BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

Air Monitoring Five-Year Assessment

July 1, 2010

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Overview of 5-Year Network Assessment

Introduction

On October 17, 2006 the U.S. Environmental Protection Agency (EPA) finalized an amendment to the ambient air monitoring regulations to require State and local monitoring agencies to conduct a network assessment once every five years [40 CFR 58.10(d)]. A copy of this 5-year assessment, along with a revised annual network plan, must be submitted to the Regional Administrator. The first assessment is due July 1, 2010.

The purpose of the assessment is to determine if the network meets the monitoring objectives defined in 40 CFR Part 58 Appendix D, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby States and Tribes or health effects studies. For $PM_{2.5}$, the assessment also must identify needed changes to population-oriented sites.

Background

The Bay Area Air Quality Management District (Air District) is the public agency responsible for air quality management in nine Bay Area counties: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, southwestern Solano, and southern Sonoma. The Air District operates air monitoring stations in each of these nine counties. The Air District has been measuring air quality in the San Francisco Bay Area since 1957. In 2009 there were 22 permanent stations in the Air District air monitoring network, plus one permanent station operated by the California Air Resources Board at Point Reyes, that measure at least one criteria pollutant (O_3, CO, NO_2, $PM_{2.5}$, SO_2, and PM_{10}). The Air District also operates two permanent stations which only measure H_2S, a non-criteria pollutant. Monitoring for lead is expected to begin in 2011 after EPA finalizes its new regulation on lead.

In addition to the 24 permanent stations in the Bay Area, the Air District also performs short term monitoring at other sites. For example, in 2009, the Air District operated a re-locatable air quality monitoring trailer at Berkeley and a monitoring shelter at Cupertino. Temporary sites are not included in the 5-year assessment as they are moved every year or two.

For some pollutants, EPA requires a minimum number of monitors, usually based on population density. Those pollutants include O_3, NO_2, $PM_{2.5}$, SO_2, and PM_{10}. No minimum CO monitoring is required for the State Implementation Plan (SIP) or Maintenance Plan. Monitoring requirements for lead are expected to be issued in the fall of 2010. The State has no minimum monitoring requirements for criteria pollutants.

Purpose of Monitoring

The purposes of the Air District monitoring network are:

- To provide air pollution data to the general public in a timely manner.
- To support compliance with California and national ambient air quality standards (NAAQS). When sites do not meet the standards, attainment plans are developed to attain the standards.
- To support air pollution research studies.

To meet its monitoring objectives the Air District monitoring network collects ambient air data at locations with a variety of monitoring site types. These site types, as defined in 40 CFR Part 58 Appendix D, Table D-1, are intended to characterize air pollution levels in areas of high pollution, high population, transported air pollution, and air pollution near specific sources. Figure 1 shows the current Bay Area monitoring network superimposed on a map showing population density. Most of the air monitoring stations are located in the populated areas of the Bay Area.

Ambient air monitoring at Air District stations is intended to meet one or more of the following monitoring objectives:

- A determination of typical concentrations in areas of high population density.
- A determination of the highest concentrations expected to occur in the area covered by the network.
- A determination of impacts from significant sources.
- A determination of general background concentration levels.
- A determination of the extent of regional pollutant transport.

Population Oriented

As the primary purpose of air quality standards is to protect the public health, air monitoring stations have been placed in areas with high population density to determine the air pollution levels to which the majority of the population is exposed. In most cases these are within the largest cities of each county. To be consistent with EPA's list of Site Types in Table D-1 of 40 CFR Part 58 Appendix D, the term "population orientated" will be used in place of "typical concentrations in areas of high population density", for clarity in this monitoring objective.

Highest Concentration

EPA regulations require that air quality in areas where the public has access be reduced to levels below the national ambient air standards. Consequently, monitoring must also be done at locations expected to have the highest concentrations, even if populations are sparse in that area. High concentrations may be found close to major sources, or further downwind if pollutants are emitted from tall stacks. High concentrations may also be found at distant downwind locations when the pollutants such as ozone or secondary particulate matter are a result of chemical reactions in the atmosphere.

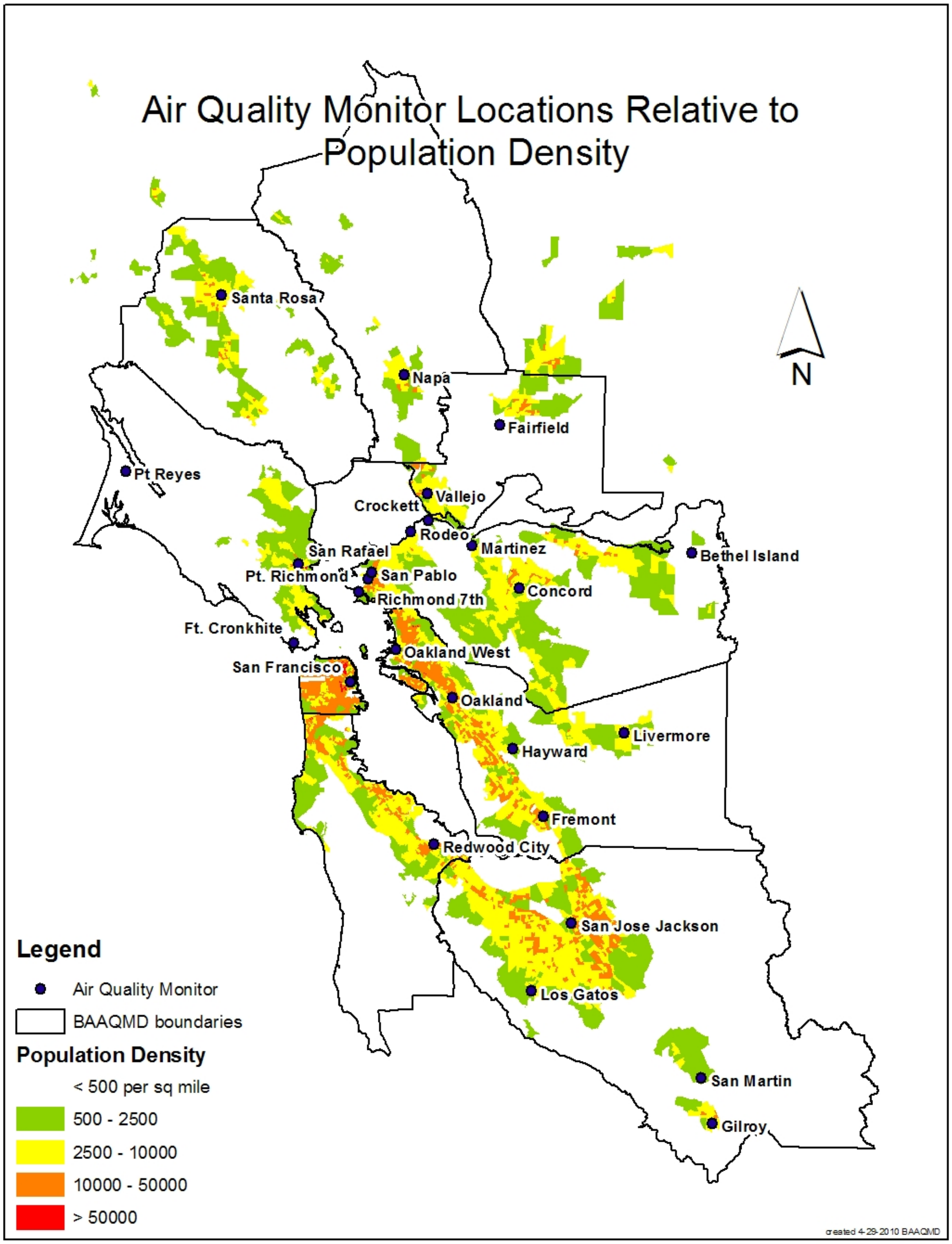

Figure 1. Map of Air District Monitoring Stations and Bay Area Population.

Source Impact

There are five refineries within the Air District: Chevron, Shell, Tesoro, ConocoPhillips, and Valero. Because these sources have the potential to emit significant amounts of SO_2 and H_2S, the Air District operates SO_2 and H_2S monitoring stations near these sources. The Port of Oakland also can be a significant source of particulates, carbon monoxide, and toxics and the Oakland West air monitoring station is located downwind of the Port to measure pollution impacts on West Oakland.

General Background

The Air District operates stations in areas that have no significant emissions from mobile, area, or industrial sources. At these sites, the measured concentrations reflect the transported air quality levels from upwind areas. When designing control strategies to reduce pollution levels, it is important to know if areas outside the boundaries of the Air District are contributing to high pollutant levels within the Air District. Where there are no significant emission sources upwind of a site, then the site is considered to be a general background site.

Regional Transport

The Air District shares a common boundary with six other air districts: Monterey Bay Unified Air Pollution Control District (APCD), San Joaquin Valley APCD, Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Lake County AQMD, and Northern Sonoma County APCD. When upwind areas have significant air pollution sources, pollutants transported into the Bay Area may result in overall higher air pollution levels within the Bay Area. The Air District operates monitoring sites near the borders of the Air District to measure the pollution concentrations transported into and out of the Bay Area Air District.

Criteria for Assessment

This assessment rates the importance of all criteria-pollutant monitors operated by the Air District. Criteria pollutants monitored are carbon monoxide, ozone, nitrogen dioxide, sulfur dioxide, PM_{10}, and $PM_{2.5}$. Lead is currently not being monitored but monitors will be operated after final regulations are issued by EPA in late 2010. In this assessment, monitors are designated as high, medium, or low in importance. These evaluations are based on how well the monitor helps meet the monitoring objectives defined in 40 CFR Part 58 Appendix D, and how well the monitor meets the monitoring objectives of the Air District. The assessment also suggests whether new monitoring sites are needed. Specific criteria used to assess the need for monitoring are based on the following:

- Meeting the minimum number of monitors as required by EPA.
- Maintaining a full station (all criteria plus toxics pollutants) in each of the nine Bay Area counties.
- Maintaining a full station in each of the 3 major Bay Area cities: Oakland, San Francisco, and San Jose.
- Locating a monitor at the expected maximum concentration for each pollutant.
- Locating monitors to determine background or transported pollutant levels.
- Operating fewer monitors for pollutants in attainment of the NAAQS.
- Operating more monitors for non-attainment pollutants (O_3 and $PM_{2.5}$).
- Operating fewer monitors for sites that are highly correlated.

Criteria Pollutants Assessment

Carbon Monoxide Monitoring

The Air District currently operates 13 permanent carbon monoxide (CO) monitors in its network. Carbon monoxide had been a problem in the past before lower tailpipe emission standards were enacted by California and national governmental agencies. The Air District has not exceeded the 1-hr CO standard since 1967, and has not exceeded the 8-hour national carbon monoxide standard since 1991. Carbon monoxide levels have continued to decrease since then to levels that are now less than 1/3 of the national standards at all locations in the Bay Area.

Figure 2 shows the current locations of carbon monoxide monitors. The stations are superimposed on a gridded carbon monoxide emission map. It shows that the stations are generally located in areas of significant CO emissions. Bethel Island, a background concentration site, can be seen in an area of low CO emissions.

EPA has no minimum requirements for the number of CO monitoring sites, and there are no monitors required for Air District SIP or Maintenance Plans. However, because the Air District will be operating an NCore site in San Jose beginning in January 2011, there is a requirement for a trace-level CO monitor at the San Jose station.

Table 1 lists the stations currently measuring carbon monoxide in the Bay Area by County. It also lists the monitoring objectives and the carbon monoxide design values for each site. The last column rates the importance of the data measured at the site in meeting the Air District's monitoring objectives.

The San Jose CO monitor is rated high because it is required as a part of NCore, is located in one of the three major cities in the Bay Area, and because it often has the highest carbon monoxide concentrations in the Bay Area (but still well below national CO standards).

In addition to the San Jose site, the Air District desires to operate at least one carbon monoxide monitor in each of the other nine Bay Area counties. Many of these monitors are rated medium because concentrations are low and there is no requirement to operate them. Currently only two counties have more than one CO monitor – Alameda and Contra Costa.

Alameda has three CO monitoring sites – Oakland, Oakland West, and Fremont. Oakland is rated high because Oakland is a major city in the Bay Area. Oakland West is rated high because it is a source-oriented site downwind of the Port of Oakland and Hwy 880. Fremont is another population oriented monitoring site, and since its design value is low and similar to other sites, it is rated low in importance.

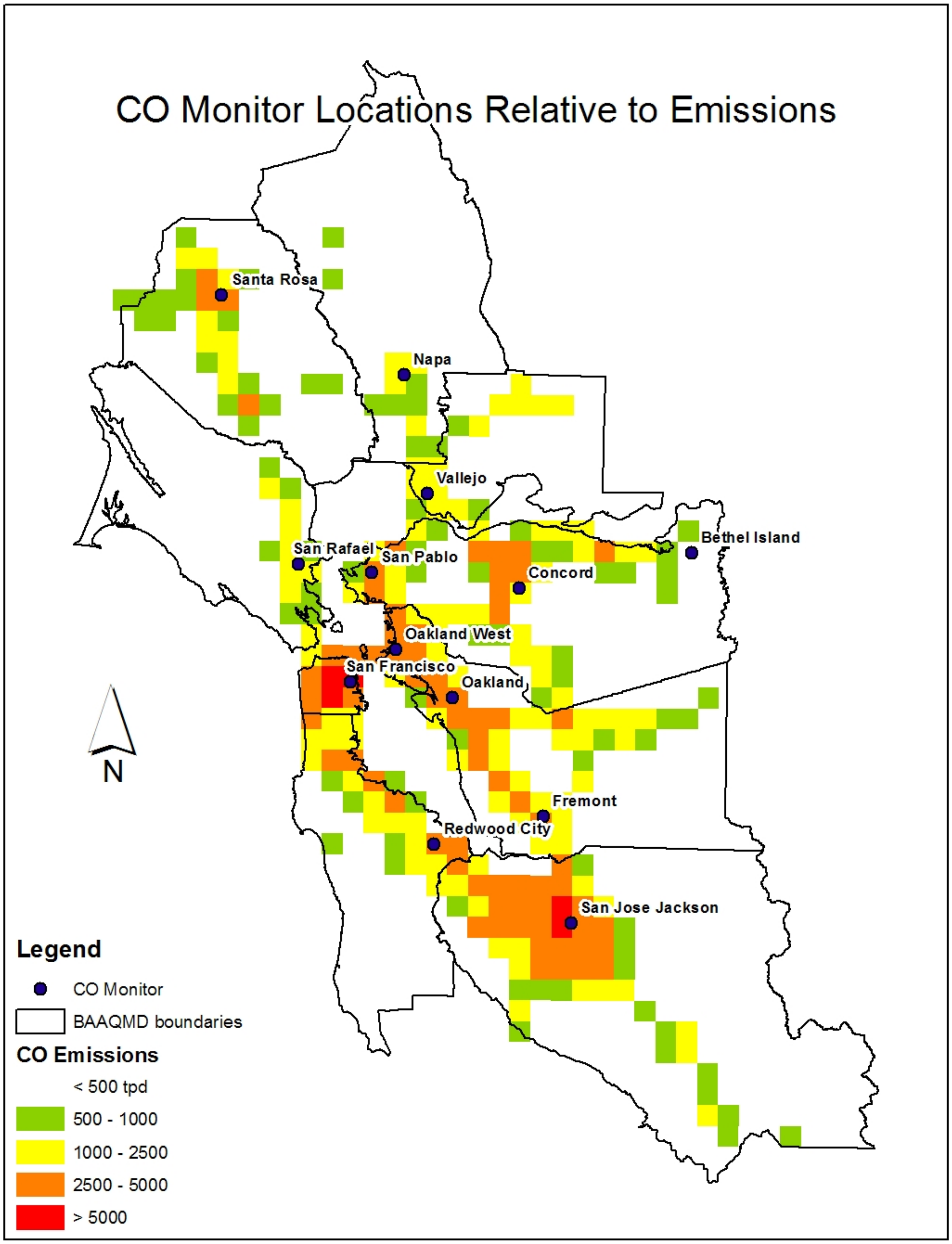

Figure 2. Map of Air District Carbon Monoxide Monitoring Stations and CO emissions.

Table 1. List of Permanent Carbon Monoxide Monitor Locations in 2009.

Station	County	Monitoring Objective	1-hr CO Design Value[1] (ppm)	8-hr CO Design Value[2] (ppm)	Assigned Value from Assessment
Fremont	Alameda	Population Oriented	2	1	Low
Oakland	Alameda	Population Oriented	3	2	High
Oakland West	Alameda	Source Oriented	3	2	High
Bethel Island	Contra Costa	Background	1	1	High
Concord	Contra Costa	Population Oriented	2	1	Medium
San Pablo	Contra Costa	Population Oriented	2	1	Low
San Rafael	Marin	Population Oriented	2	1	Medium
Napa	Napa	Population Oriented	2	1	Medium
San Francisco	San Francisco	Population Oriented	2	2	Medium
Redwood City	San Mateo	Population Oriented	3	2	Medium
San Jose	Santa Clara	NCore & Highest Concentration	3	2	High
Vallejo	Solano	Population Oriented	3	2	Medium
Santa Rosa	Sonoma	Population Oriented	2	1	Medium

[1] Design values at or below the national CO 1-hour standard of 35 ppm meet the standard.
[2] Design values at or below the national CO 8-hour standard of 9 ppm meet the standard.

Contra Costa County has three CO monitoring sites – Bethel Island, Concord, and San Pablo. The carbon monoxide monitor at Concord is rate medium because Concord is the largest city in Contra Costa with a large traffic volume nearby. Bethel Island is rated high because it is a carbon monoxide background location. San Pablo is another population oriented monitoring site, and since its design value is low and similar to other sites, it is rated low in importance.

Ozone Monitoring

The Air District currently operates 18 permanent ozone (O_3) monitors in its network. Although ozone levels have dropped significantly since the 1960s, exceedances of the national 8-hour ozone standard and the California 1-hour and 8-hours standards occur almost every year within the Bay Area. Because ozone is formed as a result of chemical reactions in the atmosphere, the highest ozone concentrations are usually found at distant downwind locations from oxides of nitrogen (NO_x) and non-methane organic carbon (NMOC) precursor pollutant emissions. Consequently, the highest concentrations in the Bay Area are usually at downwind locations in the East Bay, in Livermore, Concord, Fairfield, and Bethel Island; and in the South Bay, in San Martin and Gilroy.

Figure 3 shows the current Bay Area ozone monitoring stations. The stations are superimposed on a color-coded map showing ozone concentrations on a high-ozone day. There are a number of wind patterns on hot days which can produce high ozone concentrations. The most common summertime wind pattern in the Bay Area is a delayed afternoon sea breeze that carries precursor pollutants to the eastern part of the Air District, as is depicted in the figure. This pattern produces high ozone levels at the eastern region of the Bay Area. Ozone monitors have been placed at Bethel Island, Livermore, Concord, and Fairfield to measure these high levels. The modeling-map also suggests there may be a high ozone area south of Bethel Island where there is currently no monitor.

Another common wind pattern transports ozone precursors southward into the southern Santa Clara Valley, which results in elevated ozone concentrations at San Martin and Gilroy. Occasionally a very light wind pattern occurs, which results in high ozone concentrations close to source areas near the bay, generally at San Jose, Los Gatos, Fremont, Napa, and Hayward.

The number of EPA-required ozone monitors is based on the Metropolitan Statistical Area (MSA) population and design value; as specified in Table D-2 of 40 CFR Part 58, Appendix D – SLAMS Minimum O_3 Monitoring Requirements. Ozone design values are a calculated concentration which is used for comparison with the national standard to determine the attainment status of an area for that pollutant (see footnote no.1 in Table 2). Table 2 shows that the Air District monitoring network meets or exceeds the ozone minimum monitoring requirements. No additional monitors have been required in the SIP or Maintenance Plan for ozone. However, there is an additional EPA requirement that an ozone monitor be located at the San Jose NCore station.

Because the meteorological conditions that result in ozone levels exceeding the national standard occur over a wide area, ozone levels are highly correlated at many Bay Area ozone stations. These conditions are strong sunlight, hot temperatures, and light winds. Table 3 lists correlations between ozone monitors having a high correlation in 2008 ($r^2 \geq 0.75$, this assessment's definition of a high correlation). Sites with lower correlations are not shown. When two stations are highly correlated, they produce similar data and one of them may be discontinued with minimal information loss. Table 3 also lists the Average Relative Difference between the two stations, on a scale of 0 to 1. It is determined by taking the mean

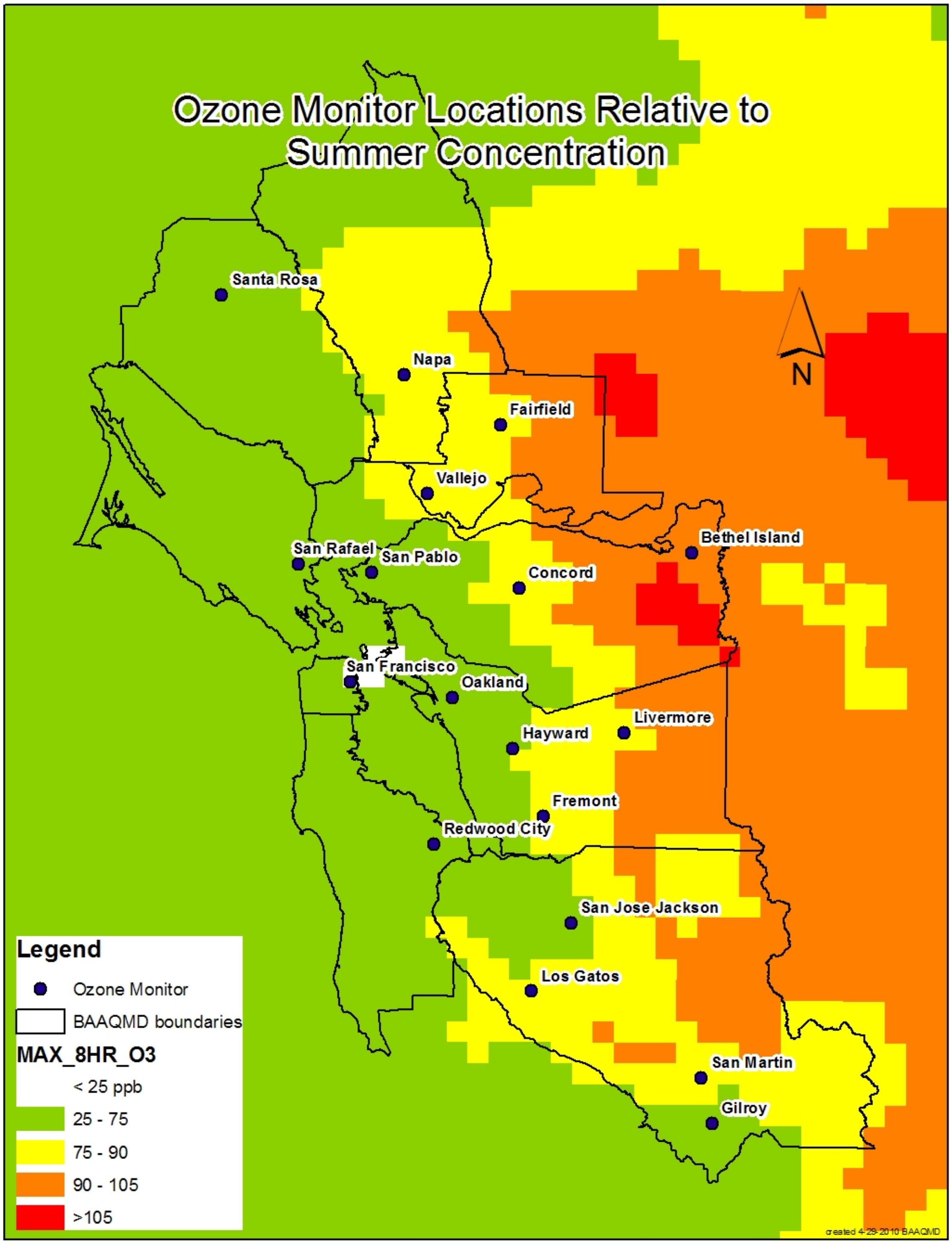

Figure 3. Map of Air District Ozone Monitoring Stations and typical maximum ozone levels on a high ozone day.

Table 2. Minimum Monitoring Requirements for Ozone SLAMS Sites.

MSA	County	Population in millions 2009	8-hour Design Value[1] (ppb) 2009	Number of Monitors Required	Number of Monitors Active
San Francisco-Oakland-Fremont	SF, Marin, Alameda, San Mateo, Contra Costa	4.32	78	3	10
San Jose-Sunnyvale-Santa Clara	Santa Clara, San Benito	1.84	72	2	6[2]
Santa Rosa-Petaluma	Sonoma	0.47	52	1	1
Vallejo-Fairfield	Solano	0.41	67	2	3[3]
Napa	Napa	0.13	61	1	1

1 Design values are calculated at each monitoring site by taking the 3-year mean of the 4th highest 8-hour concentration. The design values shown for each MSA in this table are the highest design value of monitors in the MSA that are within the boundaries of the BAAQMD. Design values at or below the 0.075 ppm National Ambient Air Quality 8-hour Ozone Standard meet the standard.

2 One of the monitors is located in Hollister in San Benito County and is operated by the Monterey Bay Unified Air Pollution Control District. Another monitor is located in Pinnacles National Monument and is operated by the National Park Service.

3 One of the monitors is located in Vacaville in Solano County and is operated by the Yolo-Solano Air Pollution Control District.

Table 3. Ozone Stations Having Correlations ≥ 0.75 in 2008.

County	Station 1	Station 2	Avg Relative Diff (0 to 1)	Distance (km)	Correlation R-squared
Alameda	Fremont	Hayward	0.07	14	0.90
	Fremont	San Jose	0.11	22	0.88
	Fremont	Vallejo	0.10	67	0.80
	Hayward	Fremont	0.07	14	0.90
	Hayward	San Jose	0.09	36	0.85
	Hayward	Vallejo	0.08	53	0.82
	Hayward	Napa	0.09	76	0.80
	Hayward	Fairfield	0.12	63	0.79
	Livermore	Concord	0.07	35	0.90
	Livermore	Los Gatos	0.11	54	0.84
	Livermore	Fairfield	0.14	65	0.77
	Livermore	Bethel Island	0.12	38	0.77
	Oakland	San Pablo	0.10	29	0.81
Contra Costa	Bethel Island	Concord	0.11	35	0.82
	Bethel Island	Livermore	0.12	38	0.77
	Concord	Livermore	0.07	35	0.90
	Concord	Bethel Island	0.11	35	0.82
	Concord	Fairfield	0.12	32	0.79

Table 3 continued. Ozone Stations Having Correlations ≥ 0.75 in 2008.

County	Station 1	Station 2	Avg Relative Diff (0 to 1)	Distance (km)	Correlation R-squared
Contra Costa	Concord	Los Gatos	0.11	78	0.78
	San Pablo	Oakland	0.10	29	0.81
	San Pablo	San Rafael	0.10	14	0.80
	San Pablo	San Francisco	0.09	22	0.80
	San Pablo	Redwood City	0.11	54	0.77
Marin	San Rafael	Vallejo	0.18	28	0.83
	San Rafael	Redwood City	0.10	61	0.80
	San Rafael	San Pablo	0.10	14	0.80
Napa	Napa	Fairfield	0.07	21	0.91
	Napa	Vallejo	0.07	24	0.89
	Napa	Hayward	0.09	76	0.80
	Napa	San Jose	0.10	112	0.75
San Francisco	San Francisco	San Pablo	0.09	22	0.80
San Mateo	Redwood City	San Rafael	0.10	61	0.80
	Redwood City	San Pablo	0.11	54	0.77
Santa Clara	Gilroy	San Martin	0.37	9	0.86
	Gilroy	Hollister	0.57	26	0.77
	Los Gatos	San Jose	0.10	15	0.86
	Los Gatos	Livermore	0.11	54	0.84
	Los Gatos	Concord	0.11	78	0.78
	Los Gatos	Fairfield	0.11	111	0.75
	San Jose	Fremont	0.11	22	0.88
	San Jose	Los Gatos	0.10	15	0.86
	San Jose	Hayward	0.09	36	0.85
	San Jose	Fairfield	0.10	98	0.78
	San Jose	Vallejo	0.11	89	0.76
	San Jose	Napa	0.10	112	0.75
Solano	Fairfield	Napa	0.07	21	0.91
	Fairfield	Concord	0.12	32	0.79
	Fairfield	Hayward	0.12	63	0.79
	Fairfield	San Jose	0.10	98	0.78
	Fairfield	Vallejo	0.11	20	0.78
	Fairfield	Livermore	0.14	65	0.77
	Fairfield	Los Gatos	0.11	111	0.75
	Vallejo	Napa	0.07	24	0.89
	Vallejo	San Rafael	0.18	28	0.83
	Vallejo	Hayward	0.08	53	0.82
	Vallejo	Fremont	0.10	67	0.80
	Vallejo	Fairfield	0.11	20	0.78
	Vallejo	San Jose	0.11	89	0.76

of the absolute value difference between concentrations at the two sites and dividing by the average difference. Site pairs with a lower relative difference are more similar to each other than pairs with a larger difference. The next column lists the distance between sites in kilometers.

Table 4 lists the Bay Area stations currently measuring ozone by county. It also lists the monitoring objectives and the ozone design values for each site. The last column rates the importance of the data measured at the site in meeting both the Air District's and EPA's monitoring objectives.

Table 4. List of Permanent Ozone Monitor Locations in 2009.

Station	County	Monitoring Objective	8-hr Design Value[1] (ppb)	Assigned Value from Assessment
Fremont	Alameda	Population Oriented	61	Low
Hayward	Alameda	Population Oriented	64	Medium
Livermore	Alameda	Population Oriented & Highest Concentration	78	High
Oakland	Alameda	Population Oriented	57	High
Bethel Island	Contra Costa	Transport & Highest Concentration	74	High
Concord	Contra Costa	Population Oriented & Highest Concentration	74	High
San Pablo	Contra Costa	Population Oriented	50	Low
San Rafael	Marin	Population Oriented	52	High
Napa	Napa	Population Oriented	61	High
San Francisco	San Francisco	Population Oriented	48	High
Redwood City	San Mateo	Population Oriented	56	High
Gilroy	Santa Clara	Population Oriented & Highest Concentration	70	High
Los Gatos	Santa Clara	Population Oriented	70	High
San Jose	Santa Clara	NCore	62	High
San Martin	Santa Clara	Highest Concentration	72	High
Fairfield	Solano	Transport & Highest Concentration	67	High
Vallejo	Solano	Population Oriented	61	Medium
Santa Rosa	Sonoma	Population Oriented	52	High

[1] Design values at or below the national Ozone standard of 75 ppb meet the standard.

The importance of each ozone monitor is related to:

- EPA minimum monitoring requirements.
- Demonstration of attainment of air quality standards.
- Proximity of the site to other sites.
- The monitoring purpose.
- The number of monitors in a county.
- Data correlation to neighboring sites.
- The size of the population in the surrounding area.

The Air District desires to operate at least one ozone monitor in each of the nine Bay Area counties. There are five counties with only one monitor: San Francisco, San Mateo, Marin, Sonoma, and Napa. These monitors are highly rated because 8-hour ozone levels are higher than one half of the national standard (currently 75 ppb), and they are the only measurements in those counties. The monitors in Napa and Sonoma Counties are also needed to meet the MSA minimum monitoring requirements, listed in Table 2.

Alameda County has four ozone monitors. Livermore is rated high because it has a design value above the national standard. Oakland is rated high because it is a major city in the Bay Area and it is not well correlated with Livermore (r^2=0.16). Hayward and Fremont sites are well correlated with each other, having an (r^2=0.90, see Table 3), and are located near each other. Thus, one monitor could be used to represent the entire Hayward-Fremont area. In addition, both Fremont and Hayward are well correlated with San Jose, r^2 = 0.88 and 0.85 respectively, suggesting San Jose ozone measurements could reasonably represent those areas as well. Neither Fremont nor Hayward has design values close to the standard, and the locations do not have any major importance, so both could be rated low if San Jose ozone measurements are substituted. However, Hayward ozone measurements are used as input to the daily ozone forecast model. Consequently, Hayward is rated as medium, and Fremont is rated as low.

Contra Costa County has three ozone monitoring sites. Bethel Island and Concord are rated high because their design values are very close to the national standard, and both are likely to exceed the new proposed ozone standard expected to be finalized in the fall of 2010 (the new standard is expected to be in the range of 0.60 ppm to 0.70 ppm). These sites are also important because Bethel Island is a site located to measure pollutants into and out of the Central Valley, and Concord is the largest city in Contra Costa County. San Pablo is rated low because its design value is low and it is well correlated with Oakland (r^2=0.81).

EPA requires that the Santa Clara and San Benito MSA have at least 2 monitors. Monterey Bay Unified APCD already operates one ozone monitor in San Benito County at Hollister. As long as they continue to operate it, EPA requires that the BAAQMD operate only one ozone monitor in Santa Clara County. Currently, Santa Clara County has four ozone monitoring sites. The San Jose station is in one of the 3 major cities of the Bay Area, and is an NCore site. Gilroy, Los Gatos, and San Martin monitors have design values below the current national standard, but are likely to equal or exceed the new proposed ozone standard. The correlation between the San Jose and Los Gatos monitors, and between the San Martin and Gilroy monitors, is high (0.86 for each). However, even though correlations are high for these sites, there are some days when ozone exceedances occur at only one of the four sites, due to localized sea breeze patterns. Thus, all four sites are rated high.

Solano County is in the Vallejo-Fairfield MSA, and must have two monitors to meet EPA ozone monitoring requirements. Yolo-Solano APCD operates one ozone monitor in Vacaville. The EPA requirement will be met as long as the Air District operates at least one other monitor. Currently the BAAQMD operates two ozone monitoring sites in Solano County, Vallejo and Fairfield. Both sites have recorded ozone exceedances in the past three years. Fairfield is rated high because it is an ozone transport site. Vallejo is rated medium because it is highly correlated with Napa (r^2=0.89), and a number of other sites.

Nitrogen Dioxide Monitoring

The Air District currently operates 15 permanent nitrogen dioxide monitors in its network. Nitrogen dioxide (NO_2) monitors also measure nitrogen oxide (NO), and the sum of NO_2 and NO, called NO_x. NO/NO_2 measurements have been made in the Bay Area since the 1960s, and NO_2 levels have never exceeded the national 24-hour standard. There is currently no California or national nitrogen oxide (NO) standard. In February 2010, EPA promulgated a new 1-hour NO_2 standard, and a review of Bay Area historical data have shown that the new standard was last exceeded in 2006 at the San Francisco station (with 0.107 ppm). NO and NO_2 are formed from vehicle, power plant and other industrial emissions, and contribute to the formation of ozone and fine particulate.

Figure 4 shows the current locations of nitrogen dioxide monitors. The stations are superimposed on a gridded NO_x emission map. NO_x is used in place of NO_2 because the amount of NO_x is better quantifiable and because NO and NO_2 concentrations change throughout the day depending upon the amount of sunlight, the ambient temperature, and the concentration of oxidizing pollutants available in the air. The map shows that the stations are generally located in areas of high NO_x emissions. Bethel Island, a site located to measure transported pollutants, is in an area of low NO_x emissions.

By 2013, the new regulations require the Air District to operate two additional population-oriented monitors and three roadside monitors located within 50 meters of major freeways. The new monitoring requirements are based on Bay Area population and traffic counts. Monitoring requirement details are listed in Table 5. No additional monitors are required for the SIP or Maintenance Plans because the Air District has never been designated as non-attainment for NO_2.

Table 6 lists the stations currently measuring nitrogen dioxide in the Bay Area in each county. It also lists the monitoring objectives and the NO_2 design values for each site. The last column rates the importance of the data measured at the site in meeting Air District and EPA monitoring objectives.

The Air District desires to operate at least one NO_2 monitor in each of the nine Bay Area counties. There are seven counties with only one monitor: San Francisco, San Mateo, Marin, Sonoma, Santa Clara, Solano, and Napa. Five of these, San Mateo, Marin, Sonoma, Solano, and Napa are rated medium in importance because NO_2 levels are only about one half of the 1-hour national standard, and less than a quarter of the national annual standard.

The monitor at San Francisco is rated high because San Francisco is one of the three major cities in the Bay Area. The monitor at San Jose is rated high because it is one of the three major cities in the Bay Area; it is required as part of NCore monitoring, and it meets the minimum monitoring requirements for Santa Clara County under the new EPA NO_2 regulations.

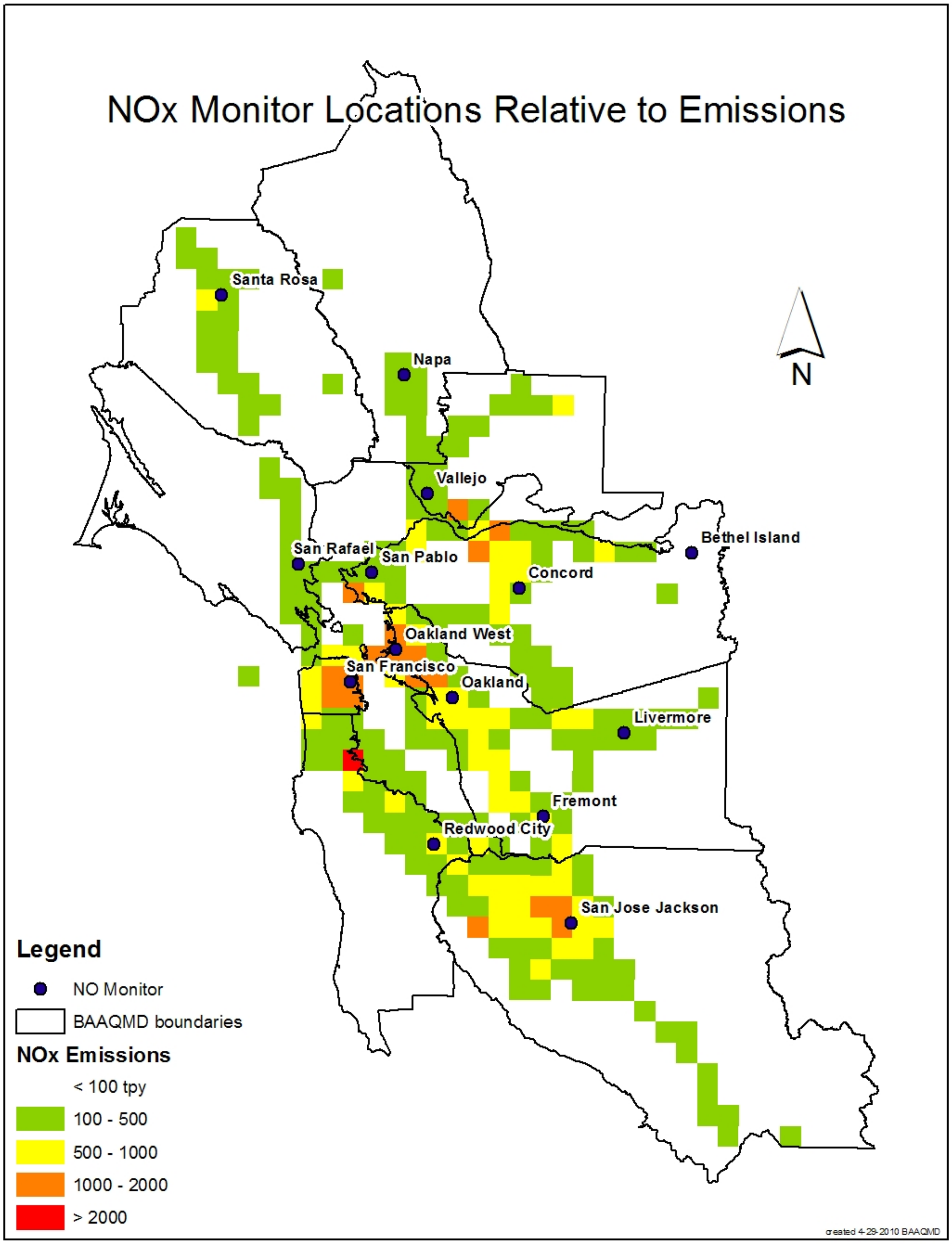

Figure 4. Map of Air District Nitrogen Dioxide Monitoring Stations and NO_x emissions.

Table 5. Minimum Monitoring Requirements for NO_2 SLAMS Sites in 2013.

MSA	County	Population in millions 2009	Annual Design Value[1] (ppb) 2009	24-hour Design Value[2] (ppb) 2009	Area-wide Monitors Required / Roadside Monitors Required	Area-wide Monitors Active / Roadside Monitors Active
SF-Oakland-Fremont	SF, San Mateo, Alameda, Marin, Contra Costa	4.32	16	54	1 / 2	10 / 0
San Jose-Sunnyvale-Santa Clara	Santa Clara, San Benito	1.84	15	53	1 / 1	1 / 0
Santa Rosa-Petaluma	Sonoma	0.47	9	38	0 / 0	1 / 0
Vallejo-Fairfield	Solano	0.41	10	42	0 / 0	1 / 0
Napa	Napa	0.13	10	39	0 / 0	1 / 0

1 Annual design values are determined for each monitoring site by calculating the arithmetic average of all of the reported 1-hour values for the most current year. The design values shown for each MSA in this table are the highest design value of monitors in the MSA that are within the boundaries of the BAAQMD. Design values at or below the national NO_2 annual standard of 53 ppb meet the standard.

2 Daily design values are calculated at each monitoring site by taking the 3-year mean of the 8th highest daily maximum 1-hour concentration. The design values shown for each MSA in this table are the highest design value of monitors in the MSA that are within the boundaries of the BAAQMD. Design values at or below the national NO_2 1-hour standard of 100 ppb meet the standard.

Alameda County has four nitrogen dioxide monitors. Livermore is rated high because ozone exceedances occur and NO/NO_2 data are needed for modeling and analysis as ozone precursors. Oakland is rated high because it is one of the major cities in the Bay Area. Oakland West is rated high because it is a source-oriented site. Fremont is rated low because there is no particular need for the monitor, and the design value is well below national air quality standards.

Contra Costa County has three nitrogen dioxide monitoring sites. Bethel Island and Concord are rated high because NO/NO_2 data are needed for modeling and analysis of ozone exceedances. Bethel Island is also important for measuring NO_x transport to and from neighboring air districts. San Pablo is rated low because there is no specific need for the data, and NO_2 design values are low.

Table 6. List of Permanent Nitrogen Dioxide Monitor Locations in 2009.

Station	County	Monitoring Objective	1-hour Design Value[1] (ppb)	Annual Design Value[2] (ppb)	Assigned Value from Assessment
Fremont	Alameda	Population Oriented	47	13	Low
Livermore	Alameda	Population Oriented	47	12	High
Oakland	Alameda	Population Oriented	52	14	High
Oakland West	Alameda	Source Oriented	49	16	High
Bethel Island	Contra Costa	Transport & Backgrnd	31	6	High
Concord	Contra Costa	Population Oriented	37	9	Medium
San Pablo	Contra Costa	Population Oriented	44	12	Low
San Rafael	Marin	Population Oriented	45	12	Medium
Napa	Napa	Population Oriented	39	10	Medium
San Francisco	San Francisco	Population Oriented	54	15	High
Redwood City	San Mateo	Population Oriented	46	12	Medium
San Jose	Santa Clara	NCore	53	15	High
Vallejo	Solano	Population Oriented	42	10	Medium
Santa Rosa	Sonoma	Population Oriented	38	9	Medium

[1] Design values at or below the national NO_2 1-hour standard of 100 ppb meet the standard.
[2] Design values at or below the national NO_2 annual standard of 53 ppb meet the standard.

The new NO_2 regulations require three roadside monitors by 2013. The Air District is currently studying optimal locations for these new monitors. Roadside monitors are classified as microscale monitoring, and will not be considered representative of areas where the general population live and work which are neighborhood or urban scale measurements. Consequently, roadside monitoring will not affect the importance rating of monitors located at the permanent Air District stations.

Sulfur Dioxide Monitoring

The Air District currently operates nine permanent sulfur dioxide monitors (SO_2) in its network. SO_2 measurements have been made in the Bay Area since 1969, and during that time SO_2 levels have never exceeded the national 24-hour or the national annual standard. In June 2010, EPA revised the primary SO_2 standard by establishing a new 1-hour standard at a level of 75 ppb, and revoking the two existing 24-hour and annual primary standards. SO_2 also contributes to the formation of fine particulate pollution.

Figure 5 shows the current locations of sulfur dioxide monitors. The stations are superimposed on a gridded SO_2 emission map. The map shows areas off the coast and on the San Francisco Bay with SO_2 emissions. These emissions are from ships. The Oakland West SO_2 monitor is located downwind of the Port of Oakland to measure SO_2 from shipping. The other major source of SO_2 emissions are Bay Area refineries owned by Chevron, Shell, Tesoro, Valero, and ConocoPhillips. Most of the remaining monitors are located near these refineries. One other SO_2 monitor is located at the San Jose NCore site, a requirement of 40 CFR Part 58. Bethel Island also has an SO_2 monitor to measure background levels and pollutant transport to and from neighboring air districts.

The Air District already meets the minimum number of SO_2 monitors under the new monitoring requirements. See Table 7 for monitoring requirement details. No additional monitors are required for SIP or Maintenance Plans, because the Air District has never been designated as non-attainment for SO_2, and no SIP or Maintenance Plans have been prepared for SO_2.

Table 8 lists the stations currently measuring sulfur dioxide in the Bay Area in each county. It also lists the monitoring objectives and the SO_2 design values based on the new 1-hour standard for each site. It shows that current design values are significantly below the 75 ppb 1-hour SO_2 national standard, and therefore the Bay Area will be in attainment of the new SO_2 standard. The last column rates the importance of the data measured at the site in meeting both the Air District's and EPA's monitoring objectives.

Unlike other pollutants, SO_2 concentrations are normally measured near sources. Counties without sources usually have concentrations near background levels. Under the EPA regulations, the Air District is only required to operate three SO_2 monitors, two in the San Francisco-Oakland-Fremont MSA, and one in San Jose-Sunnyvale-Santa Clara MSA. The Air District currently operates a required NCore SO_2 monitor at San Jose, which also satisfies the San Jose-Sunnyvale-Santa Clara MSA requirement. This monitor is rated high.

The only SO_2 monitor in Alameda County is at the Oakland West monitoring station. These measurements are rated high due to the proximity of shipping lanes and the Port of Oakland.

Contra Costa County has six SO_2 monitors. Three monitors are rated high: Concord which is downwind of the Tesoro Refinery, Crockett which is downwind of the ConocoPhillips Refinery, and Martinez which is downwind of the Shell Refinery. These three monitors exceed the two-monitor requirement for the San Francisco-Oakland-Fremont MSA.

