  - San Pedro Community Site: 3-month average
  - Wilmington Community Site: 3-month average
  - "Source-Dominated" Site: 0-month average
- Source-dominated station added on April 28, 2005.

Table 4. $PM_{2.5}$ 24-Hour Average Concentrations at the Port of Los Angeles, May 2005-April 2006

Sample Date	Port of Los Angeles Monitoring Sites				SCAQMD Monitoring Sites	
	Wilmington Community Site	Coastal Boundary Site	San Pedro Community Site	Source-Dominated Site	North Long Beach	Central Long Beach
	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)
1-May-05	7.4	5.7	6.2	6.1	8.3	7.3
4-May-05	13.1	11.2	11.1	- -	13.3	15.3
7-May-05	4.9	4.1	4.1	- -	5.4	5.5
10-May-05	5.2	4.8	3.9	- -	7.9	6.2
13-May-05	- -	10.1	11.1	13.3	13.6	13.0
16-May-05	11.7	7.9	7.9	8.8	11.9	10.9
19-May-05	9.0	6.5	8.2	8.7	9.5	9.1
22-May-05	20.5	11.7	13.3	14.8	17.1	15.9
25-May-05	16.0	17.2	- -	19.3	- -	22.9
28-May-05	10.6	9.3	9.3	9.3	11.2	12.2
31-May-05	13.0	9.7	10.1	10.9	14.8	14.8
3-Jun-05	11.5	8.5	9.5	10.4	12.6	11.4
6-Jun-05	8.6	8.3	8.0	9.1	11.2	10.2
9-Jun-05	7.6	5.7	5.7	6.6	9.8	9.5
12-Jun-05	11.2	8.8	8.3	7.6	19.4	12.1
15-Jun-05	8.3	7.1	7.1	7.6	9.8	- -
18-Jun-05	5.2	3.8	3.9	5.1	6.0	6.3
21-Jun-05	9.2	7.0	14.2	10.8	10.0	- -
24-Jun-05	7.3	7.4	8.0	9.1	9.8	- -
27-Jun-05	9.4	7.7	8.4	8.7	10.6	9.8
30-Jun-05	20.7	13.0	14.5	18.5	21.9	21.9
3-Jul-05	19.4	13.2	12.7	14.2	- -	19.2

Table 4. $PM_{2.5}$ 24-Hour Average Concentrations at the Port of Los Angeles, May 2005-April 2006 (cont.)

Sample Date	Port of Los Angeles Monitoring Sites				SCAQMD Monitoring Sites	
	Wilmington Community Site	Coastal Boundary Site	San Pedro Community Site	Source-Dominated Site	North Long Beach	Central Long Beach
	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)
6-Jul-05	14.1	11.4	10.8	12.7	17.4	15.4
9-Jul-05	13.9	11.2	10.6	12.3	15.5	13.7
12-Jul-05	24.4	19.6	19.0	22.3	- -	27.4
15-Jul-05	16.4	11.5	11.2	13.6	15.0	- -
18-Jul-05	17.1	12.4	14.1	16.2	18.7	19.3
21-Jul-05	14.3	10.8	12.3	12.9	14.4	13.1
24-Jul-05	9.1	7.1	8.7	8.7	10.0	9.7
27-Jul-05	18.4	14.0	16.1	17.3	21.2	18.2
30-Jul-05	9.9	9.0	12.1	12.0	11.6	11.1
2-Aug-05	15.2	12.1	12.5	14.0	19.5	- -
5-Aug-05	15.9	13.6	13.8	15.1	17.0	- -
8-Aug-05	15.0	13.5	16.2	16.8	15.8	19.1
11-Aug-05	20.1	15.2	17.2	18.1	21.3	21.0
14-Aug-05	10.5	9.0	8.8	9.1	11.1	11.3
17-Aug-05	12.7	10.6	14.2	14.8	14.1	16.0
20-Aug-05	12.7	11.3	14.2	14.5	16.2	16.1
23-Aug-05	16.0	11.4	12.0	13.5	17.7	15.7
26-Aug-05	14.1	11.4	13.5	14.3	13.6	13.5
29-Aug-05	11.9	9.2	12.6	13.2	13.7	13.5
1-Sep-05	19.7	14.4	15.2	17.9	18.4	17.0
4-Sep-05	15.2	13.3	16.2	16.9	15.9	15.2
7-Sep-05	13.5	10.2	13.2	15.1	14.1	13.0

Table 4. $PM_{2.5}$ 24-Hour Average Concentrations at the Port of Los Angeles, May 2005-April 2006 (cont.)

Sample Date	Port of Los Angeles Monitoring Sites				SCAQMD Monitoring Sites	
	Wilmington Community Site	Coastal Boundary Site	San Pedro Community Site	Source-Dominated Site	North Long Beach	Central Long Beach
	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)
10-Sep-05	7.6	6.5	6.5	7.2	8.7	9.0
13-Sep-05	8.9	6.6	6.9	9.2	9.5	8.9
16-Sep-05	12.7	10.1	10.7	12.2	13.4	13.3
19-Sep-05	14.9	16.8	12.6	14.6	17.9	16.1
22-Sep-05	20.9	- -	16.5	21.3	23.4	22.1
25-Sep-05	17.2	- -	13.7	15.9	20.6	19.1
28-Sep-05	14.9	13.1	15.6	24.8	17.1	15.3
1-Oct-05	9.1	15.6	17.7	18.4	20.9	20.8
4-Oct-05	13.8	14.3	13.7	23.4	11.7	12.0
7-Oct-05	14.0	- -	12.6	16.7	14.4	14.4
10-Oct-05	16.5	14.0	14.9	19.2	18.6	18.2
13-Oct-05	14.2	14.7	17.4	21.2	- -	18.6
16-Oct-05	11.7	4.7	5.2	6.7	7.2	7.0
19-Oct-05	9.7	8.3	8.5	12.2	- -	11.3
22-Oct-05	25.9	17.4	14.9	21.9	- -	34.3
25-Oct-05	5.7	4.1	5.1	7.2	- -	6.4
28-Oct-05	6.9	3.9	5.0	7.2	- -	7.5
31-Oct-05	13.6	12.9	12.2	20.9	- -	17.0
3-Nov-05	8.2	6.9	8.2	9.2	- -	10.6
6-Nov-05	31.4	24.7	19.0	23.7	48.0	39.2
9-Nov-05	4.6	2.8	4.1	4.6	5.5	4.4
12-Nov-05	18.2	19.0	15.1	- -	24.1	21.1

Table 4. $PM_{2.5}$ 24-Hour Average Concentrations at the Port of Los Angeles, May 2005-April 2006 (cont.)

Sample Date	Port of Los Angeles Monitoring Sites				SCAQMD Monitoring Sites	
	Wilmington Community Site	Coastal Boundary Site	San Pedro Community Site	Source-Dominated Site	North Long Beach	Central Long Beach
	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)
15-Nov-05	19.1	19.3	19.8	28.0	17.4	17.6
18-Nov-05	15.0	13.6	12.4	22.6	15.5	16.8
21-Nov-05	9.6	8.6	10.7	22.1	10.6	- -
24-Nov-05	32.7	25.3	25.7	31.4	41.4	37.5
27-Nov-05	8.1	6.9	6.5	15.7	7.6	8.9
30-Nov-05	21.1	15.7	17.0	19.2	25.5	- -
3-Dec-05	12.7	4.3	4.4	7.2	10.1	13.3
6-Dec-05	11.1	8.4	8.7	17.0	- -	14.2
9-Dec-05	25.1	9.7	10.0	12.9	12.9	10.1
12-Dec-05	23.3	20.7	19.7	26.4	30.2	25.6
15-Dec-05	23.3	16.8	17.7	24.0	33.7	29.0
18-Dec-05	19.9	15.5	16.8	20.0	26.2	19.1
21-Dec-05	18.2	22.0	21.9	28.4	23.4	26.1
24-Dec-05	19.4	10.9	12.8	15.1	29.5	20.6
27-Dec-05	7.8	7.2	8.8	12.1	16.1	17.0
30-Dec-05	17.7	17.5	12.6	18.4	28.1	24.9
2-Jan-06	3.4	3.1	1.6	4.2	4.3	4.2
5-Jan-06	7.2	8.2	5.8	13.0	10.0	10.6
8-Jan-06	18.8	14.3	16.7	21.2	- -	22.8
11-Jan-06	24.6	21.0	21.2	28.5	27.1	21.5
14-Jan-06	10.5	3.5	4.3	8.2	14.5	12.6
17-Jan-06	18.7	18.4	17.6	- -	- -	26.3

Table 4. $PM_{2.5}$ 24-Hour Average Concentrations at the Port of Los Angeles, May 2005-April 2006 (cont.)