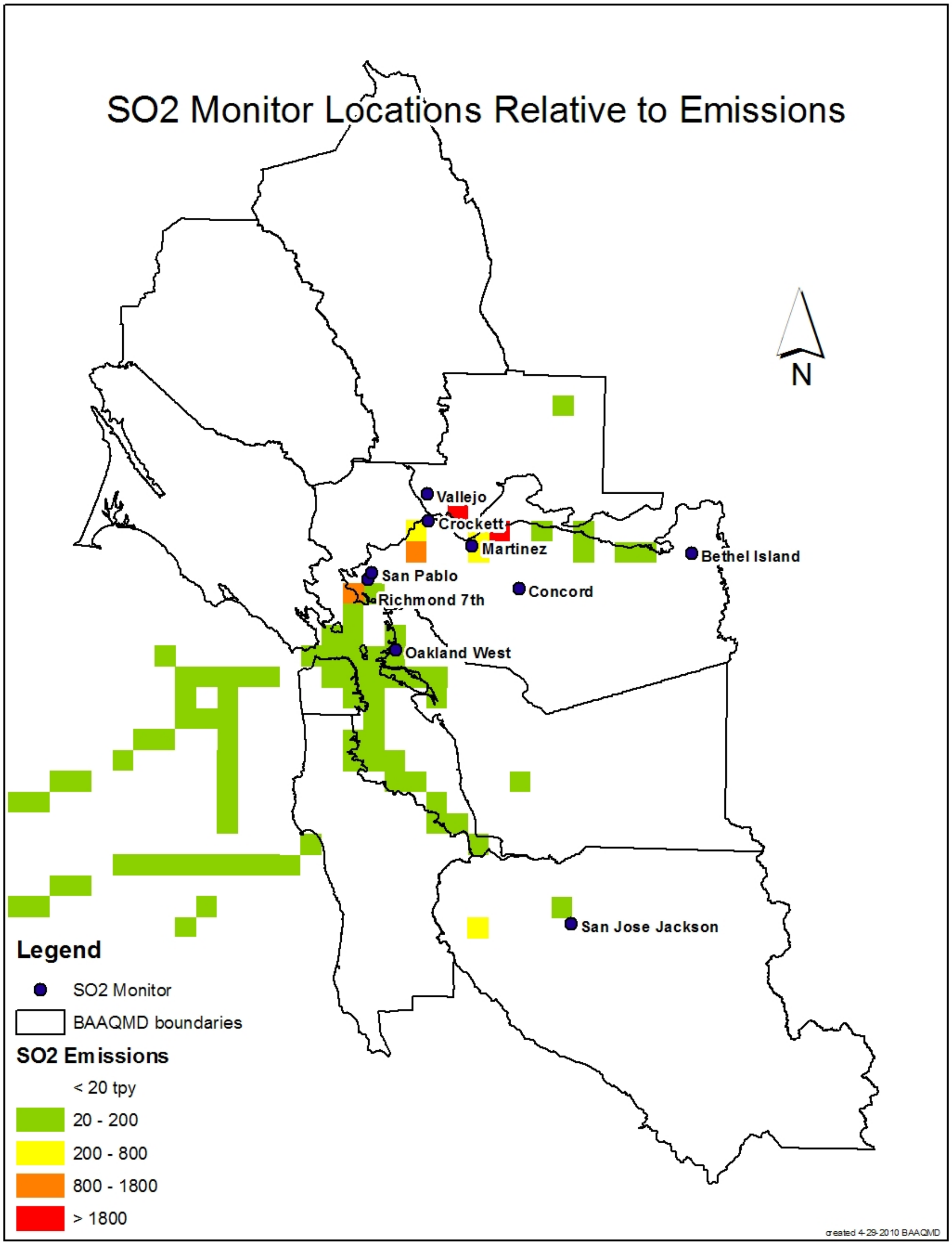

Figure 5. Map of Air District Sulfur Dioxide Monitoring Stations and SO_2 emissions.

Table 7. Minimum Monitoring Requirements for SO_2 SLAMS Sites in 2013.

MSA	County	Number of Monitors Required	Number of Monitors Active
San Francisco-Oakland-Fremont	SF, San Mateo, Alameda, Marin, Contra Costa	2	7[1]
San Jose-Sunnyvale-Santa Clara	Santa Clara, San Benito	1	1
Santa Rosa-Petaluma	Sonoma	0	0
Vallejo-Fairfield	Solano	0	1
Napa	Napa	0	0

1 The seven monitors include the permanent Crockett monitor which does not meet certain SLAMS siting criteria and is designated as an SPM monitor.

Table 8. List of Permanent Sulfur Dioxide Monitor Locations in 2009.

Station	County	Monitoring Objective	1-hour Design Value[1] (ppb)	Assigned Value from Assessment
Oakland West	Alameda	Source Oriented	13	High
Bethel Island	Contra Costa	Transport & Backgrnd	8	Medium
Concord	Contra Costa	Population Oriented	14	High
Crockett	Contra Costa	Source Oriented	25	High
Martinez	Contra Costa	Source Oriented	18	High
Richmond 7th	Contra Costa	Source Oriented	18	High/Low
San Pablo	Contra Costa	Source Oriented	14	High/Low
San Jose	Santa Clara	NCore	5	High
Vallejo	Solano	Source Oriented	8	Medium

1 Design values at or below the national SO_2 1-hour standard of 75 ppb meet the standard.

There are three other sites in Contra Costa County. The San Pablo and the Richmond 7th monitoring sites are downwind of Chevron Refinery. These sites are close to each other (one mile apart). One site should be rated high and the other low because of their proximity and similar low design values. The Bethel Island monitor is rated medium in importance because it provides background SO_2 concentration data.

The Solano County monitor in Vallejo is 5.4 miles downwind of the Valero Refinery on east wind days and is rated medium because of its distance from the refinery.

PM_{10} Monitoring

The Air District currently operates seven permanent PM_{10} monitors in its network. The highest Bay Area PM_{10} levels in the last three years are about half of the 150 $\mu g/m^3$ national 24-hour standard. The last exceedances of the 24-hour national standard were in 1991 at Livermore and San Jose. The Air District also analyzes PM_{10} filters to determine ambient levels of anions and cations, and organic carbon/elemental carbon.

Figure 6 shows the current Bay Area PM_{10} monitoring stations. The stations are superimposed on a gridded PM_{10} emission map. It shows that the stations are generally located in areas of high PM_{10} emissions. Bethel Island, a background/transport site, is located in an area of low PM_{10} emissions.

The number of required PM_{10} monitors for each MSA in the Bay Area is determined by its population and design value, as specified in Table D-4 of Appendix D to 40 CFR Part 58 – PM_{10} Minimum Monitoring Requirements. PM_{10} design values are a calculated concentration (see footnote no.1 below in Table 9) which are used to determine the PM_{10} attainment status of an area. Table 9 shows that the Air District monitoring network meets or exceeds the PM_{10} minimum monitoring requirements. No additional monitors are required for the SIP or Maintenance Plan because the Bay Area has never been designated as non-attainment for PM_{10}, and no SIP or Maintenance Plans have been prepared for PM_{10}.

Table 9. Minimum Monitoring Requirements for PM_{10} SLAMS Sites.

MSA	County	Population in millions 2009	Max 24 hr Value $\mu g/m^3$ (2007-09)	Number of Monitors Required	Number of Monitors Active
San Francisco-Oakland-Fremont	SF, San Mateo, Alameda, Marin, Contra Costa	4.32	78.2	2	5
San Jose-Sunnyvale-Santa Clara	Santa Clara, San Benito	1.84	72.9	2	2[2]
Santa Rosa-Petaluma	Sonoma	0.47	None[3]	0	0
Vallejo-Fairfield	Solano	0.41	None[3]	0	0
Napa	Napa	0.13	51.7	0	1

[1] For PM_{10}, the design value is defined as the expected number of exceedances per year, which is calculated by averaging the number of exceedances for the past 3 years. Since there were no exceedances in the past 3 years, the PM_{10} design value is zero for all MSA's within the Bay Area Air Quality Management District. The 24-hour standard (150 $\mu g/m^3$) is attained when the design value is less than or equal to one. Instead of the PM_{10} design value, the number shown in this column is the highest 24-hour PM_{10} concentration in 2007-2009.

[2] One of the monitors is located in Hollister in San Benito County and is operated by the Monterey Bay Unified Air Pollution Control District.

[3] There are no FRM or FEM PM_{10} monitors in this MSA.

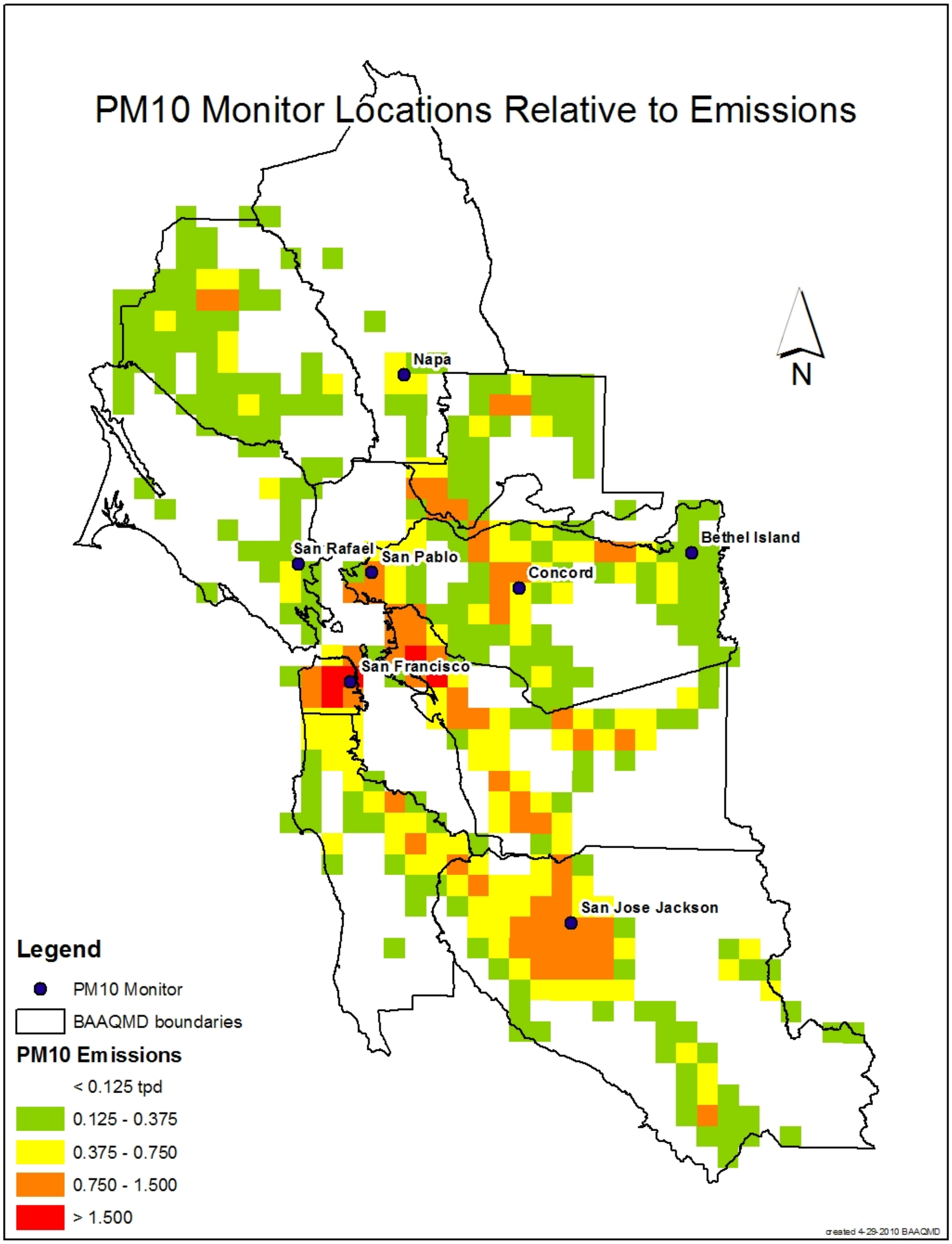

Figure 6. Map of Air District PM_{10} Monitoring Stations and PM_{10} emissions.

Because PM_{10} levels are one-half or less of the national standard, there is no need to measure PM_{10} in every county. Instead, monitoring resources have been put into sampling for fine particulate sampling ($PM_{2.5}$) because the Bay Area is not in attainment of the 24-hour $PM_{2.5}$ national standard, and because the fine particles have more serious health impacts.

Table 10 shows correlations between the Bay Area PM_{10} monitors for 2008. The table shows PM_{10} correlations to be lower than the ozone correlations in Table 3. This suggests that PM_{10} is more of a local problem, while ozone is more of an area-wide problem. The only sites with a high correlation are San Francisco and San Pablo, with an $r^2=0.88$. Table 10 also lists the Average Relative Difference between each two stations, on a scale of 0 to 1. It is determined by taking the mean of the absolute value difference between concentrations at the two sites and dividing by the average difference. Site pairs with a lower relative difference are more similar to each other then pairs with a larger difference. The next column lists the distance between sites in kilometers.

Table 11 lists the stations currently measuring PM_{10} in the Bay Area along with monitoring objective and the maximum 24-hour value ($\mu g/m^3$) from 2007-09 for each site. The last column rates the importance of the data measured at the site in meeting the Air District and EPA monitoring objectives.

Under EPA regulations, the Air District is required to operate two PM_{10} monitors in the San Francisco-Oakland-Fremont MSA. Currently there are five PM_{10} monitors within the MSA which includes Contra Costa, Marin, and San Francisco Counties. Bethel Island, Concord, and San Rafael are rated medium because none are measuring high PM_{10} concentrations. San Francisco is rated high because it is located in one of the three major Bay Area cities, and because it is highly correlated with San Pablo ($r^2=0.88$), shown in Table 10. San Pablo is rated low because its PM_{10} values are low and the data are highly correlated with San Francisco data.

The Air District operates one PM_{10} monitor in Napa County. There is no requirement for PM_{10} monitoring in Napa County, and the concentrations are not particularly high, so it is rated as medium.

There is currently no PM_{10} monitoring in Alameda County. The PM_{10} emissions map suggests that due to high PM_{10} emissions in Oakland, a monitor should be located in the Oakland area.

Two PM_{10} monitors are required for the San Jose-Sunnyvale-Santa Clara MSA. One monitor is being operated by the Monterey Bay Unified APCD in San Benito County. The second monitor is at the San Jose station. It will also be used to derive PM course measurements, which can be calculated by subtracting $PM_{2.5}$ concentrations from PM_{10} concentrations. Consequently, the San Jose PM_{10} monitor is rated high.

Table 10. PM_{10} Correlations Between Stations in 2008.

County	Station 1	Station 2	Avg Relative Diff (0 to 1)	Distance (km)	correlation R-squared
Contra Costa	Bethel Island	Concord	0.36	35	0.61
	Bethel Island	Napa	0.34	66	0.44
	Bethel Island	San Jose	0.33	76	0.38
	Bethel Island	San Rafael	0.39	77	0.34
	Bethel Island	San Pablo	0.37	63	0.30
	Bethel Island	San Francisco	0.38	72	0.27
	Concord	Napa	0.25	48	0.74
	Concord	San Rafael	0.22	43	0.66
	Concord	San Jose	0.33	66	0.64
	Concord	Bethel Island	0.36	35	0.61
	Concord	San Pablo	0.30	29	0.53
	Concord	San Francisco	0.33	38	0.46
	San Pablo	San Francisco	0.12	22	0.88
	San Pablo	San Rafael	0.20	14	0.74
	San Pablo	San Jose	0.21	79	0.58
	San Pablo	Concord	0.30	29	0.53
	San Pablo	Napa	0.24	39	0.53
	San Pablo	Bethel Island	0.37	63	0.30
Napa	Napa	Concord	0.25	48	0.74
	Napa	San Rafael	0.22	42	0.69
	Napa	San Jose	0.22	112	0.60
	Napa	San Pablo	0.24	39	0.53
	Napa	Bethel Island	0.34	66	0.44
	Napa	San Francisco	0.27	61	0.44
San Francisco	San Francisco	San Pablo	0.12	22	0.88
	San Francisco	San Rafael	0.23	25	0.67
	San Francisco	San Jose	0.24	64	0.50
	San Francisco	Concord	0.33	38	0.46
	San Francisco	Napa	0.27	61	0.44
	San Francisco	Bethel Island	0.38	72	0.27
Santa Clara	San Jose	Concord	0.33	66	0.64
	San Jose	Napa	0.22	112	0.60
	San Jose	San Pablo	0.21	79	0.58
	San Jose	San Rafael	0.25	88	0.56
	San Jose	San Francisco	0.24	64	0.50
	San Jose	Bethel Island	0.33	76	0.38
Marin	San Rafael	San Pablo	0.20	14	0.74
	San Rafael	Napa	0.22	42	0.69
	San Rafael	San Francisco	0.23	25	0.67
	San Rafael	Concord	0.22	43	0.66
	San Rafael	San Jose	0.25	88	0.56
	San Rafael	Bethel Island	0.39	77	0.34

Table 11. List of Permanent PM_{10} Monitor Locations in 2009.

Station	County	Monitoring Objective	Max 24 hour Value ($\mu g/m^3$) 2007-09	Assigned Value from Assessment
Bethel Island	Contra Costa	Background & Transport	78.2	Medium
Concord	Contra Costa	Population Oriented	50.5	Medium
San Pablo	Contra Costa	Population Oriented	54.4	Low
San Rafael	Marin	Population Oriented	52.6	Medium
Napa	Napa	Population Oriented	51.7	Medium
San Francisco	San Francisco	Population Oriented	65.7	High
San Jose	Santa Clara	NCore	64.7	High

[1] 24-hour values at or below the national PM_{10} standard of 150 $\mu g/m^3$ meet the standard.

$PM_{2.5}$ Monitoring

The Air District currently operates $PM_{2.5}$ monitors at 13 sites in the Bay Area, and the California Air Resources Board operates a monitoring site in Point Reyes. Nine of the $PM_{2.5}$ sites have continuous monitors, four sites have both continuous and filter-based monitors, and one site has two filter-based monitors. The Air District is in the process of replacing its non-regulatory continuous samplers with federal equivalent method (FEM) continuous samplers. To date, seven of the sites with continuous samplers use FEM-type samplers. By the fall of 2010, three more non-FEM samplers will be replaced with FEM samplers. Exceedances of the national 24-hour $PM_{2.5}$ standard have been recorded at most sites in the Bay Area over the last 3 years. Most exceedances occur during winter months, but can also occur during large forest fires.

Figure 7 shows the current Bay Area $PM_{2.5}$ monitoring stations. The stations are superimposed on a gridded $PM_{2.5}$ emission map. It shows that the stations are generally located in areas of high $PM_{2.5}$ emissions. Point Reyes, a background concentration site, is located in an area of low $PM_{2.5}$ emissions.

The number of required $PM_{2.5}$ monitors for each MSA in the Bay Area is determined by its population and design value, as specified in Table D-5 of Appendix D to 40 CFR Part 58 – $PM_{2.5}$ Minimum Monitoring Requirements. $PM_{2.5}$ design values are calculated concentrations (see footnotes no.1 & 2 in Table 12) used to determine the $PM_{2.5}$ attainment status of an area. Table 12 shows that the Air District monitoring network meets or exceeds the $PM_{2.5}$ minimum monitoring requirements. No additional monitors are required for the SIP because the Bay Area has only recently been designed non-attainment and the SIP planning is in progress.

Table 13 lists the stations where $PM_{2.5}$ concentrations are measured in the Bay Area along with the monitoring objective and the $PM_{2.5}$ design value for each site. The last column rates the importance of the data measured at the site in meeting both the Air District's and EPA's monitoring objectives.

The Air District desires to operate at least one $PM_{2.5}$ monitor in each of the nine Bay Area counties. There are six counties with only one monitor: Contra Costa, Napa, San Francisco, San Mateo, Solano, and Sonoma. All monitors in those counties, except Santa Rosa, are rated high because they are the only monitors in those counties and they all have recorded exceedances of the 24-hour national $PM_{2.5}$ standard. The Vallejo and Santa Rosa monitors are also rated high because one monitor is required within each MSA.

Alameda County has four monitoring sites. Livermore is rated high because the design value is very close to the standard. Oakland is rated high because it has recorded exceedances, and it is in one of the three major cities in the Bay Area. Oakland West is rated high because it is a source oriented site. Fremont is rated medium because exceedances of the $PM_{2.5}$ standard have been measured at the site though the design value is well below the standard.

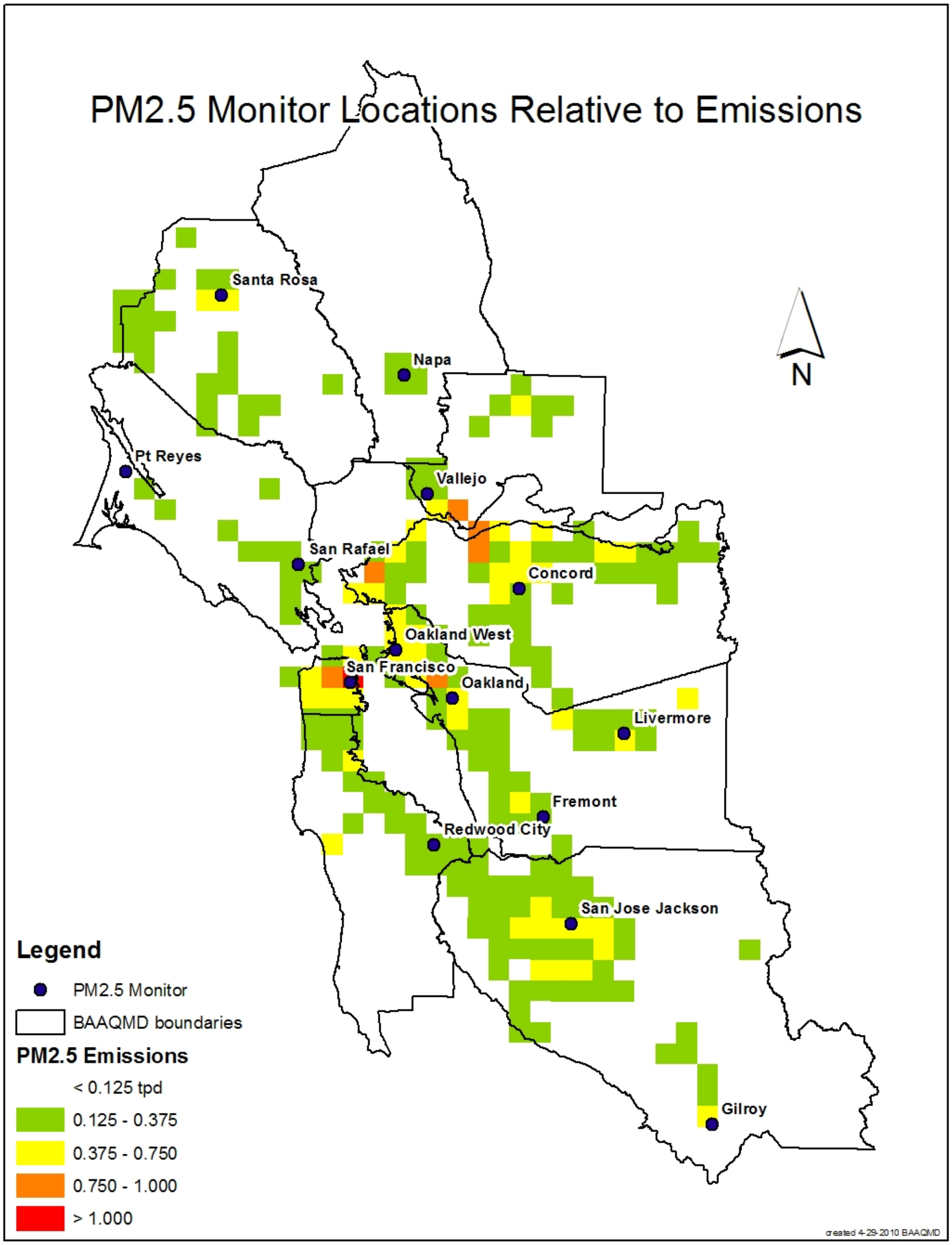

Figure 7. Map of Air District $PM_{2.5}$ Monitoring Stations and $PM_{2.5}$ emissions.

Table 12. Minimum Monitoring Requirements for $PM_{2.5}$ SLAMS Sites.

MSA	County	Popu-lation in millions 2009	Annual Design Value[1] ($\mu g/m^3$) 2009	24-hour Design Value[2] ($\mu g/m^3$) 2009	Monitors Required	Active Monitors[5]
San Francisco-Oakland-Fremont	SF, San Mateo, Alameda, Marin, Contra Costa	4.32	9.4	34	3	7
San Jose-Sunnyvale-Santa Clara	Santa Clara, San Benito	1.84	10.8	34	3	3[3]
Santa Rosa-Petaluma	Sonoma	0.47	8.2	28	1	1
Vallejo-Fairfield	Solano	0.41	9.8	36	1	1
Napa	Napa	0.13	None[4]	None[4]	0	0

1 Annual design values are calculated at each monitoring site by taking the 3-year mean (2007-2009) of the annual averages for each site. The design values shown for each MSA in this table are the highest design value of monitors in the MSA that are within the boundaries of the BAAQMD. Design values at or below the national $PM_{2.5}$ annual standard of 15 $\mu g/m^3$ indicate the area meets the standard.

2 Daily design values are calculated by taking the 3-year mean (2007-2009) of the 98th percentiles for each site. The design values shown for each MSA in this table are the highest design value of monitors in the MSA that are within the boundaries of the BAAQMD. Monitors outside of the BAAQMD may have a higher design value. Design values at or below the national $PM_{2.5}$ 24-hour standard of 35 $\mu g/m^3$ indicate the area meets the standard.

3 One of the monitors is located in Hollister in San Benito County and is operated by the Monterey Bay Unified Air Pollution Control District.

4 There are no EPA FRM or FEM $PM_{2.5}$ monitors in Napa County.

5 Does not include the non-FEM continuous monitors at Napa and Pt Reyes.

Marin County has two $PM_{2.5}$ monitors. The monitor at San Rafael is rated high because exceedances of the 24-hour standard have been recorded, and it is the largest city in the county. Point Reyes is rated high because it is the only background measurement site within the Air District.

The San Jose-Sunnyvale-San Benito MSA requires 3 monitors. One monitor is operated in San Benito County by the Monterey Bay Unified APCD. The Air District operates two $PM_{2.5}$ monitors in Santa Clara County, one at San Jose and the other at Gilroy, both are rated high.

Table 13. List of Permanent $PM_{2.5}$ Monitor Locations in 2009.

Station	County	Monitoring Objective	24-hour Design Value[1] (µg/m3)	Annual Design Value[2] (µg/m3)	Assigned Value from Assessment
Fremont	Alameda	Population Oriented	27	9.4	Medium
Livermore	Alameda	Population Oriented	34	9.4	High
Oakland	Alameda	Population Oriented	25	9.4	High
Oakland West	Alameda	Source Oriented	25	11.4	High
Concord	Contra Costa	Population Oriented	33	8.7	High
Point Reyes	Marin	Background	15	5.8	High
San Rafael	Marin	Population Oriented	34	NA[3]	High
Napa	Napa	Population Oriented	32	12.4	High
San Francisco	San Francisco	Population Oriented	27	9.4	High
Redwood City	San Mateo	Population Oriented	28	8.7	High
Gilroy	Santa Clara	Population Oriented	24	8.8	High
San Jose	Santa Clara	NCore	34	10.8	High
Vallejo	Solano	Population Oriented	36	9.8	High
Santa Rosa	Sonoma	Population Oriented	28	8.2	High

[1] Design values at or below the national $PM_{2.5}$ 24-hour standard of 35 $\mu g/m^3$ meet the standard.
[2] Design values at or below the national $PM_{2.5}$ annual standard of 15 $\mu g/m^3$ indicate the area meets the standard.
[3] The $PM_{2.5}$ monitor at San Rafael was installed in October 2009. There is less than one year of data to date, which is inadequate to calculate an annual design value.

Summary

The purpose of this assessment is to rate the effectiveness of each monitor in the Bay Area Air Quality Management District's air monitoring network in meeting the monitoring objectives defined in 40 CFR, Part 58 Appendix D, and the local objectives of the Bay Area Air Quality Management District. This assessment also determines whether new monitors or sites are needed and if monitors or sites may be discontinued to free up resources for alternative monitoring efforts.

Table 14 shows that most stations have a mix of high and medium ratings. San Francisco, Oakland, and San Jose are highly rated for most pollutants. San Francisco and Oakland monitors are rated high because they are in major cities in the Bay Area. San Jose is rated high because it is one of the major cities in the Bay Area and the monitors at the site are needed to meet NCore requirements.

Table 14. List of Assessment Ratings of Permanent Monitors in 2009.

Station	CO	Ozone	NO_2	SO_2	PM_{10}	$PM_{2.5}$
Fremont	Low	Low	Low			Medium
Hayward		Medium				
Livermore		High	High			High
Oakland	High	High	High			High
Oakland West	High		High	High		High
Bethel Island	High	High	High	Medium	Medium	
Concord	Medium	High	Medium	High	Medium	High
Crockett				High		
Martinez				High		
Richmond 7th				High/Low		
San Pablo	Low	Low	Low	High/Low	Low	
Pt Reyes						High
San Rafael	Medium	High	Medium		Medium	High
Napa	Medium	High	Medium		Medium	High
San Francisco	Medium	High	High		High	High
Redwood City	Medium	High	Medium			High
Gilroy		High				High
Los Gatos		High				
San Jose	High	High	High	High	High	High
San Martin		High				
Fairfield		High				
Vallejo	Medium	Medium	Medium	Medium		High
Santa Rosa	Medium	High	Medium			High

Most of the stations that measure one or two pollutants are also rated high. Crockett and Martinez are rated high because they are located near refineries. Fairfield, Los Gatos, San Martin, and Gilroy are rated high because they are located in areas of high levels of ozone.

Pt Reyes and Bethel Island are rated high because they are located in background or transport areas. Bethel Island is also located in a high ozone area. Oakland West is rated high because it is a source oriented site and the monitors were specifically chosen for this site to measure the impacts from the Port of Oakland and nearby highways.

Fremont, San Pablo, and Richmond 7th stations have the lowest pollutant importance ratings. Fremont has low ratings for CO, ozone, and NO_2, and a medium rating for $PM_{2.5}$. The Air District is investigating whether this station should be closed.

The San Pablo station has low ratings for CO, ozone, NO_2, and PM_{10}, and a high rating for SO_2 if the Richmond 7th station is closed. This station is likely to remain because it is the only multi-pollutant air monitoring station near the Chevron Refinery and the local community has an interest in seeing air quality measurements.

If the San Pablo station continues to operate, then the SO_2 data collected at the nearby Richmond 7th station would then be rated low.

As for new monitors, the Air District is investigating the possibility of locating an ozone monitor in Brentwood and a PM_{10} monitor in Oakland. Photochemical modeling suggests an area of high ozone area near Brentwood, south of Bethel Island. The PM_{10} emissions map indicates high PM_{10} levels near downtown and West Oakland.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Air Monitoring Five-Year Assessment

July 1, 2010

Prepared by
Technical Services Division
& Planning Division

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Written by Dick Duker
July 1, 2010

Overview of 5-Year Network Assessment

Introduction

On October 17, 2006 the U.S. Environmental Protection Agency (EPA) finalized an amendment to the ambient air monitoring regulations to require State and local monitoring agencies to conduct a network assessment once every five years [40 CFR 58.10(d)]. A copy of this 5-year assessment, along with a revised annual network plan, must be submitted to the Regional Administrator. The first assessment is due July 1, 2010.

The purpose of the assessment is to determine if the network meets the monitoring objectives defined in 40 CFR Part 58 Appendix D, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby States and Tribes or health effects studies. For $PM_{2.5}$, the assessment also must identify needed changes to population-oriented sites.

Background

The Bay Area Air Quality Management District (Air District) is the public agency responsible for air quality management in nine Bay Area counties: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, southwestern Solano, and southern Sonoma. The Air District operates air monitoring stations in each of these nine counties. The Air District has been measuring air quality in the San Francisco Bay Area since 1957. In 2009 there were 22 permanent stations in the Air District air monitoring network, plus one permanent station operated by the California Air Resources Board at Point Reyes, that measure at least one criteria pollutant (O_3, CO, NO_2, $PM_{2.5}$, SO_2, and PM_{10}). The Air District also operates two permanent stations which only measure H_2S, a non-criteria pollutant. Monitoring for lead is expected to begin in 2011 after EPA finalizes its new regulation on lead.

In addition to the 24 permanent stations in the Bay Area, the Air District also performs short term monitoring at other sites. For example, in 2009, the Air District operated a re-locatable air quality monitoring trailer at Berkeley and a monitoring shelter at Cupertino. Temporary sites are not included in the 5-year assessment as they are moved every year or two.

For some pollutants, EPA requires a minimum number of monitors, usually based on population density. Those pollutants include O_3, NO_2, $PM_{2.5}$, SO_2, and PM_{10}. No minimum CO monitoring is required for the State Implementation Plan (SIP) or Maintenance Plan. Monitoring requirements for lead are expected to be issued in the fall of 2010. The State has no minimum monitoring requirements for criteria pollutants.

Purpose of Monitoring

The purposes of the Air District monitoring network are:

- To provide air pollution data to the general public in a timely manner.
- To support compliance with California and national ambient air quality standards (NAAQS). When sites do not meet the standards, attainment plans are developed to attain the standards.
- To support air pollution research studies.

To meet its monitoring objectives the Air District monitoring network collects ambient air data at locations with a variety of monitoring site types. These site types, as defined in 40 CFR Part 58 Appendix D, Table D-1, are intended to characterize air pollution levels in areas of high pollution, high population, transported air pollution, and air pollution near specific sources. Figure 1 shows the current Bay Area monitoring network superimposed on a map showing population density. Most of the air monitoring stations are located in the populated areas of the Bay Area.

Ambient air monitoring at Air District stations is intended to meet one or more of the following monitoring objectives:

- A determination of typical concentrations in areas of high population density.
- A determination of the highest concentrations expected to occur in the area covered by the network.
- A determination of impacts from significant sources.
- A determination of general background concentration levels.
- A determination of the extent of regional pollutant transport.

Population Oriented

As the primary purpose of air quality standards is to protect the public health, air monitoring stations have been placed in areas with high population density to determine the air pollution levels to which the majority of the population is exposed. In most cases these are within the largest cities of each county. To be consistent with EPA's list of Site Types in Table D-1 of 40 CFR Part 58 Appendix D, the term "population orientated" will be used in place of "typical concentrations in areas of high population density", for clarity in this monitoring objective.

Highest Concentration

EPA regulations require that air quality in areas where the public has access be reduced to levels below the national ambient air standards. Consequently, monitoring must also be done at locations expected to have the highest concentrations, even if populations are sparse in that area. High concentrations may be found close to major sources, or further downwind if pollutants are emitted from tall stacks. High concentrations may also be found at distant downwind locations when the pollutants such as ozone or secondary particulate matter are a result of chemical reactions in the atmosphere.

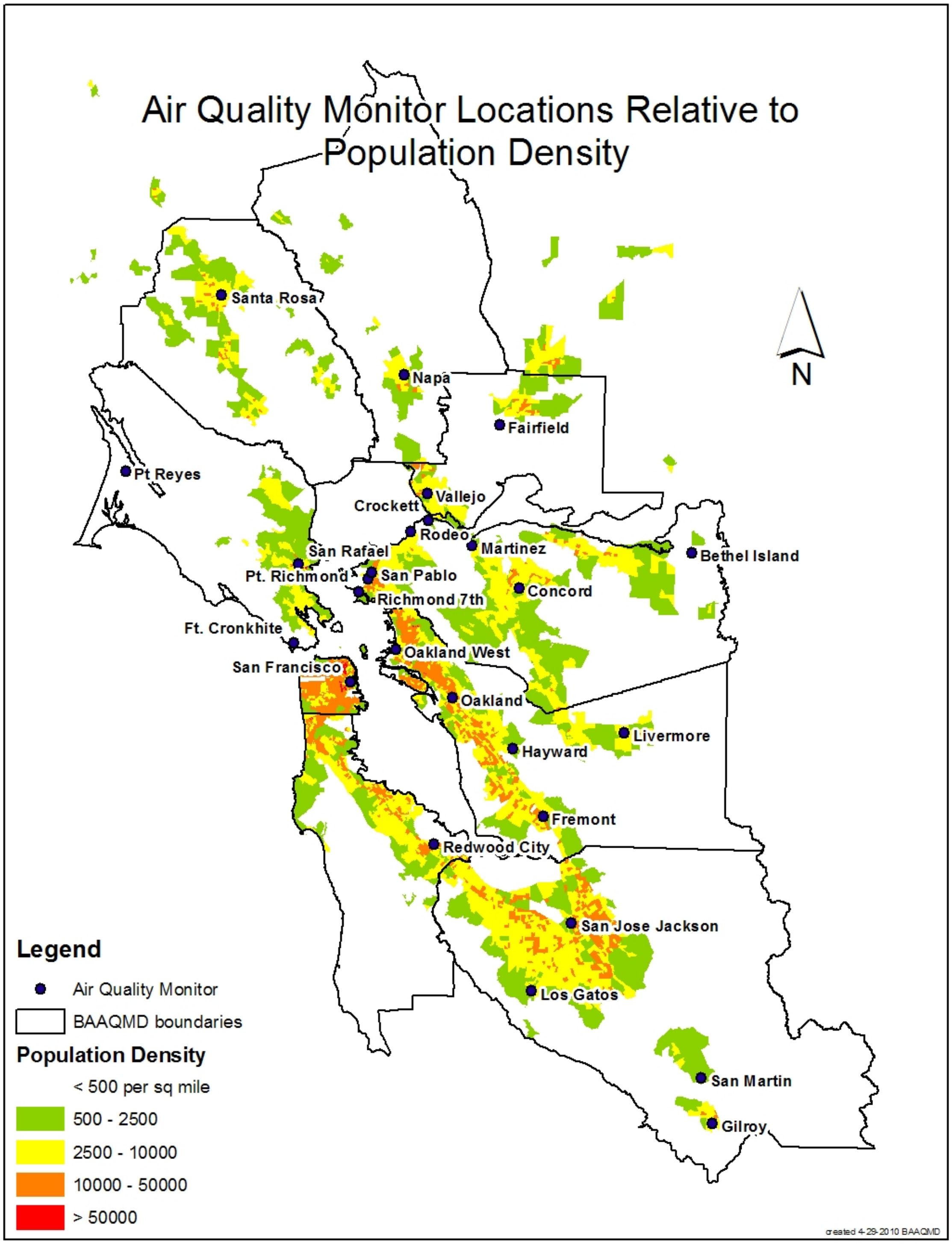

Figure 1. Map of Air District Monitoring Stations and Bay Area Population.

Source Impact

There are five refineries within the Air District: Chevron, Shell, Tesoro, ConocoPhillips, and Valero. Because these sources have the potential to emit significant amounts of SO_2 and H_2S, the Air District operates SO_2 and H_2S monitoring stations near these sources. The Port of Oakland also can be a significant source of particulates, carbon monoxide, and toxics and the Oakland West air monitoring station is located downwind of the Port to measure pollution impacts on West Oakland.

General Background

The Air District operates stations in areas that have no significant emissions from mobile, area, or industrial sources. At these sites, the measured concentrations reflect the transported air quality levels from upwind areas. When designing control strategies to reduce pollution levels, it is important to know if areas outside the boundaries of the Air District are contributing to high pollutant levels within the Air District. Where there are no significant emission sources upwind of a site, then the site is considered to be a general background site.

Regional Transport

The Air District shares a common boundary with six other air districts: Monterey Bay Unified Air Pollution Control District (APCD), San Joaquin Valley APCD, Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Lake County AQMD, and Northern Sonoma County APCD. When upwind areas have significant air pollution sources, pollutants transported into the Bay Area may result in overall higher air pollution levels within the Bay Area. The Air District operates monitoring sites near the borders of the Air District to measure the pollution concentrations transported into and out of the Bay Area Air District.

Criteria for Assessment

This assessment rates the importance of all criteria-pollutant monitors operated by the Air District. Criteria pollutants monitored are carbon monoxide, ozone, nitrogen dioxide, sulfur dioxide, PM_{10}, and $PM_{2.5}$. Lead is currently not being monitored but monitors will be operated after final regulations are issued by EPA in late 2010. In this assessment, monitors are designated as high, medium, or low in importance. These evaluations are based on how well the monitor helps meet the monitoring objectives defined in 40 CFR Part 58 Appendix D, and how well the monitor meets the monitoring objectives of the Air District. The assessment also suggests whether new monitoring sites are needed. Specific criteria used to assess the need for monitoring are based on the following:

- Meeting the minimum number of monitors as required by EPA.
- Maintaining a full station (all criteria plus toxics pollutants) in each of the nine Bay Area counties.
- Maintaining a full station in each of the 3 major Bay Area cities: Oakland, San Francisco, and San Jose.
- Locating a monitor at the expected maximum concentration for each pollutant.
- Locating monitors to determine background or transported pollutant levels.
- Operating fewer monitors for pollutants in attainment of the NAAQS.
- Operating more monitors for non-attainment pollutants (O_3 and $PM_{2.5}$).
- Operating fewer monitors for sites that are highly correlated.

Criteria Pollutants Assessment

Carbon Monoxide Monitoring

The Air District currently operates 13 permanent carbon monoxide (CO) monitors in its network. Carbon monoxide had been a problem in the past before lower tailpipe emission standards were enacted by California and national governmental agencies. The Air District has not exceeded the 1-hr CO standard since 1967, and has not exceeded the 8-hour national carbon monoxide standard since 1991. Carbon monoxide levels have continued to decrease since then to levels that are now less than 1/3 of the national standards at all locations in the Bay Area.

Figure 2 shows the current locations of carbon monoxide monitors. The stations are superimposed on a gridded carbon monoxide emission map. It shows that the stations are generally located in areas of significant CO emissions. Bethel Island, a background concentration site, can be seen in an area of low CO emissions.

EPA has no minimum requirements for the number of CO monitoring sites, and there are no monitors required for Air District SIP or Maintenance Plans. However, because the Air District will be operating an NCore site in San Jose beginning in January 2011, there is a requirement for a trace-level CO monitor at the San Jose station.

Table 1 lists the stations currently measuring carbon monoxide in the Bay Area by County. It also lists the monitoring objectives and the carbon monoxide design values for each site. The last column rates the importance of the data measured at the site in meeting the Air District's monitoring objectives.

The San Jose CO monitor is rated high because it is required as a part of NCore, is located in one of the three major cities in the Bay Area, and because it often has the highest carbon monoxide concentrations in the Bay Area (but still well below national CO standards).

In addition to the San Jose site, the Air District desires to operate at least one carbon monoxide monitor in each of the other nine Bay Area counties. Many of these monitors are rated medium because concentrations are low and there is no requirement to operate them. Currently only two counties have more than one CO monitor – Alameda and Contra Costa.

Alameda has three CO monitoring sites – Oakland, Oakland West, and Fremont. Oakland is rated high because Oakland is a major city in the Bay Area. Oakland West is rated high because it is a source-oriented site downwind of the Port of Oakland and Hwy 880. Fremont is another population oriented monitoring site, and since its design value is low and similar to other sites, it is rated low in importance.

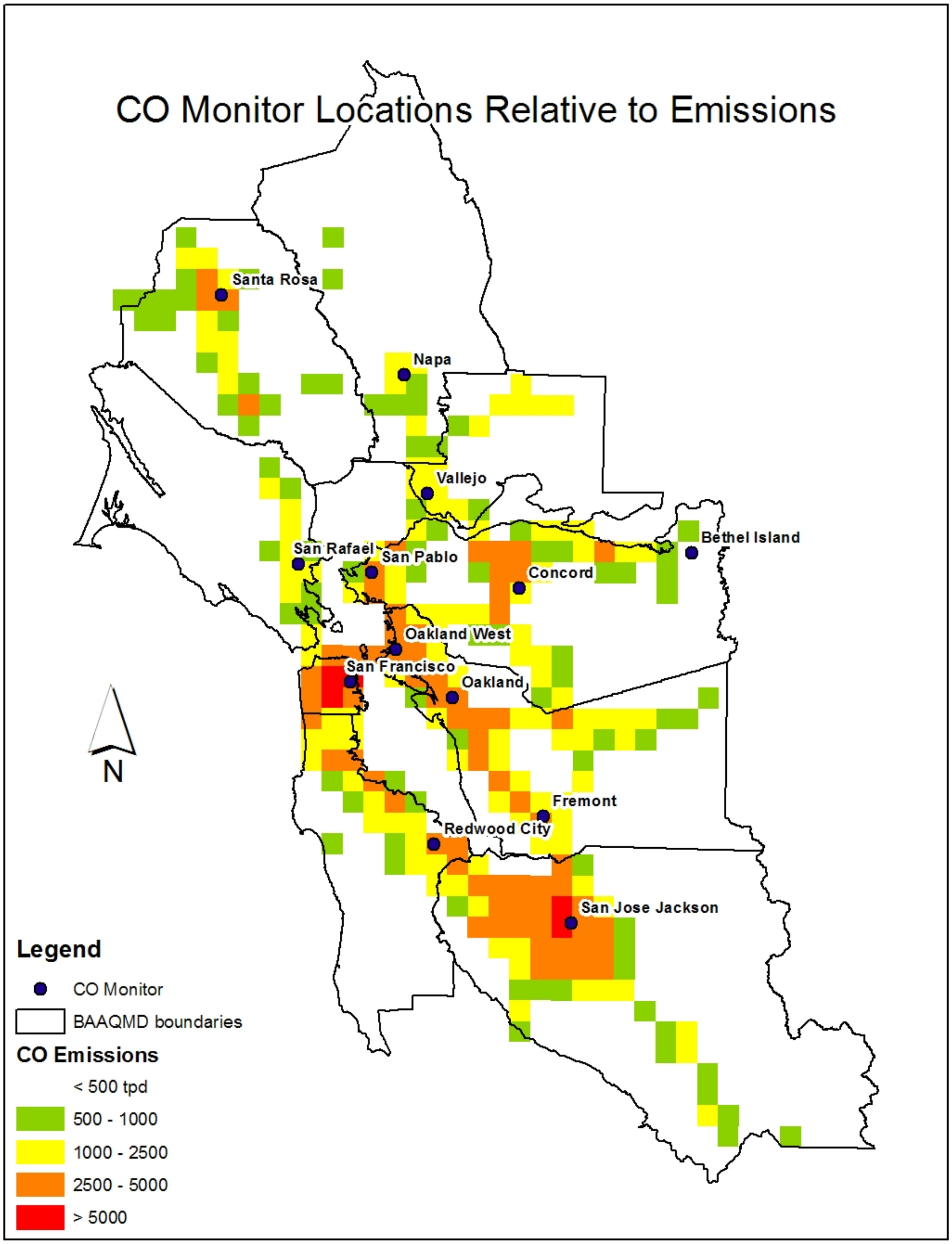

Figure 2. Map of Air District Carbon Monoxide Monitoring Stations and CO emissions.

Table 1. List of Permanent Carbon Monoxide Monitor Locations in 2009.

Station	County	Monitoring Objective	1-hr CO Design Value[1] (ppm)	8-hr CO Design Value[2] (ppm)	Assigned Value from Assessment
Fremont	Alameda	Population Oriented	2	1	Low
Oakland	Alameda	Population Oriented	3	2	High
Oakland West	Alameda	Source Oriented	3	2	High
Bethel Island	Contra Costa	Background	1	1	High
Concord	Contra Costa	Population Oriented	2	1	Medium
San Pablo	Contra Costa	Population Oriented	2	1	Low
San Rafael	Marin	Population Oriented	2	1	Medium
Napa	Napa	Population Oriented	2	1	Medium
San Francisco	San Francisco	Population Oriented	2	2	Medium
Redwood City	San Mateo	Population Oriented	3	2	Medium
San Jose	Santa Clara	NCore & Highest Concentration	3	2	High
Vallejo	Solano	Population Oriented	3	2	Medium
Santa Rosa	Sonoma	Population Oriented	2	1	Medium

[1] Design values at or below the national CO 1-hour standard of 35 ppm meet the standard.
[2] Design values at or below the national CO 8-hour standard of 9 ppm meet the standard.

Contra Costa County has three CO monitoring sites – Bethel Island, Concord, and San Pablo. The carbon monoxide monitor at Concord is rate medium because Concord is the largest city in Contra Costa with a large traffic volume nearby. Bethel Island is rated high because it is a carbon monoxide background location. San Pablo is another population oriented monitoring site, and since its design value is low and similar to other sites, it is rated low in importance.

Ozone Monitoring

The Air District currently operates 18 permanent ozone (O_3) monitors in its network. Although ozone levels have dropped significantly since the 1960s, exceedances of the national 8-hour ozone standard and the California 1-hour and 8-hours standards occur almost every year within the Bay Area. Because ozone is formed as a result of chemical reactions in the atmosphere, the highest ozone concentrations are usually found at distant downwind locations from oxides of nitrogen (NO_x) and non-methane organic carbon (NMOC) precursor pollutant emissions. Consequently, the highest concentrations in the Bay Area are usually at downwind locations in the East Bay, in Livermore, Concord, Fairfield, and Bethel Island; and in the South Bay, in San Martin and Gilroy.

Figure 3 shows the current Bay Area ozone monitoring stations. The stations are superimposed on a color-coded map showing ozone concentrations on a high-ozone day. There are a number of wind patterns on hot days which can produce high ozone concentrations. The most common summertime wind pattern in the Bay Area is a delayed afternoon sea breeze that carries precursor pollutants to the eastern part of the Air District, as is depicted in the figure. This pattern produces high ozone levels at the eastern region of the Bay Area. Ozone monitors have been placed at Bethel Island, Livermore, Concord, and Fairfield to measure these high levels. The modeling-map also suggests there may be a high ozone area south of Bethel Island where there is currently no monitor.

Another common wind pattern transports ozone precursors southward into the southern Santa Clara Valley, which results in elevated ozone concentrations at San Martin and Gilroy. Occasionally a very light wind pattern occurs, which results in high ozone concentrations close to source areas near the bay, generally at San Jose, Los Gatos, Fremont, Napa, and Hayward.

The number of EPA-required ozone monitors is based on the Metropolitan Statistical Area (MSA) population and design value; as specified in Table D-2 of 40 CFR Part 58, Appendix D – SLAMS Minimum O_3 Monitoring Requirements. Ozone design values are a calculated concentration which is used for comparison with the national standard to determine the attainment status of an area for that pollutant (see footnote no.1 in Table 2). Table 2 shows that the Air District monitoring network meets or exceeds the ozone minimum monitoring requirements. No additional monitors have been required in the SIP or Maintenance Plan for ozone. However, there is an additional EPA requirement that an ozone monitor be located at the San Jose NCore station.

Because the meteorological conditions that result in ozone levels exceeding the national standard occur over a wide area, ozone levels are highly correlated at many Bay Area ozone stations. These conditions are strong sunlight, hot temperatures, and light winds. Table 3 lists correlations between ozone monitors having a high correlation in 2008 ($r^2 \geq 0.75$, this assessment's definition of a high correlation). Sites with lower correlations are not shown. When two stations are highly correlated, they produce similar data and one of them may be discontinued with minimal information loss. Table 3 also lists the Average Relative Difference between the two stations, on a scale of 0 to 1. It is determined by taking the mean

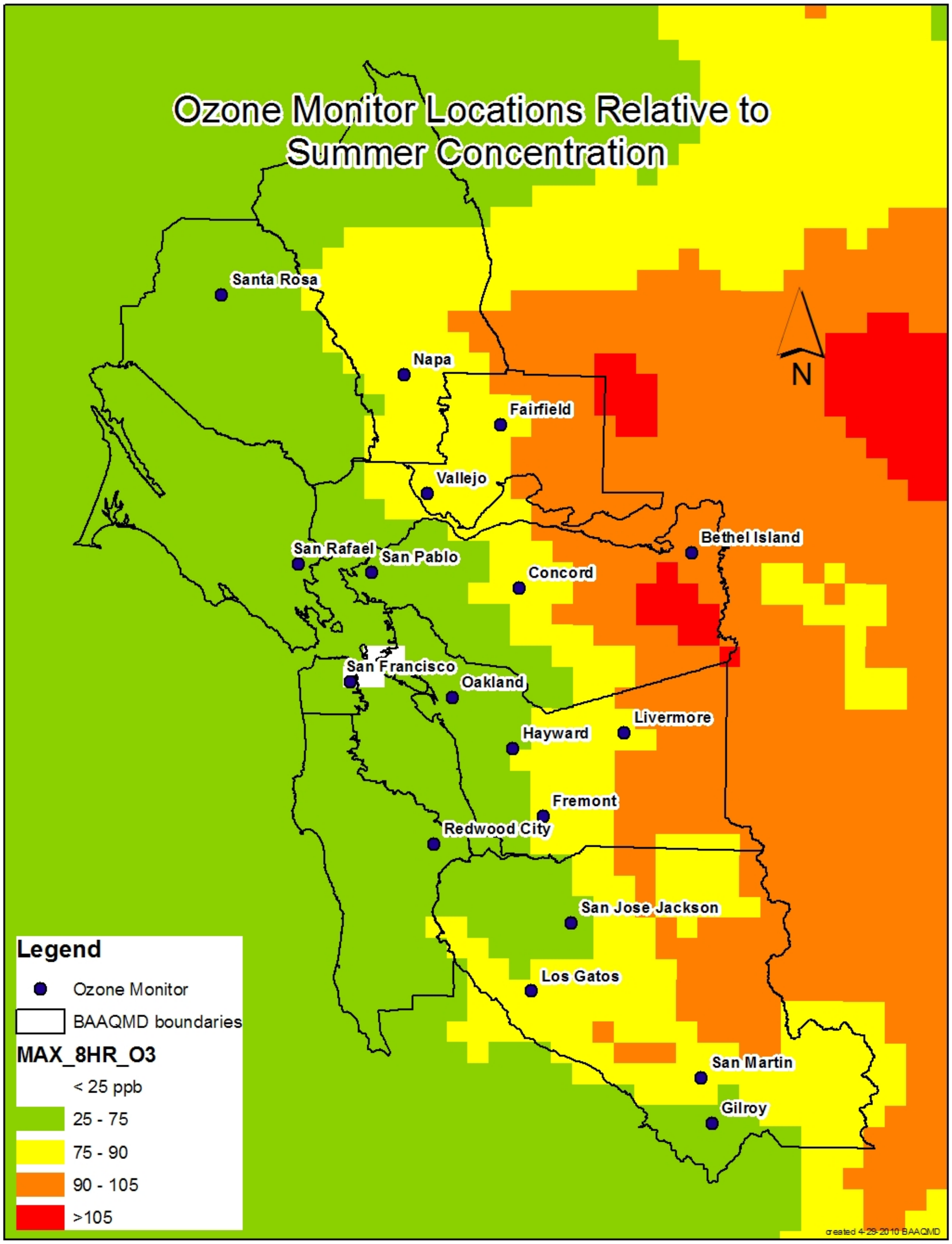

Figure 3. Map of Air District Ozone Monitoring Stations and typical maximum ozone levels on a high ozone day.

Table 2. Minimum Monitoring Requirements for Ozone SLAMS Sites.

MSA	County	Population in millions 2009	8-hour Design Value[1] (ppb) 2009	Number of Monitors Required	Number of Monitors Active
San Francisco-Oakland-Fremont	SF, Marin, Alameda, San Mateo, Contra Costa	4.32	78	3	10
San Jose-Sunnyvale-Santa Clara	Santa Clara, San Benito	1.84	72	2	6[2]
Santa Rosa-Petaluma	Sonoma	0.47	52	1	1
Vallejo-Fairfield	Solano	0.41	67	2	3[3]
Napa	Napa	0.13	61	1	1

[1] Design values are calculated at each monitoring site by taking the 3-year mean of the 4th highest 8-hour concentration. The design values shown for each MSA in this table are the highest design value of monitors in the MSA that are within the boundaries of the BAAQMD. Design values at or below the 0.075 ppm National Ambient Air Quality 8-hour Ozone Standard meet the standard.

[2] One of the monitors is located in Hollister in San Benito County and is operated by the Monterey Bay Unified Air Pollution Control District. Another monitor is located in Pinnacles National Monument and is operated by the National Park Service.

[3] One of the monitors is located in Vacaville in Solano County and is operated by the Yolo-Solano Air Pollution Control District.

Table 3. Ozone Stations Having Correlations ≥ 0.75 in 2008.

County	Station 1	Station 2	Avg Relative Diff (0 to 1)	Distance (km)	Correlation R-squared
Alameda	Fremont	Hayward	0.07	14	0.90
	Fremont	San Jose	0.11	22	0.88
	Fremont	Vallejo	0.10	67	0.80
	Hayward	Fremont	0.07	14	0.90
	Hayward	San Jose	0.09	36	0.85
	Hayward	Vallejo	0.08	53	0.82
	Hayward	Napa	0.09	76	0.80
	Hayward	Fairfield	0.12	63	0.79
	Livermore	Concord	0.07	35	0.90
	Livermore	Los Gatos	0.11	54	0.84
	Livermore	Fairfield	0.14	65	0.77
	Livermore	Bethel Island	0.12	38	0.77
	Oakland	San Pablo	0.10	29	0.81
Contra Costa	Bethel Island	Concord	0.11	35	0.82
	Bethel Island	Livermore	0.12	38	0.77
	Concord	Livermore	0.07	35	0.90
	Concord	Bethel Island	0.11	35	0.82
	Concord	Fairfield	0.12	32	0.79

Table 3 continued. Ozone Stations Having Correlations ≥ 0.75 in 2008.

County	Station 1	Station 2	Avg Relative Diff (0 to 1)	Distance (km)	Correlation R-squared
Contra Costa	Concord	Los Gatos	0.11	78	0.78
	San Pablo	Oakland	0.10	29	0.81
	San Pablo	San Rafael	0.10	14	0.80
	San Pablo	San Francisco	0.09	22	0.80
	San Pablo	Redwood City	0.11	54	0.77
Marin	San Rafael	Vallejo	0.18	28	0.83
	San Rafael	Redwood City	0.10	61	0.80
	San Rafael	San Pablo	0.10	14	0.80
Napa	Napa	Fairfield	0.07	21	0.91
	Napa	Vallejo	0.07	24	0.89
	Napa	Hayward	0.09	76	0.80
	Napa	San Jose	0.10	112	0.75
San Francisco	San Francisco	San Pablo	0.09	22	0.80
San Mateo	Redwood City	San Rafael	0.10	61	0.80
	Redwood City	San Pablo	0.11	54	0.77
Santa Clara	Gilroy	San Martin	0.37	9	0.86
	Gilroy	Hollister	0.57	26	0.77
	Los Gatos	San Jose	0.10	15	0.86
	Los Gatos	Livermore	0.11	54	0.84
	Los Gatos	Concord	0.11	78	0.78
	Los Gatos	Fairfield	0.11	111	0.75
	San Jose	Fremont	0.11	22	0.88
	San Jose	Los Gatos	0.10	15	0.86
	San Jose	Hayward	0.09	36	0.85
	San Jose	Fairfield	0.10	98	0.78
	San Jose	Vallejo	0.11	89	0.76
	San Jose	Napa	0.10	112	0.75
Solano	Fairfield	Napa	0.07	21	0.91
	Fairfield	Concord	0.12	32	0.79
	Fairfield	Hayward	0.12	63	0.79
	Fairfield	San Jose	0.10	98	0.78
	Fairfield	Vallejo	0.11	20	0.78
	Fairfield	Livermore	0.14	65	0.77
	Fairfield	Los Gatos	0.11	111	0.75
	Vallejo	Napa	0.07	24	0.89
	Vallejo	San Rafael	0.18	28	0.83
	Vallejo	Hayward	0.08	53	0.82
	Vallejo	Fremont	0.10	67	0.80
	Vallejo	Fairfield	0.11	20	0.78
	Vallejo	San Jose	0.11	89	0.76

of the absolute value difference between concentrations at the two sites and dividing by the average difference. Site pairs with a lower relative difference are more similar to each other than pairs with a larger difference. The next column lists the distance between sites in kilometers.

Table 4 lists the Bay Area stations currently measuring ozone by county. It also lists the monitoring objectives and the ozone design values for each site. The last column rates the importance of the data measured at the site in meeting both the Air District's and EPA's monitoring objectives.

Table 4. List of Permanent Ozone Monitor Locations in 2009.

Station	County	Monitoring Objective	8-hr Design Value[1] (ppb)	Assigned Value from Assessment
Fremont	Alameda	Population Oriented	61	Low
Hayward	Alameda	Population Oriented	64	Medium
Livermore	Alameda	Population Oriented & Highest Concentration	78	High
Oakland	Alameda	Population Oriented	57	High
Bethel Island	Contra Costa	Transport & Highest Concentration	74	High
Concord	Contra Costa	Population Oriented & Highest Concentration	74	High
San Pablo	Contra Costa	Population Oriented	50	Low
San Rafael	Marin	Population Oriented	52	High
Napa	Napa	Population Oriented	61	High
San Francisco	San Francisco	Population Oriented	48	High
Redwood City	San Mateo	Population Oriented	56	High
Gilroy	Santa Clara	Population Oriented & Highest Concentration	70	High
Los Gatos	Santa Clara	Population Oriented	70	High
San Jose	Santa Clara	NCore	62	High
San Martin	Santa Clara	Highest Concentration	72	High
Fairfield	Solano	Transport & Highest Concentration	67	High
Vallejo	Solano	Population Oriented	61	Medium
Santa Rosa	Sonoma	Population Oriented	52	High

[1] Design values at or below the national Ozone standard of 75 ppb meet the standard.

The importance of each ozone monitor is related to:

- EPA minimum monitoring requirements.
- Demonstration of attainment of air quality standards.
- Proximity of the site to other sites.
- The monitoring purpose.
- The number of monitors in a county.
- Data correlation to neighboring sites.
- The size of the population in the surrounding area.

The Air District desires to operate at least one ozone monitor in each of the nine Bay Area counties. There are five counties with only one monitor: San Francisco, San Mateo, Marin, Sonoma, and Napa. These monitors are highly rated because 8-hour ozone levels are higher than one half of the national standard (currently 75 ppb), and they are the only measurements in those counties. The monitors in Napa and Sonoma Counties are also needed to meet the MSA minimum monitoring requirements, listed in Table 2.

Alameda County has four ozone monitors. Livermore is rated high because it has a design value above the national standard. Oakland is rated high because it is a major city in the Bay Area and it is not well correlated with Livermore (r^2=0.16). Hayward and Fremont sites are well correlated with each other, having an (r^2=0.90, see Table 3), and are located near each other. Thus, one monitor could be used to represent the entire Hayward-Fremont area. In addition, both Fremont and Hayward are well correlated with San Jose, r^2 = 0.88 and 0.85 respectively, suggesting San Jose ozone measurements could reasonably represent those areas as well. Neither Fremont nor Hayward has design values close to the standard, and the locations do not have any major importance, so both could be rated low if San Jose ozone measurements are substituted. However, Hayward ozone measurements are used as input to the daily ozone forecast model. Consequently, Hayward is rated as medium, and Fremont is rated as low.

Contra Costa County has three ozone monitoring sites. Bethel Island and Concord are rated high because their design values are very close to the national standard, and both are likely to exceed the new proposed ozone standard expected to be finalized in the fall of 2010 (the new standard is expected to be in the range of 0.60 ppm to 0.70 ppm). These sites are also important because Bethel Island is a site located to measure pollutants into and out of the Central Valley, and Concord is the largest city in Contra Costa County. San Pablo is rated low because its design value is low and it is well correlated with Oakland (r^2=0.81).

EPA requires that the Santa Clara and San Benito MSA have at least 2 monitors. Monterey Bay Unified APCD already operates one ozone monitor in San Benito County at Hollister. As long as they continue to operate it, EPA requires that the BAAQMD operate only one ozone monitor in Santa Clara County. Currently, Santa Clara County has four ozone monitoring sites. The San Jose station is in one of the 3 major cities of the Bay Area, and is an NCore site. Gilroy, Los Gatos, and San Martin monitors have design values below the current national standard, but are likely to equal or exceed the new proposed ozone standard. The correlation between the San Jose and Los Gatos monitors, and between the San Martin and Gilroy monitors, is high (0.86 for each). However, even though correlations are high for these sites, there are some days when ozone exceedances occur at only one of the four sites, due to localized sea breeze patterns. Thus, all four sites are rated high.

Solano County is in the Vallejo-Fairfield MSA, and must have two monitors to meet EPA ozone monitoring requirements. Yolo-Solano APCD operates one ozone monitor in Vacaville. The EPA requirement will be met as long as the Air District operates at least one other monitor. Currently the BAAQMD operates two ozone monitoring sites in Solano County, Vallejo and Fairfield. Both sites have recorded ozone exceedances in the past three years. Fairfield is rated high because it is an ozone transport site. Vallejo is rated medium because it is highly correlated with Napa (r^2=0.89), and a number of other sites.

Nitrogen Dioxide Monitoring

The Air District currently operates 15 permanent nitrogen dioxide monitors in its network. Nitrogen dioxide (NO_2) monitors also measure nitrogen oxide (NO), and the sum of NO_2 and NO, called NO_x. NO/NO_2 measurements have been made in the Bay Area since the 1960s, and NO_2 levels have never exceeded the national 24-hour standard. There is currently no California or national nitrogen oxide (NO) standard. In February 2010, EPA promulgated a new 1-hour NO_2 standard, and a review of Bay Area historical data have shown that the new standard was last exceeded in 2006 at the San Francisco station (with 0.107 ppm). NO and NO_2 are formed from vehicle, power plant and other industrial emissions, and contribute to the formation of ozone and fine particulate.

Figure 4 shows the current locations of nitrogen dioxide monitors. The stations are superimposed on a gridded NO_x emission map. NO_x is used in place of NO_2 because the amount of NO_x is better quantifiable and because NO and NO_2 concentrations change throughout the day depending upon the amount of sunlight, the ambient temperature, and the concentration of oxidizing pollutants available in the air. The map shows that the stations are generally located in areas of high NO_x emissions. Bethel Island, a site located to measure transported pollutants, is in an area of low NO_x emissions.

By 2013, the new regulations require the Air District to operate two additional population-oriented monitors and three roadside monitors located within 50 meters of major freeways. The new monitoring requirements are based on Bay Area population and traffic counts. Monitoring requirement details are listed in Table 5. No additional monitors are required for the SIP or Maintenance Plans because the Air District has never been designated as non-attainment for NO_2.

Table 6 lists the stations currently measuring nitrogen dioxide in the Bay Area in each county. It also lists the monitoring objectives and the NO_2 design values for each site. The last column rates the importance of the data measured at the site in meeting Air District and EPA monitoring objectives.

The Air District desires to operate at least one NO_2 monitor in each of the nine Bay Area counties. There are seven counties with only one monitor: San Francisco, San Mateo, Marin, Sonoma, Santa Clara, Solano, and Napa. Five of these, San Mateo, Marin, Sonoma, Solano, and Napa are rated medium in importance because NO_2 levels are only about one half of the 1-hour national standard, and less than a quarter of the national annual standard.

The monitor at San Francisco is rated high because San Francisco is one of the three major cities in the Bay Area. The monitor at San Jose is rated high because it is one of the three major cities in the Bay Area; it is required as part of NCore monitoring, and it meets the minimum monitoring requirements for Santa Clara County under the new EPA NO_2 regulations.

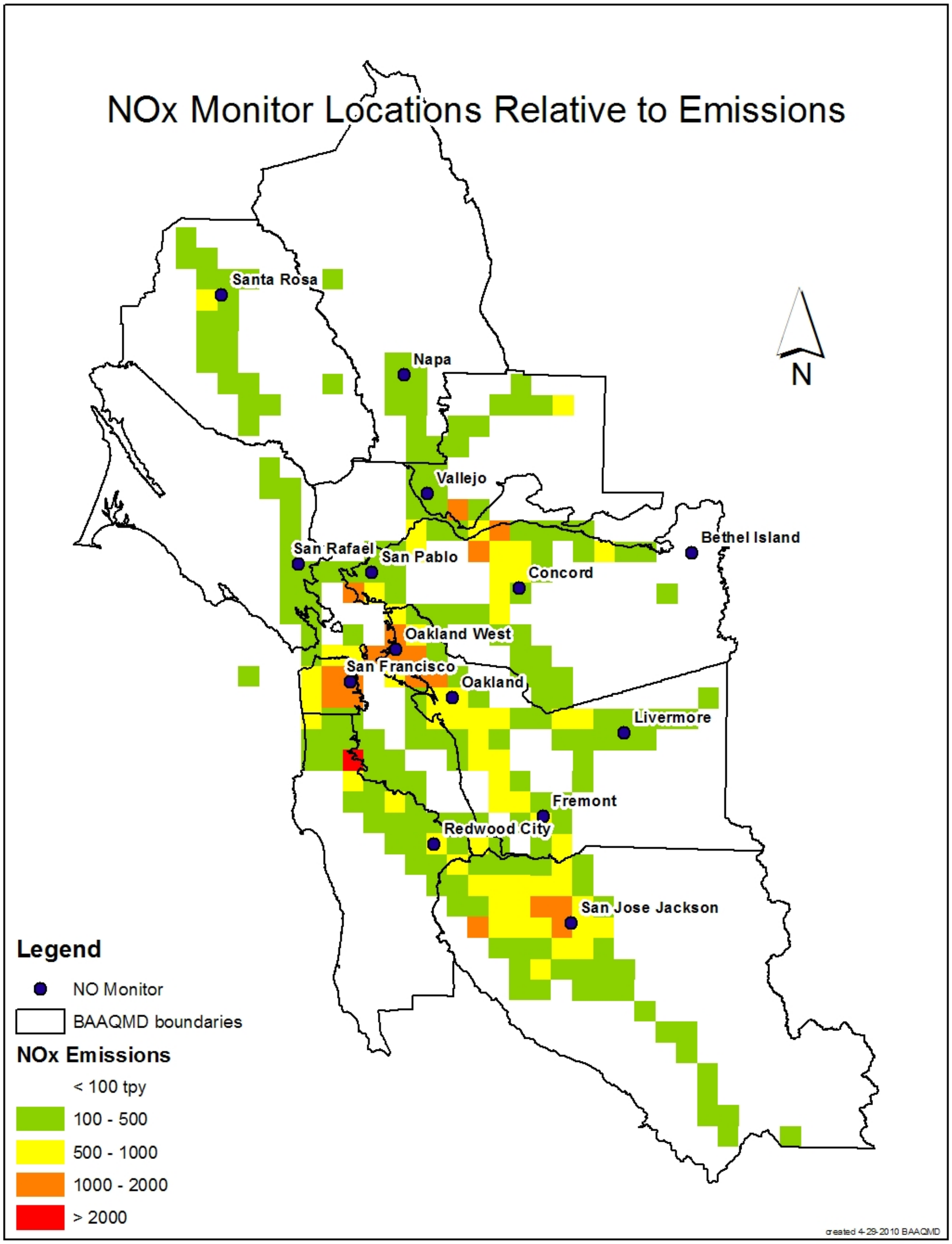

Figure 4. Map of Air District Nitrogen Dioxide Monitoring Stations and NO_x emissions.

Table 5. Minimum Monitoring Requirements for NO_2 SLAMS Sites in 2013.

MSA	County	Population in millions 2009	Annual Design Value[1] (ppb) 2009	24-hour Design Value[2] (ppb) 2009	Area-wide Monitors Required / Roadside Monitors Required	Area-wide Monitors Active / Roadside Monitors Active
SF-Oakland-Fremont	SF, San Mateo, Alameda, Marin, Contra Costa	4.32	16	54	1 / 2	10 / 0
San Jose-Sunnyvale-Santa Clara	Santa Clara, San Benito	1.84	15	53	1 / 1	1 / 0
Santa Rosa-Petaluma	Sonoma	0.47	9	38	0 / 0	1 / 0
Vallejo-Fairfield	Solano	0.41	10	42	0 / 0	1 / 0
Napa	Napa	0.13	10	39	0 / 0	1 / 0

1 Annual design values are determined for each monitoring site by calculating the arithmetic average of all of the reported 1-hour values for the most current year. The design values shown for each MSA in this table are the highest design value of monitors in the MSA that are within the boundaries of the BAAQMD. Design values at or below the national NO_2 annual standard of 53 ppb meet the standard.

2 Daily design values are calculated at each monitoring site by taking the 3-year mean of the 8^{th} highest daily maximum 1-hour concentration. The design values shown for each MSA in this table are the highest design value of monitors in the MSA that are within the boundaries of the BAAQMD. Design values at or below the national NO_2 1-hour standard of 100 ppb meet the standard.

Alameda County has four nitrogen dioxide monitors. Livermore is rated high because ozone exceedances occur and NO/NO_2 data are needed for modeling and analysis as ozone precursors. Oakland is rated high because it is one of the major cities in the Bay Area. Oakland West is rated high because it is a source-oriented site. Fremont is rated low because there is no particular need for the monitor, and the design value is well below national air quality standards.

Contra Costa County has three nitrogen dioxide monitoring sites. Bethel Island and Concord are rated high because NO/NO_2 data are needed for modeling and analysis of ozone exceedances. Bethel Island is also important for measuring NO_x transport to and from neighboring air districts. San Pablo is rated low because there is no specific need for the data, and NO_2 design values are low.

Table 6. List of Permanent Nitrogen Dioxide Monitor Locations in 2009.

Station	County	Monitoring Objective	1-hour Design Value[1] (ppb)	Annual Design Value[2] (ppb)	Assigned Value from Assessment
Fremont	Alameda	Population Oriented	47	13	Low
Livermore	Alameda	Population Oriented	47	12	High
Oakland	Alameda	Population Oriented	52	14	High
Oakland West	Alameda	Source Oriented	49	16	High
Bethel Island	Contra Costa	Transport & Backgrnd	31	6	High
Concord	Contra Costa	Population Oriented	37	9	Medium
San Pablo	Contra Costa	Population Oriented	44	12	Low
San Rafael	Marin	Population Oriented	45	12	Medium
Napa	Napa	Population Oriented	39	10	Medium
San Francisco	San Francisco	Population Oriented	54	15	High
Redwood City	San Mateo	Population Oriented	46	12	Medium
San Jose	Santa Clara	NCore	53	15	High
Vallejo	Solano	Population Oriented	42	10	Medium
Santa Rosa	Sonoma	Population Oriented	38	9	Medium

[1] Design values at or below the national NO_2 1-hour standard of 100 ppb meet the standard.
[2] Design values at or below the national NO_2 annual standard of 53 ppb meet the standard.

The new NO_2 regulations require three roadside monitors by 2013. The Air District is currently studying optimal locations for these new monitors. Roadside monitors are classified as microscale monitoring, and will not be considered representative of areas where the general population live and work which are neighborhood or urban scale measurements. Consequently, roadside monitoring will not affect the importance rating of monitors located at the permanent Air District stations.

Sulfur Dioxide Monitoring

The Air District currently operates nine permanent sulfur dioxide monitors (SO_2) in its network. SO_2 measurements have been made in the Bay Area since 1969, and during that time SO_2 levels have never exceeded the national 24-hour or the national annual standard. In June 2010, EPA revised the primary SO_2 standard by establishing a new 1-hour standard at a level of 75 ppb, and revoking the two existing 24-hour and annual primary standards. SO_2 also contributes to the formation of fine particulate pollution.

Figure 5 shows the current locations of sulfur dioxide monitors. The stations are superimposed on a gridded SO_2 emission map. The map shows areas off the coast and on the San Francisco Bay with SO_2 emissions. These emissions are from ships. The Oakland West SO_2 monitor is located downwind of the Port of Oakland to measure SO_2 from shipping. The other major source of SO_2 emissions are Bay Area refineries owned by Chevron, Shell, Tesoro, Valero, and ConocoPhillips. Most of the remaining monitors are located near these refineries. One other SO_2 monitor is located at the San Jose NCore site, a requirement of 40 CFR Part 58. Bethel Island also has an SO_2 monitor to measure background levels and pollutant transport to and from neighboring air districts.

The Air District already meets the minimum number of SO_2 monitors under the new monitoring requirements. See Table 7 for monitoring requirement details. No additional monitors are required for SIP or Maintenance Plans, because the Air District has never been designated as non-attainment for SO_2, and no SIP or Maintenance Plans have been prepared for SO_2.

Table 8 lists the stations currently measuring sulfur dioxide in the Bay Area in each county. It also lists the monitoring objectives and the SO_2 design values based on the new 1-hour standard for each site. It shows that current design values are significantly below the 75 ppb 1-hour SO_2 national standard, and therefore the Bay Area will be in attainment of the new SO_2 standard. The last column rates the importance of the data measured at the site in meeting both the Air District's and EPA's monitoring objectives.

Unlike other pollutants, SO_2 concentrations are normally measured near sources. Counties without sources usually have concentrations near background levels. Under the EPA regulations, the Air District is only required to operate three SO_2 monitors, two in the San Francisco-Oakland-Fremont MSA, and one in San Jose-Sunnyvale-Santa Clara MSA. The Air District currently operates a required NCore SO_2 monitor at San Jose, which also satisfies the San Jose-Sunnyvale-Santa Clara MSA requirement. This monitor is rated high.

The only SO_2 monitor in Alameda County is at the Oakland West monitoring station. These measurements are rated high due to the proximity of shipping lanes and the Port of Oakland.

Contra Costa County has six SO_2 monitors. Three monitors are rated high: Concord which is downwind of the Tesoro Refinery, Crockett which is downwind of the ConocoPhillips Refinery, and Martinez which is downwind of the Shell Refinery. These three monitors exceed the two-monitor requirement for the San Francisco-Oakland-Fremont MSA.

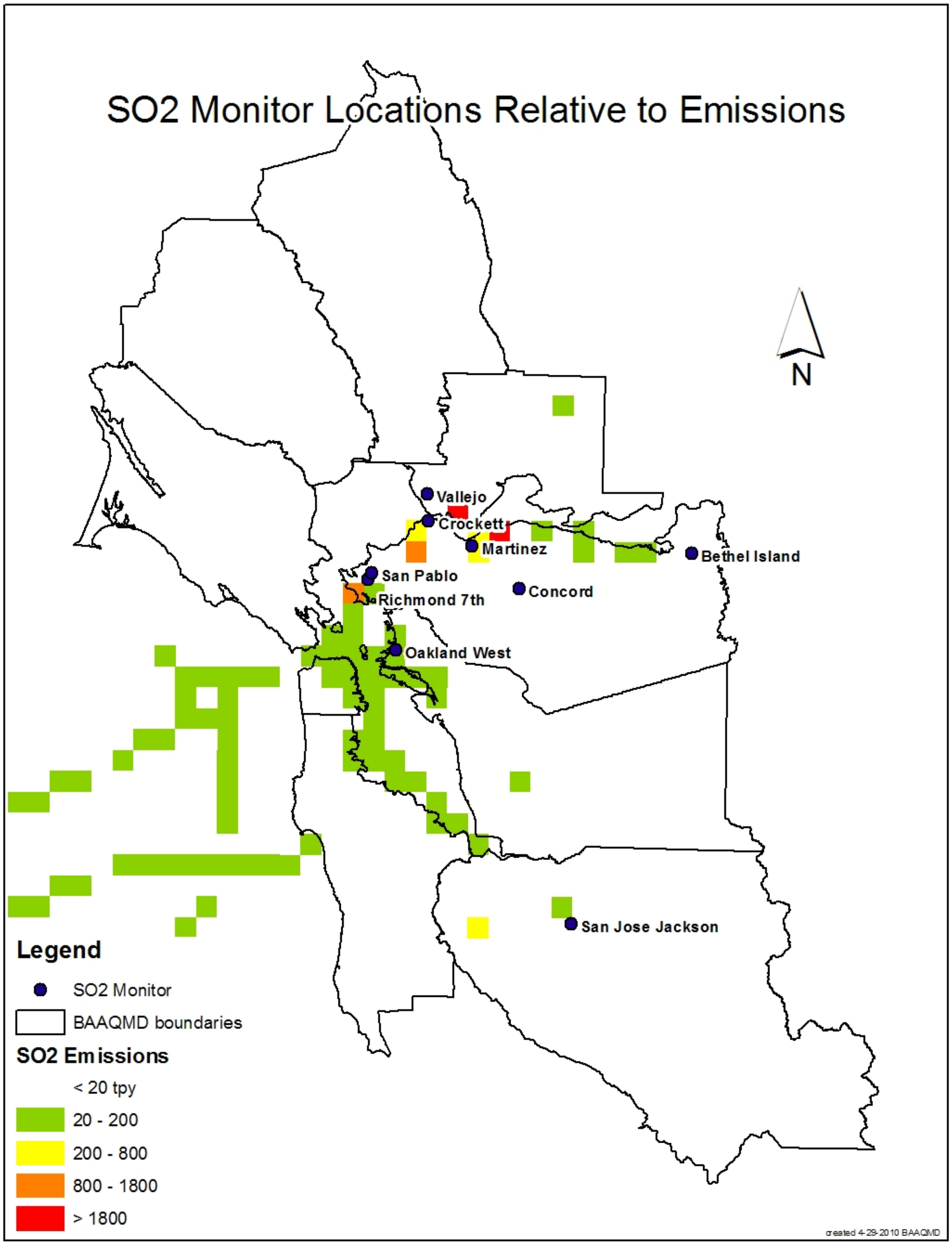

Figure 5. Map of Air District Sulfur Dioxide Monitoring Stations and SO_2 emissions.

Table 7. Minimum Monitoring Requirements for SO_2 SLAMS Sites in 2013.

MSA	County	Number of Monitors Required	Number of Monitors Active
San Francisco-Oakland-Fremont	SF, San Mateo, Alameda, Marin, Contra Costa	2	7[1]
San Jose-Sunnyvale-Santa Clara	Santa Clara, San Benito	1	1
Santa Rosa-Petaluma	Sonoma	0	0
Vallejo-Fairfield	Solano	0	1
Napa	Napa	0	0

[1] The seven monitors include the permanent Crockett monitor which does not meet certain SLAMS siting criteria and is designated as an SPM monitor.

Table 8. List of Permanent Sulfur Dioxide Monitor Locations in 2009.

Station	County	Monitoring Objective	1-hour Design Value[1] (ppb)	Assigned Value from Assessment
Oakland West	Alameda	Source Oriented	13	High
Bethel Island	Contra Costa	Transport & Backgrnd	8	Medium
Concord	Contra Costa	Population Oriented	14	High
Crockett	Contra Costa	Source Oriented	25	High
Martinez	Contra Costa	Source Oriented	18	High
Richmond 7th	Contra Costa	Source Oriented	18	High/Low
San Pablo	Contra Costa	Source Oriented	14	High/Low
San Jose	Santa Clara	NCore	5	High
Vallejo	Solano	Source Oriented	8	Medium

[1] Design values at or below the national SO_2 1-hour standard of 75 ppb meet the standard.

There are three other sites in Contra Costa County. The San Pablo and the Richmond 7th monitoring sites are downwind of Chevron Refinery. These sites are close to each other (one mile apart). One site should be rated high and the other low because of their proximity and similar low design values. The Bethel Island monitor is rated medium in importance because it provides background SO_2 concentration data.

The Solano County monitor in Vallejo is 5.4 miles downwind of the Valero Refinery on east wind days and is rated medium because of its distance from the refinery.

PM_{10} Monitoring

The Air District currently operates seven permanent PM_{10} monitors in its network. The highest Bay Area PM_{10} levels in the last three years are about half of the 150 $\mu g/m^3$ national 24-hour standard. The last exceedances of the 24-hour national standard were in 1991 at Livermore and San Jose. The Air District also analyzes PM_{10} filters to determine ambient levels of anions and cations, and organic carbon/elemental carbon.

Figure 6 shows the current Bay Area PM_{10} monitoring stations. The stations are superimposed on a gridded PM_{10} emission map. It shows that the stations are generally located in areas of high PM_{10} emissions. Bethel Island, a background/transport site, is located in an area of low PM_{10} emissions.

The number of required PM_{10} monitors for each MSA in the Bay Area is determined by its population and design value, as specified in Table D-4 of Appendix D to 40 CFR Part 58 – PM_{10} Minimum Monitoring Requirements. PM_{10} design values are a calculated concentration (see footnote no.1 below in Table 9) which are used to determine the PM_{10} attainment status of an area. Table 9 shows that the Air District monitoring network meets or exceeds the PM_{10} minimum monitoring requirements. No additional monitors are required for the SIP or Maintenance Plan because the Bay Area has never been designated as non-attainment for PM_{10}, and no SIP or Maintenance Plans have been prepared for PM_{10}.

Table 9. Minimum Monitoring Requirements for PM_{10} SLAMS Sites.

MSA	County	Population in millions 2009	Max 24 hr Value $\mu g/m^3$ (2007-09)	Number of Monitors Required	Number of Monitors Active
San Francisco-Oakland-Fremont	SF, San Mateo, Alameda, Marin, Contra Costa	4.32	78.2	2	5
San Jose-Sunnyvale-Santa Clara	Santa Clara, San Benito	1.84	72.9	2	2[2]
Santa Rosa-Petaluma	Sonoma	0.47	None[3]	0	0
Vallejo-Fairfield	Solano	0.41	None[3]	0	0
Napa	Napa	0.13	51.7	0	1

[1] For PM_{10}, the design value is defined as the expected number of exceedances per year, which is calculated by averaging the number of exceedances for the past 3 years. Since there were no exceedances in the past 3 years, the PM_{10} design value is zero for all MSA's within the Bay Area Air Quality Management District. The 24-hour standard (150 $\mu g/m^3$) is attained when the design value is less than or equal to one. Instead of the PM_{10} design value, the number shown in this column is the highest 24-hour PM_{10} concentration in 2007-2009.

[2] One of the monitors is located in Hollister in San Benito County and is operated by the Monterey Bay Unified Air Pollution Control District.

[3] There are no FRM or FEM PM_{10} monitors in this MSA.

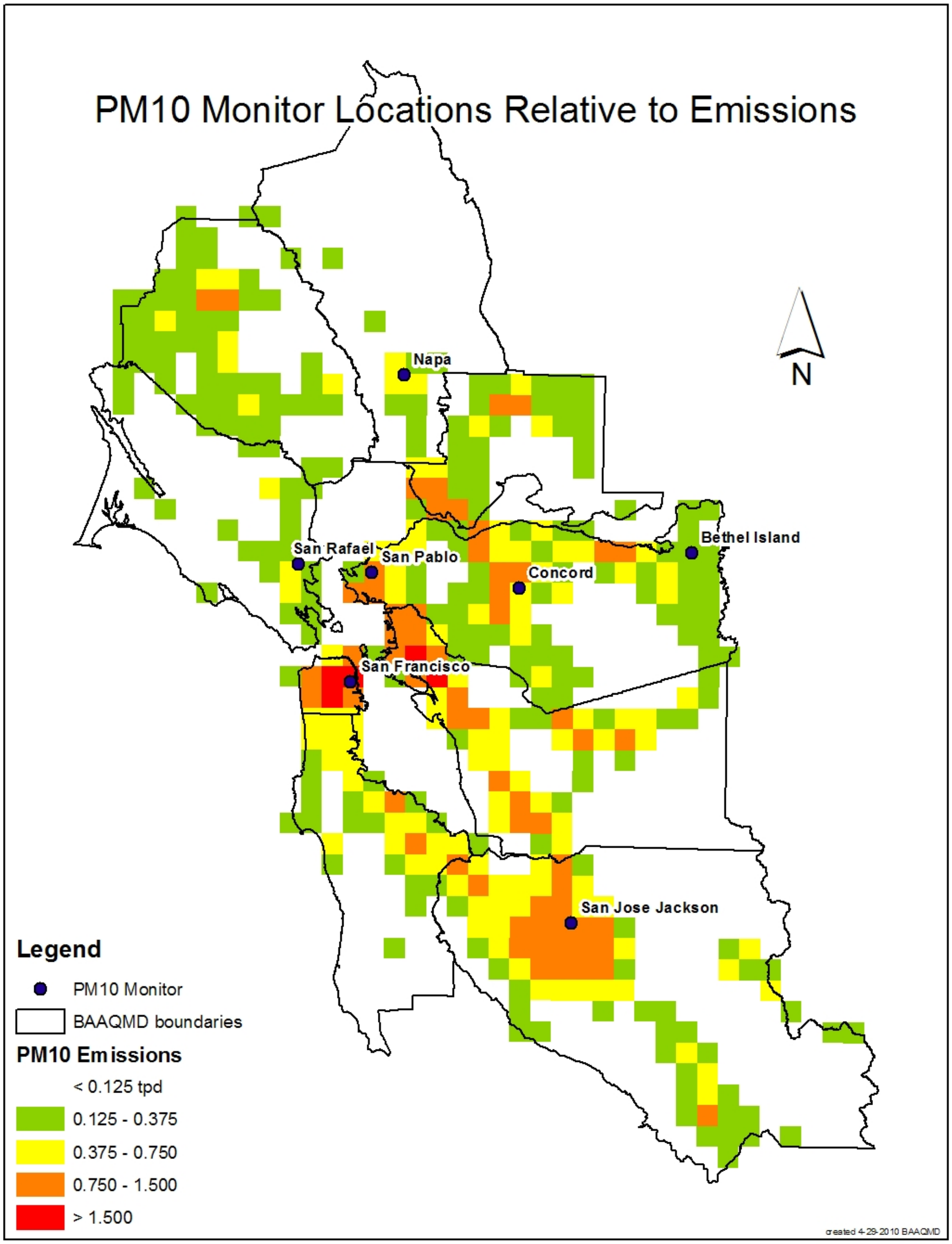

Figure 6. Map of Air District PM_{10} Monitoring Stations and PM_{10} emissions.

Because PM_{10} levels are one-half or less of the national standard, there is no need to measure PM_{10} in every county. Instead, monitoring resources have been put into sampling for fine particulate sampling ($PM_{2.5}$) because the Bay Area is not in attainment of the 24-hour $PM_{2.5}$ national standard, and because the fine particles have more serious health impacts.

Table 10 shows correlations between the Bay Area PM_{10} monitors for 2008. The table shows PM_{10} correlations to be lower than the ozone correlations in Table 3. This suggests that PM_{10} is more of a local problem, while ozone is more of an area-wide problem. The only sites with a high correlation are San Francisco and San Pablo, with an $r^2=0.88$. Table 10 also lists the Average Relative Difference between each two stations, on a scale of 0 to 1. It is determined by taking the mean of the absolute value difference between concentrations at the two sites and dividing by the average difference. Site pairs with a lower relative difference are more similar to each other then pairs with a larger difference. The next column lists the distance between sites in kilometers.

Table 11 lists the stations currently measuring PM_{10} in the Bay Area along with monitoring objective and the maximum 24-hour value ($\mu g/m^3$) from 2007-09 for each site. The last column rates the importance of the data measured at the site in meeting the Air District and EPA monitoring objectives.

Under EPA regulations, the Air District is required to operate two PM_{10} monitors in the San Francisco-Oakland-Fremont MSA. Currently there are five PM_{10} monitors within the MSA which includes Contra Costa, Marin, and San Francisco Counties. Bethel Island, Concord, and San Rafael are rated medium because none are measuring high PM_{10} concentrations. San Francisco is rated high because it is located in one of the three major Bay Area cities, and because it is highly correlated with San Pablo ($r^2=0.88$), shown in Table 10. San Pablo is rated low because its PM_{10} values are low and the data are highly correlated with San Francisco data.

The Air District operates one PM_{10} monitor in Napa County. There is no requirement for PM_{10} monitoring in Napa County, and the concentrations are not particularly high, so it is rated as medium.

There is currently no PM_{10} monitoring in Alameda County. The PM_{10} emissions map suggests that due to high PM_{10} emissions in Oakland, a monitor should be located in the Oakland area.

Two PM_{10} monitors are required for the San Jose-Sunnyvale-Santa Clara MSA. One monitor is being operated by the Monterey Bay Unified APCD in San Benito County. The second monitor is at the San Jose station. It will also be used to derive PM course measurements, which can be calculated by subtracting $PM_{2.5}$ concentrations from PM_{10} concentrations. Consequently, the San Jose PM_{10} monitor is rated high.

Table 10. PM_{10} Correlations Between Stations in 2008.

County	Station 1	Station 2	Avg Relative Diff (0 to 1)	Distance (km)	correlation R-squared
Contra Costa	Bethel Island	Concord	0.36	35	0.61
	Bethel Island	Napa	0.34	66	0.44
	Bethel Island	San Jose	0.33	76	0.38
	Bethel Island	San Rafael	0.39	77	0.34
	Bethel Island	San Pablo	0.37	63	0.30
	Bethel Island	San Francisco	0.38	72	0.27
	Concord	Napa	0.25	48	0.74
	Concord	San Rafael	0.22	43	0.66
	Concord	San Jose	0.33	66	0.64
	Concord	Bethel Island	0.36	35	0.61
	Concord	San Pablo	0.30	29	0.53
	Concord	San Francisco	0.33	38	0.46
	San Pablo	San Francisco	0.12	22	0.88
	San Pablo	San Rafael	0.20	14	0.74
	San Pablo	San Jose	0.21	79	0.58
	San Pablo	Concord	0.30	29	0.53
	San Pablo	Napa	0.24	39	0.53
	San Pablo	Bethel Island	0.37	63	0.30
Napa	Napa	Concord	0.25	48	0.74
	Napa	San Rafael	0.22	42	0.69
	Napa	San Jose	0.22	112	0.60
	Napa	San Pablo	0.24	39	0.53
	Napa	Bethel Island	0.34	66	0.44
	Napa	San Francisco	0.27	61	0.44
San Francisco	San Francisco	San Pablo	0.12	22	0.88
	San Francisco	San Rafael	0.23	25	0.67
	San Francisco	San Jose	0.24	64	0.50
	San Francisco	Concord	0.33	38	0.46
	San Francisco	Napa	0.27	61	0.44
	San Francisco	Bethel Island	0.38	72	0.27
Santa Clara	San Jose	Concord	0.33	66	0.64
	San Jose	Napa	0.22	112	0.60
	San Jose	San Pablo	0.21	79	0.58
	San Jose	San Rafael	0.25	88	0.56
	San Jose	San Francisco	0.24	64	0.50
	San Jose	Bethel Island	0.33	76	0.38
Marin	San Rafael	San Pablo	0.20	14	0.74
	San Rafael	Napa	0.22	42	0.69
	San Rafael	San Francisco	0.23	25	0.67
	San Rafael	Concord	0.22	43	0.66
	San Rafael	San Jose	0.25	88	0.56
	San Rafael	Bethel Island	0.39	77	0.34

Table 11. List of Permanent PM_{10} Monitor Locations in 2009.

Station	County	Monitoring Objective	Max 24 hour Value ($\mu g/m^3$) 2007-09	Assigned Value from Assessment
Bethel Island	Contra Costa	Background & Transport	78.2	Medium
Concord	Contra Costa	Population Oriented	50.5	Medium
San Pablo	Contra Costa	Population Oriented	54.4	Low
San Rafael	Marin	Population Oriented	52.6	Medium
Napa	Napa	Population Oriented	51.7	Medium
San Francisco	San Francisco	Population Oriented	65.7	High
San Jose	Santa Clara	NCore	64.7	High

[1] 24-hour values at or below the national PM_{10} standard of 150 $\mu g/m^3$ meet the standard.

$PM_{2.5}$ Monitoring

The Air District currently operates $PM_{2.5}$ monitors at 13 sites in the Bay Area, and the California Air Resources Board operates a monitoring site in Point Reyes. Nine of the $PM_{2.5}$ sites have continuous monitors, four sites have both continuous and filter-based monitors, and one site has two filter-based monitors. The Air District is in the process of replacing its non-regulatory continuous samplers with federal equivalent method (FEM) continuous samplers. To date, seven of the sites with continuous samplers use FEM-type samplers. By the fall of 2010, three more non-FEM samplers will be replaced with FEM samplers. Exceedances of the national 24-hour $PM_{2.5}$ standard have been recorded at most sites in the Bay Area over the last 3 years. Most exceedances occur during winter months, but can also occur during large forest fires.

Figure 7 shows the current Bay Area $PM_{2.5}$ monitoring stations. The stations are superimposed on a gridded $PM_{2.5}$ emission map. It shows that the stations are generally located in areas of high $PM_{2.5}$ emissions. Point Reyes, a background concentration site, is located in an area of low $PM_{2.5}$ emissions.

The number of required $PM_{2.5}$ monitors for each MSA in the Bay Area is determined by its population and design value, as specified in Table D-5 of Appendix D to 40 CFR Part 58 – $PM_{2.5}$ Minimum Monitoring Requirements. $PM_{2.5}$ design values are calculated concentrations (see footnotes no.1 & 2 in Table 12) used to determine the $PM_{2.5}$ attainment status of an area. Table 12 shows that the Air District monitoring network meets or exceeds the $PM_{2.5}$ minimum monitoring requirements. No additional monitors are required for the SIP because the Bay Area has only recently been designed non-attainment and the SIP planning is in progress.

Table 13 lists the stations where $PM_{2.5}$ concentrations are measured in the Bay Area along with the monitoring objective and the $PM_{2.5}$ design value for each site. The last column rates the importance of the data measured at the site in meeting both the Air District's and EPA's monitoring objectives.

The Air District desires to operate at least one $PM_{2.5}$ monitor in each of the nine Bay Area counties. There are six counties with only one monitor: Contra Costa, Napa, San Francisco, San Mateo, Solano, and Sonoma. All monitors in those counties, except Santa Rosa, are rated high because they are the only monitors in those counties and they all have recorded exceedances of the 24-hour national $PM_{2.5}$ standard. The Vallejo and Santa Rosa monitors are also rated high because one monitor is required within each MSA.

Alameda County has four monitoring sites. Livermore is rated high because the design value is very close to the standard. Oakland is rated high because it has recorded exceedances, and it is in one of the three major cities in the Bay Area. Oakland West is rated high because it is a source oriented site. Fremont is rated medium because exceedances of the $PM_{2.5}$ standard have been measured at the site though the design value is well below the standard.