Sample Date	Port of Los Angeles Monitoring Sites				SCAQMD Monitoring Sites	
	Wilmington Community Site	Coastal Boundary Site	San Pedro Community Site	Source-Dominated Site	North Long Beach	Central Long Beach
	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)
20-Jan-06	7.2	7.6	7.5	10.9	- -	12.0
23-Jan-06	9.5	9.0	11.9	12.7	- -	6.8
26-Jan-06	8.2	7.2	8.2	10.2	13.4	10.1
29-Jan-06	21.4	19.0	15.1	19.0	31.8	24.8
1-Feb-06	14.0	8.7	10.1	15.3	18.8	15.8
4-Feb-06	20.6	20.0	20.3	25.1	43.5	39.5
7-Feb-06	13.3	13.3	12.5	21.8	- -	15.4
10-Feb-06	16.4	12.3	13.3	15.6	23.7	21.3
13-Feb-06	16.8	13.1	- -	22.6	16.8	21.9
16-Feb-06	6.1	5.1	5.2	8.0	10.0	8.4
19-Feb-06	4.7	4.0	4.0	5.1	5.7	4.6
22-Feb-06	11.8	10.9	10.2	14.5	15.3	17.2
25-Feb-06	34.6	25.9	23.8	31.4	49.8	49.5
28-Feb-06	3.2	2.5	2.4	3.8	5.2	5.7
3-Mar-06	4.0	2.3	2.8	4.3	5.6	5.3
6-Mar-06	6.0	1.3	4.6	7.3	7.4	7.6
9-Mar-06	7.0	5.7	6.9	8.3	9.1	8.4
12-Mar-06	4.5	3.0	3.4	4.6	- -	5.3
15-Mar-06	4.9	3.5	5.0	5.7	7.7	7.1
18-Mar-06	4.0	3.5	4.1	6.7	7.5	6.8
21-Mar-06	3.0	2.2	3.1	6.5	5.4	5.3
24-Mar-06	11.9	7.2	12.9	14.4	12.9	13.0

Table 4. $PM_{2.5}$ 24-Hour Average Concentrations at the Port of Los Angeles, May 2005-April 2006 (cont.)

Sample Date	Port of Los Angeles Monitoring Sites				SCAQMD Monitoring Sites	
	Wilmington Community Site	**Coastal Boundary Site**	**San Pedro Community Site**	**Source-Dominated Site**	**North Long Beach**	**Central Long Beach**
	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)	$PM_{2.5}$ Conc. ($\mu g/m^3$)
27-Mar-06	6.8	4.5	6.0	6.5	8.6	8.2
30-Mar-06	4.8	3.9	3.8	7.9	7.2	6.1
2-Apr-06	7.4	5.8	7.4	8.2	9.5	8.5
5-Apr-06	3.4	3.4	3.7	4.5	4.7	4.8
8-Apr-06	6.8	4.6	5.4	7.5	7.4	6.8
11-Apr-06	3.5	3.1	4.0	5.4	- -	5.5
14-Apr-06	3.8	3.1	2.7	4.1	5.0	5.2
17-Apr-06	3.5	6.7	2.0	7.4	6.6	5.4
20-Apr-06	12.8	9.5	11.2	13.1	12.0	11.5
23-Apr-06	3.2	5.2	3.5	8.3	4.5	4.8
26-Apr-06	2.7	- -	2.5	4.1	4.7	5.8
29-Apr-06	10.1	12.4	8.9	13.5	16.7	17.1
Average	**12.7**	**10.3**	**10.7**	**13.7**	**15.3**	**14.6**

Table 5. PM_{10} 24-Hour Average Concentrations at the Port of Los Angeles, May 2005-April 2006

Sample Date	Port of Los Angeles Monitoring Sites				SCAQMD Monitoring Sites	
	Wilmington Community Site	Coastal Boundary Site	San Pedro Community Site	Source-Dominated Site	North Long Beach	Central Long Beach
	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)
1-May-05	- -	- -	- -	- -	- -	- -
4-May-05	25.2	- -	- -	- -	26.0	131.0
7-May-05	14.6	- -	- -	- -	- -	- -
10-May-05	18.2	- -	- -	- -	24.0	48.0
13-May-05	17.8	- -	- -	- -	- -	- -
16-May-05	- -	- -	- -	- -	18.0	40.0
19-May-05	26.6	- -	- -	- -	- -	- -
22-May-05	37.8	- -	- -	- -	31.0	37.0
25-May-05	36.9	- -	- -	- -	- -	- -
28-May-05	22.5	- -	- -	- -	21.0	28.0
31-May-05	30.2	- -	- -	- -	- -	- -
3-Jun-05	30.3	- -	- -	- -	25.0	59.0
6-Jun-05	33.4	- -	- -	- -	- -	- -
9-Jun-05	21.9	- -	- -	- -	21.0	50.0
12-Jun-05	29.9	- -	- -	- -	- -	- -
15-Jun-05	15.9	- -	- -	- -	17.0	46.0
18-Jun-05	16.9	- -	- -	- -	- -	- -
21-Jun-05	27.1	- -	- -	- -	26.0	72.0
24-Jun-05	27.9	- -	- -	- -	- -	- -
27-Jun-05	18.6	- -	- -	- -	18.0	34.0
30-Jun-05	33.9	- -	- -	- -	- -	- -
3-Jul-05	30.4	- -	- -	- -	26.0	30.0

Table 5. PM_{10} 24-Hour Average Concentrations at the Port of Los Angeles, May 2005-April 2006 (cont.)

Sample Date	Port of Los Angeles Monitoring Sites				SCAQMD Monitoring Sites	
	Wilmington Community Site	Coastal Boundary Site	San Pedro Community Site	Source-Dominated Site	North Long Beach	Central Long Beach
	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)
6-Jul-05	31.6	- -	- -	- -	- -	- -
9-Jul-05	28.4	- -	- -	- -	25.0	32.0
12-Jul-05	41.2	- -	- -	- -	- -	- -
15-Jul-05	28.0	- -	- -	- -	21.0	25.0
18-Jul-05	28.8	- -	- -	- -	- -	- -
21-Jul-05	30.3	- -	- -	- -	34.0	40.0
24-Jul-05	18.2	- -	- -	- -	- -	- -
27-Jul-05	25.0	- -	- -	- -	37.0	45.0
30-Jul-05	24.4	- -	- -	- -	- -	- -
2-Aug-05	24.7	- -	- -	- -	29.0	40.0
5-Aug-05	30.5	- -	- -	- -	- -	- -
8-Aug-05	25.3	- -	- -	- -	28.0	40.0
11-Aug-05	32.4	- -	- -	- -	- -	- -
14-Aug-05	20.5	- -	- -	- -	20.0	28.0
17-Aug-05	24.3	- -	- -	- -	- -	- -
20-Aug-05	23.8	- -	- -	- -	23.0	34.0
23-Aug-05	33.0	- -	- -	- -	- -	- -
26-Aug-05	25.6	- -	- -	- -	30.0	67.0
29-Aug-05	35.0	- -	- -	- -	- -	- -
1-Sep-05	43.6	- -	- -	- -	40.0	60.0
4-Sep-05	28.8	- -	- -	- -	- -	- -
7-Sep-05	37.9	- -	- -	- -	35.0	47.0

Table 5. PM_{10} 24-Hour Average Concentrations at the Port of Los Angeles, May 2005-April 2006 (cont.)

Sample Date	Port of Los Angeles Monitoring Sites				SCAQMD Monitoring Sites	
	Wilmington Community Site	Coastal Boundary Site	San Pedro Community Site	Source-Dominated Site	North Long Beach	Central Long Beach
	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)
10-Sep-05	19.3	- -	- -	- -	- -	- -
13-Sep-05	26.6	- -	- -	- -	- -	51.0
16-Sep-05	31.1	- -	- -	- -	- -	- -
19-Sep-05	31.6	- -	- -	- -	37.0	37.0
22-Sep-05	43.8	- -	- -	- -	- -	- -
25-Sep-05	37.8	- -	- -	- -	43.0	47.0
28-Sep-05	40.7	- -	- -	- -	- -	- -
1-Oct-05	28.3	- -	- -	- -	30.0	29.0
4-Oct-05	38.5	- -	- -	- -	- -	- -
7-Oct-05	32.2	- -	- -	- -	40.0	53.0
10-Oct-05	47.8	- -	- -	- -	- -	- -
13-Oct-05	34.3	- -	- -	- -	45.0	62.0
16-Oct-05	18.7	- -	- -	- -	- -	- -
19-Oct-05	24.8	- -	- -	- -	26.0	38.0
22-Oct-05	46.1	- -	- -	- -	- -	- -
25-Oct-05	15.0	- -	- -	- -	16.0	35.0
28-Oct-05	18.6	- -	- -	- -	- -	- -
31-Oct-05	27.5	- -	- -	- -	40.0	65.0
3-Nov-05	22.6	- -	- -	- -	- -	- -
6-Nov-05	63.3	- -	- -	- -	66.0	64.0
9-Nov-05	13.5	- -	- -	- -	- -	- -
12-Nov-05	37.5	- -	- -	- -	35.0	38.0
15-Nov-05	48.9	- -	- -	- -	- -	- -

Table 5. PM_{10} 24-Hour Average Concentrations at the Port of Los Angeles, May 2005-April 2006 (cont.)