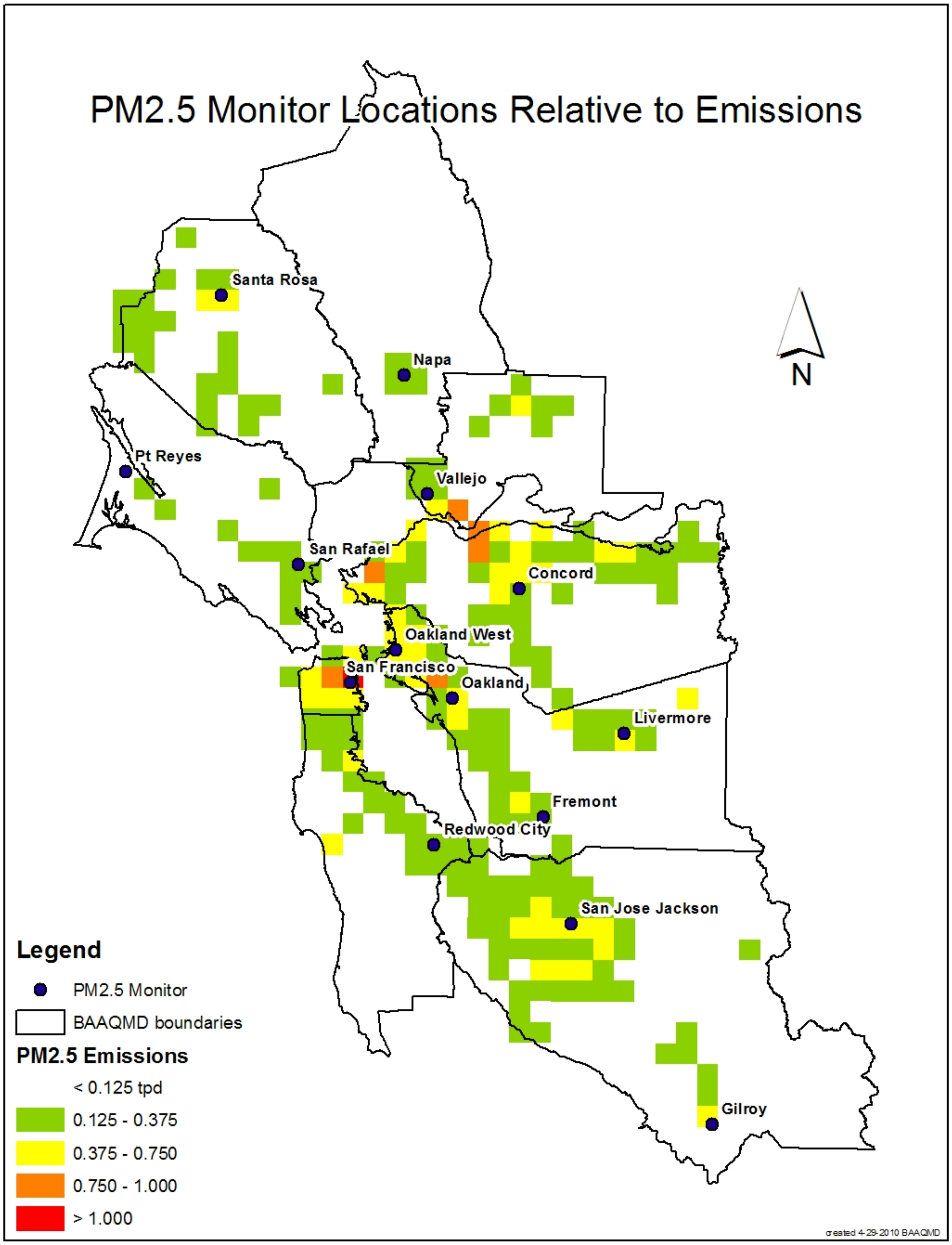

Figure 7. Map of Air District $PM_{2.5}$ Monitoring Stations and $PM_{2.5}$ emissions.

Table 12. Minimum Monitoring Requirements for $PM_{2.5}$ SLAMS Sites.

MSA	County	Population in millions 2009	Annual Design Value[1] ($\mu g/m^3$) 2009	24-hour Design Value[2] ($\mu g/m^3$) 2009	Monitors Required	Active Monitors[5]
San Francisco-Oakland-Fremont	SF, San Mateo, Alameda, Marin, Contra Costa	4.32	9.4	34	3	7
San Jose-Sunnyvale-Santa Clara	Santa Clara, San Benito	1.84	10.8	34	3	3[3]
Santa Rosa-Petaluma	Sonoma	0.47	8.2	28	1	1
Vallejo-Fairfield	Solano	0.41	9.8	36	1	1
Napa	Napa	0.13	None[4]	None[4]	0	0

1 Annual design values are calculated at each monitoring site by taking the 3-year mean (2007-2009) of the annual averages for each site. The design values shown for each MSA in this table are the highest design value of monitors in the MSA that are within the boundaries of the BAAQMD. Design values at or below the national $PM_{2.5}$ annual standard of 15 $\mu g/m^3$ indicate the area meets the standard.

2 Daily design values are calculated by taking the 3-year mean (2007-2009) of the 98th percentiles for each site. The design values shown for each MSA in this table are the highest design value of monitors in the MSA that are within the boundaries of the BAAQMD. Monitors outside of the BAAQMD may have a higher design value. Design values at or below the national $PM_{2.5}$ 24-hour standard of 35 $\mu g/m^3$ indicate the area meets the standard.

3 One of the monitors is located in Hollister in San Benito County and is operated by the Monterey Bay Unified Air Pollution Control District.

4 There are no EPA FRM or FEM $PM_{2.5}$ monitors in Napa County.

5 Does not include the non-FEM continuous monitors at Napa and Pt Reyes.

Marin County has two $PM_{2.5}$ monitors. The monitor at San Rafael is rated high because exceedances of the 24-hour standard have been recorded, and it is the largest city in the county. Point Reyes is rated high because it is the only background measurement site within the Air District.

The San Jose-Sunnyvale-San Benito MSA requires 3 monitors. One monitor is operated in San Benito County by the Monterey Bay Unified APCD. The Air District operates two $PM_{2.5}$ monitors in Santa Clara County, one at San Jose and the other at Gilroy, both are rated high.

Table 13. List of Permanent $PM_{2.5}$ Monitor Locations in 2009.

Station	County	Monitoring Objective	24-hour Design Value[1] (µg/m3)	Annual Design Value[2] (µg/m3)	Assigned Value from Assessment
Fremont	Alameda	Population Oriented	27	9.4	Medium
Livermore	Alameda	Population Oriented	34	9.4	High
Oakland	Alameda	Population Oriented	25	9.4	High
Oakland West	Alameda	Source Oriented	25	11.4	High
Concord	Contra Costa	Population Oriented	33	8.7	High
Point Reyes	Marin	Background	15	5.8	High
San Rafael	Marin	Population Oriented	34	NA[3]	High
Napa	Napa	Population Oriented	32	12.4	High
San Francisco	San Francisco	Population Oriented	27	9.4	High
Redwood City	San Mateo	Population Oriented	28	8.7	High
Gilroy	Santa Clara	Population Oriented	24	8.8	High
San Jose	Santa Clara	NCore	34	10.8	High
Vallejo	Solano	Population Oriented	36	9.8	High
Santa Rosa	Sonoma	Population Oriented	28	8.2	High

[1] Design values at or below the national $PM_{2.5}$ 24-hour standard of 35 µg/m^3 meet the standard.
[2] Design values at or below the national $PM_{2.5}$ annual standard of 15 µg/m^3 indicate the area meets the standard.
[3] The $PM_{2.5}$ monitor at San Rafael was installed in October 2009. There is less than one year of data to date, which is inadequate to calculate an annual design value.

Summary

The purpose of this assessment is to rate the effectiveness of each monitor in the Bay Area Air Quality Management District's air monitoring network in meeting the monitoring objectives defined in 40 CFR, Part 58 Appendix D, and the local objectives of the Bay Area Air Quality Management District. This assessment also determines whether new monitors or sites are needed and if monitors or sites may be discontinued to free up resources for alternative monitoring efforts.

Table 14 shows that most stations have a mix of high and medium ratings. San Francisco, Oakland, and San Jose are highly rated for most pollutants. San Francisco and Oakland monitors are rated high because they are in major cities in the Bay Area. San Jose is rated high because it is one of the major cities in the Bay Area and the monitors at the site are needed to meet NCore requirements.

Table 14. List of Assessment Ratings of Permanent Monitors in 2009.

Station	CO	Ozone	NO_2	SO_2	PM_{10}	$PM_{2.5}$
Fremont	Low	Low	Low			Medium
Hayward		Medium				
Livermore		High	High			High
Oakland	High	High	High			High
Oakland West	High		High	High		High
Bethel Island	High	High	High	Medium	Medium	
Concord	Medium	High	Medium	High	Medium	High
Crockett				High		
Martinez				High		
Richmond 7th				High/Low		
San Pablo	Low	Low	Low	High/Low	Low	
Pt Reyes						High
San Rafael	Medium	High	Medium		Medium	High
Napa	Medium	High	Medium		Medium	High
San Francisco	Medium	High	High		High	High
Redwood City	Medium	High	Medium			High
Gilroy		High				High
Los Gatos		High				
San Jose	High	High	High	High	High	High
San Martin		High				
Fairfield		High				
Vallejo	Medium	Medium	Medium	Medium		High
Santa Rosa	Medium	High	Medium			High

Most of the stations that measure one or two pollutants are also rated high. Crockett and Martinez are rated high because they are located near refineries. Fairfield, Los Gatos, San Martin, and Gilroy are rated high because they are located in areas of high levels of ozone.

Pt Reyes and Bethel Island are rated high because they are located in background or transport areas. Bethel Island is also located in a high ozone area. Oakland West is rated high because it is a source oriented site and the monitors were specifically chosen for this site to measure the impacts from the Port of Oakland and nearby highways.

Fremont, San Pablo, and Richmond 7th stations have the lowest pollutant importance ratings. Fremont has low ratings for CO, ozone, and NO_2, and a medium rating for $PM_{2.5}$. The Air District is investigating whether this station should be closed.

The San Pablo station has low ratings for CO, ozone, NO_2, and PM_{10}, and a high rating for SO_2 if the Richmond 7th station is closed. This station is likely to remain because it is the only multi-pollutant air monitoring station near the Chevron Refinery and the local community has an interest in seeing air quality measurements.

If the San Pablo station continues to operate, then the SO_2 data collected at the nearby Richmond 7th station would then be rated low.

As for new monitors, the Air District is investigating the possibility of locating an ozone monitor in Brentwood and a PM_{10} monitor in Oakland. Photochemical modeling suggests an area of high ozone area near Brentwood, south of Bethel Island. The PM_{10} emissions map indicates high PM_{10} levels near downtown and West Oakland.

California Air Resources Board
Planning and Technical Support Division
Air Quality Analysis Section

California Air Resources Board's 2010 Monitoring Network Assessment Report

Prepared for:
U.S. EPA Region 9
75 Hawthorne Street
San Francisco, CA, 94105

July 2010

Executive Summary

This report provides a summary assessment of the ambient air quality monitoring network in certain regions of California. Federal regulations require air quality agencies to conduct a comprehensive assessment every five years, beginning in 2010, and forward a report summarizing the findings to the U.S. Environmental Protection Agency (U.S. EPA). This document comprises the first report, due July 1, 2010.

The purpose of the assessment is to determine if the network achieves the monitoring objectives specified in federal regulations for pollutants with federal ambient air quality standards. These pollutants include ozone, PM10, PM2.5, carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), and lead. The regulations require an assessment of whether existing monitoring sites are sufficient. They also require an evaluation of any needed changes to PM2.5 population-oriented sites. In addition to the federal requirements, this report also provides an evaluation of key needs for implementing California ambient air quality standards and program requirements.

California has the most severe air quality problem in the nation. Over time, California's monitoring network has expanded to meet the increasing challenges of implementing air quality programs to achieve healthy air. The current monitoring network exceeds minimum federal requirements. Areas that violate or are close to violating the new ozone and PM2.5 standards now include most of the rural counties in northern California and in some instances, even more remote locations near national parks. Therefore, our fundamental conclusion is that as federal air quality standards for ozone and PM2.5 have become increasingly more stringent in recent years, monitoring at the sites covered by this report is critical for determining compliance with the new standards. Moreover, monitoring discussed in this report is also needed for State designation purposes and other State and local monitoring programs.

Monitoring is a shared responsibility between local air districts and the Air Resources Board (ARB). The areas covered by this report are shown in Table 1. They include all or some of the counties in seven different air basins. These counties span the most rural and sparsely populated counties in northern California.

Areas not included in Table 1, which include all of California's larger districts, as well as many of the State's smaller districts, are preparing their own network assessments. The districts expected to submit their individual network assessments to Region 9 include: San Francisco Bay Area, South Coast, San Joaquin Valley, San Luis Obispo County, Ventura County, Monterey Bay Unified, Santa Barbara County, Great Basin Unified, San Diego County, Sacramento Metropolitan, North Coast Unified, Mojave Desert, and Imperial County.

Table 1. Areas covered in this report.

Air Basin	County (or portions of County)	Air District
Lake County	Lake	Lake County AQMD
Lake Tahoe	El Dorado (partial)	El Dorado County AQMD
	Placer (partial)	Placer County APCD
Mojave Desert (partial)	Kern (partial)	Eastern Kern APCD
Mountian Counties	Amador	Amador County APCD
	Calaveras	Calaveras County APCD
	El Dorado (partial)	El Dorado County AQMD
	Mariposa	Mariposa County APCD
	Nevada	Northern Sierra AQMD
	Placer (partial)	Placer County APCD
	Plumas	Northern Sierra AQMD
	Sierra	Northern Sierra AQMD
	Tuolumne	Tuolumne County APCD
North Coast	Mendocino	Mendocino County AQMD
	Sonoma (partial)	Northern Sonoma County APCD
Northeast Plateau	Lassen	Lassen County AQMD
	Modoc	Modoc County APCD
	Siskiyou	Siskiyou County APCD
Sacramento Valley	Butte	Butte County AQMD
	Colusa	Colusa County APCD
	Glenn	Glenn County APCD
	Placer (partial)	Placer County APCD
	Shasta	Shasta County AQMD
	Solano (partial)	Yolo-Solano AQMD
	Sutter	Feather River AQMD
	Tehama	Tehama County APCD
	Yolo	Yolo-Solano AQMD
	Yuba	Feather River AQMD

Note:
AQMD = Air Quality Management District
APCD = Air Pollution Control District

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Introduction

The United States Environmental Protection Agency (U.S. EPA) finalized amendments to federal monitoring regulations in 2006. These amendments included requirements for air quality monitoring agencies to prepare an annual monitoring network plan and to conduct a comprehensive assessment of its monitoring network every five years. Both the 2010 annual monitoring network plan and the five year network assessment report are due on July 1, 2010 to the U.S. EPA. This report summarizes the results of the network assessment.

The primary requirements for the assessment report are to determine if:

- The monitoring network (network) is meeting the monitoring objectives of Appendix D in 40 CFR Part 58;
- Existing sites are no longer needed and can be terminated;
- New sites and technologies are appropriate; and if
- Any changes are needed to the PM2.5 population oriented sites.

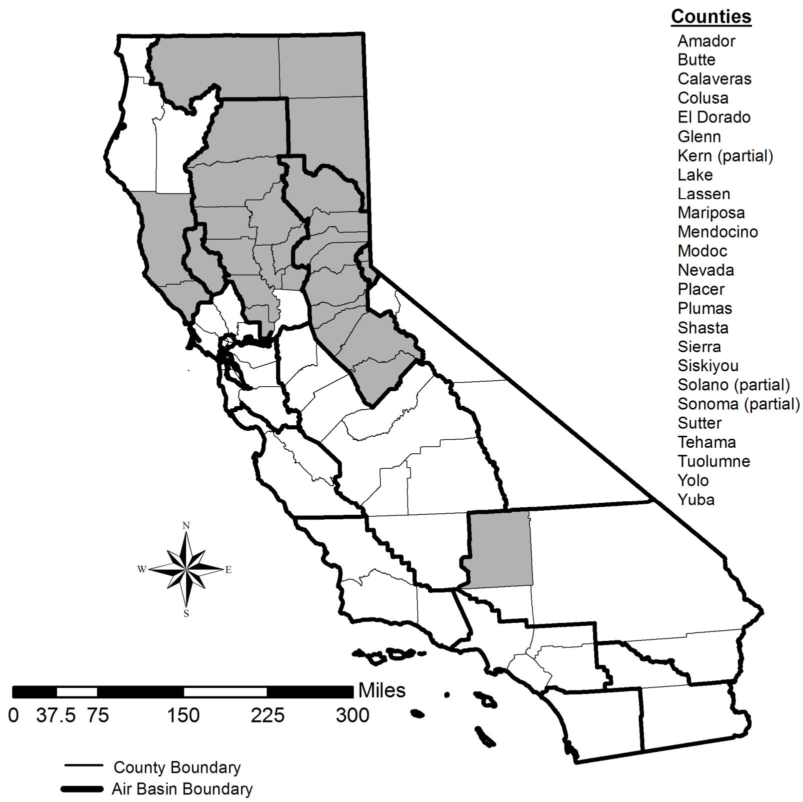
California has one of the most extensive monitoring networks in the country. Monitoring is routinely conducted at over 250 locations. Monitoring is a joint responsibility between air districts, the Air Resources Board (ARB), and other agencies including the National Park Service. Because of the severity of California's air quality problems, the number of monitors exceeds minimum federal requirements but is critical to implementing programs to attain federal and State ambient air quality standards.

The assessment is required to cover all pollutants for which the U.S. EPA has established health based air quality standards. These pollutants are ozone (O3), PM2.5, PM10, carbon monoxide (CO), sulfur dioxide (SO2), nitrogen dioxide (NO2) and lead. This report focuses on the most critical pollutants. Ozone and PM2.5 represent California's most severe air quality problems and have the greatest public health impacts. None of the areas in this report currently monitor for SO2 or lead. New federal NO2, SO2 and lead monitoring requirements will be covered in the 2011 or 2012 annual network report.

Separately, thirteen districts, including the largest districts in California, have elected to conduct their own assessment. In some districts, the network also includes monitors operated by ARB or the National Park Service. Districts that have decided to assess their own monitoring network are also responsible for assessing all ARB monitoring sites that are located within the district's jurisdiction. The network assessment summarized in this report covers the same geographical area covered in the 2010 annual network plan and includes the following areas: Lake County Air Basin, Lake Tahoe Air Basin, the eastern Kern

County portion of the Mojave Desert Air Basin, Mountain Counties Air Basin, a portion of the North Coast Air Basin, Northeast Plateau Air Basin, and the Sacramento Valley Air Basin (minus the sites operated by the Sacramento Metropolitan Air Quality Management District). The map illustrates the areas covered by this assessment.

Figure 1
Counties and portions of counties covered in this report



Network Monitoring Objectives

Federal regulations specify the monitoring objectives that should be supported for each pollutant by monitors that are part of the State and Local Air Monitoring Stations (SLAMS) network. Note that there are no SO2 or lead monitors operating within the geographic scope of this report. As previously noted, this report is limited to a number of ARB, air district and National Park operated sites within the smaller air districts in northern California and one in southern California. The ARB assessment includes a site-by-site, monitor-by-monitor evaluation.

One of the most important monitoring objectives is to determine compliance with State and federal air quality standards. As federal standards have become more stringent recently, having sufficient monitoring to meet this objective is even more critical. Many smaller, primarily rural counties have ozone and PM2.5 air quality that approaches or exceeds these new more stringent standards. Other monitoring objectives are also important. Below is a selected summary of typical monitoring objectives.

- Establish compliance with State and federal air quality standards
- Monitor sites with expected high concentrations
- Understand historical trends and progress made towards standards
- Track spatial distribution of air pollutants
- Evaluate population exposure to air pollutants and have information to inform the public about air quality (AQI)
- Characterize specific geographic locations and emissions sources
- Provide air quality data for air quality models and emission inventory development
- Provide air quality data for determining burn days for agricultural and prescribed burning
- Determine relationship between sources and resulting air quality (Source-apportionment).
- Characterize the extent of pollutant transport.

Approach

This assessment is organized by air basin. An air basin generally has similar meteorological and geographical conditions throughout with similar air mass. California is divided into 15 air basins to better manage air pollution. We used this approach in the assessment because a network of monitoring sites within an air basin would likely serve similar monitoring objectives. It should be noted that several counties are located in more than one air basin and the discussion of the monitors is broken out by air basin.

Within each air basin, we conducted an evaluation for each monitoring site. We considered a number of sources of information including applicable federal and State requirements, current air quality conditions and attainment status, population, topography and climate. The overall goal was to determine how effectively each site is meeting critical monitoring objectives. Throughout the assessment, we provide 2009 ozone and PM2.5 federal design values for many sites. However it should be noted that, in some instances, these design values may include data for potential exceptional events.

Federal Monitoring Requirements

U.S. EPA regulations specify the minimum number of sites at which State and local air agencies must deploy monitors. In practice, the State and local agencies find they need to deploy significantly more monitors to fulfill State and local monitoring objectives, as well as federal objectives. Requirements for the minimum numbers of monitors appear in Appendix D of Part 58 of the CFR. For ozone, PM2.5, and PM10, the required minimum number is based on the population of an area and the severity of the air quality for the pollutant in the area. For CO and lead, no current monitoring is required by Appendix D unless an area exceeds or is close to exceeding a national ambient air quality standard, which is true for very few if any areas in the U.S. New federal monitoring requirements for NO2 and SO2 will be discussed in future annual monitoring network plans. For purposes of the minimum requirements, the areas are defined by the metropolitan statistical areas (MSA) developed by the Office of Management and Budget. An MSA may include one or more counties. However, not all counties are within an MSA.

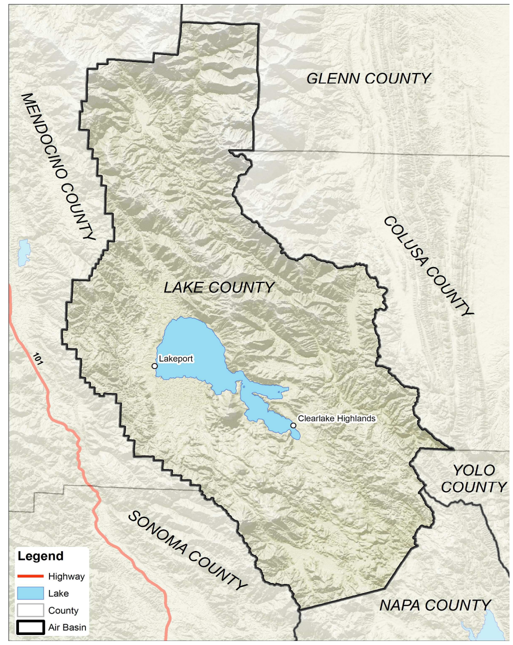
All areas in this report meet or exceed federal requirements. However, additional monitoring is often needed to implement State and local programs designed to attain State air quality standards as expediously as possible. A summary of the numbers of required and existing monitoring sites in the geographical scope of this report can be found in Appendix A, located at the end of this report.

Summary of Assessment

California's extensive network of monitors is needed due to our severe air quality issues, large population and vehicle miles traveled, varied topography, large number of separate airsheds, and ozone and PM2.5 concentrations that are significantly higher than the rest of the country. As a result of this assessment, all existing monitors are critical and none are proposed to be discontinued or relocated. Under current federal regulations, no additional monitors are required in the geographic scope of this report. Any new federal monitoring requirements that take effect later in the year or in the next few years will be addressed in future annual monitoring network plans. Furthermore, this assessment demonstrates that the monitors and sites within this report meet the monitoring requirements of Appendix D in 40 CFR 58. At the time that this report was drafted no additional monitoring is under consideration.

Lake County Air Basin

Lake County is the only county in the Lake County Air Basin (Basin). It is a rural county located in northern California and borders Napa, Sonoma, Mendocino, Glenn and Colusa counties. It has a population of 65,000, covers 1,327 square miles and includes the towns of Lakeport and Clearlake.



There is one (each) ozone, PM10, and PM2.5 monitor at Lakeport that is part of the State and Local Air Monitoring Stations (SLAMS) network and two PM10 monitors used in the Geyser Air Monitoring Program (GAMP). Lake County has long attained State and federal air quality standards and has some of the best air quality in the State. In 2009, there were no violations of State or federal ozone, PM10, or PM2.5 standards in the Basin.

However, the 2009 federal 8-hour ozone design value of 0.062 ppm is within the range proposed by U.S. EPA for the revised federal ozone standard (to be finalized in August 2010). As federal standards become increasingly stringent over time, monitoring is critical for determining whether an area complies with revised federal standards. Continued ozone, PM10 and PM2.5 monitoring is also needed for State designations. As shown below, the monitoring objectives in Lake County are to measure high concentrations needed to make designation determinations. Because the current sites in Lake County are located where the highest concentrations are expected to occur and there are no minimum federal requirements, no additional monitoring is needed. No changes to the monitoring network for Lake County are being considered at this time.

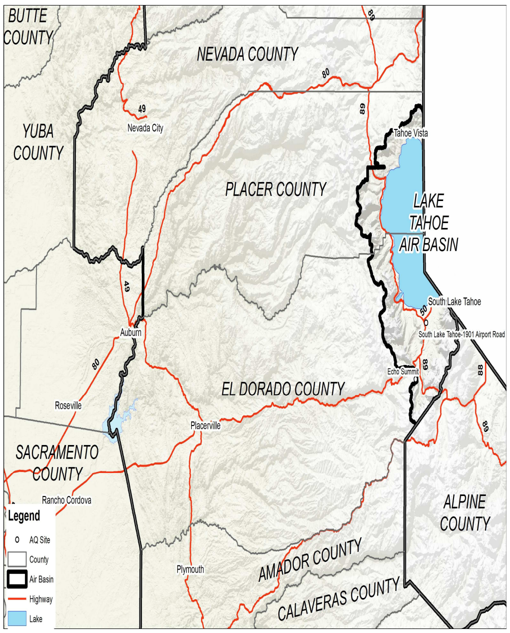
Lake County Air Basin: Lake County							
	O_3	CO	NO_2	$PM_{2.5}$	PM_{10}	cont. $PM_{2.5}$	cont. PM_{10}
Lakeport (060333001)	StateD, Gnrl			StateD, Gnrl	StateD, Gnrl		
Middletown (060333010)					StateD, Gamp		
Glenbrook (060333011)					StateD, Gamp		

Note: None of the areas discussed in this report have monitors for SO_2 or lead. Moreover, listed design values in this report may include data for potential exceptional events.

Monitoring Objectives:
Hconc = expected high concentration site
Rconc = representative concentration site
Simp = local emission source
Bkgrnd = background levels
StateD = attainment of State standards
Trends = trends analysis
Trans = pollutant transport
AgBn = agriculture burning programs
PopEx = population exposure to pollutant
Gamp = Geyser Air Monitoring Program
Gnrl = general (i.e., public reporting, spatial representation)

Lake Tahoe Air Basin (portions of El Dorado and Placer counties)

The Lake Tahoe Air Basin (Basin) is the smallest air basin in California. It covers approximately 224 square miles and has an estimated population of 58,121 (2010). Part of the Basin is in the State of Nevada, and part in California. The part that lies in California comprises the eastern part of El Dorado and Placer counties and includes the cities of South Lake Tahoe, Tahoe City and Tahoe Vista. Major U.S. Highway 50 runs through the City of South Lake Tahoe.



There is one ozone monitor at the South Lake Tahoe-Airport site located in El Dorado County and it is a seasonal monitor that operates May through October. Although there is no current ozone monitor in the Placer County portion of the Basin, the South Lake Tahoe-Airport site is considered representative of the entire Basin.
The area violates the State ozone standard and had one exceedance day in 2009. The 2009 federal 8-hour design value of 0.068 ppm is within the range proposed by U.S. EPA for the revised 8-hour federal ozone standard. The South Lake Tahoe-Airport site is needed for State and federal designations.

The continuous PM10 monitor at the South Lake Tahoe-Sandy Way site is used for public reporting and spatial representation as well as for State designation purposes. The area violates the State 24-hour PM10 standard and had one State exceedance day in 2009. The Basin is currently nonattainment for the State PM10 standard. This site is the only PM10 site in the Basin. For these reasons, the PM10 monitor is also needed.

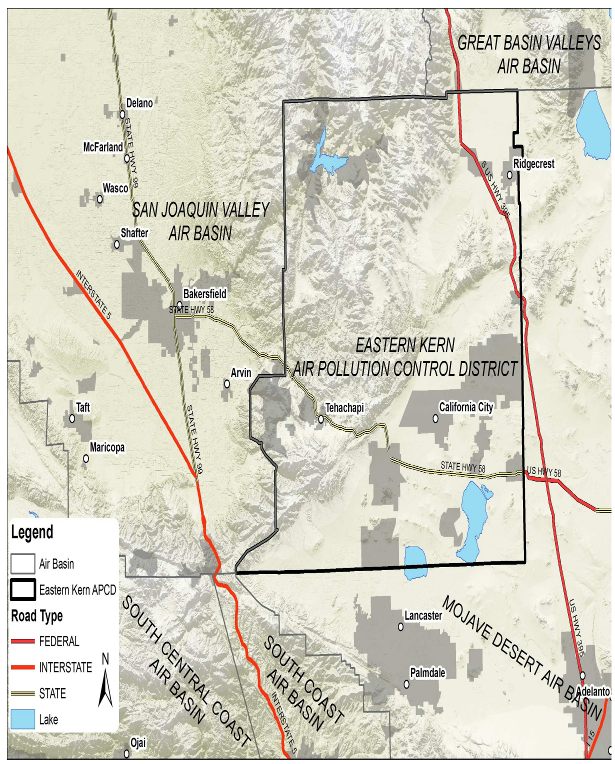
The current sites in the El Dorado County portion of the Basin are part of the Sacramento-Arden-Arcade-Roseville MSA and are located where the highest concentrations are expected to occur. No additional monitoring is required in the MSA and no changes to the monitoring network in the Basin are being considered at this time.

Lake Tahoe Air Basin: Portions of El Dorado and Placer Counties							
	O_3	**CO**	**NO_2**	**$PM_{2.5}$**	**PM_{10}**	**cont. $PM_{2.5}$**	**cont. PM_{10}**
South Lake Tahoe-Airport (060170013)	StateD, Trans, Hconc						
South Lake Tahoe-Sandy Way (060170011)							Grnl

Eastern Kern Air Pollution Control District (a portion of the Mojave Desert Air Basin)

This section covers the monitoring sites located in the Eastern Kern Air Pollution Control District (District). The District comprises the eastern portion of Kern County and is one of three districts located in the Mojave Desert Air Basin (Basin). The other two districts in the Basin will be included in a separate assessment prepared by the Mojave Desert Air Quality Management District.

The District is located in the northwestern corner of the Basin and separated, to the south, from the South Coast Air Basin by the Antelope Valley and San Gabriel Mountains. The Tehachapi and the Sierra Nevada Mountains separate it from the San Joaquin Valley, to the west and north. Directly to the east is San Bernardino County. Eastern Kern's population of 147,758 (2010) resides primarily in and around the major towns, including Tehachapi, Rosamond, Boron and Mojave. Major highways are U.S. Highways 58, 14, and 395.



The ozone monitor at the Mojave-Poole site is the only ozone monitor in the District. In 2009, 32 days and 61 days exceeded the federal and State 8-hour ozone standards, respectively. The 2009 federal 8-hour ozone design value of 0.084 ppm is well above the level proposed by U.S. EPA for the revised 8-hour federal ozone standard. This site is critical for both federal and State ozone designation purposes.

The PM2.5 monitors at the Mojave-Poole Street and Ridgecrest-California Street sites are used for collecting data at expected high and representative concentration sites. The District is designated as an unclassified area for both State and federal PM2.5 standards. Federal 2009 PM2.5 annual average and 24-hour design values for the District are 6.1 ug/m^3 and 16 ug/m^3, respectively. As federal and State PM standards become increasingly more stringent, monitoring becomes more critical for demonstrating whether an area complies with these revised standards.

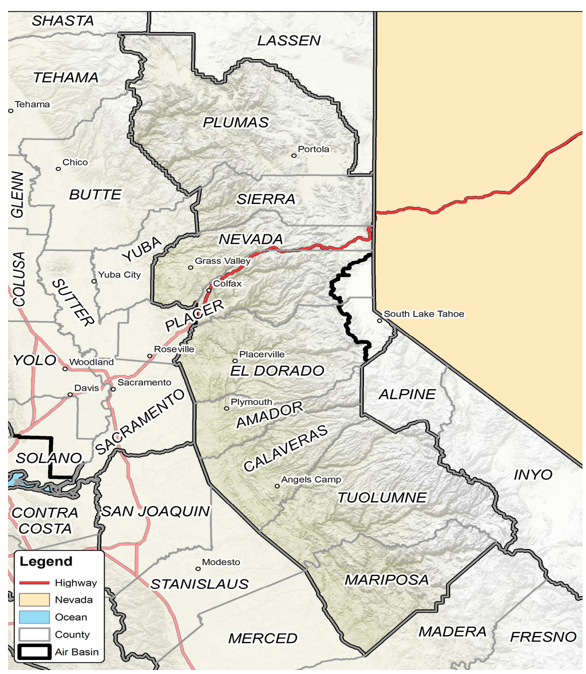
The PM10 monitors at the Mojave-Poole Street and Ridgecrest-California Street sites are used for collecting data at expected high and representative concentration sites. The Canebrake site started on January 1, 2009 and is used for monitoring regional PM10 concentration levels in the area and for demonstrating compliance with the federal standard. This portion of eastern Kern County is currently a nonattainment area for PM10. For these reasons, continued PM10 monitoring is needed in the District. Note that the District recently started ozone and meteorological monitoring at Tehachapi for the evaluation of transport. However, there are no data reported from this site into the Environmental Protection Agency's Air Quality System (AQS) at the time this report was drafted.

The current sites in the District are part of the Bakersfield MSA and the majority of sites are located where the highest concentrations are expected to occur. No additional monitoring is required in the MSA and no changes to the monitoring network in the District are being considered at this time.

Mojave Desert Air Basin: Eastern part of Kern County							
	O_3	**CO**	**NO_2**	**$PM_{2.5}$**	**PM_{10}**	**cont. $PM_{2.5}$**	**cont. PM_{10}**
Canebrake (060290017)					Rconc		
Mojave-Poole (060290011)	Hconc, Trans			Hconc	Hconc		
Ridgecrest-West California (060290015)				Rconc	Hconc		

Mountain Counties Air Basin

The Mountain Counties Air Basin (Basin) extends from Plumas County in the north to Mariposa County in the south, and also includes all of Sierra, Nevada, Amador, Calaveras, Tuolumne, and Mariposa counties, and portions of Placer and El Dorado counties. The Basin covers the central and northern parts of the Sierra Nevada Mountains. The elevation ranges from several hundred feet in the foothills along the western edge of the Basin to more than 10,000 feet along the Sierra crest. Although bordering the Sacramento urban area to the west, the Basin is predominately rural, with a total population of 472,991 (2010).



Despite its rural character, the Basin includes all or part of four nonattainment areas for the federal 1997 ozone standard. Three nonattainment areas are completely contained within the Basin: Central Mountain Counties (Amador and Calaveras counties), Southern Mountain Counties (Tuolumne and Mariposa counties), and Western Nevada County (a portion of Nevada County). Furthermore, El Dorado and Placer counties have long been part of the Sacramento Metro ozone nonattainment area because they are linked to the Sacramento urban area through travel, employment and housing patterns.

Most of the Basin is either attainment or unclassifiable for the federal 2006 24-hour PM2.5 standard. A portion of El Dorado County is included in the Sacramento PM2.5 nonattainment area. (A portion of the Placer County is also included in the nonattainment area, but this portion lies in the Sacramento Valley rather than Mountain Counties Air Basin.)

There are a variety of monitoring objectives in the Basin. These objectives include collecting data at expected high concentration sites, providing data for agriculture burn decisions, evaluation of ozone transport and for educating the public about air quality. Some sites also collect representative and background concentration data. All of the monitors in the Basin provide data to implement a variety of federal and State programs. We did not identify any new or unmet monitoring needs.

The current sites in the El Dorado and Placer counties portion of the Basin are part of the Sacramento-Arden-Arcade-Roseville MSA. No other counties in the Basin are part of an MSA. No additional monitoring is required in the MSA or in any part of the Basin and no changes to the monitoring network in the Basin are being considered at this time. A summary of the monitors and their objectives accompanies each of the tables below.

Nevada, Plumas, and Sierra counties

There are more PM2.5 than ozone monitors in this northernmost part of the Basin. These monitors provide data for general uses, designation purposes, and to help assess potential wood smoke impacts and are located at potentially high concentration sites. In addition, the Plumas County 2009 PM2.5 design value is near the daily federal PM2.5 standard. The Grass Valley site is the most comprehensive, and includes monitors for O3, NO2, and PM2.5. Nevada County is nonattainment for the federal ozone standard and had a 2009 8-hour ozone design value of 0.087 ppm with 18 federal exceedance days in 2009. The White Cloud Mountain site is operated by the ARB and helps characterize air quality in the eastern portion of the ozone nonattainment area. Ozone concentrations at this site also violate the current federal and State ozone standards. Ozone monitoring at Truckee restarted on July 1, 2010 and the data will be submitted into AQS. Ozone monitoring in Penn Valley in Nevada County and PM10 monitoring in Loyalton in Sierra County are not reporting data into AQS. These non-AQS monitors are used for local monitoring purposes.

Mountain Counties Air Basin: Nevada, Plumas and Sierra Counties							
	O_3	CO	NO_2	$PM_{2.5}$	PM_{10}	cont. $PM_{2.5}$	cont. PM_{10}
Chester (060631007)						StateD, Gnrl	
Grass Valley (060570005)	Hconc, Rconc, StateD		Rconc, StateD	Rconc		StateD, Gnrl	
Portola (060631009)				Hconc		StateD, Gnrl	
Quincy (060631006)				Hconc		StateD, Gnrl	
Truckee (060571001)	Hconc			Hconc		StateD, Gnrl	
White Cloud Mountain (060570007)	StateD						

El Dorado and Placer counties

El Dorado and Placer counties both split their land area among one or more air basins. A part of the El Dorado County is also in the Lake Tahoe Air Basin and Placer County is split into three air basins (Lake Tahoe, Mountain Counties, and Sacramento Valley). The Mountain Counties Air Basin portions of El Dorado and Placer counties are part of the Sacramento Metro nonattainment area for the federal 1997 ozone standard. Consequently, identifying areas of high ozone concentration is the primary monitoring objective within this part of the Basin. Cool has been the high ozone site during several different ozone seasons and had a 2009 federal 8-hour ozone design value of 0.093 ppm. Echo Summit was established to characterize the extent of air pollutant transport from the Sacramento and San Joaquin Valleys up the western slope of the Sierra Nevada. This area is currently nonattainment for the State 24-hour PM10 standard. For these reasons, continued ozone and PM10 monitoring in El Dorado and Placer counties is needed.

Mountain Counties Air Basin: Portions of El Dorado and Placer Counties							
	O_3	CO	NO_2	$PM_{2.5}$	PM_{10}	cont. $PM_{2.5}$	cont. PM_{10}
Colfax (060610004)	Hconc, StateD						
Cool-Hwy 193 (060170020)	Hconc, Trans, StateD						
Echo Summit (060170012)	Hconc, Trans						
Placerville-Gold Nugget (060170010)	Hconc, Trans				Hconc		

Amador and Calaveras counties

Amador and Calaveras counties comprise the Central Mountain counties nonattainment area for the federal 1997 ozone standard. Two ozone monitors track the area's progress toward attaining the standard. The San Andreas site is the 2009 federal design site for the federal 8-hour ozone nonattainment area and had a 2009 federal 8-hour ozone design value of 0.082 ppm. Though neither county is part of a federal PM2.5 or PM10 nonattainment area, the monitors in San Andreas help us understand representative concentrations in that area and are used for State designation purposes.

Mountain Counties Air Basin: Amador and Calaveras Counties							
	O_3	CO	NO_2	$PM_{2.5}$	PM_{10}	cont. $PM_{2.5}$	cont. PM_{10}
Jackson-Clinton Road (060050002)	Hconc, Trans, StateD						
San Andreas (060090001)	Hconc, Trans, StateD			Rconc	Rconc		

Mariposa and Tuolumne counties

Mariposa and Tuolumne counties comprise the Southern Mountain counties nonattainment area for the federal 1997 ozone standard. They also violate the State ozone standards. The area had a 2009 federal 8-hour ozone design value of 0.086 ppm with more than 10 days in 2009 that exceeded the federal ozone standard. The ozone sites are critical in determining compliance with federal and State ozone standards. The ozone monitor at the Yosemite-Turtleback site is operated by the National Park Service. The Sonora and Yosemite-Turtleback sites are the 2009 federal ozone design sites in the southern portion of the Basin.

While there were no days that exceeded the federal 24-hour PM10 standard in 2009, three days exceeded the State 24-hour PM10 standard. A portion of Mariposa County is nonattainment for the State PM10 standard. This area is unclassifiable for both federal and State PM2.5 standards. The continuous PM2.5 monitor at the Yosemite Village site is used for State designation purposes as well as public reporting, smoke monitoring and spatial representation. For these reasons, continued PM2.5 and PM10 monitoring is needed at the Yosemite Village site, which is operated by ARB.

Mountain Counties Air Basin: Mariposa and Tuolumne Counties							
	O_3	CO	NO_2	$PM_{2.5}$	PM_{10}	cont. $PM_{2.5}$	cont. PM_{10}
Jerseydale (060430006)	Hconc, Trans						
Sonora (061090005)	Hconc, StateD						
Yosemite-Turtleback (060430003)	Hconc, Trans, StateD						
Yosemite Village (060431001)					Hconc	StateD, Gnrl	

Mendocino County Air Quality Management District and Northern Sonoma Air Quality Management District (a portion of the North Coast Air Basin)

This section covers monitoring in the Mendocino County Air Quality Management District and the Northern Sonoma Air Quality Management District. These two districts cover the entire portion of Mendocino County and the portion of Sonoma County located in the North Coast Air Basin (Basin). The other three counties in the Basin are covered in a separate assessment report prepared by the North Coast Unified Air Quality Management District (Humboldt, Del Norte, and Trinity).

Stretching along the northern coastline of California, the Basin covers 12,339 square miles and is home to giant coastal redwood trees that are found nowhere else in the world. The Mendocino, Humboldt, Trinity, Del Norte, and northern part of Sonoma counties lies within the Basin boundary, which borders the State of Oregon directly to the north, the Sacramento Valley and Northeast Plateau air basins to the west, and the San Francisco Air Basin to the south. The Basin's population of 333,829 (2010) resides primarily in and around major towns, including Crescent City, Eureka, Fort Bragg, Ukiah, Willits, and Healdsburg. Major highways are U.S. Highways 101 and 1.

While the current sites in the Mendocino County Air Quality Management District are not part of an MSA, the current sites in the Northern Sonoma Air Quality Management District are part of the Santa Rosa-Petaluma MSA. The majority of sites in both districts are located where the highest concentrations are expected to occur. No additional monitoring is required in the MSA and no changes to the monitoring network in the districts are being considered at this time.

Mendocino County Air Quality Management District

There is only one ozone monitor in Mendocino County, at Ukiah-Gobbi Street. Ozone monitoring at the Willits-Main Street site was suspended in 2008. Ozone concentrations at the Willits-Main Street site were lower than ozone concentrations at the Ukiah-Gobbi Street site and were below the range of the proposed federal ozone standard. However, the 2009 federal 8-hour design value of 0.062 ppm at Ukiah-Gobbi Street is within the range proposed by U.S.

EPA for the revised 8-hour federal ozone standard. For this reason, continued ozone monitoring is critical at the Ukiah-Gobbi Street site.

PM2.5 and PM10 monitoring in Mendocino County are mainly used for collecting data at expected high and representative concentration sites. The District discontinued three filter-based PM10 monitors and one filter-based PM2.5 monitor in 2008 and started two continuous PM2.5 FEMs and one continuous PM10 FEM monitor in 2009. Data from the continuous PM2.5 and PM10 monitors are reported into AQS. Due to the recent establishment of the continuous FEM PM monitors in the county, continued PM monitoring is needed to have more completed data for regulatory purposes, including State designations. Mendocino County is currently nonattainment for the State 24-hour PM10 standard.

Carbon monoxide monitors at the Ukiah-Gobbi Street and Willits-Main Street sites were discontinued in 2008, along with the nitrogen dioxide (NO2) monitor at Willits-Main Street in Mendocino County. Carbon monoxide concentrations in the District were well below both federal and State standards. Currently, there is only one NO2 monitor left operating in Mendocino County, which is located at the Ukiah-Gobbi Street site. The NO2 monitor provides useful information on ozone precursors and for evaluating transport. Further evaluation of NO2 monitoring needs will be discussed in the 2012 annual network report.

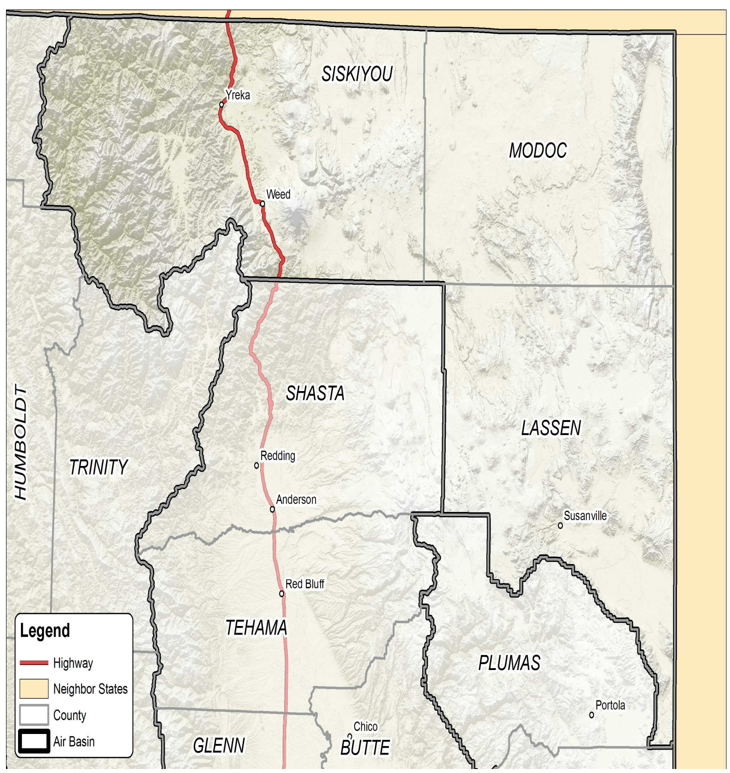
Northern Sonoma Air Quality Management District

One ozone monitor exists in the northern part of Sonoma County that lies within the North Coast Air Basin. This portion of the county comprises the Northern Sonoma County Air Quality Management District (District). This District attains State and federal ozone standards. The 2009 federal 8-hour ozone design value is 0.056 ppm. The ozone monitoring site is the only ozone monitor in the county and is needed for determining compliance with State and federal standards. The ozone monitor is also needed to characterize transport. For these reasons, continued ozone monitoring is needed at the Healdsburg-Airport site.

Currently, there are three PM10 monitoring sites in the District. The District had expressed interest in discontinuing all filter-based PM10 monitoring and establishing continuous PM10 monitoring. The ARB is coordinating with the District in this effort. This area had attained the State PM10 standard and is listed as unclassified under federal standards; however, continued PM10 monitoring is needed in the area to maintain State compliance.

North Coast Air Basin: Mendocino County and the northern part of Sonoma County							
	O_3	CO	NO_2	$PM_{2.5}$	PM_{10}	cont. $PM_{2.5}$	cont. PM_{10}
Cloverdale (060970001)					Rconc		
Fort Bragg (060450002)							Hconc, StateD
Guerneville (060973002)					Rconc		
Healdsburg-Airport (060971003)	Rconc, StateD						
Healdsburg-Matheson (060970002)					Rconc		
Ukiah-County Library (060450006)						Hconc, StateD	
Ukiah-Gobbi Street (060450008)	Hconc, Trans, StateD	Rconc	Rconc				
Willits-Firehouse (060452001)						Hconc, StateD	

Northeast Plateau Air Basin



The Northeast Plateau Air Basin (Basin) is located in the remote northeast corner of California and comprises Lassen, Modoc, and Siskiyou counties. The northern part of the Basin has lofty volcanic peaks, such as Mount Shasta and Mount Lassen. To the south and west, forested mountains dominate the Basin. The Basin covers approximately 14,788 square miles and is bordered by the states of Oregon directly to the north and Nevada to the east. The Basin's population of 92,112 (2010) predominately resides in rural towns, including Yreka, Mount Shasta, Alturas, and Susanville. Major highways are U.S. Highways 5, 97, and 395.

While there are three monitoring sites in Siskiyou County, there are no monitoring sites in Lassen and Modoc counties. Lassen and Modoc counties have long attained the federal and State ozone standards. The City of Yreka, located in Siskiyou County, is the largest populated area in the Basin and represents an area of expected high concentrations within the Basin. For this reason, ARB believes that Siskiyou County adequately represents the entire Basin. This section describes the monitoring objectives for the ozone, PM10, and PM2.5 monitors in Siskiyou County.

There is only one ozone monitor located at Yreka in Siskiyou County. Siskiyou County is currently designated nonattainment-transitional for the State ozone standard. Siskiyou County has made dramatic progress towards attainment of the State ozone standard. In 2009, no days exceeded either the federal or State 8-hour ozone standard at the site. However, the 2009 federal 8-hour ozone design value of 0.061 ppm is within the range proposed by U.S EPA for the revised 8-hour federal ozone standard. This site is needed for determining compliance with State and federal ozone standards. For this reason, continued ozone monitoring at the Yreka site is needed.

There are three PM10 monitoring sites in Siskiyou County. While the Yreka and Mount Shasta sites are operated by the District, the Lava Beds National Monument site is operated by the National Park Service. The area had attained the federal 24-hour PM10 standard, however, PM10 concentrations in the last three years exceeded the State 24-hour PM10 standard. Continued PM10 monitoring is needed for State designation purposes.

In 2007, the PM2.5 monitor at the Yreka site was inoperable and no data were reported in that year. The PM2.5 monitor was reestablished at the site in 2008 and two years of PM2.5 data were reported into AQS. While PM2.5 concentrations in the area are below both federal and State PM2.5 standards, continued monitoring of the PM2.5 monitor is needed to have more complete data for designation purposes. Because the majority of sites in Siskiyou County are located where the highest concentrations are expected to occur and there are no minimum federal requirements, no additional monitoring is needed and no changes are being proposed to the monitoring listed below.

Northeast Plateau Air Basin: Siskiyou County							
	O_3	**CO**	**NO_2**	**$PM_{2.5}$**	**PM_{10}**	**cont. $PM_{2.5}$**	**cont. PM_{10}**
Lave Beds (060930005)					Hconc		
Mount Shasta (060930004)					Rconc		
Yreka (060932001)	Hconc, Trans, StateD			Hconc	Hconc		

Sacramento Valley Air Basin

The Sacramento Valley Air Basin (Basin) comprises the Sacramento urban area in the south and stretches northward for more than 150 miles. The Basin includes nine complete counties—Butte, Colusa, Glenn, Sacramento, Shasta, Sutter, Tehama, Yolo, and Yuba—and portions of two others—Solano and Placer. The Basin is a valley, ringed on three sides by significant mountain ranges—the California Coastal Range to the west, the Sierra Nevada Mountains to the east, and the Cascade Range to the north.

The Basin is home to more than 2.5 million people, the majority of whom live in the Sacramento Metro ozone nonattainment area portion of the Basin. The rest are scattered among smaller cities to the north (Yuba City, Marysville, Chico, and Redding) as well as smaller towns and communities.

There are multiple air quality concerns in this region. Butte, Sacramento, Yolo and the portions of Placer and Solano counties located in the Basin are currently designated nonattainment for federal and State ozone standards. Most of the other counties have federal 8-hour ozone design values within the range proposed for the revised 8-hour federal ozone standard and violated the State ozone standard. While most of the counties (excluding Butte and Sacramento) either had attained or are unclassifiable for the State PM2.5 standard, several areas in the Basin are nonattainment for the federal PM2.5 standard. All counties in the Basin are designated nonattainment for the State PM10 standard.

The Basin includes five MSAs: Chico, Redding, Sacramento-Arden-Arcade-Roseville, Vallejo-Fairfield, and Yuba City. No other counties in the Basin are part of an MSA. There are a variety of monitoring objectives in the Basin. These objectives include collecting data at expected high concentration sites, providing data for agriculture burn decisions, evaluation of ozone transport and for educating the public about air quality. Some sites also collect representative and background concentration data. All of the monitors in the Basin provide data to implement a variety of federal and State programs. We did not identify any new or unmet monitoring needs.

No additional monitoring is required in the MSA or in any part of the Basin and no changes to the monitoring network in the Basin are being considered at this time. Specific monitors and monitoring objectives are described below. The Sacramento Metropolitan Air Quality Management District is conducting their own assessment; therefore, monitors located in Sacramento County are not discussed in this report.

Shasta County

Shasta County has a mix of ozone and PM2.5 and PM10 monitors, most of which are intended to measure potential high pollutant values. Shasta County is designated as nonattainment for the State ozone standard as well as the State PM10 standard. Shasta County currently is designated attainment for the State PM2.5 standard. However, the continuous PM2.5 monitor is needed for agricultural burn forecasting and general purposes.

Shasta County had a 2009 federal 8-hour ozone design value of 0.76 ppm and exceeded federal and State ozone standards more than five days in 2009. The Anderson and Redding sites are critical for determining compliance with State and federal ozone standards. The Lassen site is operated by the National Park Service and provides useful data for evaluating transport and background ozone concentrations.

Sacramento Valley Air Basin: Shasta County							
	O_3	CO	NO_2	$PM_{2.5}$	PM_{10}	cont. $PM_{2.5}$	cont. PM_{10}
Anderson (060890007)	Hconc, StateD				Hconc	StateD, Gnrl	
Lassen Volcanic NP (060893003)	Rconc						
Redding (060890004)	Hconc, StateD			Hconc	Hconc		
Shasta Lake (060890008)					Rconc		

Colusa, Glenn and Tehama counties

These counties have a mix of particulate matter and ozone monitors, most are designed to monitor potential high concentrations. However, the Colusa and Willows' continuous PM2.5 monitors help inform agricultural burning decisions, which are important considering that this area has a significant amount of agricultural land. None of these counties are currently designated nonattainment for the federal ozone or PM2.5 standards. The area's 2009 federal 8-hour ozone design values range from 0.062 ppm to 0.082 ppm, which is within the range proposed by U.S. EPA for the revised 8-hour federal ozone standard. Moreover, this area is currently nonattainment for the State 24-hour PM10 standard. Continued ozone and PM monitoring is needed for determining compliance with State and federal standards, as well as agriculture burn forecasting.

Sacramento Valley Air Basin: Colusa, Glenn and Tehama Counties							
	Ozone	**CO**	**NO2**	**PM2.5**	**PM10**	**cont. PM2.5**	**cont. PM10**
Colusa (060111002)	Rconc, StateD			Hconc	Hconc	StateD, AgBn	
Red Bluff-Messer Drive (061030002)					Hconc		
Red Bluff-Oak Street (061030005)	Hconc, StateD						
Tuscan Butte (061030004)	Hconc, Trans, StateD						
Willows (060210003)	Hconc, StateD				Hconc	StateD, AgBn	

Butte County

Butte County is currently designated nonattainment for the federal 1997 ozone standard and a portion of Butte County is nonattainment for the federal 2006 24-hour PM2.5 standard. The county had a 2009 federal 24-hour PM2.5 design value of 59 ug/m^3. The Paradise-Airport site is the ozone design site with a 2009 federal 8-hour design value of 0.082 ppm. With air quality challenges for both pollutants, multi-pollutant monitoring is needed at the Chico site. PM2.5 monitors at the Gridley and Paradise – Fire Station sites also help inform agricultural burning decisions, which is important in this region, as well as characterizing impacts from residential wood burning. Butte County is currently nonattainment for the State 24-hour PM10 standard. Continued monitoring in Butte County is needed.

Sacramento Valley Air Basin: Butte County							
	O_3	**CO**	**NO_2**	**$PM_{2.5}$**	**PM_{10}**	**cont. $PM_{2.5}$**	**cont. PM_{10}**
Chico (060070002)	Hconc	Rconc	Rconc	Hconc	Hconc	StateD, Gnrl	
Gridley (060007004)						StateD, AgBn	
Paradise-Airport (060074001)	Hconc						
Paradise-Fire Station (060072001)						StateD, AgBn	

Sutter and Yuba counties

Both counties are designated nonattainment for the State ozone standard. In addition, a portion of Sutter County is part of the Sacramento federal ozone nonattainment area. Sutter County had a 2009 8-hour ozone design value of 0.079 ppm, which is above the federal 8-hour ozone standard. In addition, portions of Sutter and Yuba counties comprise their own nonattainment area for the federal 24-hour PM2.5 standard. While this area currently meets this standard, PM2.5 monitoring is needed to demonstrate continued attainment. Both ozone and particulate matter monitoring in this area is very important.

Yuba City, located in Sutter County, and Marysville, located in Yuba County, are adjacent to one another, form one combined metropolitan statistical area, and function more like one city than two. Consequently, although there is no monitor physically in Yuba County, the Yuba City site in Sutter County is considered representative of both Yuba City and Marysville, and therefore functions to represent Yuba County, as well. The Sutter Buttes site was established to characterize ozone transport aloft in the Sacramento Valley. This area is currently nonattainment for the State 24-hour PM10 standard. Continued monitoring at the Sutter Buttes and Yuba City sites is needed.

Sacramento Valley Air Basin: Sutter and Yuba Counties							
	Ozone	**CO**	**NO2**	**PM2.5**	**PM10**	**cont. PM2.5**	**cont. PM10**
Sutter Buttes (061010004)	Hconc, Trans						
Yuba City (061010003)	Hconc, StateD		Rconc	Hconc	Hconc	StateD, AgBn	

Yolo County and portions of Placer and Solano counties

All of these counties are nonattainment for the federal and State ozone standards. Solano and Yolo counties have monitors with 2009 federal 8-hour ozone design values exceeding 0.070 ppm. In addition, Yolo County and the Sacramento Valley portions of Placer and Solano counties are all part of the Sacramento federal ozone nonattainment area. Additionally, portions of Yolo and Solano counties and the Sacramento Valley portion of Placer are part of the Sacramento nonattainment area for the State 24-hour PM2.5 and PM10 standards. With multiple air quality challenges, a comprehensive monitoring strategy is important for these areas. Consequently, four out of the seven monitor sites in this area monitor for two or more pollutants. As standards tighten and become more stringent, continued monitoring in these counties becomes even more important. Moreover, with agricultural lands being the predominate land use in and around these counties, monitoring PM2.5 for purposes of agricultural burning forecasts is also important.

Sacramento Valley Air Basin: Yolo County, part of Placer County, and northern and eastern parts of Solano County							
	O_3	**CO**	**NO_2**	**$PM_{2.5}$**	**PM_{10}**	**cont. $PM_{2.5}$**	**cont. PM_{10}**
Auburn (060610002)	Hconc						
Davis-UCD Campus (061130004)	Hconc		Rconc		Rconc	StateD, AgBn	
Roseville (060610006)	Hconc		Rconc	Rconc	Hconc	StateD, AgBn	
West Sacramento (061132001)					Hconc		
Woodland (061131003)	Hconc, StateD			Hconc	Hconc	StateD, AgBn	
Vacaville-Merchant (060953001)					Rconc		
Vacaville-Ulatis (060953003)	Hconc, Trans, StateD					StateD, Gnrl	

Summary

California has one of the most extensive monitoring networks in the nation. Such a network is needed due to our severe air quality issues, large population and vehicle miles traveled, varied topography and a large number of separate airsheds. There are more than 250 monitoring locations in California where the ambient air quality is routinely measured for gaseous and particulate air pollutants. The measured data form a backbone for air quality management programs, provide the public with information on the status of air quality and progress in improving air quality, and are used by health researchers, business interests, environmental groups, and others. As a result of this assessment, all existing monitors covered in this report are critical and none is proposed to be discontinued or relocated. Moreover, this assessment demonstrates that the monitors and sites within this report meet the monitoring objective requirements of Appendix D in 40 CFR 58, which is to provide air pollution data to the general public in a timely manner and to support compliance with ambient air quality standards and air pollution research studies.

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This appendix provides a summary of the required and existing monitoring sites within the geographical scope of this report.

APPENDIX A

Numbers of Required and Existing Sites in the Geographical Areas of this Report[1]

Geographical Area/*MSA*	Pop.	Ozone		PM2.5				PM10			
		Required	Existing	Required FRM	Existing FRM	Required Continuous	Existing Continuous	Required FRM	Existing FRM	Required Continuous	Existing Continuous
Lake County Air Basin	67,530	0	1	0	1	0	0	0	1	0	0
Lake Tahoe Air Basin (portions of El Dorado and Placer counties)	58,121	0	1	0	0	0	0	0	0	0	1
*Sacramento-Arden-Arcade-Roseville MSA**		2	16	3	5	2	6	4	9	0	3
Eastern Kern Air Pollution Control District (a portion of Mojave Desert Air Basin)	147,758	0	1	0	2	0	0	0	3	0	0
*Bakersfield MSA**		2	9	2	5	1	3	2	6	0	1
Mountain Counties Air Basin	472,991	0	11	0	5	0	6	0	3	0	0
*Sacramento-Arden-Arcade-Roseville MSA**		2	16	3	5	2	6	4	9	0	3
Mendocino County and Northern Sonoma Air Quality Management Districts	333,829	0	2	0	0	0	2	0	3	0	1
*Santa Rosa-Petaluma MSA**		1	2	0	1	0	0	0	3	0	0
Northeast Plateau Air Basin	92,112	0	1	0	1	0	0	0	3	0	0
Sacramento Valley Air Basin (minus Sacramento Metro AQMD)	2,817,815	0	16	0	6	0	11	0	13	0	0
Chico MSA		1	2	1	1	1	3	0	1	0	0
Redding MSA		1	3	0	1	0	0	0	3	0	0
*Sacramento-Arden-Arcade-Roseville MSA**		2	16	3	5	2	6	4	9	0	3
*Vallejo-Fairfield MSA**		2	4	1	1	1	2	0	2	0	0
Yuba City MSA		1	2	1	1	1	1	0	1	0	0

[1] Federal minimum monitoring requirements for an area is by Metropolitan Statiscal Area (MSA). However, for the purpose of this assessment, we are listing the number of required and existing monitoring sites by the geographical areas that are covered in this report. Note that there are more monitoring sites in the geographical scope of this report than required by federal regulations. New federal monitoring requirements for NO2 and SO2 will be discussed in future annual monitoring network plans. There are no federal requirements for CO and lead monitoring within the geographical scope of this report.

* Parts of these MSAs are included in the geographical scope of this report, and parts are within the geographical scope of the reports being completed by the districts. The numbers of sites listed are for the entire MSA.

Annual Network Plan for Ambient Air Monitoring

5-Year Network Assessment Plan

Imperial County

June 2010

Prepared by the

Imperial County Air Pollution Control District

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I Introduction

The Imperial County Air Pollution Control District (ICAPCD) Annual Network Plan for Ambient Air Monitoring is an annual evaluation of the ICAPCD's network of air pollution monitoring sites. The annual review of our State and Local Air Monitoring Stations (SLAMS) network is required by Title 40, Code of Federal Regulations, Part 58.10 (40 CFR 58.10). Information is provided for all ambient air pollution monitoring which occurred in Imperial County, including two (2) sites operated by the California Air Resources Board (ARB). Data for the ARB sites was obtained directly from the agency and is accurate to the best of our knowledge.

This review is used to determine if the State and Local Air Monitoring Station (SLAMS) network in Imperial County meets the U.S. Environmental Protection Agency (EPA) criteria for station sitting based on the EPA monitoring objectives. This network review ensures that the data collected by the SLAMS air monitoring network in Imperial County is representative and will satisfy the data needs of EPA, the California Air Resources Board (CARB), and the Imperial County Air Pollution Control District.

As required by the regulations, this report includes monitors which are federal reference methods (FRM) or federal equivalent methods (FEM). While the CFR requires reporting of approved regional methods (ARM), no ARMs are in operation in Imperial County as of this time.

This report is a directory of existing and proposed modifications to the monitoring stations in the ICAPCD's network of SLAMS and includes recommendations and progress reports. New changes to the Code of Federal Regulations require specific detailed monitoring network information to be included in this report along with a 30 day public review period prior to submittal of the report to USEPA.

Starting in 2010, USEPA requires that all state and local monitoring agencies conduct a monitoring network assessment once every five years (40 CFR 58.10(e)). It includes re-evaluation of the objectives and budget for air monitoring; evaluation of the networks effectiveness and efficiency relative to its objectives and costs; and development of recommendations for network reconfigurations and improvements. It also includes consideration of non-technical factors, such as political or justice-related issues; subjective situational analysis, cost considerations, and sensitive populations, to name a few.

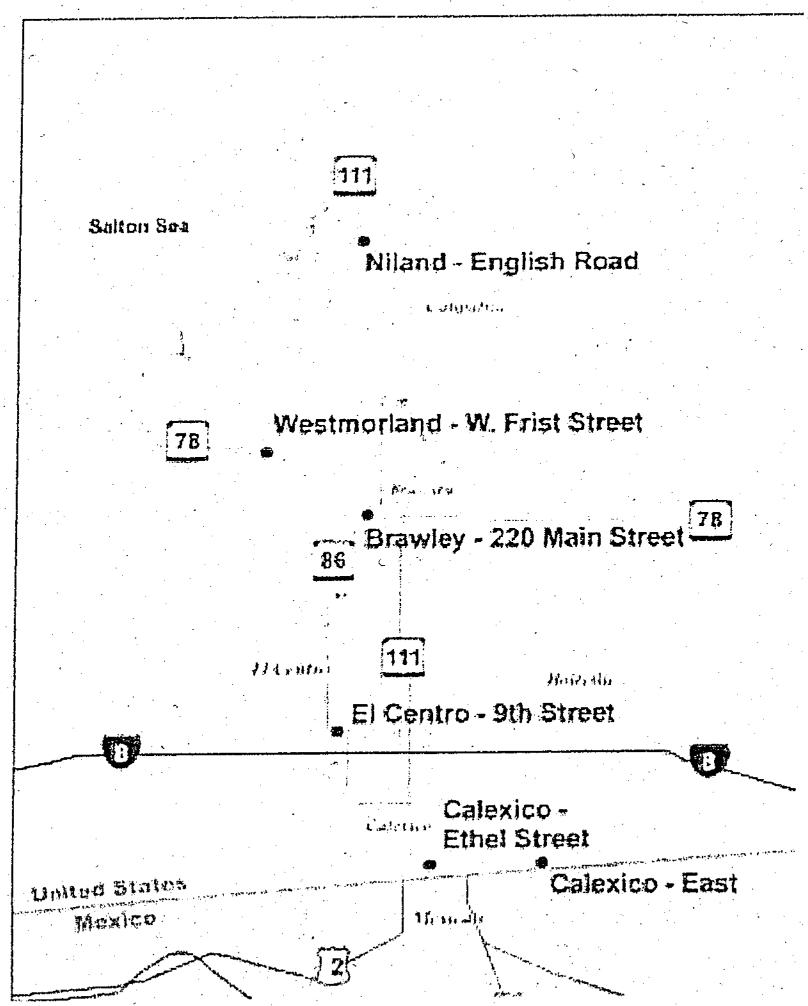


Figure 1. Map of Ambient Air Monitoring Stations in Imperial County

II Overview of Network

II.1 Air Monitoring Network Design - Monitoring Objectives and Spatial Scales

The ambient air monitoring network in Imperial County consists of SLAMS operated by the ICAPCD and California Air Resources Board (ARB). The monitoring network is designed to cover the meteorology, topography, emissions and air quality in Imperial County, and at the same time, to adequately represent the population in Imperial County.

This network review is used to determine in the monitoring system meets the monitoring objectives defined in 40 CFR 58, Appendix D. The three basic monitoring objectives as described in Appendix D are:

1. Provide air pollution date to the general public in a timely manner.

   Air quality information is posted daily via Internet site at www.imperialvalleyair.org ; www.airnow.gov ; www.arb.ca.gov/aqmis2/aqinfo.php

2. Support compliance with ambient air quality standards and emission strategy development.

   The Imperial County Air Pollution Control District currently is finalizing State Implementation Plans (SIP) for Particulate Matter and Ozone.

3. Support for air pollution research studies.

   The Imperial County Air Pollution Control District is collaborating with other State and Federal Agencies in a research study for the development of the Salton Sea Restoration Project, which includes the installation of an ambient air monitoring network in that specific area.

There are 6 ambient air monitoring stations located in Imperial County, which is part of the Salton Sea Air Basin. The map in Figure 1 shows the location of each site. These sites are operated for different objectives and are sited to measure the typical concentrations in areas for high population density or to monitor the impacts of regional air pollution. Two of these sites (Calexico Ethel Street and Calexico East) are operated by ARB. The other four SLAMS sites (El Centro, Brawley, Westmorland, Niland) are operated by ICAPCD.

II.2 Monitors

All of the monitoring sites in Imperial County serve multi-purposes. Ambient concentration data is collected for a wide variety of pollutants. The most important of these in the Imperial County, which is part of the Salton Sea Air Basin, are Ozone (O3), and fine particulate matter of a size of 10 micrometers or less (PM10). Other pollutants measured include oxides of nitrogen (NOX), particulate matter of a size of 2.5 micrometers or less (PM2.5), carbon monoxide (CO), and sulfur dioxide (SO2). Monitoring for meteorological parameters such as temperature, wind direction, atmospheric pressure, and wind speed, are also conducted at most monitoring stations. Data for all of the pollutants is needed to better understand the nature of the ambient air quality problems in Imperial County, as well as to inform the public regarding where the air quality is poor and where it is meeting the ambient air quality standards.

Not all pollutants are monitored at all sites. Most sites monitor for multiple pollutants, while some sites monitor only a couple of pollutants. A particular site's location and monitor purpose determine the actual pollutants measured at that site.

The goal in designing a SLAMS network is to establish monitoring stations that will provide data to meet these monitoring objectives. The physical siting of the air monitoring station must achieve a spatial scale of representativeness that is consistent with the monitoring objectives. The spatial scale results from the physical location of the site with respect to the pollutant sources and categories. It estimates the size of the area surrounding the monitoring site that experiences uniform pollutant concentrations. The categories of spatial scale are:

- Microscale - An area of uniform pollutant concentrations ranging from several meters up to 100 meters.
- Middle Scale - Uniform pollutant concentrations in an area of about 110 meters to 0.5 kilometers.
- Neighborhood Scale - An area with dimensions in the 0.5 to 4 kilometers range.
- Urban Scale - Citywide pollutant conditions with dimensions from 4 to 50 kilometers.
- Regional Scale - An entire rural area of the same general geography (this area ranges from tens to hundreds of kilometers).

Table 2. Relationship Among Monitoring Objectives and Scale of Representativeness.

Monitoring Objective	Appropriate Spatial Scale
Highest Concentration	Micro, middle, neighborhood and sometimes urban.
Population	Neighborhood, urban
Source Impact	Micro, middle, neighborhood
General/Background	Neighborhood, urban, regional
Regional Transport	Urban, regional
Welfare-related Impacts	Urban, regional

III Monitoring Requirements

EPA regulations specify the minimum number of sites at which state and local air agencies must deploy monitors. Imperial County meets or exceeds EPA's minimum requirements, but in overall practice, state and local agencies typically operate more monitors than required by law. The additional monitors are needed to fulfill state and local purposes for monitoring that are additional to federal purposes. California air quality standards are more stringent than federal standards and require more ambient air monitoring to show compliance with the state standards. Monitors are also used to keep the public informed of the actual air quality conditions where they live and work.

The requirements for the number of monitors in Imperial County appear in CFR, Part 58, Appendix D. For purposes of the minimum requirements, the areas are defined by the metropolitan statistical areas (MSAs) developed by the U.S. Census Bureau. Imperial County is part of the El Centro MSA. It covers the major cities in our county and has a population count of 142,361 based on the 2000 U.S. Census, however, currently the U.S. Census Bureau has an estimated population as of July 01, 2009 of 166,874.

For ozone, $PM_{2.5}$ and PM_{10}, the required minimum number is based on the population of an area and the severity of the air quality for the pollutant in the area. For other pollutants, no monitoring is required unless an area exceeds or is close to exceeding a federal ambient air quality standard.

A brief description of the network for each criteria pollutant monitored is provided below:

III.1 Ozone (O3)

The minimum monitoring requirements for ozone are listed in Table 3.1. Imperial County has 5 ozone monitors which meet the requirements of EPA. All ambient air monitoring stations in the county monitor continuously for ozone. The SLAMS network in Imperial County features ozone monitors located in El Centro, Westmorland, and Niland, operated by ICAPCD; and Calexico Ethel and Calexico East, operated by ARB. Brawley site monitored ozone until early 2008 when the monitor was removed by ICAPCD. Westmoreland and El Centro are the highest concentration sites in the monitoring network with an 8 hour design value of 0.082 ppm (2006-2008 data). Imperial County is classified by EPA as moderate non-attainment for Ozone. On December 03, 2009 USEPA issued a final ruling determining that the Imperial County "Moderate" 8-hour ozone non-attainment area attained the 1997 8-hour NAAQS. The determination by USEPA was based upon complete, quality-assured and certified ambient air monitoring data for the years 2006 thru 2008. The high ozone levels tend to occur in the south areas of the county during summer, but El Centro and Westmorland also experience high ozone levels. All sites are used to keep the public informed of air quality. The data is used in Air Quality Index (AQI) reporting and air quality mapping.

Table 3.1

Minimum Monitoring Requirements for Ozone

MSA	County	Population (year 2000)	8-hr design value (years)	Min # of monitors required	Number of active monitors	Monitors needed
20940 El Centro	Imperial	142,361	.082 ppm 2006-2008	1	5	0

III.2 Carbon Monoxide (CO)

There are no EPA minimum requirements for the number of CO monitoring sites. Continued operation of existing SLAMS CO sites is required until discontinuation is approved by the EPA Regional Administrator. There are three SLAMS CO monitors operating in the monitoring network. (El Centro, Calexico Ethel, and Calexico East). Calexico East is the highest concentration site in the monitoring network with an 8 hour design value of 7.4 ppm (2004-2007 data)

Table 3.2

Minimum Monitoring Requirements for Carbon Monoxide.

MSA	County	Population (year 2000)	8-hr design value (years)	Min # of monitors required	Number of active monitors	Monitors needed
20940 El Centro	Imperial	142,361	7.4 ppm 2004-2007	0	3	0

III.3 Nitrogen Dioxide (NO2)

There are no EPA minimum requirements for the number of NO2 monitoring sites. Continued operation of existing SLAMS NO2 sites is required until discontinuation is approved by the EPA Regional Administrator. There are three SLAMS NO2 monitors operating in the monitoring network (El Centro, Calexico Ethel, and Calexico East). Calexico Ethel is the highest concentration site in the monitoring network with an 8 hour design value of 0.0145 ppm (2005-2007 data)

Table 3.3

Minimum Monitoring Requirements for Nitrogen Dioxide.

MSA	County	Population (year 2000)	8-hr design value (years)	Min # of monitors required	Number of active monitors	Monitors needed
20940 El Centro	Imperial	142,361	0.0145 ppm 2005-2007	0	3	0

III.4 Sulfur Dioxide (SO2)

There are no EPA minimum requirements for the number of SO2 monitoring sites. Continued operation of existing SLAMS SO2 sites is required until discontinuation is approved by the EPA Regional Administrator. There is one SLAMS SO2 monitor operating in the monitoring network (Calexico Ethel).

Table 3.4

Minimum Monitoring Requirements for Sulfur Dioxide.

MSA	County	Population (year 2000)	Min # of monitors required	Number of active monitors	Monitors needed
208940 El Centro	Imperial	142,361	0	1	0

III.5 Particulate Matter (PM10)

The minimum monitoring requirements for PM10 are listed on Table 3.5. Size selective inlet high volume samplers are operated at 5 sites (Niland, Westmorland, Brawley, El Centro, and Calexico Ethel) to meet the requirements for PM10 sampling. At 2 of the sampling sites, PM10 continuous analyzers are also operated (Niland, Brawley). There real-time devices are capable of making hourly particulate concentration measurements. Real time monitors are clustered in high concentration areas and in downwind areas of the Salton Sea Air Basin. Imperial County is classified by EPA as non-attainment for PM10. All PM10 monitors operate on a one day in six day schedule. Calexico East and Westmorland register the highest concentrations in the monitoring network.

Table.3.5

Minimum Monitoring Requirements for Particulate Matter (PM10).

MSA	County	Population (year 2000)	Min # of monitors required	Number of active monitors	Monitors needed
20940 El Centro	Imperial	142,361	1-2	5	0

III.6 Particulate Matter (PM2.5)

The minimum requirements for PM2.5 are listed on Table 3.6, and the required monitoring stations or sites must be sited to represent community-wide air quality from both mobile and stationary sources, and these monitoring stations shall typically be at neighborhood or urban-scale. FRM approved monitors operate at 3 sites (Brawley, El Centro, and Calexico Ethel). In addition, there are 2 real-time PM2.5 monitors operating in the monitoring network (Calexico Ethel, and Calexico East). Calexico East registers the highest concentrations in the monitoring network.

Table 3.6

Minimum Monitoring Requirements for Particulate Matter (PM2.5)

MSA	County	Population (year 2000)	Min # of monitors required	Number of active monitors	Monitors needed
20940 El Centro	Imperial	142,361	1	3	0

III.6.1 PM2.5 Additional Information

This section includes information for a couple of elements required to be in the annual network plan that relate specifically to PM2.5. One required element relates to whether data for a PM2.5 monitor can be used to determine compliance with the national annual PM2.5 air quality standard. In the CFR, it is stated as the suitability for comparison to the annual standard. The other element requires information regarding the review process followed by air agencies when changes are made to the location of a PM2.5 monitor that is violating a PM2.5 National Ambient Air Quality Standard.

III.6.2 Comparison to annual PM2.5 NAAQS

The CFR requires that only data from a PM2.5 FRM or FEM be used in regulatory determinations of compliance with the annual PM2.5 NAAQS and that the monitor be located at a neighborhood scale. For a PM2.5 monitor to be representative at a neighborhood scale, the concentration values measured by the monitor should be representative of concentrations expected over an area with dimensions of a few kilometers. Therefore, the monitor shall not be located too close to a hot spot of PM2.5 concentrations that extends over distances less than a few hundred meters. The 3 PM2.5 FRM monitors in Imperial County are sited to be representative of a neighborhood scale and meet this siting requirement.

III.6.3 Review of changes to PM2.5 monitoring network

The PM2.5 network of FRM monitors in California was largely established in 1999. There are 3 monitors located in Imperial County as part of this larger network in California. CARB and ICAPCD located this monitors. CARB operates 1 monitor at Calexico Ethel, and the ICAPCD operates 2 monitors (Brawley and El Centro). In addition, CARB operates two BAM2.5 units at Calexico East and Calexico Ethel. CARB and ICAPCD will discuss any proposed changes or modifications to the PM2.5 monitoring network in Imperial County prior to any formal changes being made.

III.7 Recent or proposed modifications to Network

Calexico East

The California Air Resources Board is evaluating shutting down the complete monitoring site and has started the process.

Calexico Ethel

The California Air Resources Board is evaluating relocating Calexico Ethel complete monitoring site to a different location within the City of Calexico. The proposed relocation is to be within a 1 mile perimeter from the current location.

Salton Sea Air Monitoring Network

The ICAPCD is working closely with other state and federal agencies and has established an ambient air monitoring station network around the Salton Sea for the proposed Salton Sea restoration project.

The Imperial Irrigation District (IID) Water Conservation and Transfer Project (Project) is a long-term water conservation project, up to 75 years, implemented by IID to conserve up to 300 thousand acre-feet per year of Colorado River water for the purpose of transferring the conserved water to the San Diego County Water Authority (SDCWA), Coachella Valley Water District (CVWD), and/or Metropolitan Water District of Southern California (MWD). The Project also includes the implementation of a Habitat Conservation Plan (HCP) which mitigates or avoids certain effects of the Project. Specifically, the HCP addresses the impacts to species and habitats within the IID water service area, the right-of-way of the All American Canal and the Salton Sea. The Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the HCP identified potential significant impacts on air quality, specifically dust emissions by the shoreline sediments exposed by lowered water levels in the Salton Sea.

The ICAPCD is very concerned that reduced water levels will expose additional playa at the Salton Sea creating a potential to produce significant dust emissions. In order to address the potentially significant impact, a phased approach was identified in the EIR/EIS for the HCP which included a 4-step plan. Part of that 4-step plan is the implementation of a meteorological data collection, Particulate Matter of less than 10 microns (PM_{10}), and toxic air contaminant monitoring program. The goals of the monitoring program are three fold. They include the observation of incremental increases in toxic air contaminant concentrations, observation of PM_{10} issues and a basis for mitigation efforts. However, any meaningful observations will require comparison to a baseline. In order to establish a baseline the monitoring program must be established prior to any implementation of the Project and must continue through the implementation process.

In order to establish baseline air quality conditions at the Salton Sea, air quality and meteorological data has been collected starting in early 2010 via a network of stations surrounding the sea. As specified by the EIR/EIS six monitoring stations, collectively known as the Salton Sea Air Quality Monitoring Network (SSAQMN), have been located around the Salton Sea shore at sites near existing communities, significant emission sources or sensitive receptor areas. Each station within the SSAQMN has a functional Thermo Fischer Scientific tapered element oscillating microbalance (TEOM) Series 1405-D instrument and up to seven (7) types of meteorological instruments designed to complement the TEOM series 1045-D. The SSAQMN will be operate as Special Purpose Monitors (SPM) for a period of five years, commencing early 2010 for the sole purpose of assessing baseline air quality conditions.

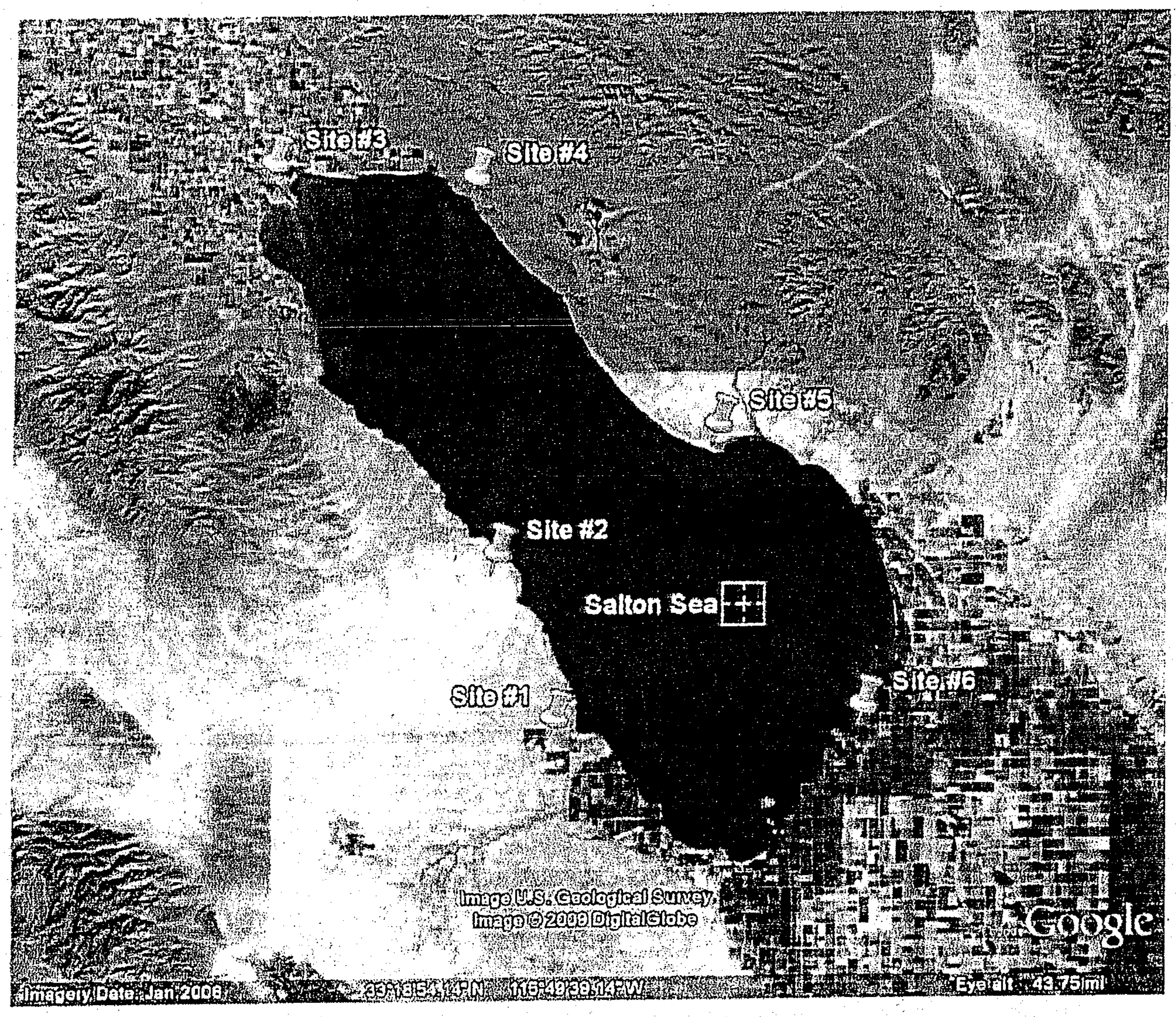


Figure 2. Map of the Salton Sea Air Quality Monitoring Network Sites

IV Quality Assurance

IV.1 Quality Assurance and Data Submittal

All data collected from the monitors in the Imperial County monitoring network is first reviewed by the Imperial County, then forwarded for quality assurance to CARB to be reviewed and processed. $PM_{2.5}$ FRM filter data, is first submitted to San Diego County APCD, for review and analysis, and the information is forwarded to CARB and back to Imperial County.

IV.2 Data Submittal

Digital records of the data including precision and accuracy data are submitted to EPA by uploading the records to their air quality system data base (AQS). These records are submitted within 90 days following the end of each quarterly reporting period.

IV.3 Annual Certification

Federal regulations require air monitoring organizations to submit precision and accuracy data for the data reported to federal and state databases. ICAPCD air monitoring precision data are submitted to USEPA AIRS/AQS database. Accuracy data are reported to the USEPA by ARB. The data is certified for accuracy and completeness on an annual basis.

V Ambient Air Monitoring Network in Imperial County

Figure 1 shows a map of current operating ambient air monitoring stations in Imperial County, and Figure 2 shows a map of the new Salton Sea Air Quality Monitoring Network Sites. Table 5.1 lists the location of the Imperial County Air Quality Monitoring Sites and Table 5.2 lists the location of the Salton Sea Air Quality Monitoring Sites. Table 5.3 lists the Imperial County Monitoring Network sites and the pollutants and other parameters which are monitored at each location, Table 5.4 Monitoring Sites in Salton Sea Monitoring Network with pollutants and parameter monitored, and Table 5.5 lists the criteria pollutant spatial scale and monitoring objective. All of the monitors operating in Imperial County are part of the SLAMS network. Ozone monitors were part of a Special Purpose (SPM) monitors, as stated in 40CFR 58.20, but the ICAPCD is working with CARB to have them designated as part of the SLAMS.

There are currently six (6) permanent ambient air monitoring stations in Imperial County. Five (4) of these stations are operated by the ICAPCD as part of the SLAMS network. Two (2) additional stations are operated by ARB as part of their SLAMS network, both in Calexico, CA.

In addition, in early 2010, the District started the operation and maintenance of the Salton Sea Air Quality Monitoring Network, consisting of six (6) Special Purpose Monitors (SPM) for a period of five years, for the sole purpose of assessing baseline air quality conditions.

The tables in this section give detailed information relating to the sites and monitors. They are presented to show compliance with the monitoring requirements found in 40 CFR58.10.

Table 5.1 Ambient Air Quality Monitoring sites in Imperial County

Location	Address	ARB No.	AIRS No.	Latitude	Longitude
Niland	7711 English Road, Niland, CA 92257	13997	060254004	33º12'49"	115º32'43"
Westmorland	570 Cook St., Westmorland, CA 92281	13697	060254003	33º01'57"	115º37'25"
Brawley	220 Main St., Brawley, CA 92227	13701	060250007	32º58'42"	115º32'21"
El Centro	150 S. 9th St., El Centro, CA 92243	13694	060251003	32º47'32"	115º33'47"
Calexico Ethel	1029 Belcher St., Calexico, CA 922231	13698	060250005	32º40'34"	115º28'59"
Calexico East	1699 Carr Rd., Calexico, CA 92231	13700	060250006	32º40'27"	115º23'28"

Table 5.2 Salton Sea Ambient Air Quality Monitoring Sites

Location /Site#	Address	ARB No.	AIRS No.	Latitude	Longitude
1.Naval Test Base	N/A	13603	None	33°10'10"	115°51'21"
2. Salton City	N/A, Salton City, CA 92275	13604	None	33°16'21"	115°54'02"
3.Torres-Martinez	Lincoln Ave. & 73rd St., Mecca, CA 92254	33601	None	33°31'06"	116°04'31"
4.Salton Sea State Park	100-225 State Park Rd., North Shore, CA 92254	33602	None	33°30'32"	115°55'11"
5.Bombay Beach	A St. & 3rd St., Bombay Beach, CA 92257	13601	None	33°21'09"	115°44'04"
6. Sonny Bono	906 W. Sinclair Rd., Calipatria, CA 92233	13602	None	33°10'35"	115°37'23"

Table 5.3 Monitoring Sites in Imperial County with Pollutants and Parameter Monitored

Location	Pollutants Monitored	Parameters Monitored
Niland	O3, PM10	OT, RH, WD, HWS, BP
Westmoreland	O3, PM10	OT, RH, WD, HWS, BP
Brawley	PM10, PM2.5	OT, BP
El Centro	CO, NO2, O3, PM10, PM2.5	OT, WD, HWS, BP
Calexico Ethel	CO, SO2, NO2, PM10, PM2.5	OT, RH, WD, HWS, BP, SR
Calexico East	CO, NO2, O3, PM2.5	OT, WD, HWS

Pollutants

O3- Ozone
PM10- Particulate Matter <10 microns
PM2.5- Particulate Matter <2.5 microns
NO2- Nitrogen Dioxide
CO- Carbon Monoxide
SO2- Sulfur Dioxide

Parameters

OT- Outside Temperature
RH- Relative Humidity
WD- Wind Direction
HWS- Horizontal Wind Speed
BP- Barometric Pressure
SR- Solar Radiation

Table 5.4 Monitoring Sites in Salton Sea Monitoring Network with Pollutants and Parameter Monitored

Location	Pollutants Monitored	Parameters Monitored
Naval Test Base	PM10, PM2.5, PMc	OT, RH, WD, HWS, BP, SR
Salton City	PM10, PM2.5, PMc	OT, RH, WD, HWS, BP, SR
Torres-Martinez	PM10, PM2.5, PMc	OT, RH, WD, HWS, BP, SR
Salton Sea State Park	PM10, PM2.5, PMc	OT, RH, WD, HWS, BP, SR
Bombay Beach	PM10, PM.2.5, PMc	OT, RH, WD, HWS, BP, SR
Sonny Bono	PM10, PM2.5, PMc	OT, RH, WD, HWS, BP, SR

Pollutants

PM10- Particulate Matter <10 microns
PM2.5- Particulate Matter <2.5 microns
PMc Particulate Matter Coarse

Parameters

OT- Outside Temperature
RH- Relative Humidity
WD- Wind Direction
HWS- Horizontal Wind Speed
BP- Barometric Pressure
SR- Solar Radiation

Table 5.5 Criteria Pollutant Spatial Scale and Monitoring Objective for Imperial County Ambient Monitoring Stations

Location	CO	NO2	SO2	O3	PM10	PM2.5
Niland				NS/RC	NS/RC	
Westmorland				RS/HC	RS/HC	
Brawley					NS/RC	NS/RC
El Centro	NS/RC	NS/RC		NS/RC	NS/RC	NS/RC
Calexico Ethel	NS/RC	NS/HC	NS/RC	US/RC	US/RC	NS/RC
Calexico East	MS/HC	MS/RC		MS/RC	MS/HC	MS/HC

Spatial Scale

MS- Middle Scale
NS- Neighborhood Scale
US- Urban Scale

Monitoring Objective

HC- High Concentrations
RC- Representative Concentrations

Table 5.6 Criteria Pollutant Spatial Scale and Monitoring Objective for Salton Sea Air Quality Monitoring Network Sites

Location	PM10	PM2.5	PMc
Naval Test Base	NS/RC	NS/RC	NS/RC
Salton City	NS/RC	NS/RC	NS/RC
Torres-Martinez	NS/RC	NS/RC	NS/RC
Salton Sea Park	NS/RC	NS/RC	NS/RC
Bombay Beach	NS/RC	NS/RC	NS/RC
Sonny Bono	NS/RC	NS/RC	NS/RC

Spatial Scale

NS- Neighborhood Scale

Monitoring Objective

RC- Representative Concentrations

VI Detailed Site Information

The tables in this section give detailed site information the reporting of which is required by federal regulation under 40 CFR 5810.

Site Survey Report

Siting Information

Site Name: Niland-English Road	Audit Date: 2010-01-27	ARB Number: 13997	AIRS Number: 060254004
Address: 7711 English Road Niland, CA 92257	Latitude: 33° 12' 49"	Longitude: 115° 32' 43"	Elevation (m): -54
	Auditors: Patrick Rainey Mark Copple	Site Technician: Mike Green	Site Phone:
Operating Agency: Imperial County APCD		Site Report: Yes	Site Photos: Yes

General Siting Conditions

Station Temperature	Traffic	Topography	Predominant Wind Direction: West
Controlled: Yes	Description: Remote	Site: Level	Arc Air Flow (Deg): 360 Degrees
Recorded: Yes	Distance: 20 meters	Region: valley	Probe Clean: Yes
Inside Temp: 25 Degrees Celsius	Count (Veh/Day): 50	**QA Manual**	Manifold Clean: N/A
Meteorology	**Non-vehicular Local Sources**	Approved: Yes	Cleaning Schedule: As Needed
Located With Instruments: Yes	Description: Agriculture	Agency: Imperial County APCD	Autocalibrator Type: API 400A IZS
Shadowing: No	Distance: 50 meters	Urbanization: Rural	Site Survey Complete: Yes
Boom Orientation (Deg): 350	Direction: 360	Ground Cover: Dirt	Logbook Up To Date: Yes
Temp(Motor/Natural): Motor			

Action Items

Comments

Site Survey Report (Cont.)