Sample Date	Port of Los Angeles Monitoring Sites				SCAQMD Monitoring Sites	
	Wilmington Community Site	Coastal Boundary Site	San Pedro Community Site	Source-Dominated Site	North Long Beach	Central Long Beach
	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)
18-Nov-05	37.0	- -	- -	- -	51.0	72.0
21-Nov-05	25.3	- -	- -	- -	- -	- -
24-Nov-05	57.2	- -	- -	- -	57.0	55.0
27-Nov-05	27.1	- -	- -	- -	- -	- -
30-Nov-05	39.2	- -	- -	- -	45.0	48.0
3-Dec-05	11.1	- -	- -	- -	- -	- -
6-Dec-05	29.2	- -	- -	- -	34.0	53.0
9-Dec-05	21.8	- -	- -	- -	- -	- -
12-Dec-05	47.0	- -	- -	- -	42.0	- -
15-Dec-05	43.7	- -	- -	- -	- -	- -
18-Dec-05	36.9	- -	- -	- -	- -	34.0
21-Dec-05	52.1	- -	- -	- -	- -	- -
24-Dec-05	32.7	- -	- -	- -	34.0	- -
27-Dec-05	23.5	- -	- -	- -	- -	- -
30-Dec-05	43.9	- -	- -	- -	43.0	51.0
2-Jan-06	12.7	- -	- -	- -	- -	- -
5-Jan-06	21.8	- -	- -	- -	30.0	45.0
8-Jan-06	42.6	- -	- -	- -	- -	- -
11-Jan-06	58.5	- -	- -	- -	51.0	60.0
14-Jan-06	25.3	- -	- -	- -	- -	- -
17-Jan-06	41.9	- -	- -	- -	43.0	90.0
20-Jan-06	19.6	- -	- -	- -	- -	- -
23-Jan-06	29.9	- -	- -	- -	28.0	60.0

Table 5. PM_{10} 24-Hour Average Concentrations at the Port of Los Angeles, May 2005-April 2006 (cont.)

Sample Date	Port of Los Angeles Monitoring Sites				SCAQMD Monitoring Sites	
	Wilmington Community Site	Coastal Boundary Site	San Pedro Community Site	Source-Dominated Site	North Long Beach	Central Long Beach
	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)
26-Jan-06	25.9	- -	- -	- -	- -	- -
29-Jan-06	48.1	- -	- -	- -	43.0	41.0
1-Feb-06	36.1	- -	- -	- -	- -	- -
4-Feb-06	46.9	- -	- -	- -	51.0	52.0
7-Feb-06	37.1	- -	- -	- -	- -	- -
10-Feb-06	34.2	- -	- -	- -	34.0	37.0
13-Feb-06	45.9	- -	- -	- -	- -	- -
16-Feb-06	22.0	- -	- -	- -	31.0	42.0
19-Feb-06	9.8	- -	- -	- -	- -	- -
22-Feb-06	27.2	- -	- -	- -	34.0	117.0
25-Feb-06	56.0	- -	- -	- -	- -	- -
28-Feb-06	12.8	- -	- -	- -	15.0	20.0
3-Mar-06	13.9	- -	- -	- -	- -	- -
6-Mar-06	16.0	- -	- -	- -	13.0	17.0
9-Mar-06	30.5	- -	- -	- -	- -	- -
12-Mar-06	12.2	- -	- -	- -	13.0	13.0
15-Mar-06	16.4	- -	- -	- -	- -	- -
18-Mar-06	18.2	- -	- -	- -	21.0	23.0
21-Mar-06	13.9	- -	- -	- -	- -	- -
24-Mar-06	34.2	- -	- -	- -	34.0	43.0
27-Mar-06	22.6	- -	- -	- -	- -	- -
30-Mar-06	16.0	- -	- -	- -	18.0	25.0
2-Apr-06	18.9	- -	- -	- -	- -	- -

Table 5. PM_{10} 24-Hour Average Concentrations at the Port of Los Angeles, May 2005-April 2006 (cont.)

Sample Date	Port of Los Angeles Monitoring Sites				SCAQMD Monitoring Sites	
	Wilmington Community Site	**Coastal Boundary Site**	**San Pedro Community Site**	**Source-Dominated Site**	**North Long Beach**	**Central Long Beach**
	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)	PM_{10} Conc. ($\mu g/m^3$)
5-Apr-06	16.7	- -	- -	- -	19.0	26.0
8-Apr-06	16.5	- -	- -	- -	- -	- -
11-Apr-06	12.1	- -	- -	- -	11.0	18.0
14-Apr-06	9.1	- -	- -	- -	- -	- -
17-Apr-06	14.6	- -	- -	- -	18.0	- -
20-Apr-06	31.9	- -	- -	- -	- -	- -
23-Apr-06	9.1	- -	- -	- -	- -	- -
26-Apr-06	9.4	- -	- -	- -	- -	- -
29-Apr-06	25.7	- -	- -	- -	33.0	33.0
Average	**28.8**	**- -**	**- -**	**- -**	**31.1**	**46.1**

Notes:
- Ambient PM_{10} data are only collected at the Wilmington Community site in the Port of Los Angeles network.

Table 6. Elemental Carbon 24-Hour Average Concentrations at the Port of Los Angeles, May 2005-April 2006

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. ($\mu g/m^3$)
1-May-05	0.5	0.3	0.4	0.2
4-May-05	0.9	0.5	1.0	1.2
7-May-05	0.5	0.5	0.6	- -
10-May-05	0.7	0.5	0.6	- -
13-May-05	- -	0.8	2.1	3.2
16-May-05	1.0	0.3	0.6	0.8
19-May-05	1.2	0.6	1.5	1.6
22-May-05	1.8	0.6	0.9	1.4
25-May-05	1.2	1.0	- -	1.1
28-May-05	0.7	0.7	0.8	0.5
31-May-05	0.7	0.4	0.8	1.1
3-Jun-05	0.3	0.2	0.8	0.9
6-Jun-05	1.0	0.5	0.6	1.0
9-Jun-05	0.7	0.2	0.5	0.8
12-Jun-05	0.4	0.5	0.5	0.5
15-Jun-05	0.7	0.2	0.6	0.7
18-Jun-05	0.3	0.3	0.2	0.3
21-Jun-05	1.3	0.5	1.2	2.1
24-Jun-05	0.9	0.2	0.3	1.5
27-Jun-05	0.5	0.4	0.6	1.0
30-Jun-05	1.1	0.5	0.9	1.3
3-Jul-05	0.9	0.7	0.5	0.7
6-Jul-05	0.9	0.6	0.8	1.3

Table 6. Elemental Carbon 24-Hour Average concentrations at the Port of Los Angeles, May 2005-April 2006 (cont.)

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. ($\mu g/m^3$)
9-Jul-05	0.9	0.7	0.6	0.6
12-Jul-05	1.3	0.7	1.1	1.3
15-Jul-05	1.1	0.6	1.0	1.3
18-Jul-05	1.0	0.5	0.8	1.4
21-Jul-05	1.9	0.5	1.7	2.0
24-Jul-05	0.5	0.2	0.6	0.6
27-Jul-05	1.1	0.4	1.2	1.6
30-Jul-05	0.5	0.3	1.2	1.4
2-Aug-05	0.6	0.3	0.6	1.0
5-Aug-05	0.8	0.4	0.8	0.9
8-Aug-05	0.8	0.4	1.8	2.3
11-Aug-05	1.1	0.7	0.8	1.5
14-Aug-05	0.7	0.7	0.7	0.4
17-Aug-05	1.3	0.6	1.5	2.8
20-Aug-05	0.8	1.0	1.4	1.8
23-Aug-05	0.9	0.4	0.9	1.6
26-Aug-05	1.6	0.7	2.2	2.4
29-Aug-05	1.3	0.2	1.4	2.3
1-Sep-05	1.9	0.8	1.3	2.4
4-Sep-05	0.8	1.1	2.0	2.6
7-Sep-05	2.0	1.2	2.7	4.1
10-Sep-05	0.6	0.6	0.6	0.8
13-Sep-05	1.2	0.7	0.9	2.2

Table 6. Elemental Carbon 24-Hour Average concentrations at the Port of Los Angeles, May 2005-April 2006 (cont.)