Monitor Type	Ozone			Outdoor Temperature
Manufacturer/Model	API/Teledyne 400			
Serial Number	30330	17800	20005420	x4805
POC	1	1	1	1
Data For Record?	Yes	Yes	Yes	Yes
Purpose	SLAMS	Other	Other	Other
Objective	POPULATION EXPOSURE	UNKNOWN	UNKNOWN	
Scale				
Height Above Ground	4.5	4.5	5.0	10.0
Height Above Platform	1.5	1.5		
Sampler Spacing				
Current Manual Available?	Yes	Yes	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes	Yes	Yes
In-line Filter Change Date	2010-01-26	Not Available	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available	Not Available	Not Available
Calibration Current?	Yes	Yes	Yes	No
Calibration Date	2010-01-13	2009-05-06	2009-04-13	2009-01-22
Cal. Equipment Cert. Date	2009-10-13	2008-08-28	2009-04-13	Not Available
Obstacle Description	None	None	None	None
Distance to Obstacle	-	-	-	-
Height Above Inlet	-	-	-	-
Distance to Walls, etc.	-	-	-	-
Distance to Dripline	-	-	-	-
Dominant Influence	Agriculture	Agriculture	Agriculture	
Residence Time (sec)	5.4			

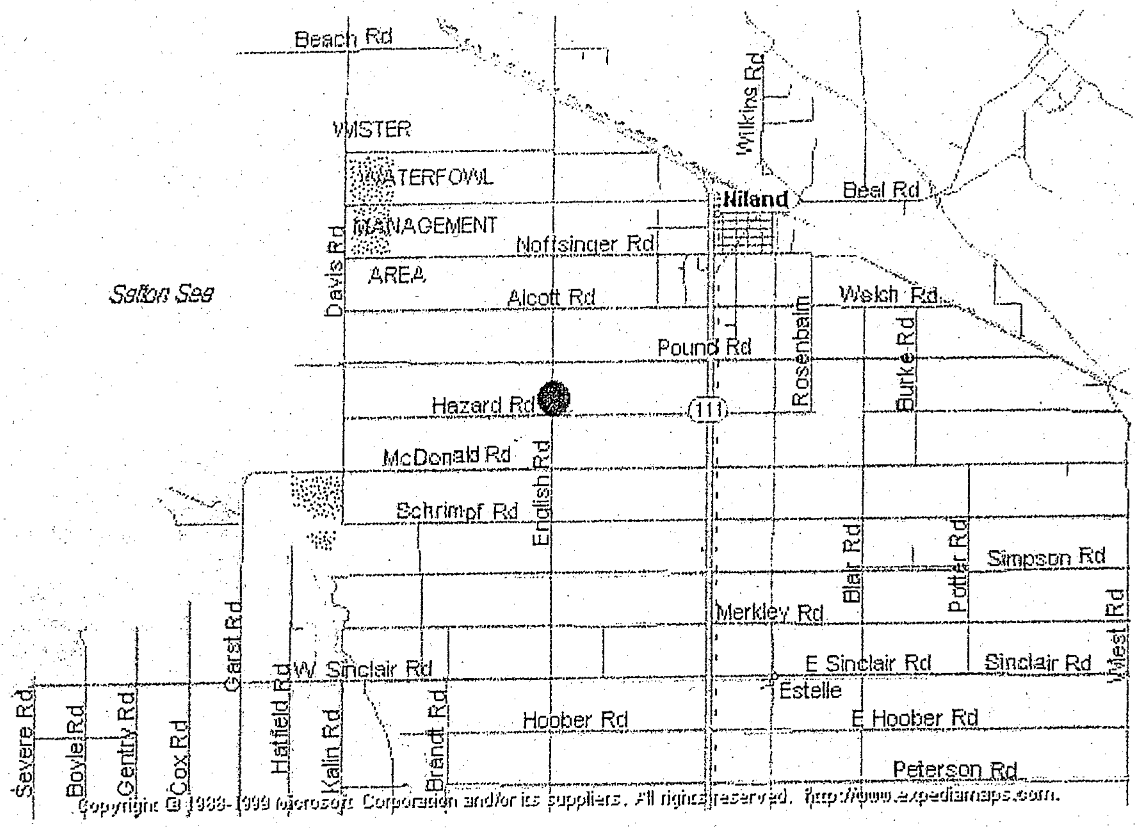
Monitor Type	Wind Direction	Horizontal Wind Speed
Manufacturer/Model		
Serial Number	x4362	x4245
POC	1	1
Data For Record?	Yes	Yes
Purpose	Other	Other
Objective		
Scale		
Height Above Ground	10.0	10.0
Height Above Platform		
Sampler Spacing		
Current Manual Available?	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes
In-line Filter Change Date	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available
Calibration Current?	Yes	Yes
Calibration Date	2009-11-16	2009-11-16
Cal. Equipment Cert. Date		2009-01-14
Obstacle Description	None	None
Distance to Obstacle	-	-
Height Above Inlet	-	-
Distance to Walls, etc.	-	-
Distance to Dripline	-	-
Dominant Influence		
Residence Time (sec)		

Site Name	Niland
AQS ID	060254004
GIS Coordinates	Lat 33º 12' 49" Long 115º 32' 43"
Location	Located in remote setting near the community of Niland
Address	7711 English Road, Niland, CA 92257
County	Imperial County
Dist. to road	20 meters
Traffic count	50 vehicles per day
Ground Cover	Dirt
Representative area	MSA (El Centro)

Pollutant	O3	PM10
Sampling Method	API/Teledyne 400	Anderson 1200
Analysis Method	N/A	Weighed by ARB
Start Date	6/1/96	6/1/96
Operation Schedule	Continuous	Continuous
Sampling Season	All year	All year
Probe height	4.5 m	4.5 m
Dist. from supporting structure	1.5 m	1.5 m
Dist. from obstructions on roof	None	None
Distance from trees	None	None
Unrestricted airflow	360º	360º
Probe Material	Glass & Teflon	N/A
Residence Time	5.4 sec	N/A
Is it suitable for comparison against the annual PM2.5?	N/A	No
Frequency of flow rate verification for manual PM samplers audit	N/A	Monthly
Frequency of flow rate verification for automated PM analyzers audit	N/A	N/A
Frequency of 1-point QC check (gaseous)	Bi-Weekly	N/A
Last annual performance evaluation (gaseous)	01/27/10	N/A
Last two semi-annual flow rate audits for PM monitors	N/A	01/27/10

Site Information for Niland-English Road

This page last reviewed on June 17, 2010



AIRS Number	ARB Number	Site Start Date	Reporting Agency and Agency Code
060254004	13997	6/1/96	Imperial County APCD (009)

Site Address	County	Air Basin	Latitude (N)	Longitude (W)	Elevation
7711 English Road, Niland CA 92257	Imperial	Salton Sea	33° 12' 49"	115° 32' 43"	-54

Pollutants Monitored (click on parameter link for real-time data)
O_3, PM_{10}, Outdoor Temperature, Relative Humidity, Wind Direction, Horizontal Wind Speed, Barometric Pressure

Site Survey Report

Siting Information

Site Name: Westmoreland	Audit Date: 2010-01-27	ARB Number: 13697	AIRS Number: 060254003
Address: 570 Cook St. Westmoreland, CA 92281	Latitude: 33° 1' 57"	Longitude: 115° 37' 25"	Elevation (m): -32
	Auditors: Patrick Rainey Mark Copple	Site Technician: Mike Green	Site Phone:
Operating Agency: Imperial County APCD		Site Report: Yes	Site Photos: Yes

General Siting Conditions

Station Temperature	**Traffic**	**Topography**	Predominant Wind Direction: West
Controlled: Yes	Description: Rural	Site: Level	Arc Air Flow (Deg): 360 Degrees
Recorded: Yes	Distance: 20 meters	Region: Level	Probe Clean: Yes
Inside Temp: 25 Degrees Celsius	Count (Veh/Day): 100	**QA Manual**	Manifold Clean: N/A
Meteorology	**Non-vehicular Local Sources**	Approved: Yes	Cleaning Schedule: As Needed
Located With Instruments: Yes	Description: None	Agency: Imperial County APCD	Autocalibrator Type: API 400A IZS
Shadowing: No	Distance: N/A	Urbanization: Rural	Site Survey Complete: Yes
Boom Orientation (Deg): 346	Direction: N/A	Ground Cover: Gravel	Logbook Up To Date: Yes
Temp(Motor/Natural): Motor			

Action Items

Comments

Site Survey Report (Cont.)

Monitor Type	Ozone		Outdoor Temperature	Wind Direction
Manufacturer/Model	API/Teledyne 400			
Serial Number	30331	p1770	X4808	X4363
POC	1	1	1	1
Data For Record?	Yes	Yes	Yes	Yes
Purpose	SLAMS	SLAMS	Other	Other
Objective	UNKNOWN	UNKNOWN		
Scale				
Height Above Ground	5.0	4.7	10.0	10.0
Height Above Platform	1.3	1.5		
Sampler Spacing				
Current Manual Available?	Yes	Yes	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes	Yes	Yes
In-line Filter Change Date	2010-01-21	Not Available	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available	Not Available	Not Available
Calibration Current?	Yes	Yes	No	Yes
Calibration Date	2010-01-13	2009-05-06	2009-01-21	2009-11-16
Cal. Equipment Cert. Date	2008-10-13	2008-08-28	Not Available	
Obstacle Description	None	None	None	None
Distance to Obstacle	-	-	-	-
Height Above Inlet	-	-	-	-
Distance to Walls, etc.	-	-	-	-
Distance to Dripline	-	-	-	-
Dominant Influence	Vehicular	Vehicular		
Residence Time (sec)	7.6			

Monitor Type	Horizontal Wind Speed
Manufacturer/Model	
Serial Number	x4246
POC	1
Data For Record?	Yes
Purpose	Other
Objective	
Scale	
Height Above Ground	10.0
Height Above Platform	
Sampler Spacing	
Current Manual Available?	Yes
Instrument Log Up-to-date?	Yes
In-line Filter Change Date	Not Available
Cal. Gas Cert. Date	Not Available
Calibration Current?	Yes
Calibration Date	2009-11-16
Cal. Equipment Cert. Date	2009-01-14
Obstacle Description	None
Distance to Obstacle	-
Height Above Inlet	-
Distance to Walls, etc.	-
Distance to Dripline	-
Dominant Influence	
Residence Time (sec)	

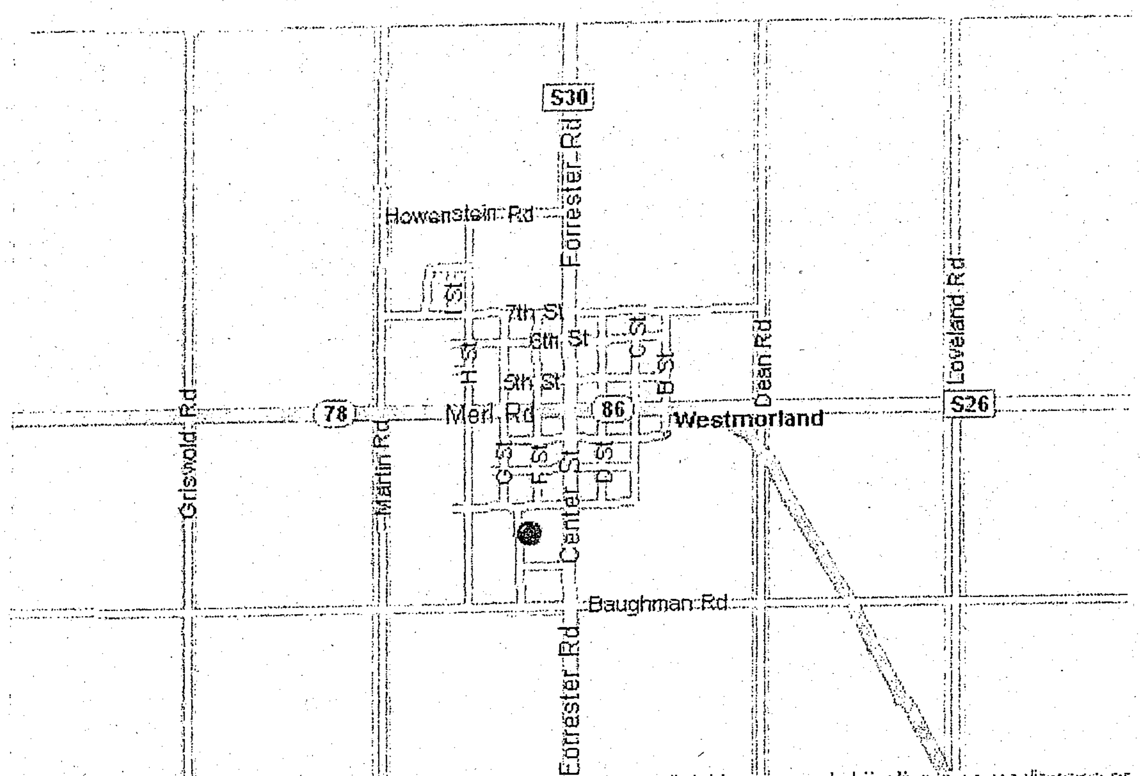
Westmoreland Monitoring Station Details

Site Name	Westmoreland
AQS ID	060254003
GIS Coordinates	Lat 33º 01' 57" Long 115º 37' 25"
Location	Located in suburban setting in the City of Westmoreland
Address	570 Cook St., Westmoreland, CA 92281
County	Imperial County
Dist. to road	20 meters
Traffic count	100 vehicles per day
Ground Cover	Dirt
Representative area	MSA (El Centro)

Pollutant	O3	PM10
Sampling Method	API/Teledyne 400	Anderson 1200
Analysis Method	N/A	Weighed by ARB
Start Date	4/1/93	4/1/93
Operation Schedule	Continuos	1 in 6 day
Sampling Season	All year	All year
Probe height	5 m	5 m
Dist. from supporting structure	1.3 m	1.5
Dist. from obstructions on roof	None	None
Distance from trees	None	None
Unrestricted airflow	360º	360º
Probe Material	Glass & Teflon	N/A
Residence Time	7.6 sec	N/A
Is it suitable for comparison against the annual PM2.5?	N/A	No
Frequency of flow rate verification for manual PM samplers audit	N/A	Monthly
Frequency of flow rate verification for automated PM analyzers audit	N/A	N/A
Frequency of 1-point QC check (gaseous)	Bi-Weekly	N/A
Last annual performance evaluation (gaseous)	1/27/10	N/A
Last two semi-annual flow rate audits for PM monitors	N/A	01/27/10

Site Information for Westmoreland

This page last reviewed on June 17, 2010



AIRS Number	ARB Number	Site Start Date	Reporting Agency and Agency Code
060254003	13697	4/1/93	Imperial County APCD (009)

Site Address	County	Air Basin	Latitude (N)	Longitude (W)	Elevation
570 Cook St., Westmoreland CA 92281	Imperial	Salton Sea	33° 1' 57"	115° 37' 25"	-32

Pollutants Monitored (click on parameter link for real-time data)
O_3, PM_{10}, Outdoor Temperature, Relative Humidity, Wind Direction, Horizontal Wind Speed, Barometric Pressure

Site Survey Report

Siting Information

Site Name: Brawley-Main Street #2	Audit Date: 2010-01-26	ARB Number: 13701	AIRS Number: 060250007
Address: 220 Main St. Brawley, CA 92227	Latitude: 32° 58' 42"	Longitude: 115° 32' 21"	Elevation (m): -13
	Auditors: Patrick Rainey Mark Copple	Site Technician: Mike Green	Site Phone:
Operating Agency: Imperial County APCD		Site Report: Yes	Site Photos: Yes

General Siting Conditions

Station Temperature	Traffic	Topography	Predominant Wind Direction: South
Controlled: Yes	Description: Commercial	Site: Level	Arc Air Flow (Deg): 360 Degrees
Recorded: Yes	Distance: 30 meters	Region: Level	Probe Clean: N/A
Inside Temp: 25 Degrees Celsius	Count (Veh/Day): 5000	**QA Manual**	Manifold Clean: N/A
Meteorology	**Non-vehicular Local Sources**	Approved: Yes	Cleaning Schedule: N/A
Located With Instruments: Yes	Description: None	Agency: Imperial County APCD	Autocalibrator Type: N/A
Shadowing: No	Distance: N/A	Urbanization: City Center	Site Survey Complete: Yes
Boom Orientation (Deg): N/A Temp(Motor/Natural): Natural	Direction: N/A	Ground Cover: Roof	Logbook Up To Date: Yes

Action Items

Comments

Site Survey Report (Cont.)

Monitor Type				Outdoor Temperature
Manufacturer/Model				
Serial Number	07346	20021417	20021398	81681
POC	1	1	1	1
Data For Record?	Yes	Yes	Yes	Yes
Purpose	SLAMS	SLAMS	SLAMS	Unknown
Objective	Other	Other	Other	
Scale				
Height Above Ground	10.0	10.0	10.0	10.0
Height Above Platform	1.5	1.5	1.5	1.0
Sampler Spacing				
Current Manual Available?	Yes	Yes	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes	Yes	No
In-line Filter Change Date	Not Available	Not Available	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available	Not Available	Not Available
Calibration Current?	Yes	Yes	Yes	No
Calibration Date	2009-05-06	2009-04-13	2009-10-14	2009-01-21
Cal. Equipment Cert. Date	2008-08-28	2009-01-07	2009-04-13	Not Available
Obstacle Description	None	None	None	None
Distance to Obstacle	-	-	-	-
Height Above Inlet	-	-	-	-
Distance to Walls, etc.	-	-	-	-
Distance to Dripline	-	-	-	-
Dominant Influence	Vehicular	Vehicular	Vehicular	
Residence Time (sec)				

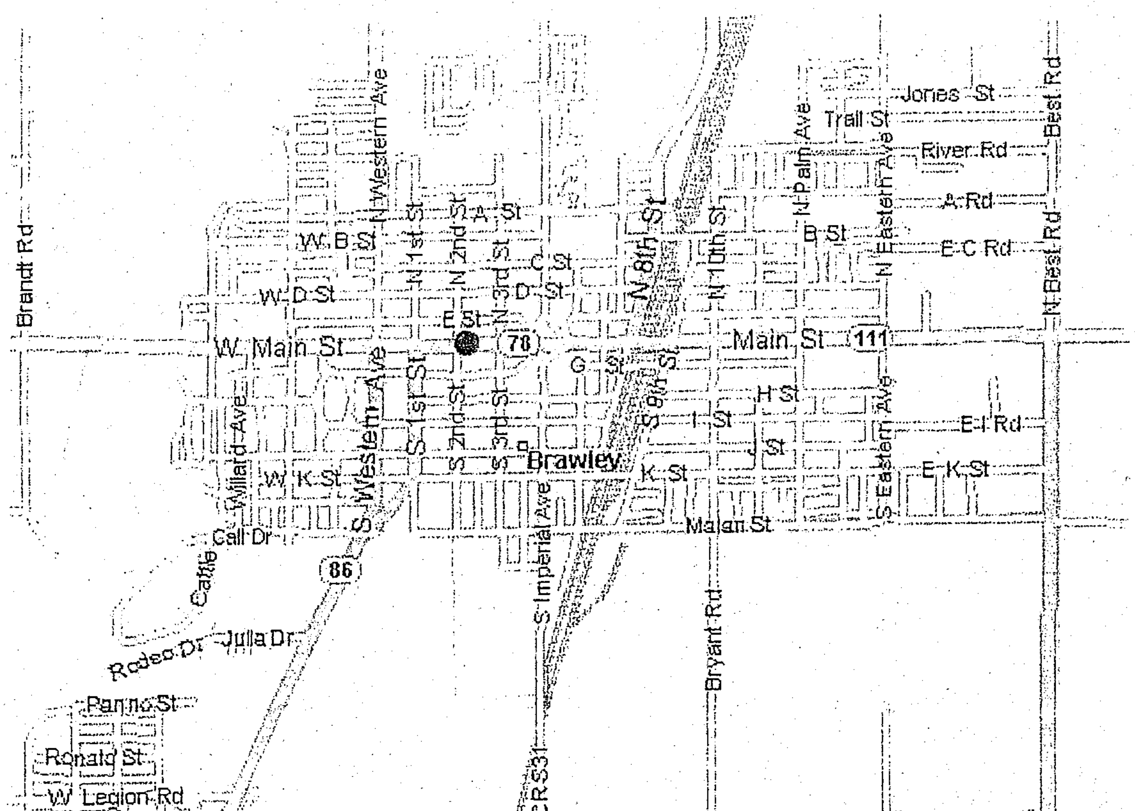
Brawley Monitoring Station Details

Site Name	Brawley
AQS ID	060250007
GIS Coordinates	Lat 32º 58' 42" Long 115º 32' 21"
Location	Located in city center setting in the City of Brawley
Address	220 Main St., Brawley, CA 92227
County	Imperial County
Dist. to road	30 meters
Traffic count	5000 vehicles per day
Ground Cover	Roof
Representative area	MSA (El Centro)

Pollutant	PM2.5	PM10	PM10
Sampling Method	R&P seq. WINS	Anderson 1200	BAM 1020
Analysis Method	Weighed by SDAPCD	Weighed by ARB	N/A
Start Date	1/1/04	1/1/04	1/7/09
Operation Schedule	1 in 3 day	1 in 6 day	Continuous
Sampling Season	All year	All year	All year
Probe height	10.0 m	10.0 m	10.0 m
Dist. from supporting structure	1.5 m	1.5 m	1.5 m
Dist. from obstructions on roof	None	None	None
Distance from trees	None	None	None
Unrestricted airflow	360º	360º	360º
Probe Material	N/A	N/A	N/A
Residence Time	N/A	N/A	N/A
Is it suitable for comparison against the annual PM2.5?	No	No	No
Frequency of flow rate verification for manual PM samplers audit	Monthly	Monthly	N/A
Frequency of flow rate verification for automated PM analyzers audit	N/A	N/A	Monthly
Frequency of 1-point QC check (gaseous)	N/A	N/A	N/A
Last annual performance evaluation (gaseous)	N/A	N/A	N/A
Last two semi-annual flow rate audits for PM monitors	01/26/10	01/26/10	01/26/10

Site Information for Brawley-Main Street #2

This page last reviewed on June 17, 2010



AIRS Number	ARB Number	Site Start Date	Reporting Agency and Agency Code
060250007	13701	1/1/04	Imperial County APCD (009)

Site Address	County	Air Basin	Latitude (N)	Longitude (W)	Elevation
220 Main St., Brawley CA 92227	Imperial	Salton Sea	32° 58' 42"	115° 32' 21"	-13

Pollutants Monitored (click on parameter link for real-time data)
PM_{10}, BAM_{PM10}, $PM_{2.5}$, Outdoor Temperature

Site Survey Report

Siting Information

Site Name: El Centro-9th Street	Audit Date: 2010-01-28	ARB Number: 13694	AIRS Number: 060251003
Address: 150 9th St El Centro, CA 92243	Latitude: 32° 47' 32"	Longitude: 115° 33' 47"	Elevation (m): 9
	Auditors: Patrick Rainey Mark Copple	Site Technician: Mike Green	Site Phone:
Operating Agency: Imperial County APCD		Site Report: Yes	Site Photos: Yes

General Siting Conditions

Station Temperature	**Traffic**	**Topography**	Predominant Wind Direction: South
Controlled: Yes	Description: Residential	Site: Level	Arc Air Flow (Deg): 360 Degrees
Recorded: Yes	Distance: 30 meters	Region: Level	Probe Clean: Yes
Inside Temp: 25.6 Degrees Celsius	Count (Veh/Day): 2500	**QA Manual**	Manifold Clean: Yes
Meteorology	**Non-vehicular Local Sources**	Approved: Yes	Cleaning Schedule: As Needed
Located With Instruments: Yes	Description: None	Agency: Imperial County APCD	Autocalibrator Type: Environics 9100
Shadowing: No	Distance: N/A	Urbanization: City Center	Site Survey Complete: Yes
Boom Orientation (Deg): 347 Temp(Motor/Natural): Natural	Direction: N/A	Ground Cover: Roof	Logbook Up To Date: Yes

Action Items

Comments

Page 1

Site Survey Report (Cont.)

Monitor Type	Nitrogen Dioxide	Ozone		PM2.5
Manufacturer/Model	API 200A	API/Teledyne 400		
Serial Number	2002070	30332	07661	20020959
POC	1	1	2	1
Data For Record?	Yes	Yes	Yes	Yes
Purpose	SLAMS	SLAMS	SLAMS	SLAMS
Objective	POPULATION EXPOSURE	UNKNOWN	UNKNOWN	POPULATION EXPOSURE
Scale	Null			Neighborhood
Height Above Ground	9.2	9.2	10.0	10.0
Height Above Platform	1.8	1.8	1.5	1.5
Sampler Spacing				
Current Manual Available?	Yes	Yes	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes	Yes	Yes
In-line Filter Change Date	2010-01-25	2010-01-25	Not Available	Not Available
Cal. Gas Cert. Date	2009-06-29	Not Available	Not Available	Not Available
Calibration Current?	Yes	Yes	Yes	Yes
Calibration Date	2009-11-23	2009-11-23	2009-05-06	2009-10-14
Cal. Equipment Cert. Date	2008-07-08	2009-07-08	2008-08-28	2009-04-13
Obstacle Description	None	None	None	None
Distance to Obstacle	-	-	-	-
Height Above Inlet	-	-	-	-
Distance to Walls, etc.	-	-	-	-
Distance to Dripline	-	-	-	-
Dominant Influence	Vehicular	Vehicular	Vehicular	Vehicular
Residence Time (sec)	8.7	8.1		

Monitor Type	Outdoor Temperature	Wind Direction	Horizontal Wind Speed
Manufacturer/Model			
Serial Number	X4806	X4361	U5005
POC	1	1	1
Data For Record?	Yes	Yes	Yes
Purpose	Other	Other	Other
Objective			
Scale			
Height Above Ground	10.0	10.0	10.0
Height Above Platform		3.3	3.3
Sampler Spacing			
Current Manual Available?	Yes	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes	Yes
In-line Filter Change Date	Not Available	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available	Not Available
Calibration Current?	Yes	Yes	Yes
Calibration Date	2009-01-29	2009-11-16	2009-11-16
Cal. Equipment Cert. Date	Not Available		2009-01-14
Obstacle Description	None	None	None
Distance to Obstacle	-	-	-
Height Above Inlet	-	-	-
Distance to Walls, etc.	-	-	-
Distance to Dripline	-	-	-
Dominant Influence			
Residence Time (sec)			

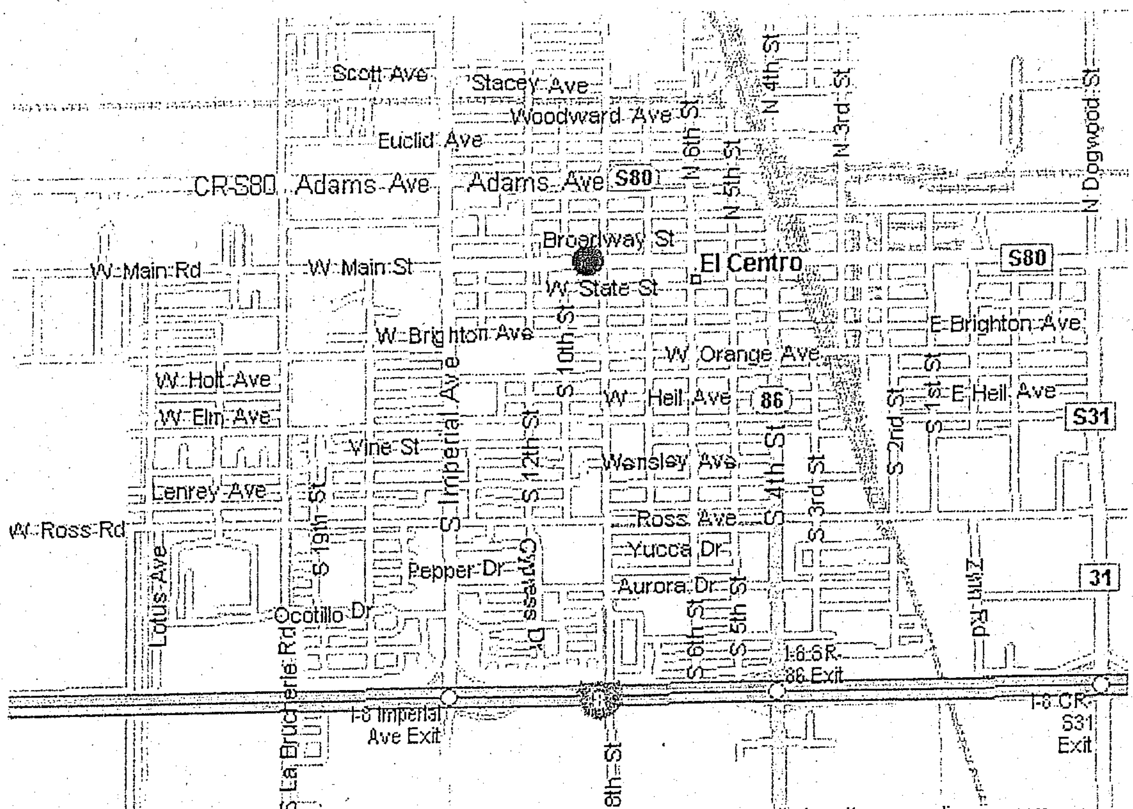
El Centro Monitoring Station Details

Site Name	El Centro
AQS ID	060251003
GIS Coordinates	Lat 32º 47' 32" Long 115º 33' 47"
Location	Located in city center setting in the City of El Centro
Address	150 S. 9th St., El Centro, CA 92243
County	Imperial County
Dist. to road	30 meters
Traffic count	2500 vehicles per day
Ground Cover	Roof
Representative area	MSA (El Centro)

Pollutant	NO2	O3	CO	PM2.5	PM10
Sampling Method	API 200A	API/Teledyne 400	API 300	R&P seq. WINS	Anderson 1200
Analysis Method	N/A	N/A	N/A	W. by SDAPCD	W. by ARB
Start Date	2/1/88	2/1/88	2/1/88	2/1/88	2/1/88
Operation Schedule	Continuous	Continuous	Continuous	1 in 3 day	1 in 6 day
Sampling Season	All year	All year	All year	All year	All year
Probe height	9.2 m	9.2 m	9.2	10.0 m	10.0 m
Dist. from sup structure	1.8 m	1.8 m	1.8 m	1.5 m	1.5 m
Dist. from obstructions on roof	None	None	None	None	None
Distance from trees	None	None	None	None	None
Unrestricted airflow	360º	360º	360º	360º	360º
Probe Material	Glass & Teflon	Glass & Teflon	Glass & Teflon	N/A	N/A
Residence Time	8.7 sec	8.1 sec	8.1	N/A	N/A
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	No	No
Frequency of flow rate verification for manual PM samplers audit	N/A	N/A	N/A	Monthly	Monthly
Frequency of flow rate verification for automated PM analyzers audit	N/A	N/A	N/A	N/A	N/A
Frequency of 1-point QC check (gaseous)	Bi-Weekly	Bi-Weekly	Bi-Weekly	N/A	N/A
Last annual performance evaluation (gaseous)	1/28/10	1/28/10	1/28/10	N/A	N/A
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	01/28/10	01/28/10

Site Information for El Centro-9th Street

This page last reviewed on June 17, 2010



AIRS Number	ARB Number	Site Start Date	Reporting Agency and Agency Code
060251003	13694	2/1/88	Imperial County APCD (009)

Site Address	County	Air Basin	Latitude (N)	Longitude (W)	Elevation
150 9th St, El Centro CA 92243	Imperial	Salton Sea	32° 47' 32"	115° 33' 47"	9

Pollutants Monitored (click on parameter link for real-time data)
CO, NO_2, O_3, PM_{10}, $PM_{2.5}$, Outdoor Temperature, Wind Direction, Horizontal Wind Speed, Barometric Pressure

Site Survey Report

Siting Information

Site Name: Calexico-Ethel Street	Audit Date: 2010-02-02	ARB Number: 13698	AIRS Number: 060250005
Address: 1029 Belcher St Calexico, CA 92231	Latitude: 32° 40' 34"	Longitude: 115° 28' 59"	Elevation (m): 6
	Auditors: Mark Copple Alvin Danque	Site Technician: Tony Royer	Site Phone:
Operating Agency: California Air Resources Board		Site Report: Yes	Site Photos: Yes

General Siting Conditions

Station Temperature	Traffic	Topography	Predominant Wind Direction: West
Controlled: Yes	Description: Residential	Site: Level	Arc Air Flow (Deg): 360 Degrees
Recorded: Yes	Distance: 20 meters	Region: Level	Probe Clean: Yes
Inside Temp: 25 Degrees Celsius	Count (Veh/Day): 7000	**QA Manual**	Manifold Clean: Yes
Meteorology	**Non-vehicular Local Sources**	Approved: Yes	Cleaning Schedule: Annually
Located With Instruments: Yes	Description: Parking lot	Agency: Air Resources Board	Autocalibrator Type: Environics 9100
Shadowing: No	Distance: 3 meters	Urbanization: Suburban	Site Survey Complete: Yes
Boom Orientation (Deg): 346 Temp(Motor/Natural): Motor	Direction: 270	Ground Cover: Asphalt	Logbook Up To Date: Yes

Action Items

Comments

Site Survey Report (Cont.)

Monitor Type	Carbon Monoxide	Carbon Monoxide	Carbon Monoxide	Sulfur Dioxide
Manufacturer/Model	Dasibi 3008			TECO 43A, 43B, 43C, 43i
Serial Number	20003816	Not Available	Not Available	20021372
POC	1			1
Data For Record?	Yes	No	No	Yes
Purpose	SLAMS			SLAMS
Objective	UNKNOWN			UNKNOWN
Scale	Null			Null
Height Above Ground	5.7			5.7
Height Above Platform	2.2			2.2
Sampler Spacing				
Current Manual Available?	Yes	No	No	Yes
Instrument Log Up-to-date?	Yes	No	No	Yes
In-line Filter Change Date	2010-01-29	Not Available	Not Available	2010-01-29
Cal. Gas Cert. Date	2009-06-09	Not Available	Not Available	2009-06-09
Calibration Current?	Yes	No	No	Yes
Calibration Date	2009-06-10	Not Available	Not Available	2009-06-10
Cal. Equipment Cert. Date	2009-05-11	Not Available	Not Available	2009-05-11
Obstacle Description	None	None	None	None
Distance to Obstacle	-	-	-	-
Height Above Inlet	-	-	-	-
Distance to Walls, etc.	-	-	-	-
Distance to Dripline	-	-	-	-
Dominant Influence	Vehicular			Vehicular
Residence Time (sec)				10.1

Monitor Type	Nitrogen Dioxide	Ozone		Suspended Particulate (TSP)
Manufacturer/Model	API 200A	API/Teledyne 400		
Serial Number	200072337	1302	20004186	20081137
POC	1	1	1	1
Data For Record?	Yes	Yes	Yes	No
Purpose	SLAMS	SLAMS	SLAMS	
Objective	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
Scale	Null			
Height Above Ground	5.7	5.7	6.0	5.9
Height Above Platform	2.2	2.2	1.5	1.4
Sampler Spacing				
Current Manual Available?	Yes	Yes	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes	Yes	Yes
In-line Filter Change Date	2010-01-29	2010-01-29	Not Available	Not Available
Cal. Gas Cert. Date	2009-06-09	Not Available	Not Available	Not Available
Calibration Current?	Yes	Yes	Yes	Yes
Calibration Date	2009-06-10	2009-06-10	2010-01-28	2010-01-28
Cal. Equipment Cert. Date	2009-05-11	2009-02-19	2009-07-28	2009-07-28
Obstacle Description	None	None	None	None
Distance to Obstacle	-	-	-	-
Height Above Inlet	-	-	-	-
Distance to Walls, etc.	-	-	-	-
Distance to Dripline	-	-	-	-
Dominant Influence	Vehicular	Vehicular	Vehicular	
Residence Time (sec)	9.7	6.1		

Site Survey Report (Cont.)

Monitor Type			PM2.5	PM2.5
Manufacturer/Model				
Serial Number	20020893	20021151	20081150	20081149
POC	1	3	3	1
Data For Record?	Yes	Yes	Yes	Yes
Purpose	Other	Other	Other	SLAMS
Objective	POPULATION EXPOSURE	POPULATION EXPOSURE	POPULATION EXPOSURE	Other
Scale				Neighborhood
Height Above Ground	6.0	6.0	2.2	2.2
Height Above Platform	1.5	1.5	1.2	1.2
Sampler Spacing				
Current Manual Available?	Yes	Yes	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes	Yes	Yes
In-line Filter Change Date	Not Available	Not Available	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available	Not Available	Not Available
Calibration Current?	Yes	Yes	Yes	Yes
Calibration Date	2009-11-25	2009-11-25	2009-10-29	2009-10-29
Cal. Equipment Cert. Date	2009-04-13	2009-04-13	2009-04-13	2009-04-13
Obstacle Description	None	None	None	None
Distance to Obstacle	-	-	-	-
Height Above Inlet	-	-	-	-
Distance to Walls, etc.	-	-	-	-
Distance to Dripline	-	-	-	-
Dominant Influence	Vehicular	Vehicular	Vehicular	Vehicular
Residence Time (sec)				

Monitor Type		Outdoor Temperature	Wind Direction	Horizontal Wind Speed
Manufacturer/Model				
Serial Number	20021472	P8795	E 1338	E1112
POC	1	1	1	1
Data For Record?	Yes	Yes	Yes	Yes
Purpose	Unknown	SLAMS	SLAMS	SLAMS
Objective	UNKNOWN			
Scale				
Height Above Ground	5.5	8.0	10.0	10.0
Height Above Platform	1.0			
Sampler Spacing				
Current Manual Available?	Yes	Yes	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes	Yes	Yes
In-line Filter Change Date	Not Available	Not Available	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available	Not Available	Not Available
Calibration Current?	Yes	No	No	No
Calibration Date	2010-01-28	2009-01-28	2009-01-28	2009-01-28
Cal. Equipment Cert. Date	2009-11-23	Not Available		Not Available
Obstacle Description	None	None	None	None
Distance to Obstacle	-	-	-	-
Height Above Inlet	-	-	-	-
Distance to Walls, etc.	-	-	-	-
Distance to Dripline	-	-	-	-
Dominant Influence	Vehicular			
Residence Time (sec)				

Site Survey Report (Cont.)

Monitor Type	Barometric Pressure
Manufacturer/Model	
Serial Number	060250005
POC	1
Data For Record?	Yes
Purpose	Other
Objective	
Scale	
Height Above Ground	6.0
Height Above Platform	
Sampler Spacing	
Current Manual Available?	Yes
Instrument Log Up-to-date?	Yes
In-line Filter Change Date	Not Available
Cal. Gas Cert. Date	Not Available
Calibration Current?	No
Calibration Date	2009-01-28
Cal. Equipment Cert. Date	Not Available
Obstacle Description	None
Distance to Obstacle	-
Height Above Inlet	-
Distance to Walls, etc.	-
Distance to Dripline	-
Dominant Influence	
Residence Time (sec)	

Calexico-Ethel Monitoring Station Details

Site Name	Calexico-Ethel
AQS ID	060250005
GIS Coordinates	Lat 32º 40' 34" Long 115º 28' 59"
Location	Located in suburban (residential) area next to a school in City of Calexico
Address	1020 Belcher St., Calexico, CA 92231
County	Imperial County
Dist. to road	20 meters
Traffic count	7000 vehicles per day
Ground Cover	Asphalt
Representative area	MSA (El Centro)

Pollutant	NO2	O3	CO	SO2	PM2.5	PM2.5	PM10	TSP
Sampling Method	API 200E	API/Teledyne 400	Dasibi 3008	Teco 43	R&P seq. WINS	BAM 1020	Anderson 1200	Anderson 1200
Analysis Method	N/A	N/A	N/A	N/A	Weighed by ARB	N/A	Weighed by ARB	Weighed by ARB
Start Date	3/1/94	3/1/94	3/1/94	3/1/94	3/1/94	3/1/94	3/1/94	3/1/94
Operation Schedule	Continuous	Continuous	Continuous	Continuous	1 in 3 day	Continuous	1 in 6 day	1 IN 6 dau
Sampling Season	All year	All year	All year	All year	All year	All year	All year	All year
Probe height	5.7 m	5.7 m	5.7m	5.7m	2.5 m	2.5 m	6.0 m	6.0 m
Dist. from supporting structure	2.2 m	2.2 m	2.2 m	2.2 m	1.5 m	1.5 m	1.5 m	1.5 m
Dist. from obstructions on roof	None	None	None	None	None	None	None	None
Distance from trees	None	None	None	None	None	None	None	None
Unrestricted airflow	360º	360º	360º	360º	360º	360º	360º	360º
Probe Material	Glass & Teflon	Glass & Teflon	Glass & Teflon	Glass & Teflon	N/A	N/A	N/A	N/A
Residence Time	9.7 sec	6.1 sec	7.5 sec	10.1 sec	N/A	N/A	N/A	N/A
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	N/A	Yes	Yes	No	No
Frequency of flow rate verification for manual PM samplers audit	N/A	N/A	N/A	N/A	Monthly	N/A	Monthly	Monthly
Frequency of flow rate verification for automated PM analyzers audit	N/A	N/A	N/A	N/A	N/A	Monthly	N/A	N/A
Frequency of 1-point QC check (gaseous)	Bi-Weekly	Bi-Weekly	Bi-Weekly	Bi-Weekly	N/A	N/A	N/A	N/A
Last annual performance evaluation (gaseous)	02/02/10	02/02/10	02/02/10	02/02/10	N/A	N/A	N/A	N/A
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	N/A	02/02/10	02/02/10	02/02/10	02/02/10

Site Information for Calexico-Ethel Street

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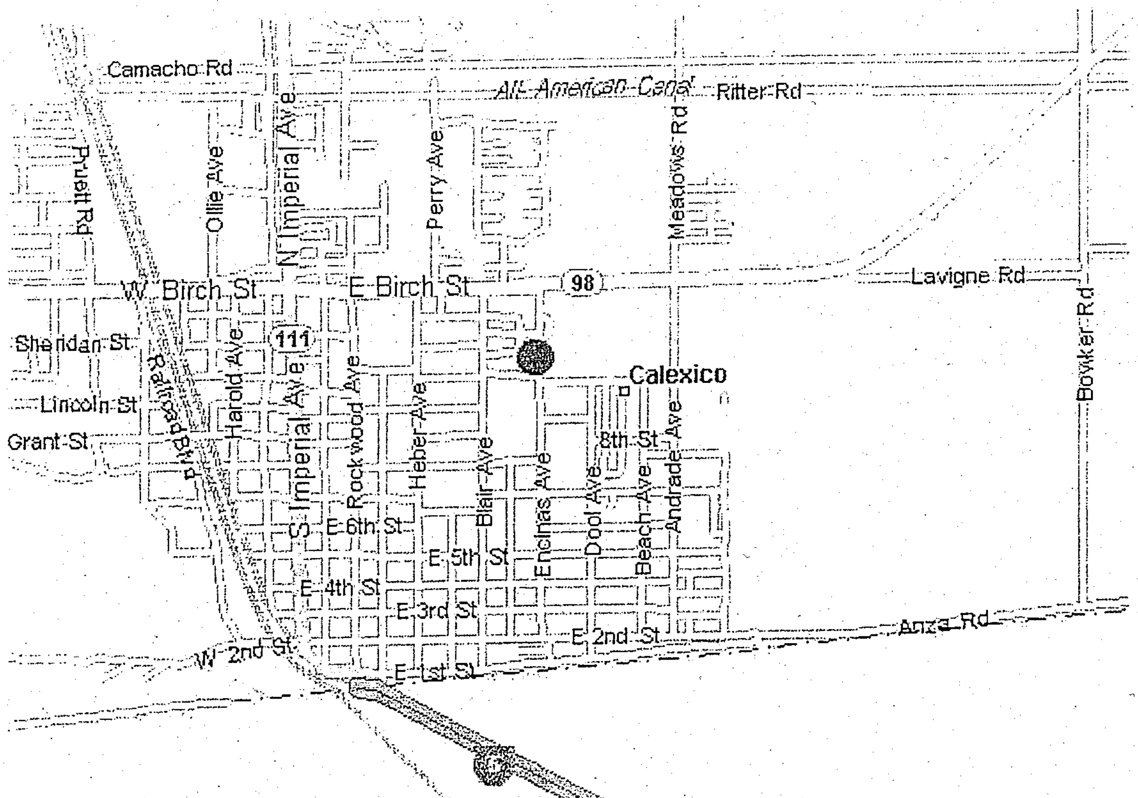

AIRS Number	ARB Number	Site Start Date	Reporting Agency and Agency Code
060250005	13698	3/1/94	California Air Resources Board (001)

Site Address	County	Air Basin	Latitude (N)	Longitude (W)	Elevation
1029 Belcher St, Calexico CA 92231	Imperial	Salton Sea	32° 40' 34"	115° 28' 59"	6

Pollutants Monitored (click on parameter link for real-time data)
CO, SO_2, NO_2, O_3, PM_{10}, $BAM_{PM2.5}$, $PM_{2.5}$, TSP, Toxics, Cr^{6+}, Outdoor Temperature, Relative Humidity, Wind Direction, Horizontal Wind Speed, Barometric Pressure, Solar Radiation

Site Survey Report

Siting Information

Site Name: Calexico-East	Audit Date: 2010-02-03	ARB Number: 13700	AIRS Number: 060250006
Address: 1699 Carr Rd Calexico, CA 92231	Latitude: 32° 40' 27"	Longitude: 115° 23' 28"	Elevation (m): 10
	Auditors: Mark Copple Alvin Danque	Site Technician: Tony Royer	Site Phone:
Operating Agency: California Air Resources Board		Site Report: Yes	Site Photos: Yes

General Siting Conditions

Station Temperature Controlled: Yes Recorded: Yes Inside Temp: 24 Degrees Celsius	**Traffic** Description: Border Distance: 150 meters Count (Veh/Day): 5000	**Topography** Site: Level Region: level	Predominant Wind Direction: West Arc Air Flow (Deg): 360 Degrees Probe Clean: No
		QA Manual Approved: Yes Agency: CARB	Manifold Clean: No Cleaning Schedule: Semi Annually Autocalibrator Type: Environics 9100
Meteorology Located With Instruments: Yes Shadowing: No Boom Orientation (Deg): 347 Temp(Motor/Natural): Motor	**Non-vehicular Local Sources** Description: None Distance: N/A Direction: N/A	Urbanization: Rural	Site Survey Complete: Yes
		Ground Cover: Dirt	Logbook Up To Date: Yes

Action Items

Comments

Site Survey Report (Cont.)