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. ($\mu g/m^3$)
16-Sep-05	1.0	0.6	0.9	1.0
19-Sep-05	0.8	0.9	1.5	1.7
22-Sep-05	2.8	- -	2.6	4.7
25-Sep-05	1.1	- -	1.3	1.5
28-Sep-05	3.6	2.6	3.8	6.6
1-Oct-05	1.7	1.0	1.6	2.3
4-Oct-05	2.4	2.0	2.8	7.8
7-Oct-05	1.8	1.1	2.0	3.2
10-Oct-05	2.7	0.9	2.5	4.0
13-Oct-05	2.1	2.1	2.8	5.8
16-Oct-05	1.1	0.3	0.7	0.7
19-Oct-05	1.4	1.1	1.6	3.8
22-Oct-05	1.7	1.0	1.0	1.3
25-Oct-05	0.8	0.3	0.7	1.8
28-Oct-05	1.2	0.2	0.9	1.6
31-Oct-05	2.1	2.6	2.4	6.2
3-Nov-05	0.8	0.4	0.8	1.2
6-Nov-05	3.5	2.8	3.0	3.4
9-Nov-05	1.0	0.5	1.1	1.4
12-Nov-05	2.2	2.1	2.2	3.5
15-Nov-05	3.2	2.7	3.6	7.2
18-Nov-05	3.5	3.5	2.7	5.8
21-Nov-05	2.0	2.0	3.1	7.1

Table 6. Elemental Carbon 24-Hour Average concentrations at the Port of Los Angeles, May 2005-April 2006 (cont.)

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. ($\mu g/m^3$)
24-Nov-05	2.8	2.7	2.9	3.9
27-Nov-05	0.3	0.6	0.7	1.6
30-Nov-05	2.3	3.0	2.6	- -
3-Dec-05	0.8	0.6	0.6	1.1
6-Dec-05	4.3	2.1	2.6	5.2
9-Dec-05	2.1	2.8	2.5	4.1
12-Dec-05	4.9	3.5	4.1	6.2
15-Dec-05	3.0	1.9	3.0	4.7
18-Dec-05	2.9	2.5	3.0	3.6
21-Dec-05	5.2	3.7	6.7	8.1
24-Dec-05	3.4	1.3	2.3	2.9
27-Dec-05	1.3	0.8	1.6	4.0
30-Dec-05	4.7	2.2	2.4	5.0
2-Jan-06	0.3	0.1	0.3	0.4
5-Jan-06	2.3	2.2	1.6	3.9
8-Jan-06	2.4	1.8	2.7	3.3
11-Jan-06	5.1	3.8	4.1	9.3
14-Jan-06	1.0	0.2	0.8	1.0
17-Jan-06	4.3	4.6	5.3	- -
20-Jan-06	1.8	1.5	1.8	3.1
23-Jan-06	1.5	1.2	2.1	2.7
26-Jan-06	1.3	0.9	1.8	2.1
29-Jan-06	3.2	2.0	2.6	3.1

Table 6. Elemental Carbon 24-Hour Average concentrations at the Port of Los Angeles, May 2005-April 2006 (cont.)

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. ($\mu g/m^3$)
1-Feb-06	3.7	1.4	2.1	4.2
4-Feb-06	1.7	1.4	1.6	2.5
7-Feb-06	3.2	3.4	2.3	6.7
10-Feb-06	1.7	0.9	1.9	1.6
13-Feb-06	3.8	3.3	- -	8.1
16-Feb-06	1.3	0.8	0.9	1.7
19-Feb-06	1.0	0.5	0.5	0.8
22-Feb-06	2.4	2.8	2.0	4.2
25-Feb-06	1.9	1.8	2.1	2.4
28-Feb-06	0.5	0.3	0.2	0.6
3-Mar-06	0.5	0.3	0.4	1.0
6-Mar-06	1.6	0.3	0.9	2.0
9-Mar-06	0.9	0.7	1.0	1.4
12-Mar-06	0.9	0.4	0.6	0.8
15-Mar-06	0.6	0.6	0.9	1.4
18-Mar-06	0.4	0.2	0.5	0.8
21-Mar-06	0.4	0.1	0.4	1.5
24-Mar-06	2.8	1.1	2.9	4.7
27-Mar-06	0.7	0.4	0.6	1.2
30-Mar-06	0.6	0.4	0.9	1.4
2-Apr-06	0.9	0.6	1.1	1.1
5-Apr-06	0.2	0.1	0.1	0.5
8-Apr-06	1.5	0.8	0.9	2.0

Table 6. Elemental Carbon 24-Hour Average concentrations at the Port of Los Angeles, May 2005-April 2006 (cont.)

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. ($\mu g/m^3$)
11-Apr-06	0.8	0.4	1.1	2.2
14-Apr-06	0.4	0.4	0.8	1.2
17-Apr-06	0.8	0.1	0.4	1.4
20-Apr-06	2.4	1.4	1.3	3.1
23-Apr-06	0.5	0.3	0.3	1.0
26-Apr-06	0.4	- -	0.3	0.7
29-Apr-06	0.8	0.7	1.0	1.4
Average	**1.6**	**1.1**	**1.5**	**2.5**

Table 7. Comparison of $PM_{2.5}$ and PM_{10} Data Collected by SFS and FRM Monitors at the Wilmington Community Station

Date	$PM_{2.5}$ Concentration		PM_{10} Concentration	
	SFS $PM_{2.5}$	FRM $PM_{2.5}$	SFS PM_{10}	FRM PM_{10}
5/1/2005	7.4	7.3	- -	- -
5/4/2005	13.1	13.2	25.2	26.1
5/7/2005	4.9	4.0	14.6	14.1
5/10/2005	5.2	4.8	18.2	21.4
5/16/2005	11.7	10.5	- -	- -
5/19/2005	9.0	8.0	26.6	29.8
5/22/2005	20.5	20.2	37.8	38.1
5/25/2005	16.0	17.4	36.9	38.7
5/28/2005	- -	- -	22.5	22.6
5/31/2005	13.0	11.7	30.2	31.3
6/3/2005	11.5	9.5	30.3	30.8
6/6/2005	8.6	8.0	33.4	30.5
6/9/2005	- -	- -	21.9	23.5
6/12/2005	11.2	10.9	29.9	28.9
6/15/2005	8.3	8.5	15.9	15.2
6/18/2005	5.2	5.6	16.9	17.9
6/21/2005	9.2	9.4	27.1	30.8
6/24/2005	7.3	7.9	27.9	27.5
6/27/2005	9.4	9.2	18.6	18.0
6/30/2005	20.7	19.9	33.9	32.5
7/3/2005	19.4	18.8	30.4	28.1
7/6/2005	14.1	12.0	31.6	29.8

Table 7. Comparison of $PM_{2.5}$ and PM_{10} Data Collected by SFS and FRM Monitors at the Wilmington Community Station

Date	$PM_{2.5}$ Concentration		PM_{10} Concentration	
	SFS $PM_{2.5}$	FRM $PM_{2.5}$	SFS PM_{10}	FRM PM_{10}
7/9/2005	13.9	13.3	28.4	27.4
7/12/2005	24.4	23.6	41.2	42.1
7/15/2005	16.4	14.7	- -	- -
7/18/2005	- -	- -	- -	- -
7/21/2005	14.3	14.0	30.3	33.5
7/24/2005	- -	- -	18.2	18.0
7/27/2005	18.4	14.3	25.0	34.8
7/30/2005	9.9	9.0	24.4	23.8
8/2/2005	15.2	14.0	24.7	24.6
8/5/2005	15.9	14.4	30.5	29.5
8/8/2005	15.0	13.5	25.3	24.7
8/11/2005	20.1	18.5	32.4	30.6
8/14/2005	10.5	9.7	20.5	18.8
8/17/2005	12.7	11.7	24.3	21.6
8/20/2005	12.7	12.3	23.8	22.5
8/23/2005	16.0	14.3	33.0	31.7
8/26/2005	14.1	15.1	25.6	34.8
8/29/2005	11.9	11.1	35.0	34.1
9/1/2005	19.7	18.1	43.6	40.5
9/4/2005	- -	- -	28.8	28.8
9/7/2005	13.5	13.5	37.9	38.9
9/10/2005	7.6	6.8	19.3	17.8
9/13/2005	8.9	8.3	26.6	28.1

Table 7. Comparison of $PM_{2.5}$ and PM_{10} Data Collected by SFS and FRM Monitors at the Wilmington Community Station