Monitor Type	Nitrogen Dioxide	Nitrogen Dioxide	Ozone	
Manufacturer/Model	API 200A	API 200E	API/Teledyne 400	
Serial Number	20072338	20072338	20060127	20021146
POC	1	1	1	3
Data For Record?	Yes	Yes	Yes	Yes
Purpose	SLAMS	SLAMS	SLAMS	Other
Objective	UNKNOWN	UNKNOWN	UNKNOWN	POPULATION EXPOSURE
Scale		Null		
Height Above Ground	4.0	4.0	4.0	3.8
Height Above Platform	1.7	1.7	1.7	1.4
Sampler Spacing				
Current Manual Available?	Yes	Yes	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes	Yes	Yes
In-line Filter Change Date	2010-01-28	2010-05-05	2010-01-28	Not Available
Cal. Gas Cert. Date	2009-04-29	2009-04-29	Not Available	Not Available
Calibration Current?	No	Yes	No	Yes
Calibration Date	2009-02-17	2010-04-14	2009-01-20	2010-01-29
Cal. Equipment Cert. Date	2009-01-28	2010-03-01	2008-11-20	2009-04-13
Obstacle Description	Trees	Trees	Trees	Trees
Distance to Obstacle	3.0	3.0	3.0	6.5
Height Above Inlet	6.0	6.0	6.0	6.2
Distance to Walls, etc.	-	-	-	-
Distance to Dripline	3.0	3.0	3.0	6.5
Dominant Influence	Vehicular	Vehicular	Vehicular	Vehicular
Residence Time (sec)	16.4	18.4	16.3	

Monitor Type	Outdoor Temperature
Manufacturer/Model	
Serial Number	R8071
POC	1
Data For Record?	Yes
Purpose	SLAMS
Objective	
Scale	
Height Above Ground	6.0
Height Above Platform	
Sampler Spacing	
Current Manual Available?	Yes
Instrument Log Up-to-date?	Yes
In-line Filter Change Date	Not Available
Cal. Gas Cert. Date	Not Available
Calibration Current?	No
Calibration Date	2009-01-14
Cal. Equipment Cert. Date	Not Available
Obstacle Description	Trees
Distance to Obstacle	6.5
Height Above Inlet	0.0
Distance to Walls, etc.	-
Distance to Dripline	-
Dominant Influence	
Residence Time (sec)	

Calexico East Monitoring Station Details

Site Name	Calexico East
AQS ID	060250006
GIS Coordinates	Lat 32º 40' 27" Long 115º 23' 28"
Location	Located in rural setting near the Calexico East Border Inspection Station in the City of Calexico
Address	1699 Carr Road, Calexico, CA 92231
County	Imperial County
Dist. to road	150 meters
Traffic count	5000 vehicles per day
Ground Cover	Dirt
Representative area	MSA (El Centro)

Pollutant	NO2	O3	CO	PM2.5
Sampling Method	API 200E	API/Teledyne 400	Dasibi 3008	BAM 1020
Analysis Method	N/A	N/A	N/A	N/A
Start Date	4/5/96	4/5/96	4/5/96	4/5/96
Operation Schedule	Continuous	Continuous	Continuous	Continuos
Sampling Season	All year	All year	All year	All year
Probe height	4.0 m	4.0 m	4.0 m	3.8 m
Dist. from supporting structure	1.7 m	1.7 m	1.7 m	1.4 m
Dist. from obstructions on roof	None	None	None	None
Distance from trees	3.0 m	3.0 m	3.0 m	6.5 m
Unrestricted airflow	360º	360º	360º	360º
Probe Material	Glass & Teflon	Glass & Teflon	Glass & Teflon	N/A
Residence Time	16.4	16.3	12.8	N/A
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	Yes
Frequency of flow rate verification for manual PM samplers audit	N/A	N/A	N/A	N/A
Frequency of flow rate verification for automated PM analyzers audit	N/A	N/A	N/A	Monthly
Frequency of 1-point QC check (gaseous)	Bi-weekly	Bi-Weekly	Bi-Weekly	N/A
Last annual performance evaluation (gaseous)	02/03/10	02/03/10	02/03/10	N/A
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	02/03/10

Site Information for Calexico-East

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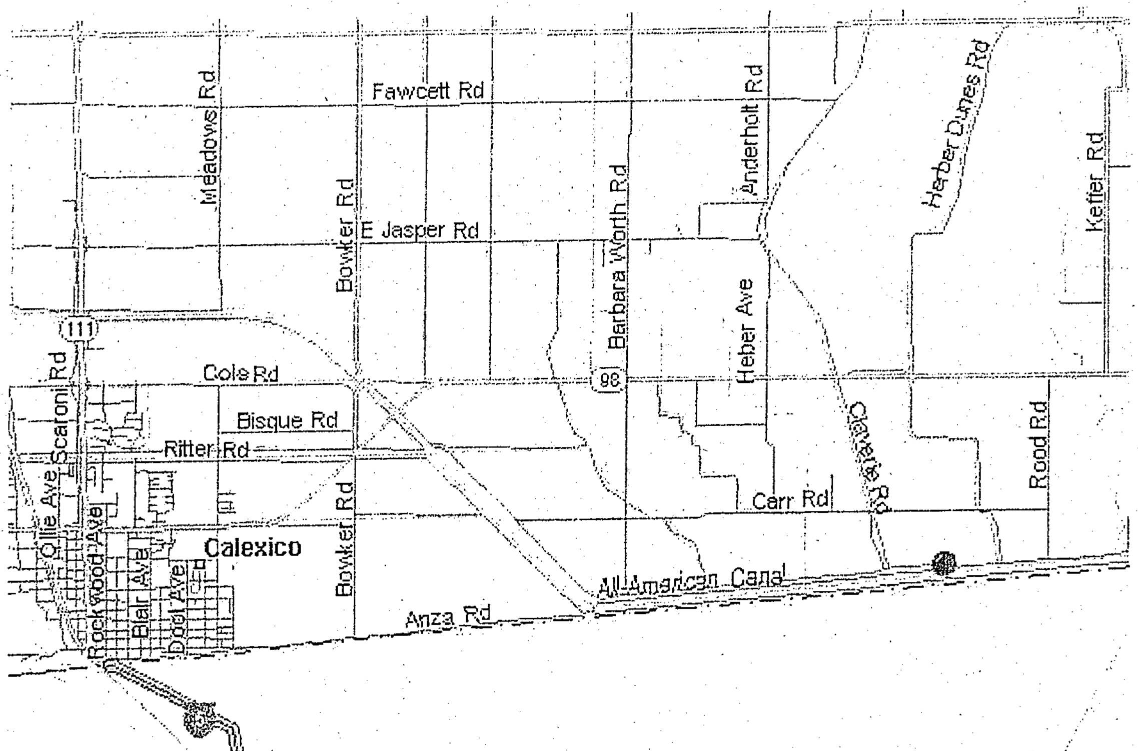


AIRS Number	ARB Number	Site Start Date	Reporting Agency and Agency Code
060250006	13700	4/5/96	California Air Resources Board (001)

Site Address	County	Air Basin	Latitude (N)	Longitude (W)	Elevation
1699 Carr Rd, Calexico CA 92231	Imperial	Salton Sea	32° 40' 27"	115° 23' 28"	10

Pollutants Monitored (click on parameter link for real-time data)
CO, NO_2, O_3, $BAM_{PM2.5}$, Outdoor Temperature, Wind Direction, Horizontal Wind Speed

Site Survey Report

Siting Information

Site Name: Naval Test Base	Audit Date: 2010-03-23	ARB Number: 13603	AIRS Number: None
Address: None , CA	Latitude: 33° 10' 10"	Longitude: 115° 51' 21"	Elevation (m): -37m
	Auditors: Chris Deidrick Don Fitzell	Site Technician: Jonathan Barroga	Site Phone:
Operating Agency:		Site Report: Yes	Site Photos: Yes

General Siting Conditions

Station Temperature Controlled: Yes Recorded: Yes Inside Temp: 25 Degrees Celsius	**Traffic** Description: Rural Distance: 2000 meters Count (Veh/Day): 10000	**Topography** Site: Level Region: Valley	Predominant Wind Direction: Northwest Arc Air Flow (Deg): 360 Degrees Probe Clean: N/A
		QA Manual Approved: Yes Agency: Imperial County.	Manifold Clean: N/A Cleaning Schedule: N/A Autocalibrator Type: N/A
Meteorology Located With Instruments: Yes Shadowing: No Boom Orientation (Deg): Temp(Motor/Natural): Motor	**Non-vehicular Local Sources** Description: None Distance: N/A Direction: N/A	Urbanization: Remote	Site Survey Complete: Yes
		Ground Cover: Sand	Logbook Up To Date: Yes

Action Items

Comments

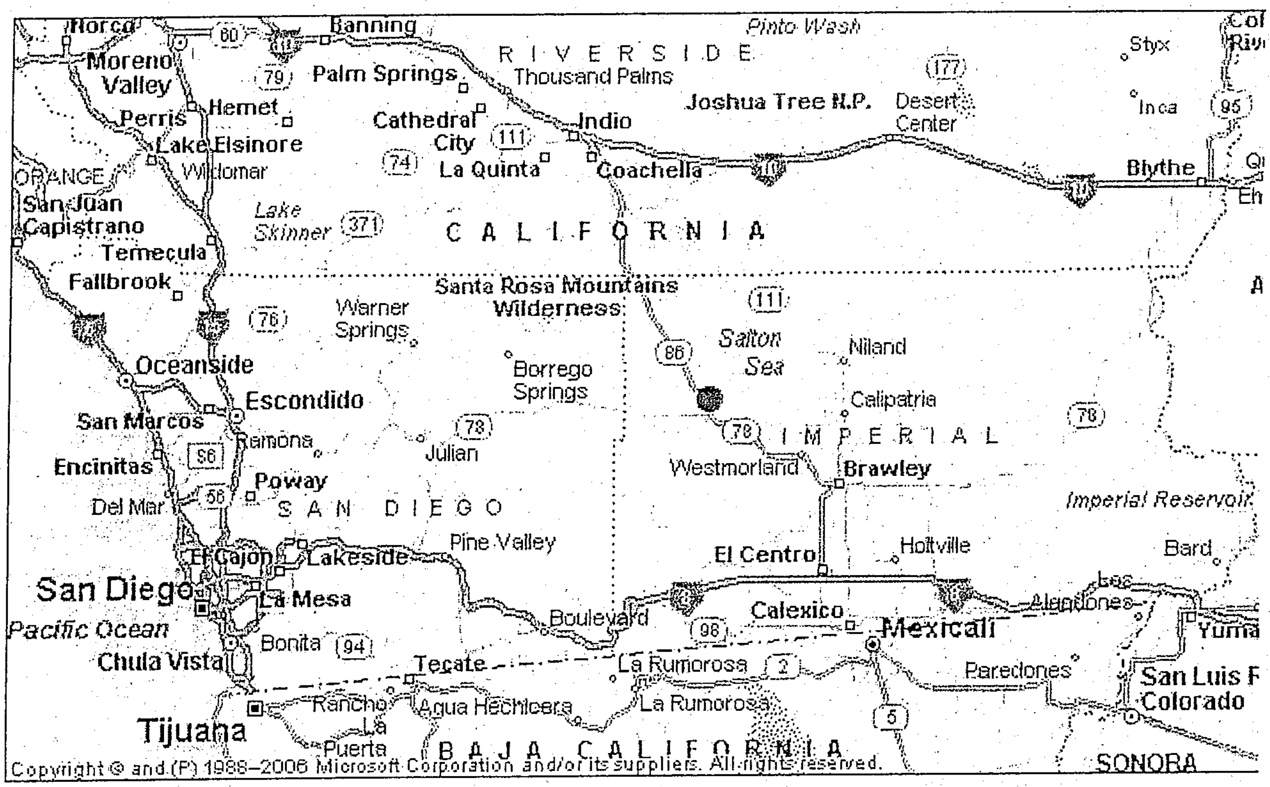
Site Survey Report (Cont.)

Monitor Type		Outdoor Temperature	Outdoor Temperature	Horizontal Wind Speed
Manufacturer/Model				
Serial Number	A205060906	TS16699	TS16696	S510M
POC				
Data For Record?	No	No	No	No
Purpose				
Objective				
Scale				
Height Above Ground	5.0	10.0	2.0	10.0
Height Above Platform	2.0			
Sampler Spacing				
Current Manual Available?	Yes	Yes	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes	Yes	Yes
In-line Filter Change Date	Not Available	Not Available	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available	Not Available	Not Available
Calibration Current?	Yes	Yes	Yes	Yes
Calibration Date	2009-09-14	2009-07-16	2009-07-16	2009-09-24
Cal. Equipment Cert. Date	Not Available	Not Available	Not Available	Not Available
Obstacle Description	None	None	None	None
Distance to Obstacle	-	-	-	-
Height Above Inlet	-	-	-	-
Distance to Walls, etc.	-	-	-	-
Distance to Dripline	-	-	-	-
Dominant Influence	Vehicular			
Residence Time (sec)				

Monitor Type	Horizontal Wind Speed	Horizontal Wind Speed
Manufacturer/Model		
Serial Number	S51M	S52M
POC		
Data For Record?	No	No
Purpose		
Objective		
Scale		
Height Above Ground	1.0	2.0
Height Above Platform		
Sampler Spacing		
Current Manual Available?	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes
In-line Filter Change Date	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available
Calibration Current?	Yes	Yes
Calibration Date	2009-09-24	2009-09-24
Cal. Equipment Cert. Date	Not Available	Not Available
Obstacle Description	None	None
Distance to Obstacle	-	-
Height Above Inlet	-	-
Distance to Walls, etc.	-	-
Distance to Dripline	-	-
Dominant Influence		
Residence Time (sec)		

Site Information for Naval Test Base

This page last reviewed on June 17, 2010



AIRS Number	ARB Number	Site Start Date	Reporting Agency and Agency Code
None	13603	Not Available	()

Site Address	County	Air Basin	Latitude (N)	Longitude (W)	Elevation
None, CA	Imperial	Salton Sea	33° 10' 10"	115° 51' 21"	-37m

Pollutants Monitored
TEOM, Outdoor Temperature, Wind Direction, Horizontal Wind Speed

Site Survey Report

Siting Information

Site Name: Salton City	Audit Date: 2010-03-25	ARB Number: 13604	AIRS Number: None
Address: N/A Salton City, CA 92275	Latitude: 33° 16' 21"	Longitude: 115° 54' 2"	Elevation (m): -67m
	Auditors: Don Fitzell Chris Deidrick	Site Technician: Johathan Barroga	Site Phone:
Operating Agency:		Site Report: Yes	Site Photos: Yes

General Siting Conditions

Station Temperature	**Traffic**	**Topography**	Predominant Wind Direction: Northwest
Controlled: Yes	Description: Rural	Site: Level	Arc Air Flow (Deg): 360 Degrees
Recorded: Yes	Distance: 10000 meters	Region: Level	Probe Clean: N/A
Inside Temp: 25 Degrees Celsius	Count (Veh/Day): 3000	**QA Manual**	Manifold Clean: N/A
Meteorology	**Non-vehicular Local Sources**	Approved: Yes	Cleaning Schedule: N/A
Located With Instruments: Yes	Description: None	Agency: Imperial County	Autocalibrator Type: N/A
Shadowing: No	Distance: N/A	Urbanization: Rural	Site Survey Complete: Yes
Boom Orientation (Deg): N/A Temp(Motor/Natural): Motor	Direction: N/A	Ground Cover: Sand	Logbook Up To Date: Yes

Action Items

Comments

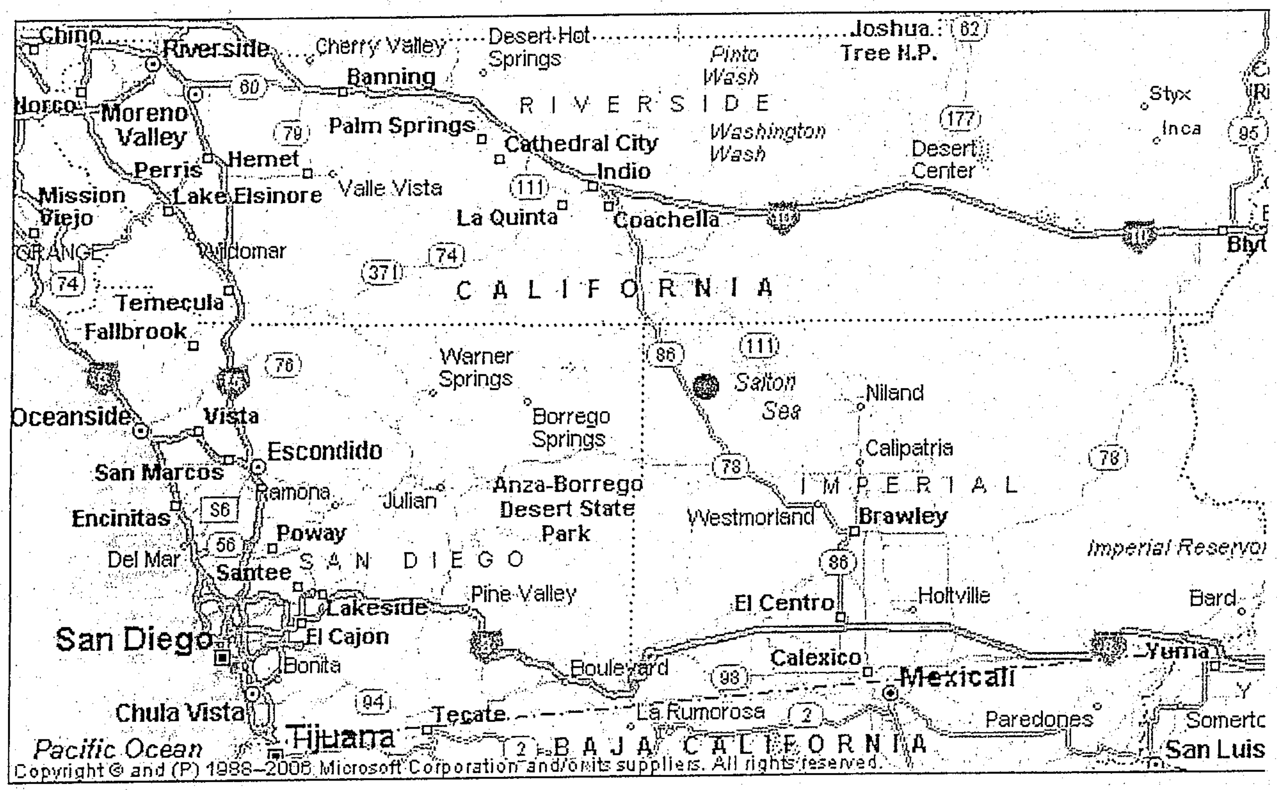
Site Survey Report (Cont.)

Monitor Type		Outdoor Temperature	Outdoor Temperature	Horizontal Wind Speed
Manufacturer/Model				
Serial Number	A205070906	TS16698	TS16695	S610M
POC				
Data For Record?	No	No	No	No
Purpose				
Objective				
Scale				
Height Above Ground	5.0	10.0	2.0	10.0
Height Above Platform	2.0			
Sampler Spacing				
Current Manual Available?	Yes	Yes	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes	Yes	Yes
In-line Filter Change Date	Not Available	Not Available	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available	Not Available	Not Available
Calibration Current?	Yes	Yes	Yes	Yes
Calibration Date	2009-09-14	2009-07-16	2009-07-16	2009-09-24
Cal. Equipment Cert. Date	Not Available	Not Available	Not Available	Not Available
Obstacle Description	None	None	None	None
Distance to Obstacle	-	-	-	-
Height Above Inlet	-	-	-	-
Distance to Walls, etc.	-	-	-	-
Distance to Dripline	-	-	-	-
Dominant Influence	Vehicular			
Residence Time (sec)				

Monitor Type	Horizontal Wind Speed	Horizontal Wind Speed
Manufacturer/Model		
Serial Number	S61M	S62M
POC		
Data For Record?	No	No
Purpose		
Objective		
Scale		
Height Above Ground	2.0	1.0
Height Above Platform		
Sampler Spacing		
Current Manual Available?	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes
In-line Filter Change Date	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available
Calibration Current?	Yes	Yes
Calibration Date	2009-09-24	2009-09-24
Cal. Equipment Cert. Date	Not Available	Not Available
Obstacle Description	None	None
Distance to Obstacle	-	-
Height Above Inlet	-	-
Distance to Walls, etc.	-	-
Distance to Dripline	-	-
Dominant Influence		
Residence Time (sec)		

Site Information for Salton City

This page last reviewed on June 17, 2010



AIRS Number	ARB Number	Site Start Date	Reporting Agency and Agency Code
None	13604	Not Available	0

Site Address	County	Air Basin	Latitude (N)	Longitude (W)	Elevation
N/A, Salton City CA 92275	Imperial	Salton Sea	33° 16' 21"	115° 54' 2"	-67m

Pollutants Monitored
TEOM, Outdoor Temperature, Wind Direction, Horizontal Wind Speed

Site Survey Report

Siting Information

Site Name: Torres-Martinez	Audit Date: 2010-03-25	ARB Number: 33601	AIRS Number: None
Address: Lincoln Ave. & 73rd Ave. Mecca, CA 92254	Latitude: 33° 31' 6"	Longitude: 116° 4' 31"	Elevation (m): -70m
	Auditors: Don Fitzell Chris Deidrick	Site Technician: Johathan Chapman	Site Phone:
Operating Agency:		Site Report: Yes	Site Photos: Yes

General Siting Conditions

Station Temperature	**Traffic**	**Topography**	Predominant Wind Direction: Northwest
Controlled: Yes	Description: Rural	Site: Level	Arc Air Flow (Deg): 360 Degrees
Recorded: Yes	Distance: 2000 meters	Region: Level	Probe Clean: N/A
Inside Temp: 25 Degrees Celsius	Count (Veh/Day): 10000	**QA Manual**	Manifold Clean: N/A
Meteorology	**Non-vehicular Local Sources**	Approved: Yes	Cleaning Schedule: N/A
Located With Instruments: Yes	Description: None	Agency: Imperial County	Autocalibrator Type: N/A
Shadowing: No	Distance: N/A	Urbanization: Rural	Site Survey Complete: Yes
Boom Orientation (Deg): N/A	Direction: N/A	Ground Cover: Sand	Logbook Up To Date: Yes
Temp(Motor/Natural): Motor			

Action Items

Comments

Page 1

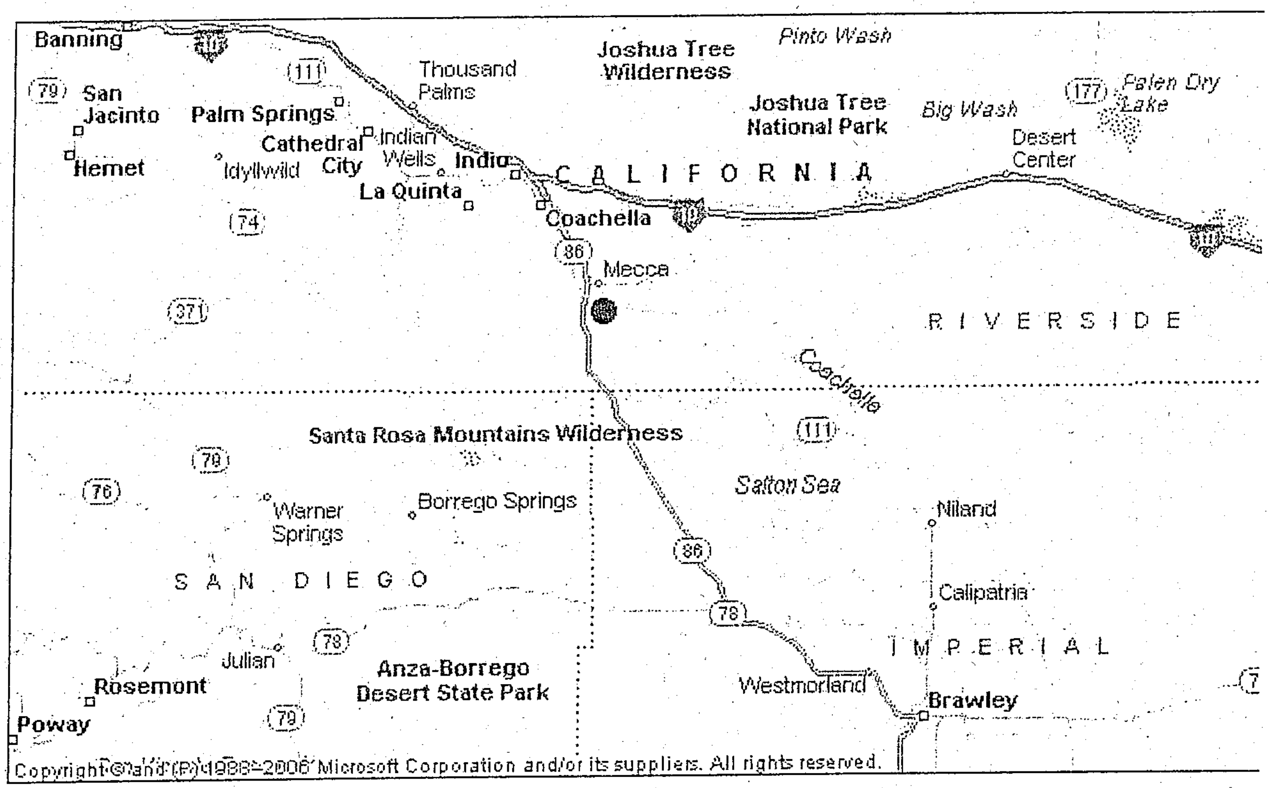
Site Survey Report (Cont.)

Monitor Type		Outdoor Temperature	Outdoor Temperature	Horizontal Wind Speed
Manufacturer/Model				
Serial Number	A205040905	TS16701	TS16705	S110M
POC				
Data For Record?	No	No	No	No
Purpose				
Objective				
Scale				
Height Above Ground	4.0	2.0	10.0	10.0
Height Above Platform	2.0			
Sampler Spacing				
Current Manual Available?	Yes	Yes	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes	Yes	Yes
In-line Filter Change Date	Not Available	Not Available	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available	Not Available	Not Available
Calibration Current?	Yes	Yes	Yes	Yes
Calibration Date	2009-09-14	2009-07-16	2009-07-16	2009-09-24
Cal. Equipment Cert. Date	Not Available	Not Available	Not Available	Not Available
Obstacle Description	None	None	None	None
Distance to Obstacle	-	-	-	-
Height Above Inlet	-	-	-	-
Distance to Walls, etc.	-	-	-	-
Distance to Dripline	-	-	-	-
Dominant Influence	Agriculture			
Residence Time (sec)				

Monitor Type	Horizontal Wind Speed	Horizontal Wind Speed
Manufacturer/Model		
Serial Number	S12M	S11M
POC		
Data For Record?	No	No
Purpose		
Objective		
Scale		
Height Above Ground	2.0	1.0
Height Above Platform		
Sampler Spacing		
Current Manual Available?	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes
In-line Filter Change Date	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available
Calibration Current?	Yes	Yes
Calibration Date	2009-09-24	2009-09-24
Cal. Equipment Cert. Date	Not Available	Not Available
Obstacle Description	None	None
Distance to Obstacle	-	-
Height Above Inlet	-	-
Distance to Walls, etc.	-	-
Distance to Dripline	-	-
Dominant Influence		
Residence Time (sec)		

Site Information for Torres-Martinez

This page last reviewed on June 17, 2010



AIRS Number	ARB Number	Site Start Date	Reporting Agency and Agency Code
None	33601	Not Available	()

Site Address	County	Air Basin	Latitude (N)	Longitude (W)	Elevation
Lincoln Ave. & 73rd Ave., Mecca CA 92254	Riverside	Salton Sea	33° 31' 6"	116° 4' 31"	-70m

Pollutants Monitored
TEOM, Outdoor Temperature, Wind Direction, Horizontal Wind Speed

Site Survey Report

Siting Information

Site Name: Salton Sea Park	Audit Date: 2010-03-24	ARB Number: 33602	AIRS Number: None
Address: 100-225 State Park Rd. North Shore, CA 92254	Latitude: 33° 30' 32"	Longitude: 115° 55' 11"	Elevation (m): -70m
	Auditors: Don Fitzell Chris Deidrick	Site Technician: Johathan Barroga	Site Phone:
Operating Agency:		Site Report: Yes	Site Photos: Yes

General Siting Conditions

Station Temperature	**Traffic**	**Topography**	Predominant Wind Direction: Northwest
Controlled: Yes	Description: Rural	Site: Level	Arc Air Flow (Deg): 360 Degrees
Recorded: Yes	Distance: 300 meters	Region: Level	Probe Clean: N/A
Inside Temp: 25 Degrees Celsius	Count (Veh/Day): 2000	**QA Manual**	Manifold Clean: N/A
Meteorology	**Non-vehicular Local Sources**	Approved: Yes	Cleaning Schedule: N/A
Located With Instruments: Yes	Description: None	Agency: Imperial County	Autocalibrator Type: N/A
Shadowing: No	Distance: N/A	Urbanization: Rural	Site Survey Complete: Yes
Boom Orientation (Deg): N/A Temp(Motor/Natural): Motor	Direction: N/A	Ground Cover: Sand	Logbook Up To Date: Yes

Action Items

Comments

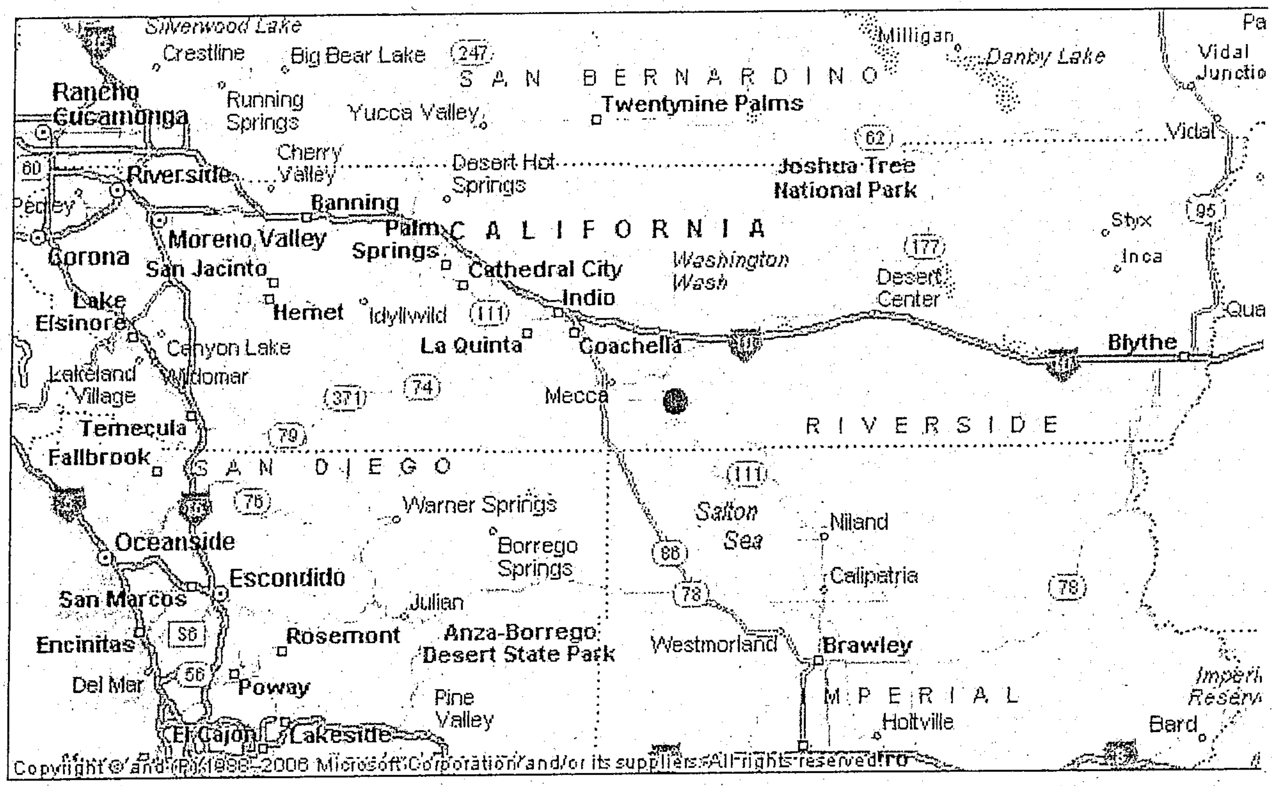
Site Survey Report (Cont.)

Monitor Type		Outdoor Temperature	Outdoor Temperature	Horizontal Wind Speed
Manufacturer/Model				
Serial Number	A205090906	TS16703	TS16700	S210M
POC				
Data For Record?	No	No	No	No
Purpose				
Objective	UNKNOWN			
Scale				
Height Above Ground	5.0	10.0	2.0	10.0
Height Above Platform	2.0			
Sampler Spacing				
Current Manual Available?	Yes	Yes	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes	Yes	Yes
In-line Filter Change Date	Not Available	Not Available	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available	Not Available	Not Available
Calibration Current?	Yes	Yes	Yes	Yes
Calibration Date	2009-09-14	2009-07-16	2009-07-16	2009-09-24
Cal. Equipment Cert. Date	Not Available	Not Available	Not Available	Not Available
Obstacle Description	None	None	None	None
Distance to Obstacle	-	-	-	-
Height Above Inlet	-	-	-	-
Distance to Walls, etc.	-	-	-	-
Distance to Dripline	-	-	-	-
Dominant Influence	Recreational Area			
Residence Time (sec)				

Monitor Type	Horizontal Wind Speed	Horizontal Wind Speed
Manufacturer/Model		
Serial Number	S21M	S22M
POC		
Data For Record?	No	No
Purpose		
Objective		
Scale		
Height Above Ground	1.0	2.0
Height Above Platform		
Sampler Spacing		
Current Manual Available?	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes
In-line Filter Change Date	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available
Calibration Current?	Yes	Yes
Calibration Date	2009-09-24	2009-09-24
Cal. Equipment Cert. Date	Not Available	Not Available
Obstacle Description	None	None
Distance to Obstacle	-	-
Height Above Inlet	-	-
Distance to Walls, etc.	-	-
Distance to Dripline	-	-
Dominant Influence		
Residence Time (sec)		

Site Information for Salton Sea Park

This page last reviewed on June 17, 2010



AIRS Number	ARB Number	Site Start Date	Reporting Agency and Agency Code
None	33602	Not Available	()

Site Address	County	Air Basin	Latitude (N)	Longitude (W)	Elevation
100-225 State Park Rd., North Shore CA 92254	Riverside	Salton Sea	33° 30' 32"	115° 55' 11"	-70m

Pollutants Monitored
TEOM, Outdoor Temperature, Wind Direction, Horizontal Wind Speed

Site Survey Report

Siting Information

Site Name: Bombay Beach	Audit Date: 2010-03-24	ARB Number: 13601	AIRS Number: None
Address: A St. & 3rd St. Bombay Beach, CA 92257	Latitude: 33° 21' 9"	Longitude: 115° 44' 4"	Elevation (m): -67m
	Auditors: Don Fitzell Chris Deidrick	Site Technician: Jonathan Barroga	Site Phone:
Operating Agency:		Site Report: Yes	Site Photos: Yes

General Siting Conditions

Station Temperature	Traffic	Topography	Predominant Wind Direction: Northwest
Controlled: Yes	Description: Rural	Site: Level	Arc Air Flow (Deg): 360 Degrees
Recorded: Yes	Distance: 900 meters	Region: Level	Probe Clean: N/A
Inside Temp: 24 Degrees Celsius	Count (Veh/Day): 2000	**QA Manual**	Manifold Clean: N/A
Meteorology	**Non-vehicular Local Sources**	Approved: Yes	Cleaning Schedule: N/A
Located With Instruments: Yes	Description: None	Agency: Imperial County	Autocalibrator Type: N/A
Shadowing: No	Distance: N/A	Urbanization: Rural	Site Survey Complete: Yes
Boom Orientation (Deg): Temp(Motor/Natural): Motor	Direction: N/A	Ground Cover: Sand	Logbook Up To Date: Yes

Action Items

Comments

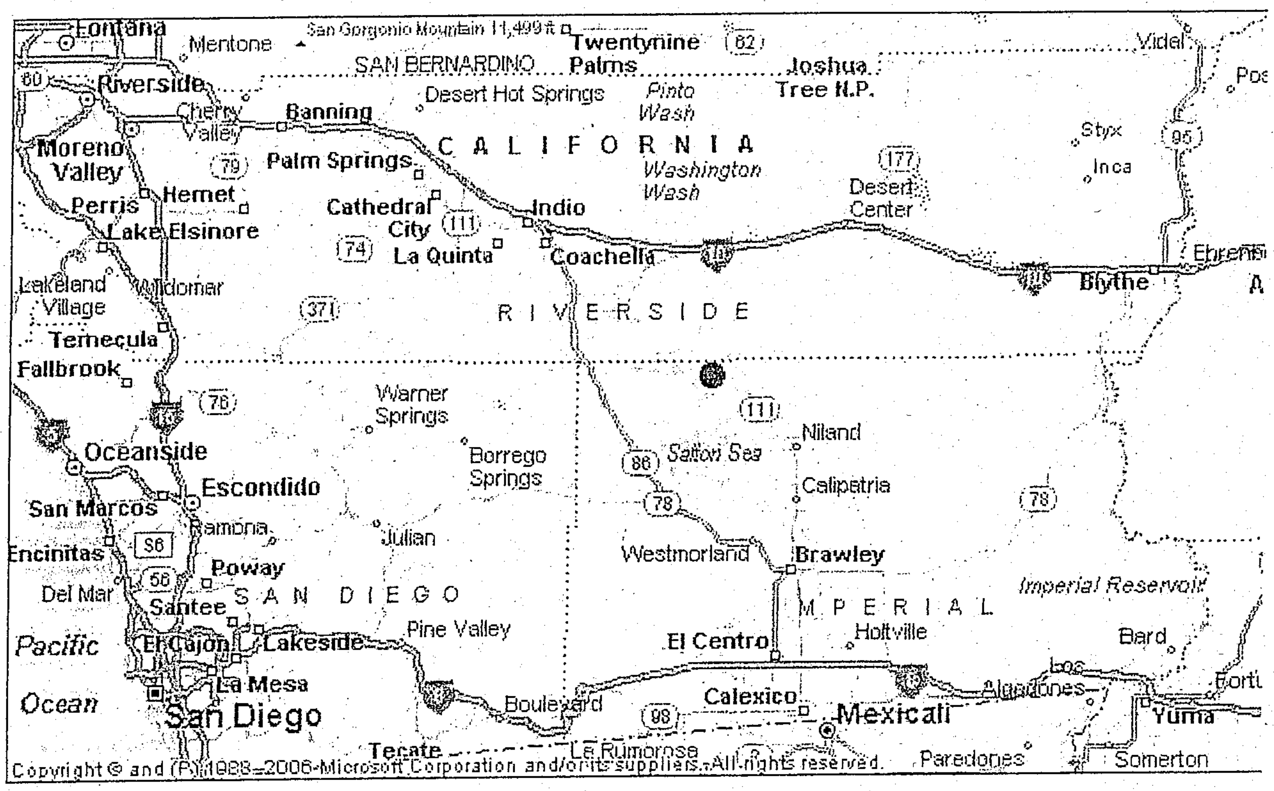
Site Survey Report (Cont.)

Monitor Type		Outdoor Temperature	Outdoor Temperature	Horizontal Wind Speed
Manufacturer/Model				
Serial Number	A205080906	TS16702	16694	S310M
POC				
Data For Record?	No	No	No	No
Purpose				
Objective				
Scale				
Height Above Ground	5.0	10.0	2.0	10.0
Height Above Platform	2.0			
Sampler Spacing				
Current Manual Available?	Yes	Yes	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes	Yes	Yes
In-line Filter Change Date	Not Available	Not Available	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available	Not Available	Not Available
Calibration Current?	Yes	Yes	Yes	Yes
Calibration Date	2009-09-14	2009-07-16	2009-07-16	2009-09-24
Cal. Equipment Cert. Date	Not Available	Not Available	Not Available	Not Available
Obstacle Description	None	None	None	None
Distance to Obstacle	-	-	-	-
Height Above Inlet	-	-	-	-
Distance to Walls, etc.	-	-	-	-
Distance to Dripline	-	-	-	-
Dominant Influence	Vehicular			
Residence Time (sec)				

Monitor Type	Horizontal Wind Speed	Horizontal Wind Speed
Manufacturer/Model		
Serial Number	S31M	S32M
POC		
Data For Record?	No	No
Purpose		
Objective		
Scale		
Height Above Ground	1.0	1.0
Height Above Platform		
Sampler Spacing		
Current Manual Available?	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes
In-line Filter Change Date	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available
Calibration Current?	Yes	Yes
Calibration Date	2009-09-24	2009-09-24
Cal. Equipment Cert. Date	Not Available	Not Available
Obstacle Description	None	None
Distance to Obstacle	-	-
Height Above Inlet	-	-
Distance to Walls, etc.	-	-
Distance to Dripline	-	-
Dominant Influence		
Residence Time (sec)		

Site Information for Bombay Beach

This page last reviewed on June 17, 2010



AIRS Number	ARB Number	Site Start Date	Reporting Agency and Agency Code
None	13601	Not Available	()

Site Address	County	Air Basin	Latitude (N)	Longitude (W)	Elevation
A St. & 3rd St., Bombay Beach CA 92257	Imperial	Salton Sea	33° 21' 9"	115° 44' 4"	-67m

Pollutants Monitored
TEOM, Outdoor Temperature, Wind Direction, Horizontal Wind Speed

Site Survey Report

Siting Information

Site Name: Sonny Bono	Audit Date: 2010-03-23	ARB Number: 13602	AIRS Number: None
Address: 906 W Sinclair Rd. Calipatria, CA 92233	Latitude: 33° 10' 35"	Longitude: 115° 37' 23"	Elevation (m): -66m
	Auditors: Chris Deidrick Don Fitzell	Site Technician: Johathan Barroga	Site Phone:
Operating Agency:		Site Report: Yes	Site Photos: Yes

General Siting Conditions

Station Temperature	**Traffic**	**Topography**	Predominant Wind Direction: Northwest
Controlled: Yes	Description: Rural	Site: Level	Arc Air Flow (Deg): 360 Degrees
Recorded: Yes	Distance: 0 meters	Region: Level	Probe Clean: N/A
Inside Temp: 25 Degrees Celsius	Count (Veh/Day): 0	**QA Manual**	Manifold Clean: N/A
Meteorology	**Non-vehicular Local Sources**	Approved: Yes	Cleaning Schedule: N/A
Located With Instruments: Yes	Description: None	Agency: Imperial County	Autocalibrator Type: N/A
Shadowing: No	Distance: N/A	Urbanization: Remote	Site Survey Complete: Yes
Boom Orientation (Deg): N/A Temp(Motor/Natural): Motor	Direction: N/A	Ground Cover: Dirt	Logbook Up To Date: Yes

Action Items

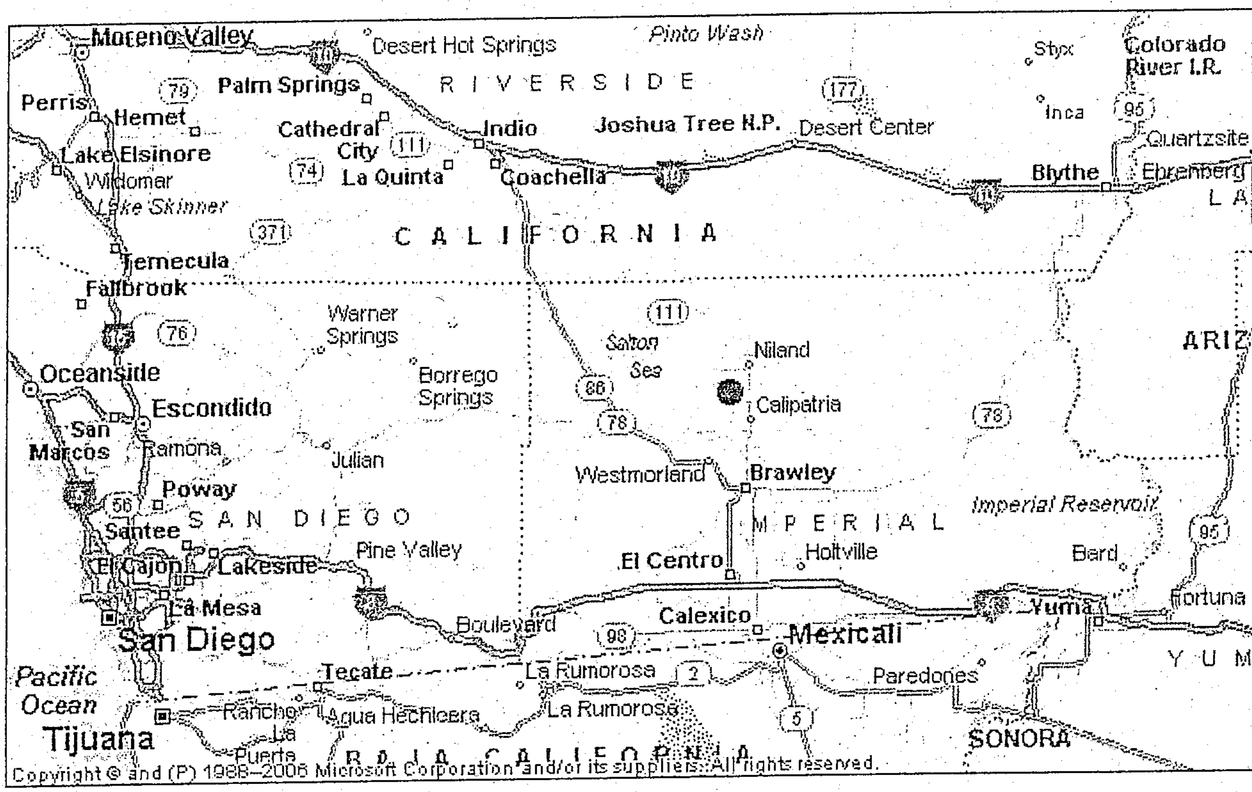
Comments

Site Survey Report (Cont.)

Monitor Type		Outdoor Temperature	Outdoor Temperature
Manufacturer/Model			
Serial Number	A205070906	16697	16704
POC			
Data For Record?	No	No	No
Purpose			
Objective	UNKNOWN		
Scale			
Height Above Ground	5.0	2.0	10.0
Height Above Platform	2.0		
Sampler Spacing			
Current Manual Available?	Yes	Yes	Yes
Instrument Log Up-to-date?	Yes	Yes	Yes
In-line Filter Change Date	Not Available	Not Available	Not Available
Cal. Gas Cert. Date	Not Available	Not Available	Not Available
Calibration Current?	Yes	Yes	Yes
Calibration Date	2009-09-14	2009-07-16	2009-07-16
Cal. Equipment Cert. Date	Not Available	Not Available	Not Available
Obstacle Description	None	None	None
Distance to Obstacle	-	-	-
Height Above Inlet	-	-	-
Distance to Walls, etc.	-	-	-
Distance to Dripline	-	-	-
Dominant Influence	Agriculture		
Residence Time (sec)			

Site Information for Sonny Bono

This page last reviewed on June 17, 2010



AIRS Number	ARB Number	Site Start Date	Reporting Agency and Agency Code
None	13602	Not Available	()

Site Address	County	Air Basin	Latitude (N)	Longitude (W)	Elevation
906 W Sinclair Rd., Calipatria CA 92233	Imperial	Salton Sea	33° 10' 35"	115° 37' 23"	-66m

Pollutants Monitored
TEOM, Outdoor Temperature, Wind Direction, Horizontal Wind Speed

APPENDIX A

Regulatory language of 40 CFR 58.10

§ 58.10 Annual monitoring network plan and periodic network assessment.

(a)(1) Beginning July 1, 2007, the State, or where applicable local, agency shall adopt and submit to the Regional Administrator an annual monitoring network plan which shall provide for the establishment and maintenance of an air quality surveillance system that consists of a network of SLAMS monitoring stations including FRM, FEM, and ARM monitors that are part of SLAMS, NCore stations, STN stations, State speciation stations, SPM stations, and/or, in serious, severe and extreme ozone nonattainment areas, PAMS stations, and SPM monitoring stations. The plan shall include a statement of purposes for each monitor and evidence that siting and operation of each monitor meets the requirements of appendices A, C, D, and E of this part, where applicable. The annual monitoring network plan must be made available for public inspection for at least 30 days prior to submission to EPA.

(2) Any annual monitoring network plan that proposes SLAMS network modifications including new monitoring sites is subject to the approval of the EPA Regional Administrator, who shall provide opportunity for public comment and shall approve or disapprove the plan and schedule within 120 days. If the State or local agency has already provided a public comment opportunity on its plan and has made no changes subsequent to that comment opportunity, the Regional Administrator is not required to provide a separate opportunity for comment.

(3) The plan for establishing required NCore multi-pollutant stations shall be submitted to the Administrator not later than July 1, 2009. The plan shall provide for all required stations to be operational by January 1, 2011.

(b) The annual monitoring network plan must contain the following information for each existing and proposed site:

(1) The AQS site identification number.

(2) The location, including street address and geographical coordinates.

(3) The sampling and analysis method(s) for each measured parameter.

(4) The operating schedules for each monitor.

(5) Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal.

(6) The monitoring objective and spatial scale of representativeness for each monitor as defined in appendix D to this part.

(7) The identification of any sites that are suitable and sites that are not suitable for comparison against the annual PM2.5NAAQS as described in §58.30.

(8) The MSA, CBSA, CSA or other area represented by the monitor.

(c) The annual monitoring network plan must document how States and local agencies provide for the review of changes to a PM2.5 monitoring network that impact the location of a violating PM2.5 monitor or the creation/change to a community monitoring zone, including a description of the proposed use of spatial averaging for purposes of making comparisons to the annual PM2.5 NAAQS as set forth in appendix N to part 50 of this chapter. The affected State or local agency must document the process for obtaining public comment and include any comments received through the public notification process within their submitted plan.

(d) The State, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby States and Tribes or health effects studies. For PM2.5, the assessment also must identify needed changes to population-oriented sites. The State, or where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan, to the Regional Administrator. The first assessment is due July 1, 2010.

(e) All proposed additions and discontinuations of SLAMS monitors in annual monitoring network plans and periodic network assessments are subject to approval according to §58.14.

Glossary of Acronyms

AQS	Air quality system
ARB	Air Resources Board
ARM	Approved regional method
BAM	Beta Attenuation Mass Monitor
CARB	California Air Resources Board
CFR	Code of Federal Regulations
CO	Carbon monoxide
CVWD	Coachella Valley Water District
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FEM	Federal equivalent method
FRM	Federal reference method
HCP	Habitat Conservation Plan
ICAPCD	Imperial County Air Pollution Control District
IID	Imperial Irrigation District
MSA	Metropolitan Statistical Area
MWD	Metropolitan Water District of Southern California
NAAQS	National ambient air quality standard
NCore	National core ambient monitoring network
NO_2	Nitrogen dioxide
O_3	Ozone
PAMS	Photochemical assessment monitoring sites
PM_{10}	Particulate Matter less than 10 microns in diameter
$PM_{2.5}$	Particulate Matter less than 2.5 microns in diameter

PMc	Particulate Matter Coarse
ppm	parts per million
SDAPCD	San Diego Air Pollution Control District
SDCWA	San Diego County Water Authority
SIP	State implementation plan
SLAMS	State and Local Air Monitoring Station
SO2	Sulfur dioxide
SPM	Special Purpose Monitor
SSAQMN	Salton Sea Air Quality Monitoring Network
SSI	Size Selective Inlet
STN	Speciation trends network
TEOM	Tapered Element Oscillating Microbalance Instrument
USEPA	United States Environmental Protection Agency

PROOF OF PUBLICATION
(2015.5 C.C.P.)