Date	$PM_{2.5}$ Concentration		PM_{10} Concentration	
	SFS $PM_{2.5}$	FRM $PM_{2.5}$	SFS PM_{10}	FRM PM_{10}
9/16/2005	- -	- -	31.1	33.5
9/19/2005	14.9	13.5	31.6	32.9
9/22/2005	20.9	20.2	43.8	46.0
9/25/2005	17.2	16.0	37.8	40.1
9/28/2005	- -	- -	40.7	42.5
10/1/2005	9.1	21.6	28.3	29.0
10/4/2005	13.8	14.9	38.5	44.4
10/7/2005	14.0	14.5	32.2	37.4
10/10/2005	- -	- -	47.8	51.9
10/13/2005	14.2	15.1	34.3	35.1
10/16/2005	11.7	6.7	18.7	21.9
10/19/2005	- -	- -	24.8	23.8
10/22/2005	25.9	30.9	46.1	46.4
10/25/2005	5.7	5.2	15.0	14.2
10/28/2005	6.9	6.4	18.6	19.5
10/31/2005	- -	- -	27.5	30.8
11/3/2005	8.2	9.5	22.6	23.3
11/6/2005	31.4	35.3	63.3	64.3
11/9/2005	4.6	5.5	13.5	14.2
11/12/2005	18.2	21.1	37.5	40.9
11/15/2005	19.1	16.5	48.9	57.8
11/18/2005	15.0	13.7	- -	- -
11/21/2005	9.6	7.9	25.3	26.9

Table 7. Comparison of $PM_{2.5}$ and PM_{10} Data Collected by SFS and FRM Monitors at the Wilmington Community Station

Date	$PM_{2.5}$ Concentration		PM_{10} Concentration	
	SFS $PM_{2.5}$	FRM $PM_{2.5}$	SFS PM_{10}	FRM PM_{10}
11/24/2005	32.7	36.8	57.2	61.2
11/27/2005	- -	- -	27.1	22.7
11/30/2005	21.1	21.5	- -	- -
12/3/2005	5.4	4.9	11.1	12.5
12/6/2005	12.7	13.5	29.2	32.8
12/9/2005	11.1	11.4	21.8	25.3
12/12/2005	25.1	28.1	47.0	48.3
12/15/2005	23.3	25.2	43.7	45.6
12/18/2005	19.9	22.8	36.9	37.7
12/21/2005	18.2	12.8	- -	- -
12/24/2005	19.4	22.3	32.7	34.7
12/27/2005	- -	- -	23.5	22.5
12/30/2005	17.7	22.0	43.9	45.9
1/2/2006	3.4	2.8	12.7	16.7
1/5/2006	7.2	6.8	21.8	22.2
1/8/2006	18.8	22.5	42.6	44.3
1/11/2006	24.6	24.9	58.5	61.1
1/14/2006	10.5	10.7	25.3	24.8
1/17/2006	18.7	20.0	41.9	42.0
1/20/2006	7.2	6.4	19.6	19.8
1/23/2006	- -	- -	29.9	29.2
1/26/2006	8.2	8.3	25.9	26.4
1/29/2006	21.4	23.4	48.1	46.0

Table 7. Comparison of $PM_{2.5}$ and PM_{10} Data Collected by SFS and FRM Monitors at the Wilmington Community Station

Date	$PM_{2.5}$ Concentration		PM_{10} Concentration	
	SFS $PM_{2.5}$	FRM $PM_{2.5}$	SFS PM_{10}	FRM PM_{10}
2/1/2006	14.0	14.8	36.1	36.3
2/4/2006	26.7	30.6	46.9	47.4
2/7/2006	13.3	13.0	37.1	41.2
2/10/2006	16.4	18.9	34.2	37.3
2/13/2006	16.8	16.4	45.9	49.5
2/16/2006	6.1	5.9	22.0	25.7
2/19/2006	4.7	5.1	9.8	10.0
2/22/2006	11.8	12.7	27.2	31.5
2/25/2006	34.6	38.8	56.0	58.2
2/28/2006	- -	- -	- -	- -
3/3/2006	4.0	4.2	13.9	14.3
3/6/2006	6.0	6.5	16.0	17.8
3/9/2006	7.0	7.1	30.5	32.6
3/12/2006	4.5	4.8	12.2	13.3
3/15/2006	- -	- -	16.4	19.0
3/18/2006	4.0	4.5	18.2	18.4
3/21/2006	- -	- -	13.9	15.3
3/24/2006	11.9	13.3	34.2	39.1
3/27/2006	6.8	6.8	22.6	22.9
3/30/2006	4.8	4.7	16.0	16.6
4/2/2006	- -	- -	18.9	21.3
4/5/2006	3.4	2.8	16.7	18.9
4/8/2006	6.8	5.5	16.5	15.8

Table 7. Comparison of $PM_{2.5}$ and PM_{10} Data Collected by SFS and FRM Monitors at the Wilmington Community Station

Date	$PM_{2.5}$ Concentration		PM_{10} Concentration	
	SFS $PM_{2.5}$	FRM $PM_{2.5}$	SFS PM_{10}	FRM PM_{10}
4/11/2006	3.5	4.2	12.1	13.0
4/14/2006	3.8	3.1	9.1	9.1
4/17/2006	3.5	2.9	14.6	15.9
4/20/2006	12.8	11.3	31.9	34.7
4/23/2006	3.2	3.0	- -	- -
4/26/2006	2.7	2.4	- -	- -
4/29/2006	10.1	12.4	25.7	27.8

Average Concentration	12.9	13.1	28.9	30.1
% Difference	1.28%		3.95%	
Correlation Coefficient (r)	0.964		0.981	
r^2	0.929		0.963	

Figure 15. Wind Rose Plot – POLA Berth 47 Station, May 2005-April 2006

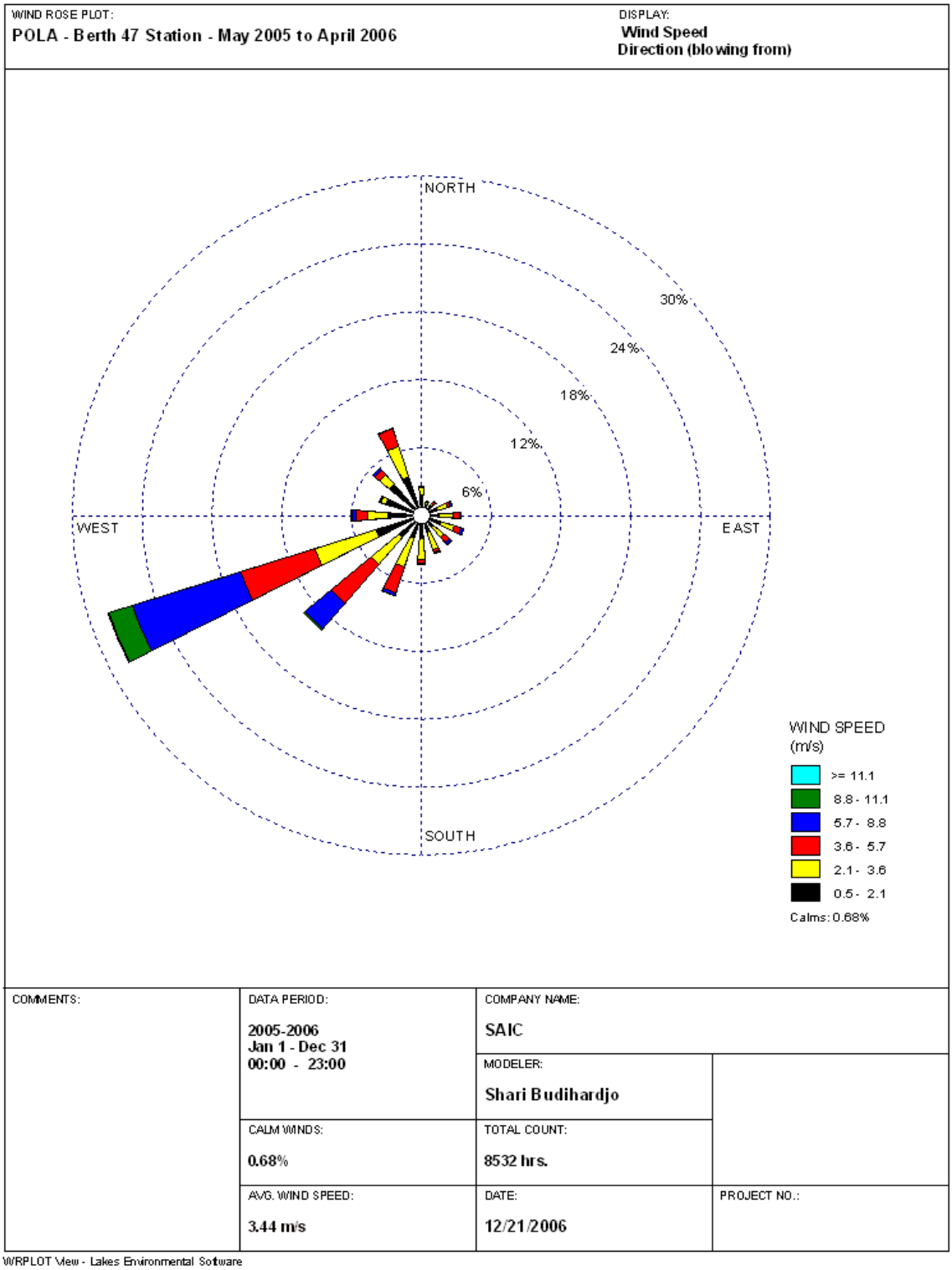


Figure 16. Wind Rose Plot – Liberty Hill Plaza Station, May 2005-April 2006

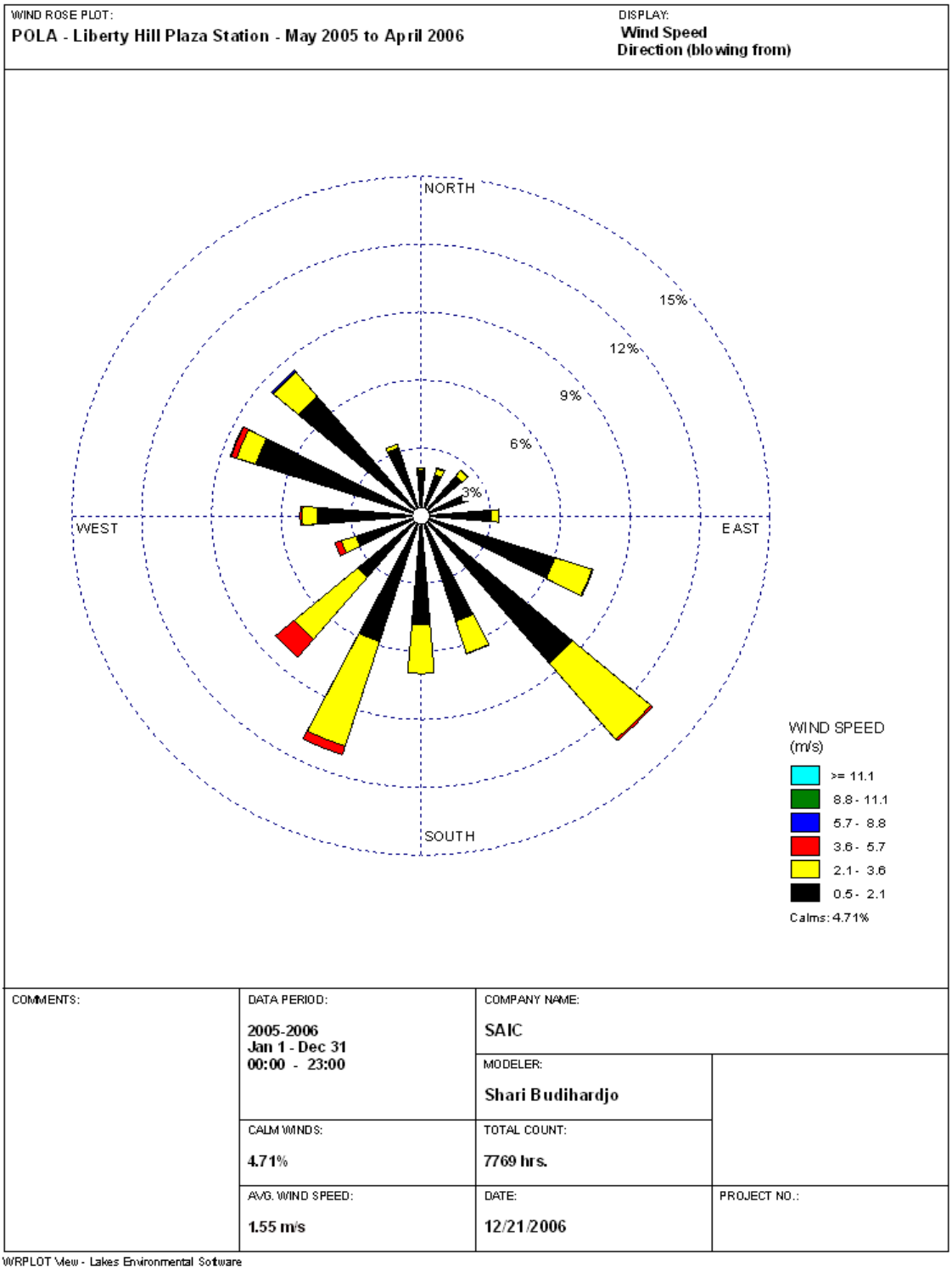


Figure 17. Wind Rose Plot – Saints Peter and Paul School Station, May 2005 –April 2006

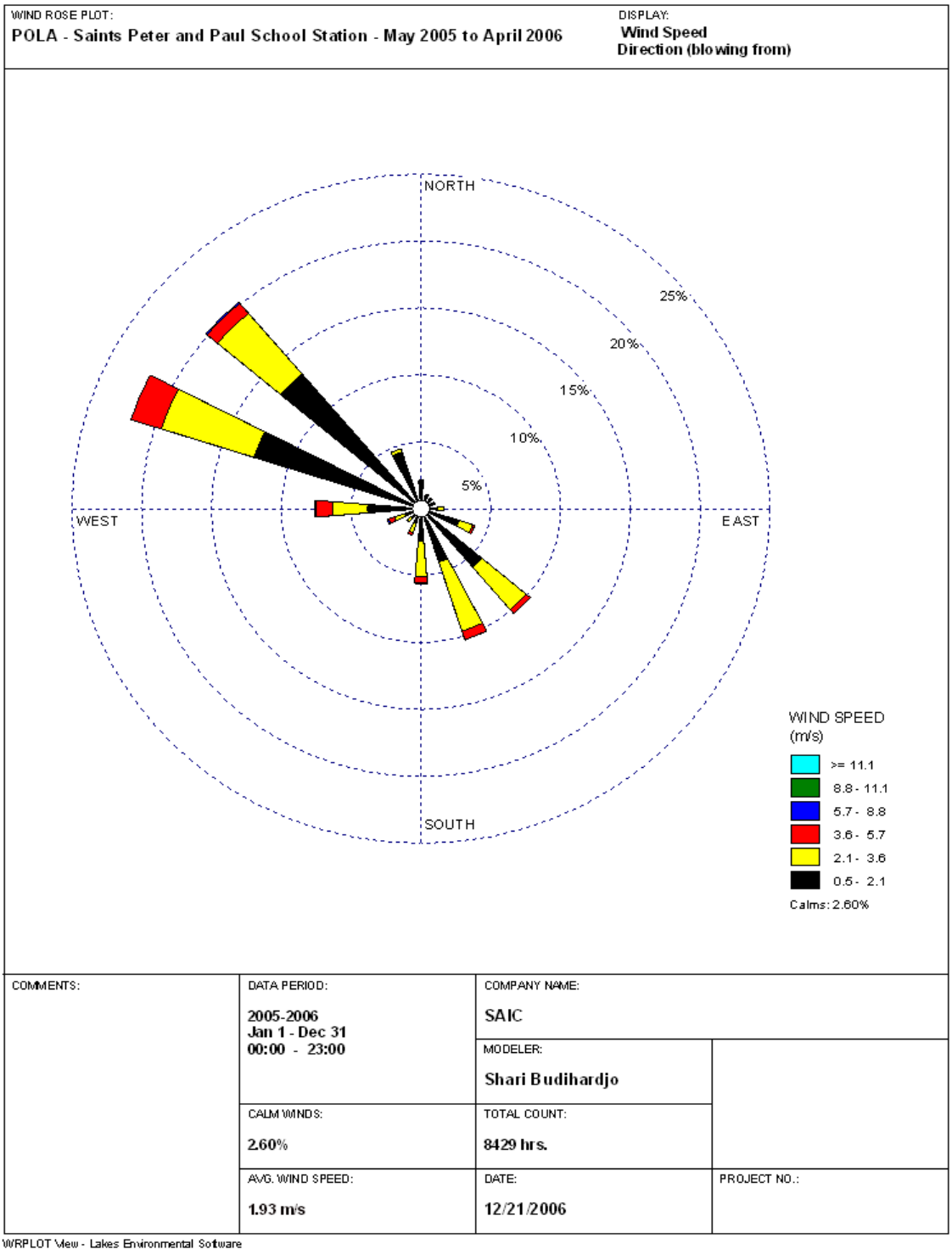


Figure 18. Wind Rose Plot – Terminal Island Treatment Plant Station, May 2005 –April 2006

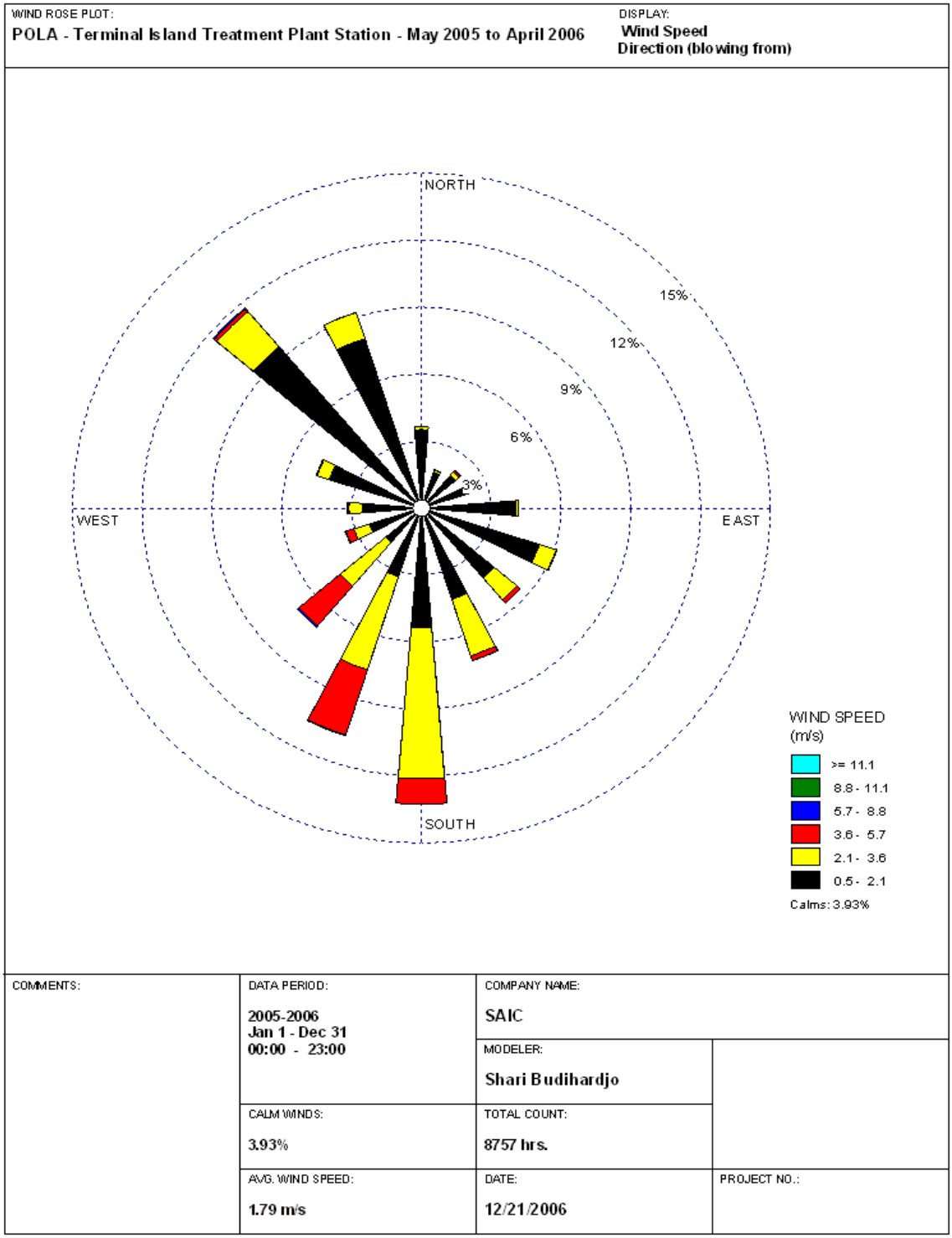


Figure 19. Mass Reconstruction of PM2.5 – Saints Peter Paul Station, February 24, 2005

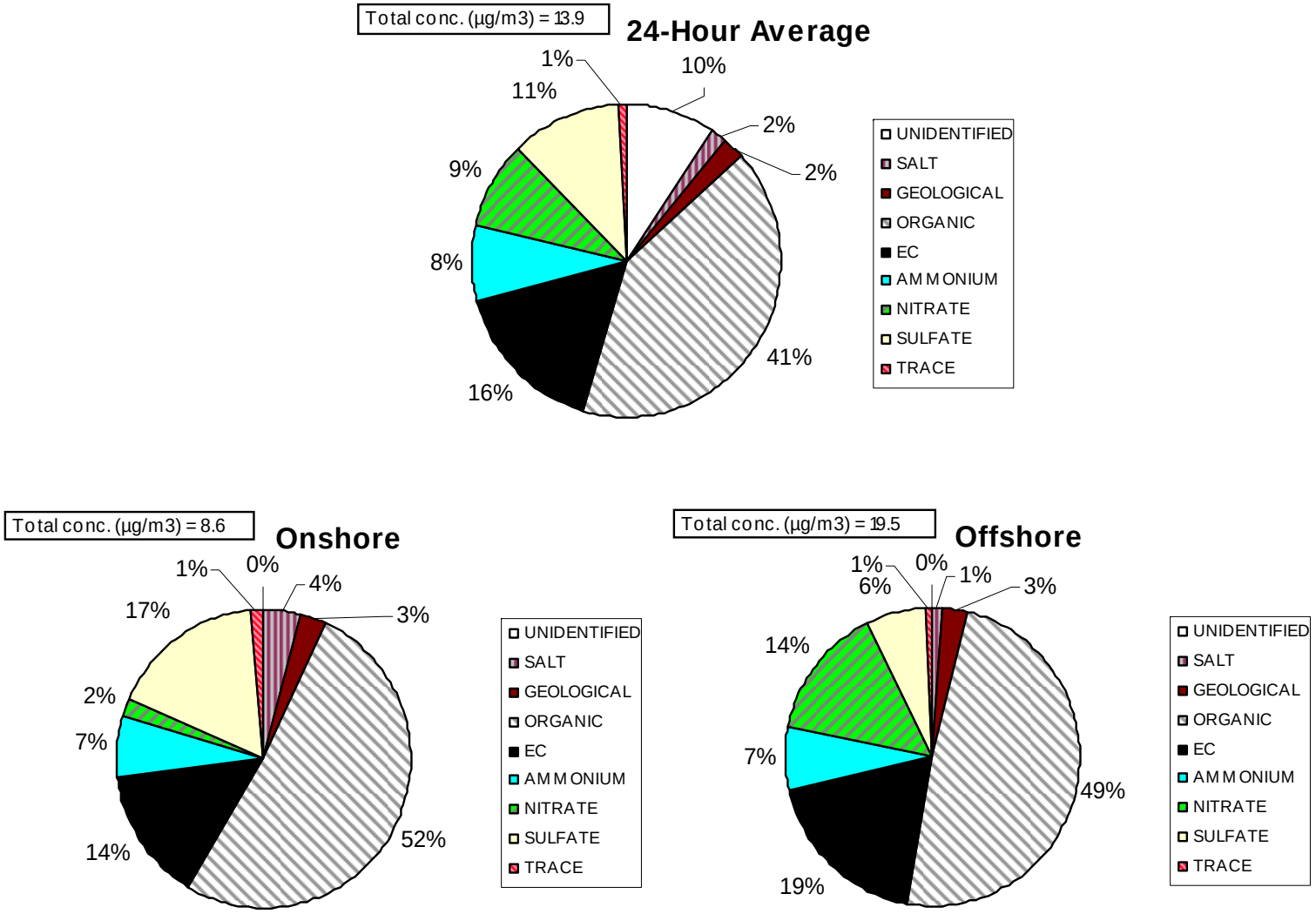
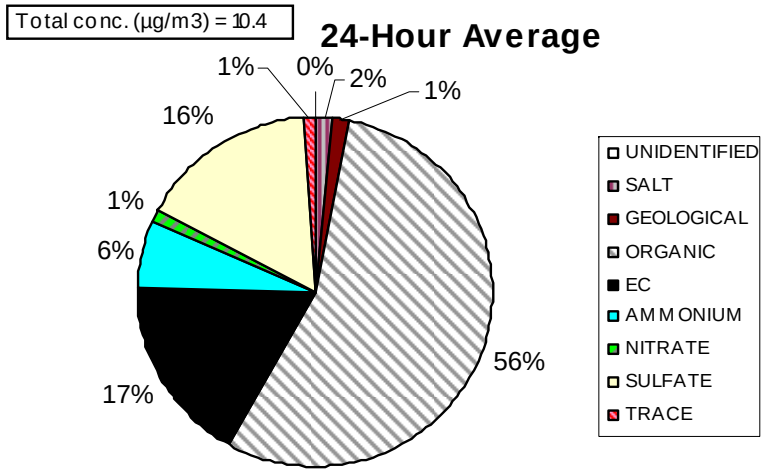


Figure 20. Mass Reconstruction of PM2.5 – Liberty Hill Plaza Station, February 24, 2005



Onshore

No Data Available

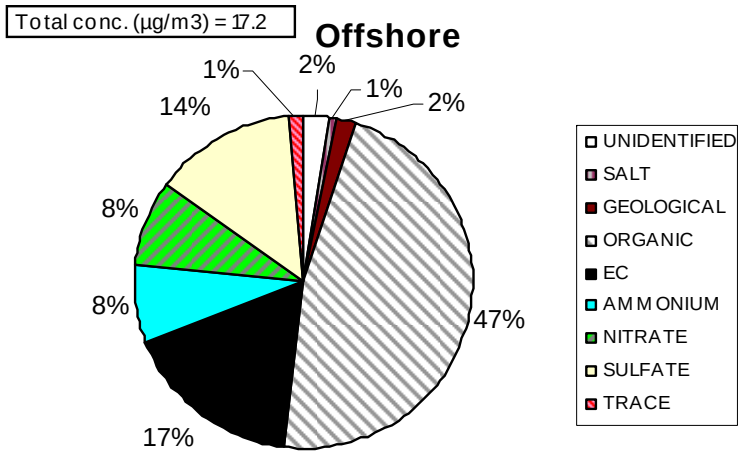


Figure 21. Mass Reconstruction of PM2.5 – POLA Berth 47 Station, February 24, 2005

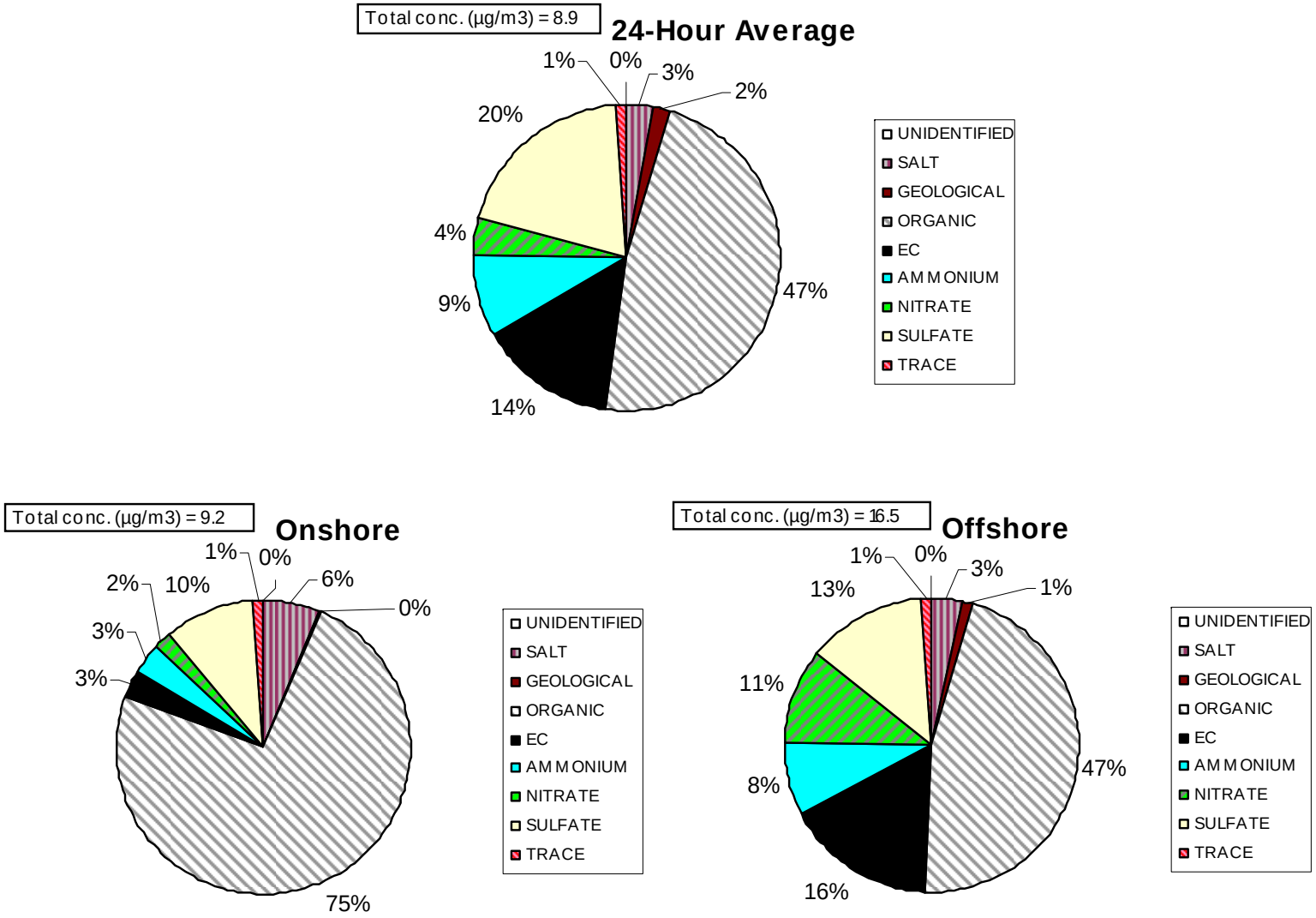


Figure 22. Mass Reconstruction of PM2.5 – 24-Hour Average, November 24, 2005

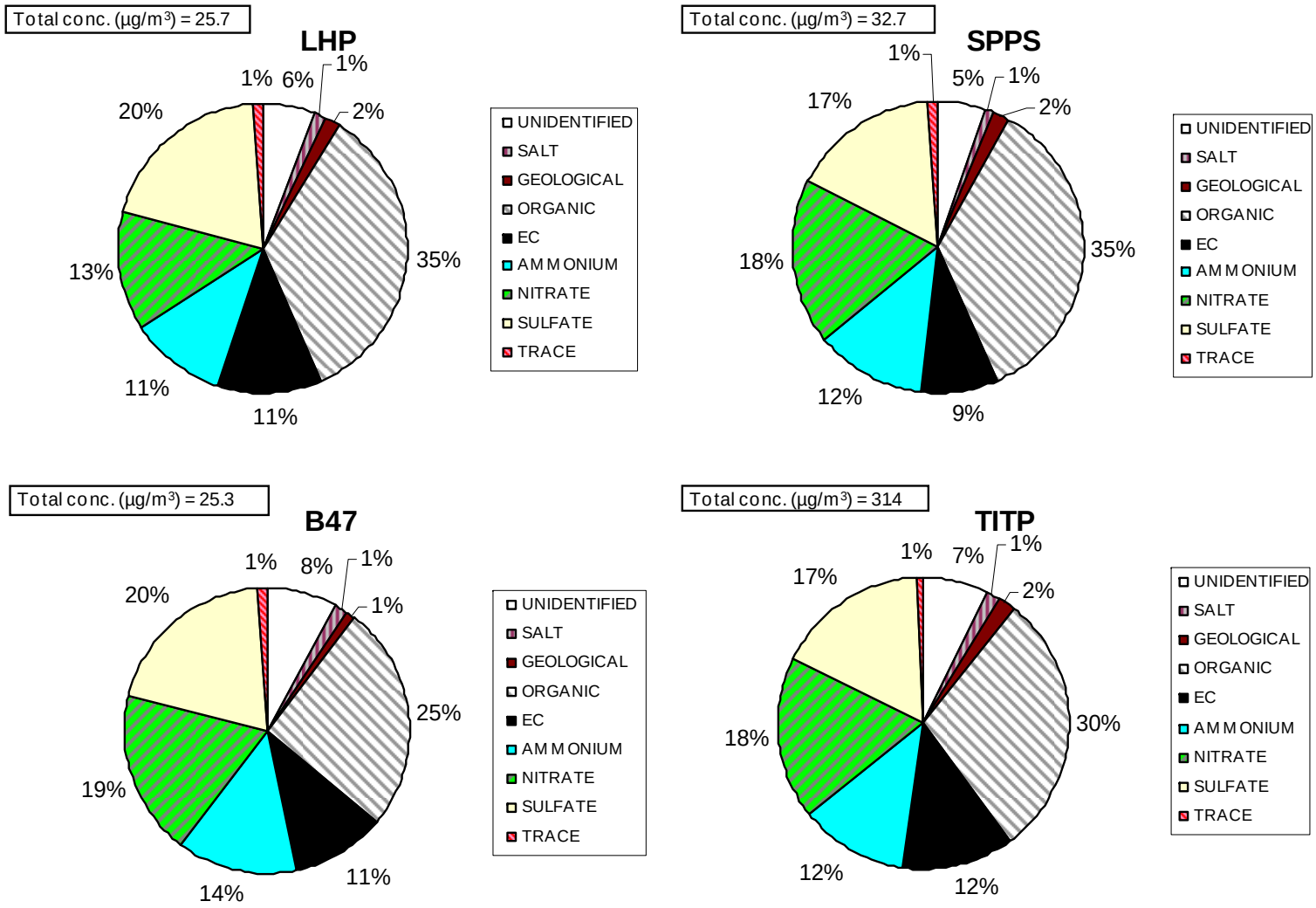


Figure 23. Mass Reconstruction of PM2.5 – 24-Hour Average, February 7, 2006