STATE OF CALIFORNIA

County of Imperial

I am a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk* of the printer of the

IMPERIAL VALLEY PRESS

a newspaper of general circulation, printed and published daily in the City of El Centro, County of Imperial and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Imperial, State of California, under the date of October 9, 1951, Case Number 26775; that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

July 15

all in the year 2010

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

SIGNATURE

* Printer, Foreman of the Printer, or Principal Clerk of the Printer

Date 7-15 2010
at El Centro, California.

This space is for the County Clerk's Filing Stamp:

Proof of Publication of:

Imperial County Air Pollution Control District Annual Network Plan and 5-year Network Assessment for Ambient Air Monitoring

In compliance with federal regulation, the Imperial County Air Pollution Control District has completed work on the 2010 Annual Network Plan and 5-year Network Assessment for Ambient Air Monitoring. The plan provides a description of ambient air quality monitors located in Imperial County and includes a plan for actions over the next 12 months and the assessment provides detailed evaluation of the monitoring network to meet objectives and requirements for the next 5-years.

Federal regulations require that the Annual Network Plan for Ambient Air Monitoring be reviewed annually to identify and need for additions, changes, relocations or terminations of monitoring sites. The public review period for this document will end 30 days after the publication of this notice and any changes will be incorporated prior to submittal to U.S. EPA.

Hard copies of this document are available at the ICAPCD at 150 S. 9th St., El Centro, CA 92243.

If you have any comments or questions about the plan and network assessment, please contact Jesus A. Ramirez, APC Division Manager, at (760) 482-4606.
L251 Jy15

Monterey Bay Unified Air Pollution Control District

North Central Coast Air Basin
California

Air Monitoring Network Assessment

June 30, 2010

Monterey Bay Unified Air Pollution Control District
24580 Silver Cloud Court
Monterey, California 93940
(831) 647-9411

TABLE OF CONTENTS

ACRONYMS

8HrO3	Ozone running eight hour average
AIRS	Air Information Retrieval System
AMBAG	The Association of Monterey Bay Area Governments
APCD	Air Pollution Control District
ARB AQS	The ARB Air Quality System audit division
ARM	approved regional method
ATM	Atmospheric temperature monitor
CARB	California Air Resources Board
CFR	Code of Federal Regulations
CO	carbon monoxide
District	Short for Monterey Bay Unified Air Pollution Control District
DOF	California Department of Finance
EPA	United States Environmental Protection Agency
EPA AQS	The EPA Air Quality System audit division
FEM	federal equivalent method
FRM	federal reference method
IMPROVE	Interagency Monitoring of Protected Visual Environments
m	meters
MBUAPCD	Monterey Bay Unified Air Pollution Control District
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standards
NCCAB	North Central Coast Air Basin
NO2	nitrogen dioxide
O3	ozone
PM10	particulate matter (0 to 10 microns aerodynamic diameter)
PM2.5	particulate matter (0 to 2.5 microns aerodynamic diameter)
SIP	State Implementation Plan
SLAMS	State or Local Air Monitoring Stations
SO2	sulfur dioxide
SPM	special purpose monitoring
WDA	Wind direction average
WSA	Wind speed average

Background
Introduction

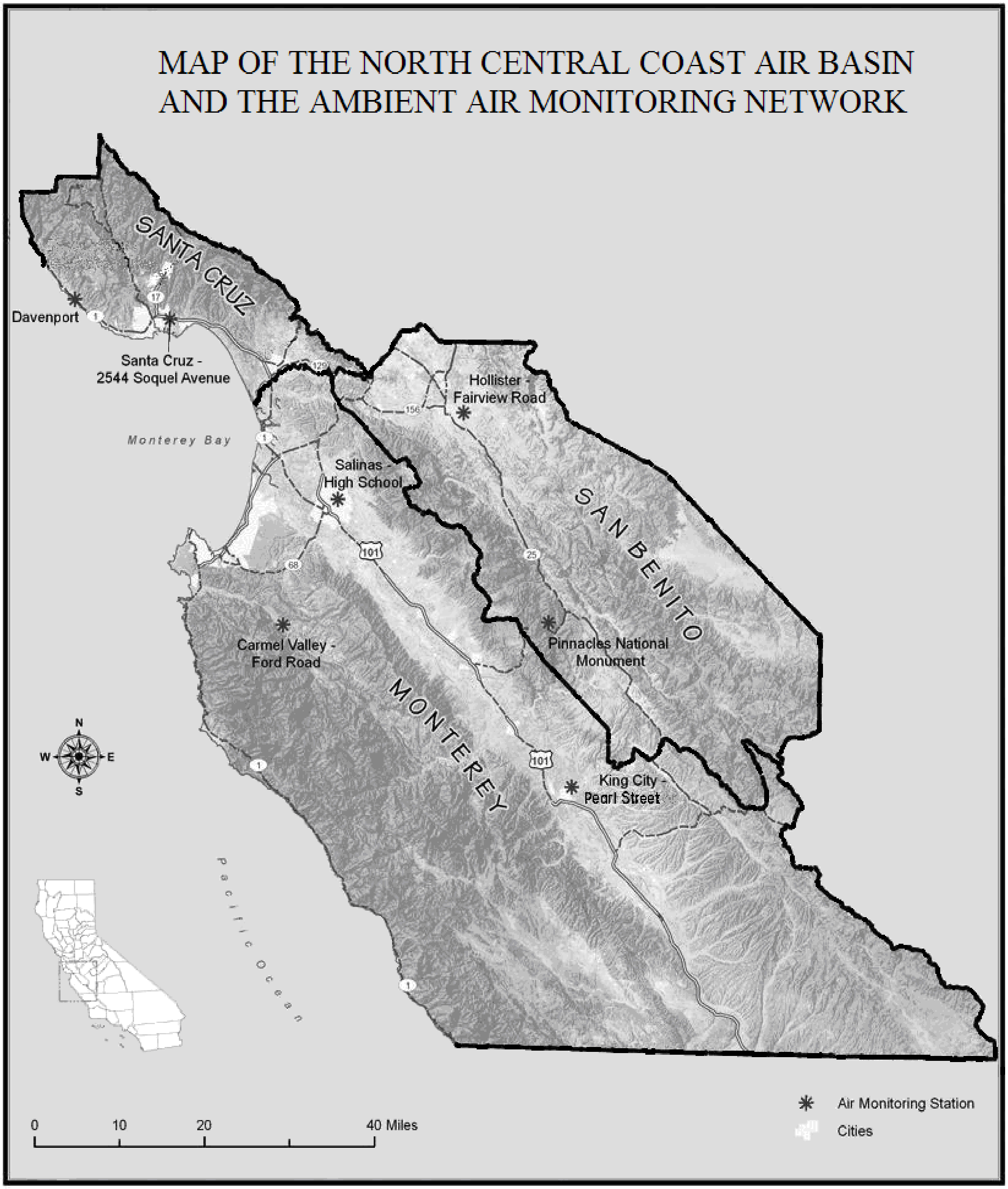
The EPA requires all air pollution control districts to submit an air monitoring network assessment for each of their individual ambient air monitoring systems every five years, starting July, 2010. The objective of the network assessment is to encourage optimal use of each district's resources in order to meet minimal monitoring requirements for pollutants of interest and to minimize monitoring redundancies within the district's area of responsibility. This report describes the North Central Coast Air Basin (NCCAB) and the ambient air monitoring network operated by the Monterey Bay Unified Air Pollution Control District (District). The analyses and potential corresponding courses of action are then discussed.

Geographical Description

Formed in 1974, the District is the public agency responsible for air quality management in Monterey, Santa Cruz, and San Benito Counties, which make up the NCCAB. The region forms an area of more than 5,100 square miles. With Monterey County covering over 3,320 square miles and Santa Cruz County covering only 445 square miles, the planning area consists of one of the largest and one of the smallest counties in the state. The NCCAB features varied vegetation, climate and geography. As shown in Figure 1, it includes portions of several mountain ranges: the Santa Lucia and Gabilan Ranges in Monterey and San Benito Counties, the southern portion of the Santa Cruz Mountains in Santa Cruz County, and the Diablo Range in the eastern half of San Benito County. The coastal terraces in the Santa Cruz area, the flat plains surrounding Watsonville, Salinas, and King City, and the southern Santa Clara Valley are sharply defined by the various mountain ranges.

The District currently collects and reports data from a network of seven air monitoring stations throughout the NCCAB, as shown in Figure 1. These monitoring sites include five State and Local Air Monitoring Stations (SLAMS) and two Special Purpose Monitoring (SPM) stations. The monitoring stations operated by the District at Salinas, Hollister, Santa Cruz, King City, and Carmel Valley are part of the SLAMS network. The King City station, which was originally located on the perimeter of the city, was relocated closer to the center of the city in 2007. These stations provide information on local and regional scale air quality. The stations operated at Davenport and Pinnacles are referred to as Special Purpose Monitoring sites because they provide information on the impact of specific sources, or to gauge air quality impacts on national resources, such as the National Parks. Six of the stations are directly operated and maintained by the District and one, the Pinnacles National Monument Site, is operated and maintained by the National Park Service.

Figure 1.


MAP OF THE NORTH CENTRAL COAST AIR BASIN
AND THE AMBIENT AIR MONITORING NETWORK
SANTA CRUZ
Davenport
Santa Cruz -
2544 Soquel Avenue
Monterey Bay
Hollister -
Fairview Road
Salinas -
High School
SAN BENITO
Carmel Valley -
Ford Road
Pinnacles National
Monument
MONTEREY
King City -
Pearl Street
Pacific Ocean
N
W
E
S
0
10
20
40 Miles
Air Monitoring Station
Cities

General Climate

The NCCAB has a climate that is best described as Mediterranean. Monterey and Santa Cruz are both coastal counties characterized by cool wet winters and warm, generally dry summers with average temperatures (degrees Fahrenheit) ranging from the high 30's to low 40's in the winter to mid to high 70's during the winter. Coastal fog and low overcast is common, especially during the evening to morning hours, during the summer months. San Benito County, which is inland from Monterey County, experiences higher daily temperatures and less coastal fog and overcast skies during the summer. The annual rainfall averages 19 inches in Monterey County, 30inches in Santa Cruz County and 14 inches in San Benito County. The vast majority of the rainfall occurs between November and the following April.

Land Use

In Monterey and Santa Cruz counties urbanized development occupies about three percent of the land area. Approximately 65 percent of regional urban development in Monterey and Santa Cruz Counties extends around Monterey Bay on the coastal plain from the Cities of Santa Cruz to Carmel-by-the-Sea. Salinas is an exception, lying more than ten miles inland from Monterey Bay. Nearly three-quarters of the urban development is for residential purposes. Commercial land uses are concentrated in the major urban centers of the counties including Santa Cruz-Capitola, Monterey Peninsula, and Salinas. Tourism is also a major segment of the economic market in these areas.

Approximately 97 percent of San Benito County is unincorporated land and, of this area, 90 percent is used as farmland, rangelands, forest, and public lands. The bulk of the county's population resides in the central region near the incorporated cities of Hollister and San Juan Bautista. Hollister serves as the major commercial center for the county.

Industrial activity within the NCCAB includes oil production (San Ardo oil field), power generation (Moss Landing), commercial fishing (Moss Landing), cement manufacturing (Davenport), quarrying activities (all three counties), agricultural processing in the Salinas and Watsonville areas, sand mining (Hollister, Marina, Scotts Valley and the North Coast of Santa Cruz County), food processors (Salinas, Watsonville and Santa Cruz) and electronic manufacturing firms (Scotts Valley, Santa Cruz, Watsonville and Salinas).

The dominant land use within the NCCAB is agriculture with approximately 1,626,000 agricultural acres or 437,000 farmed acres (pasture land excluded). About 88 percent of farmed agricultural land is in the Salinas Valley with six percent in San Benito County and six percent in Santa Cruz County. Based on the 2005 Crops Reports, the gross agricultural crop value was $3.27 billion in Monterey County, $269 million in San Benito County and $418 million in Santa Cruz County for a total of nearly $4 billion.

Institutional land uses occupy significant portions of the land area within the NCCAB. Military land uses in Monterey County include Fort Hunter-Liggett, Camp Roberts, the Naval Postgraduate School, and the Presidio of Monterey. Other major institutional uses are the

University of California at Santa Cruz (UCSC) and the Soledad Correctional Facility. Fort Ord, comprising almost 28,000 acres, was closed in 1993. The California State University at Monterey Bay and the University of California at Santa Cruz, have both received over 2,000 acres of Fort Ord land for education and research uses.

The region has a significant amount of land in open space and recreation uses including several large State Parks, the Ventana Wilderness (164,503 acres), the Los Padres National Forest (304,035 acres), and the Pinnacles National Monument. Over 17,000 acres of Fort Ord have been dedicated to open space and recreational uses. The California Department of Parks and Recreation operates over 25 visitor facilities in the region.

Population Dynamics

The population data for the area are developed by federal, state and local agencies. The U. S. Census Bureau conducts a physical count of the population once every ten years, with the last decennial census in the year 2000. The California Department of Finance (DOF) releases annual population estimates to complement the decennial census. The most recent DOF figures are for the year 2007. The NCCAB's regional Metropolitan Planning Organization, the Association of Monterey Bay Area Governments (AMBAG), periodically develops population forecasts that uses the most recent economic and population growth data. Historically, the AMBAG forecasts for a given year have been a few percentage points higher than the corresponding DOF figure.

The most recent population forecasts, adopted by AMBAG on June 11, 2008, are presented in Table 1. The current AMBAG population figures in part represent "constrained forecasts" where limitations to growth due to such factors as the availability of water, wastewater treatment and local growth policies are taken into account.

DOF figures for 2007 indicate that the air basin is home to approximately 747,888 people with 57 percent residing in Monterey County, 35 percent in Santa Cruz County, and eight percent in San Benito County. AMBAG forecasts the area to grow to about 920,714 persons by 2035.

Table 1. Population Forecasts for the North Central Coast Air Basin
(Association of Monterey Bay Area Governments, Adopted June 11, 2008)

AREA	YEAR				
	2005	**2010**	**2020**	**2030**	**2035**
Monterey County					
Carmel	4,091	4,075	3,873	4,007	4,033
Del Rey Oaks	1,647	1,627	2,237	3,197	3,171
Gonzalez	8,399	10,831	15,969	20,941	23,418
Greenfield	13,357	17,795	21,855	27,348	30,337
King City	11,430	13,540	17,269	22,482	24,726
Marina	19,051	24,551	29,274	32,010	32,942
Monterey	30,467	30,106	30,278	30,650	30,836
Pacific Grove	15,528	15,530	15,550	15,057	15,036
Salinas	149,705	153,779	163,234	170,913	173,359
Sand City	302	447	1,498	1,498	1,498
Seaside	35,173	34,666	35,158	35,017	35,549
Soledad	27,365	28,853	33,760	38,801	41,405
Unincorporated	106,117	109,509	113,778	113,628	114,052
Total	**422,632**	**445,309**	**483,733**	**515,549**	**530,362**
Santa Cruz County					
Capitola	9,918	10,124	10.693	11,090	11,269
Santa Cruz	56,421	58,919	63,265	65,884	67,807
Scotts Valley	11,565	11,923	12,311	12,688	12,921
Watsonville	49,571	51,903	56,544	61,245	62,463
Unincorporated	132,617	135,173	137,681	139,690	141,162
Total	**260,092**	**268,041**	**280,493**	**290,597**	**295,621**
San Benito County					
Hollister	37,002	40,415	49,064	59,259	62,756
San Juan Bautista	1,722	1,937	2,356	2,743	2,907
Unincorporated	18,600	20,079	24,720	27,429	29,068
Total	**57,324**	**62,431**	**76,140**	**89,431**	**94,731**
NCCAB Total	**740,048**	**775,781**	**840,366**	**895,577**	**920,714**

Pollution Sources

Ozone (Precursors)
Ozone, the primary constituent of smog, is formed in the atmosphere through complex chemical reactions involving volatile organic compounds (VOC) and nitrogen oxides (NO_x) in the presence of sunlight. Sources of VOC within the NCCAB include aircraft, on-/off-road motor vehicles, cleaning and surface coatings, solvent evaporation, landfills, petroleum production and marketing, and prescribed burning. Sources of NO_x include on-/off-road motor vehicles, stationary source fuel combustion, and industrial processes. Figures 2 and 3 illustrate some of the relative contributions of these general sources from within the NCCAB. In addition to emissions generated locally within the NCCAB, the California Air Resources Board (CARB) has determined that transport emissions from areas outside the air basin can account for violations of the State ozone ambient air quality standards (AAQS). This is particularly true at stations that currently do not meet the State standard, including Pinnacles, which is the air basin's design site for meeting the State AAQS, and to a lesser extent, Hollister.

Aside from emissions caused by human activity, emissions from natural sources also contribute to the formation of ozone. VOCs are the larger part of the natural inventory. Emissions from vegetation foliage (i.e. biogenic sources) are a primary contributor to ozone formation. For NOx, natural emissions come from wildfires as well as microbial activity in the soil. Natural emissions are difficult to quantify and are highly dependant on ambient temperature, sunlight and moisture. Natural emissions vary greatly season to season and year to year. In general, natural emissions are highest during the ozone season. These emissions from natural sources are beyond regulatory control and are excluded from the anthropogenic inventory.

Particulates
PM10 and PM2.5 represents respirable particulate matter less than 10 and 2.5 microns in size, respectively. Because of their small size, they can be inhaled deep into the lungs and are therefore a health concern. They are classified as primary or secondary depending on their origin. Primary particles are unchanged after being directly emitted. Major sources of primary particles include fugitive dust from roads and agricultural operations. Secondary particulates are formed in the atmosphere largely by chemical reactions involving gases, e.g., sulfate from directly emitted sulfur oxides. Natural sources of particulates include sea spray, forest fires, volcanic debris, etc. Man-made sources include fuel combustion, industrial processes and transportation.

Figure 2. Volatile Organic Compounds (VOC)

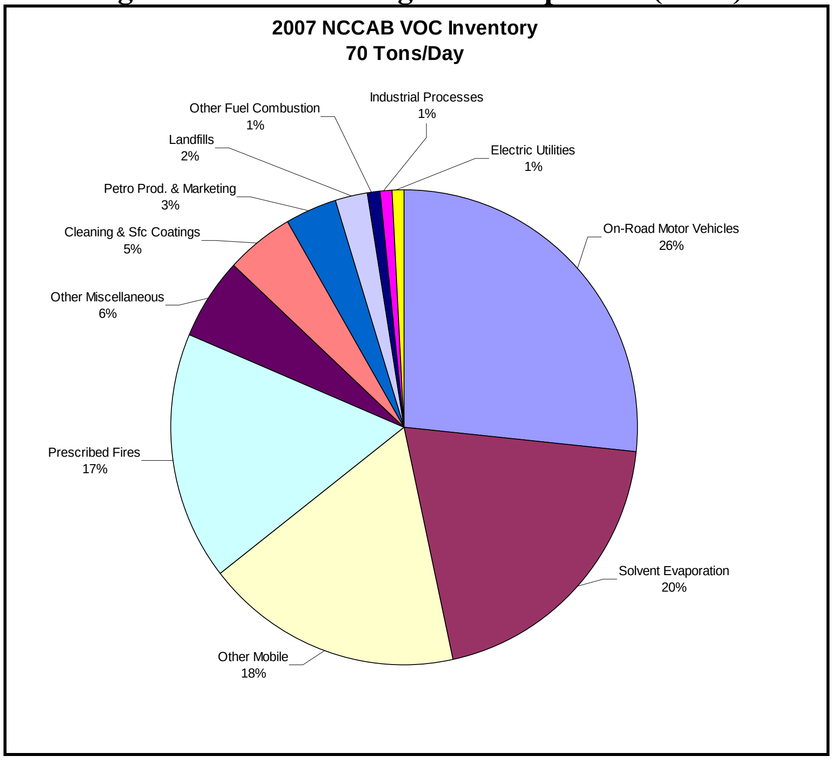
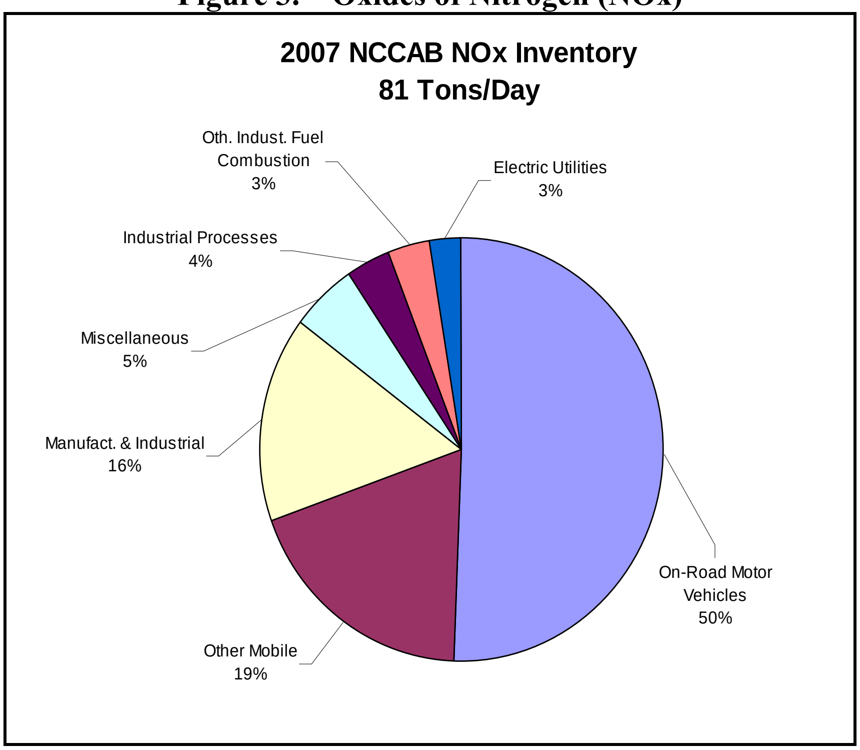


Figure 3. Oxides of Nitrogen (NOx)



Ambient Air Monitoring Network – 2006 to Present

There sites described below were part of the air monitoring network up until 2010. The SLAMS sites are used to track criteria pollutants to help ensure that the NCCAB falls within the state and national AAQS. The SPMs monitor pollutant levels emitted from a specific site (Davenport), or the effects of pollution in a specific area (Pinnacles). Tables 2-11 depict the histories for the parameters monitored at each site. The District's annual network plan submitted simultaneously with this network assessment contains much detailed information about the current sites.

Salinas 3 (SLAMS)

The current location of this station was established in December 1999 to monitor air quality conditions in the Salinas Metropolitan Statistical Area (MSA), the District's most populated area. This station features one of the District's most extensive set of measurements. The data collected include CO, NO2, O3, PM10, PM2.5, BAM-PM2.5, WSA, WDA and ATM. Particulate data, PM10 and PM2.5 are acquired by filter based instruments operating on the one in six day schedule. PM2.5 data is also acquired hourly using newer FEM BAM-1020 monitors. Data from this populated area generally indicate good air quality and meet all state and federal standards for CO, NO2, O3, PM10, and PM2.5. Data from this site have been useful in assessing air pollution impacts on populations during unusual events, such as wildfires at Fort Ord.

Salinas Site Information

Site Name	Salinas 3
AQS ID	06-053-1003
GIS coordinates	N 36° 41' 39.5" W 121° 37' 23.6" Elevation: 21.3 meters
Location	High school. Urban and Center City.
Address	867 East Laurel Dr., Salinas, CA. 93905
County	Monterey
Representative Area	MSA: Salinas, CA.

Table 2. Salinas-3 AMS • 867 E. Laurel Drive, Salinas

AIRS Site Code	Parameter	Parameter Code	POC	Interval Code	Units Code	Method Code	Date Open	Date Closed
06-053-1003	03	44201	1	1	008	047	12/31/1999	N/A
	ATM	62101	1	1	015	040	12/31/1999	N/A
	WDA	61102	1	1	014	050	01/01/2000	N/A
	WSA	61101	1	1	012	050	01/01/2000	N/A
	NOx	42603	1	1	008	074	01/01/2000	N/A
	NO	42601	1	1	008	074	01/01/2000	N/A
	NO2	42602	1	1	008	074	01/01/2000	N/A
	CO	42101	1	1	007	054	01/01/2000	N/A
	PM10 (STD)	81102	1	7	001	063	12/31/1999	N/A
	PM10 (ADT)	85101	1	7	105	063	12/31/1999	N/A
	PM10 (STD)	81102	2	7	001	063	09/01/2005	N/A
	PM10 (ADT)	85101	2	7	105	063	09/01/2005	N/A
	PM2.5 FRM	88101	1	7	001	117	01/01/2000	12/31/2009
	PM2.5 FRM	88101	2	7	001	117	10/31/2008	N/A
	PM2.5 FEM	88101	3	1	001	170	01/01/2010	N/A

Carmel Valley (SLAMS)

This station was established in 1982 due to the smoke concerns of the rural/residential Carmel Valley. The limited natural ventilation of the valley can also lead to trapping of ozone. Measurements made at this site include O3, WSA, WDA and ATM. Data from this location has been useful for issuing public health advisories during wildfire events.

Carmel Valley Site Information

Site Name	Carmel Valley
AQS ID	06-053-0002
GIS coordinates	N 36° 28' 54.5" W 121° 44' 0.1" Elevation: 137.2 meters
Location	Tularicitos Elementary School grounds. Suburban.
Address	35 Ford Rd., Carmel Valley, CA. 93924
County	Monterey
Representative Area	MSA: Salinas, CA.

Table 3. Carmel Valley AMS • 35 Ford Road, Carmel Valley

AIRS Site Code	Parameter	Parameter Code	POC	Interval Code	Units Code	Method Code	Date Open	Date Closed
06-053-0002	03	44201	1	1	008	047	01/01/1982	N/A
	ATM	62101	1	1	015	040	01/01/1997	N/A
	WDA	61102	1	1	014	050	07/01/2007	N/A
	WSA	61101	1	1	012	050	07/01/2007	N/A
	PM10 (STD)	81102	1	7	001	063	01/01/1992	09/30/2009
	PM10 (ADT)	85101	1	7	105	063	01/01/1997	09/30/2009

King City 2 (SLAMS)

This station was initially established in 1990 as a SPM station to monitor impacts from a nearby power plant. It was relocated to the city center in 2007, became a SLAMS station, and now serves as a population exposure/representative concentration site. Station funding was, and still is, provided by a consortium of organizations including the power plant, oil field interests and the District. Measurements made at the site include PM10, O3, WSA, WDA and ATM. PM10 data from this site has been used to help develop plans for controlling fugitive dust. Interestingly, the typically low levels of ozone recorded at this location were used to help demonstrate to ARB that the NCCAB was not the source of high ozone transported to San Luis Obispo County.

King City 2 Site Information (Current Site)

Site Name	King City 2
AQS ID	06-053-0008
GIS coordinates	N 36° 12' 32.8" W 121° 07' 33.5" Elevation: 99 meters
Location	San Lorenzo Middle School, residential, suburban.
Address	415 Pearl St., King City, CA. 93930
County	Monterey
Representative Area	MSA: Salinas, CA.

Table 4. King City-2 AMS • 415 Pearl Street, King City (Current Site)

AIRS Site Code	Parameter	Parameter Code	POC	Interval Code	Units Code	Method Code	Date Open	Date Closed
06-053-0008	03	44201	1	1	008	019	05/25/2007	N/A
	ATM	62101	1	1	015	040	05/25/2007	N/A
	WDA	61102	1	1	014	050	05/25/2007	N/A
	WSA	61101	1	1	012	050	05/25/2007	N/A
	PM10 (STD)	81102	1	7	001	141	05/25/2007	N/A
	PM10 (ADT)	85101	1	7	105	141	05/25/2007	N/A

King City Site Information (Former Site)

Site Name	King City
AQS ID	06-053-0005
GIS coordinates	N 36° 13' 36.6" W 121° 06' 55.8" Elevation: 106.7meters
Location	Airport, suburban.
Address	750 Metz Rd., King City, CA. 93930
County	Monterey
Representative Area	MSA: Salinas, CA.

Table 5. King City AMS • 750 Metz Road, King City (Former Site)

AIRS Site Code	Parameter	Parameter Code	POC	Interval Code	Units Code	Method Code	Date Open	Date Closed
06-053-0005	03	44201	1	1	008	019	07/01/1990	05/24/2007
	PM10 (STD)	81102	1	7	001	063	07/01/1990	05/24/2007
	PM10 (ADT)	85101	1	7	105	063	07/01/1990	05/24/2007
	PM10 (STD)	81102	1	7	001	141	02/05/2007	05/24/2007
	PM10 (ADT)	85101	1	7	105	141	02/05/2007	05/24/2007

Santa Cruz (SLAMS)

Monitoring at this station began in 1996 to assess population exposure in the Santa Cruz/Watsonville Metropolitan Statistical Area (MSA). Santa Cruz is currently the largest city in Santa Cruz County and is the second most populated city in the NCCAB. Data acquired at this SLAMS site include O3, PM10, PM2.5, BAM PM2.5, WSA, WDA and ATM. PM10 data is acquired by filter based instruments operating on the 1 in 6 day schedule. PM2.5 data is also acquired continuously using the newer FEM BAM-1020 technology. The data generally indicate good air quality and meet all state and federal standards for both ozone and particulates.

Santa Cruz Site Information

Site Name	Santa Cruz
AQS ID	06-087-0007
GIS coordinates	N 36° 59’ 2.34” W 121° 59’ 27.7” Elevation: 24.4 meters
Location	Office Building
Address	2544 Soquel Ave., Santa Cruz, CA. 95062
County	Santa Cruz
Representative Area	MSA: Santa Cruz – Watsonville, CA.

Table 6. Santa Cruz AMS • 777 Soquel Avenue, Santa Cruz

AIRS Site Code	Parameter	Parameter Code	POC	Interval Code	Units Code	Method Code	Date Open	Date Closed
06-087-0007	03	44201	1	1	008	047	09/24/1996	N/A
	ATM	62101	1	1	015	040	01/01/1997	N/A
	WDA	61102	1	1	014	050		N/A
	WSA	61101	1	1	012	050		N/A
	PM10 (SDT)	81102	1	7	001	063	10/24/1996	N/A
	PM10 (ADT)	85101	1	7	105	063	01/01/1997	N/A
	PM2.5 FRM	88101	1	7	001	117	01/01/1999	12/31/2009
	PM2.5 FEM	88101	3	1	001	170	01/01/2010	N/A

Hollister (SLAMS)

This station was established in 1987 to monitor population exposure in the Hollister area, the largest and most rapidly growing city in San Benito County. Data acquired at this site include O3, PM10, BAM PM2.5, WSA, WDA and ATM. PM10 and data is acquired by filter based instruments operating on the one in six day schedule. PM2.5 data is acquired continuously using the newer FEM BAM-1020 technology. Hollister is the second highest station on the NCCAB's ozone monitoring network. Ozone levels at Hollister are attributable to local sources as well as transport from the San Francisco Bay Area Air Basin (SFBAAB). Ozone data from this site have been used in a number of regional photochemical modeling studies including San Jouquin Valley AUSPEX Regional Mapping of Air Pollution (SARMAP), Central California Ozone Study (CCOS) as well as a special District funded project using the Bay Area Air Quality Management District's urban airshed model. AUSPEX stands for Atmospheric Utility Signature Prediction Experiment. PM10 exceedances at this site can occasionally be associated with wildfire events, although fugitive dust appears to be the most common contributor.

Hollister Site Information

Site Name	Hollister
AQS ID	06-069-0002
GIS coordinates	N 36° 50' 36.2" W 121° 21' 43.8" Elevation: 134.1 meters
Location	On CDF Station, edger of town.
Address	1979 Fairview Rd., Hollister, CA. 95023
County	San Benito
Representative Area	MSA: San Jose – Sunnyvale – Santa Clara, CA.

Table 7. Hollister AMS • 1979 Fairview Road, Hollister

AIRS Site Code	Parameter	Parameter Code	POC	Interval Code	Units Code	Method Code	Date Open	Date Closed
06-069-0002	03	44201	1	1	008	047	01/01/1980	N/A
	ATM	62101	1	1	015	040	01/01/1992	N/A
	WDA	61102	1	1	014	050	01/01/1992	N/A
	WSA	61101	1	1	012	050	01/01/1992	N/A
	PM10 (STD)	81102	2	7	001	063	01/01/1988	N/A
	PM10 (ADT)	85101	2	7	105	063	01/01/1997	N/A
	PM2.5 FRM	88101	1	7	001	117	01/01/1999	12/31/2009
	PM2.5 FEM	88101	3	1	001	170	01/01/2010	N/A

Scotts Valley (SLAMS – Closed on 06/15/09)

Monitoring at that Scotts Valley location began in 1992 to assess population exposure to ozone. Data acquired included ozone, WS, WD and T. This was the area's third highest site for ozone. This eight hour design values for this site have often exceeded state ozone standard although they did consistently meet the national ozone standard. Data has been used for ARB's triennial transport assessments which documented significant ozone transport from the San Francisco Bay Area Air Basin, resulting in exceedance events. The station was closed on 06/15/2009.

Scotts Valley Site Information

Site Name	Scotts Valley – 4
AQS ID	06-087-0006
GIS coordinates	N 37° 03' 6.60" W 122° 00' 51.9" Elevation: 164.5 meters
Location	Office Building. City Center.
Address	4859 Scotts Valley Dr., Scotts Valley, CA. 95066
County	Santa Cruz
Representative Area	MSA: Santa Cruz-Watsonville, CA.

Table 8. Scotts Valley-4 AMS • 4859 Scotts Valley Drive, Scotts Valley

AIRS Site Code	Parameter	Parameter Code	POC	Interval Code	Units Code	Method Code	Date Open	Date Closed
06-087-0006	03	44201	1	1	008	047	07/01/1994	06/15/2009
	ATM	62101	1	1	015	040	01/01/2004	06/15/2009
	WDA	61102	1	1	014	050	01/10/2004	06/15/2009
	WSA	61101	1	1	012	050	01/01/2004	06/15/2009

Watsonville (SLAMS – Closed on 09/30/09)

This station was established in 1992 to monitor population exposure to ozone and particulate matter in the southern portion of the Santa Cruz/Watsonville MSA. Watsonville is the most rapidly growing city in Santa Cruz County and is expected to be the second largest city in the entire NCCAB by 2020. Data acquired at this District operated site included ozone, PM10, WS, WD and T. Air quality data from this site have indicated compliance with state and federal air quality standards. The station was shut down on 09/30/2009.

Watsonville Site Information

Site Name	Watsonville
AQS ID	06-087-0004
GIS coordinates	N 36° 55' 57.1" W 121° 47' 14.6" Elevation: 51.8 meters
Location	Office Building next to Airport.
Address	444 Airport Blvd., Watsonville, CA. 95076
County	Santa Cruz
Representative Area	MSA: Santa Cruz – Watsonville, CA.

Table 9. Watsonville AMS • 444 Airport Blvd., Watsonville

AIRS Site Code	Parameter	Parameter Code	POC	Interval Code	Units Code	Method Code	Date Open	Date Closed
06-087-0004	03	44201	1	1	008	047	07/01/1992	09/30/2009
	ATM	62101	1	1	015	040	07/01/1992	09/30/2009
	WDA	61102	1	1	014	050	07/01/1992	09/30/2009
	WSA	61101	1	1	012	050	07/01/1992	09/30/2009
	PM10 (STD)	81102	1	7	001	063	01/01/1994	09/30/2009
	PM10 (ADT)	85101	1	7	105	063	01/01/1997	09/30/2009

Davenport (SPM)

This station was established in 1993 as a permit condition for the nearby cement plant. This special purpose station monitored plant related impacts on the nearby town of Davenport. Data currently acquired at site include NOX, CO, WSA, WDA and ATM. Also measurements of NOX, and CO have been conducted to monitor potential impacts from the cement planton the local population, including a nearby school. Funding for the station has been part of the permit conditions of the cement plant, and the station is operated by the District.

Davenport Site Information

Site Name	Davenport
AQS ID	06-087-0003
GIS coordinates	N 37° 00’ 43.3” W 122° 11’ 37.9” Elevation: 30.5 meters
Location	Elementary School
Address	Center St., Davenport, CA. 95017
County	Santa Cruz
Representative Area	MSA: Santa Cruz – Watsonville, CA.

Table 10. Davenport AMS • Center and Marine View South, Davenport

AIRS Site Code	Parameter	Parameter Code	POC	Interval Code	Units Code	Method Code	Date Open	Date Closed
06-087-0003	03	44201	1	1	008	047	12/01/1986	09/30/2009
	ATM	62101	1	1	015	040	01/01/1992	N/A
	WDA	61102	1	1	014	050	01/01/1992	N/A
	WSA	61101	1	1	012	050	01/01/1992	N/A
	NOx	42603	1	1	008	074	01/01/1993	N/A
	NO	42601	1	1	008	074	01/01/1993	N/A
	NO2	42602	1	1	008	074	01/01/1993	N/A
	CO	42101	1	1	007	054	12/01/1986	N/A
	SO2	42401	1	1	008	060	12/01/1986	09/30/2009
	PM10 (STD)	81102	1	7	001	063	01/01/1992	09/30/2009
	PM10 (ADT)	85101	1	7	105	063	01/01/1997	09/30/2009

Pinnacles (SPM)

This station was established in 1987 by the National Park Service (NPS) to monitor air quality at Pinnacles National Monument, a federal Class I protected area and part of the national park monitoring network. Data acquired at this site include O3, WS, WD and T. In addition, as part of the federal Interagency Monitoring of Protected Visual Environments (IMPROVE) program, a wide variety of particulate aerosols is monitored for the purpose of assessing visibility trends. However, the only parameters reported by the District at this site are O3 and 8HrO3. Although located in a remote unpopulated area, ozone readings at this site are the highest in the District and the ozone data are used to establish the NCCAB's designations in relation to the state and federal standards. CARB's triennial transport assessments have demonstrated that the cause of the high readings at this mountain site is attributal to transport, particularly from the upwind San Francisco Bay Area. Nitrate data from the IMPROVE monitors has also been used in District plans to indicate an improving trend, most likely due to regional reductions in motor vehicle NO_x emissions, as well as controls on stationary sources.

Pinnacles Site Information

Site Name	Pinnacles
AQS ID	06-069-0003
GIS coordinates	N 36° 29' 57" W 121° 10' 18" Elevation: 305 meters
Location	National Park
Address	Pinnacles National Monument,5000 Hwy 146, Paicines, CA. 95043
County	San Benito
Representative Area	CBSA: San Jose – Sunnyvale – Santa Clara, CA.

Table 11. Pinnacles NM AMS • Pinnacles National Monument, Paicines

AIRS Site Code	Parameter	Parameter Code	POC	Interval Code	Units Code	Method Code	Date Open	Date Closed
06-069-0003	03	44201	1	1	007	019	11/07/1986	N/A

Network Analysis
Ambient Air Quality Standards

Ambient air quality standards (AAQS) are set to protect the public from the adverse effects of air pollution. State standards are established to protect public health, including the most sensitive members of the population. National standards include a primary standard to protect public health and a secondary standard to protect the public welfare including property, vegetation and visibility. Current State and National AAQS are shown in Table 12. All components of both the state and national standards for a parameter must be met in order for the standard to be attained.

Table 12. National & State Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards		National Standards[a]			
		ppm	µg/m³	Primary[b]		Secondary[c]	
				ppm	µg/m³	ppm	µg/m³
Ozone	1 hour	0.09	180				
	8 hours	0.070	137	0.075[h]	147	0.075	147
Carbon Monoxide	8 hours	9.0	10,000	9	10,000	9.0	10,000
	1 hour	20	23,000	35	40,000	35.0	40,000
Nitrogen Dioxide	Annual	0.030	57	0.053	100	0.053	100
	1 hour	0.18	339				
Sulfur Dioxide	Annual			0.03	80		
	24 hours	0.04	105	0.14	365		
	3 hours					0.5	1,300
	1 hour	0.25	655				
Respirable Particulate Matter (PM_{10})[d]	Annual		20				
	24 hours		50		150		150
Fine Particulate Matter ($PM_{2.5}$)[e]	Annual		12		15		15
	24 hours		35		35		35
Lead	Calendar quarter				1.5		1.5
	30-day avg		1.5				
Sulfate	24 hours		25				
Hydrogen Sulfide	1 hour	0.03	42				
Vinyl Chloride	24 hours	0.010	26				
Visibility Reducing Particles	8 hours (10AM–6PM)	In sufficient amounts to reduce prevailing visibility to < 10 miles when relative humidity of < 70% with equivalent instrument method					

[a] National standards, other than ozone and those based on annual averages, are not to be exceeded more than once a year.
[b] Designed to protect human health with an adequate margin of safety
[c] Designed to protect public welfare (i.e., prevent damage to vegetation, property, visibility)

(Adapted from CARB's 02/16/10 chart)

Number of Instruments per Site

The District's sites are ranked here according to the number of monitoring instruments currently in operation at each station as of January 1st, 2010 (Table 13). Sites which have the same number of instruments are ranked the same, regardless of the types of monitoring instruments or site descriptions (SLAMS or SPM). The rankings are based on the data shown on Tables 2-11.

Table 13 Ranking Based on Number of Parameters

Ranking	Site	AIRS Site Code	Number of Instruments	Instrument Types
1	Salinas-3	06-053-1003	10	O3, NO/NO2/NOx, CO, PM10, PM10 Colo, PM2.5 FRM, PM2.5 BAM-1020 FEM, WSA, WDA, & ATM.
2	Santa Cruz	06-087-0007	6	O3, PM10, PM2.5 BAM-1020 FEM, WSA, WDA, and ATM.
2	Hollister	06-087-0002	6	O3, PM10, PM2.5 BAM-1020 FEM, WSA, WDA, and ATM.
3	King City 2	06-053-0008	5	O3, PM10, WSA, WDA, and ATM.
3	Davenport	06-087-0003	5	NO/NO2/NOx, CO, WSA, WDA, and ATM.
4	Carmel Valley	06-053-0002	4	O3, WSA, WDA, and ATM.
4	Pinnacles	06-069-0003	4	O3, WSA, WDA, and ATM.

Trend Impacts for Each Site

The District's sites are ranked below strictly based on the number years that certain criteria pollutants were monitored at each station as of January 1st, 2010. Davenport is included in the O3 ranking because the O3 parameter will be reopened as stated in the annual network plan. The rankings are shown on Table 14 which is based on the data depicted on Tables 2-11.

Table 14 Ranking Based on Monitoring Time

O3 Ranking	Site	Date Open	Date Closed	# Years Open
1	Hollister	01/01/1980	N/A	30
2	Carmel Valley	01/01/1982	N/A	28
3	Pinnacles	11/07/1986	N/A	24
4	Davenport	12/01/1986	09/30/2009	24
5	Santa Cruz	09/24/1996	N/A	14
6	Salinas	12/31/1999	N/A	10
7	King City 2	05/25/2007	N/A	3
PM10 Ranking				
1	Hollister	01/01/1988	N/A	22
2	Santa Cruz	09/24/1996	N/A	14
3	Salinas	12/31/1999	N/A	10
4	King City 2	05/25/2007	N/A	3
PM2.5 FRM Ranking				
1	Santa Cruz	01/01/1999	12/31/2009	10
1	Hollister	01/01/1999	12/31/2009	10
2	Salinas	01/01/2000	12/31/2009	9
PM2.5 FEM Ranking				
1	Salinas	01/01/2010	N/A	0
1	Santa Cruz	01/01/2010	N/A	0
1	Hollister	01/01/2010	N/A	0

Measured Concentrations and Deviation from the AAQS (Ozone)

Tables 15 to 20 depict the both the calculated State 1Hr and 8Hr Ozone Design Values, and the National 1Hr and 8Hr Ozone Designation Values for the sites that are currently operating in 2010. Figures 4 and 5 give a visual representation of the State and National 8Hr trends from 2000 - 2009. This data was taken from CARB's data and statistics website at http://www.arb.ca.gov/adam/. Sites are ranked on Table 21 according to the magnitude of their State 8Hr Ozone Design Values from 2006-2008, and on Table 22 according to the magnitude their National 8Hr Ozone Designation Values from 2006-2008. Sites are also ranked on Tables 23 and 24 according to the magnitude of their deviation from the State and National 8Hr AAQS from 2006-2008, however, the EPA will be lowering the national AAQS for ozone this year which means that the rankings in Table 24, and possibly Table 23, will change. Because the State 1Hr Design Values are less precise and there is no National 1Hr AAQS, the 1Hr values have not been used for ranking in this assessment.

Table 15. Salinas 3 DV Trends

Salinas-3 Ozone Design/Designation Values				
Year	State (1Hr)	National (1Hr)	State (8Hr)	National (8Hr)
AAQS	0.09	*	0.070	0.075
2009	0.07	0.072	0.062	0.056
2008	0.07	0.067	0.060	0.055
2007	0.06	0.064	0.058	0.053
2006	0.07	0.073	0.062	0.056
2005	0.07	0.073	0.063	0.058
2004	0.07	0.075	0.063	0.059
2003	0.07	0.073	0.062	0.059
2002	0.07	0.073	0.060	0.057
2001	0.07	0.073	0.069	*
2000	0.08	0.068	0.066	*

Table 16. Carmel Valley DV Trends

Carmel Valley Ozone Design/Designation Values				
Year	State (1Hr)	National (1Hr)	State (8Hr)	National (8Hr)
AAQS	**0.09**	*	**0.070**	**0.075**
2009	0.07	0.073	0.064	0.058
2008	0.08	0.073	0.066	0.059
2007	0.07	0.073	0.065	0.058
2006	0.08	0.080	0.068	0.062
2005	0.08	0.080	0.070	0.065
2004	0.08	0.080	0.075	0.068
2003	0.08	0.080	0.071	0.066
2002	0.08	0.080	0.073	0.064
2001	0.08	0.080	0.068	0.063
2000	0.08	0.080	0.069	0.061

Table 17. King City 2 DV Trends

King City 2 Ozone Design/Designation Values				
Year	State (1Hr)	National (1Hr)	State (8Hr)	National (8Hr)
AAQS	**0.09**	*	**0.070**	**0.075**
2009	0.07	0.070	0.063	*
2008	0.07	0.072	0.068	*
2007	0.07	0.067	0.060	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*

Table 18. Santa Cruz DV Trends

Santa Cruz Ozone Design/Designation Values				
Year	State (1Hr)	National (1Hr)	State (8Hr)	National (8Hr)
AAQS	**0.09**	*	**0.070**	**0.075**
2009	0.07	0.073	0.061	0.055
2008	0.07	0.072	0.060	0.054
2007	0.07	0.065	0.058	0.052
2006	0.07	0.071	0.059	0.055
2005	0.08	0.079	0.063	0.057
2004	0.08	0.080	0.065	0.058
2006	0.07	0.071	0.059	0.055
2002	0.07	0.076	0.061	0.055
2001	0.08	0.079	0.064	0.058
2000	0.08	0.081	0.064	0.058

Table 19. Hollister DV Trends

Hollister Ozone Design/Designation Values				
Year	State (1Hr)	National (1Hr)	State (8Hr)	National (8Hr)
AAQS	**0.09**	*****	**0.070**	**0.075**
2009	0.09	0.087	0.074	0.067
2008	0.09	0.090	0.076	0.069
2007	0.09	0.089	0.076	0.068
2006	0.09	0.089	0.076	0.068
2005	0.09	0.087	0.076	0.068
2004	0.09	0.097	0.079	0.072
2006	0.10	0.097	0.080	0.073
2002	0.10	0.097	0.080	0.073
2001	0.10	0.094	0.080	0.072
2000	0.10	0.102	0.086	0.074

Table 20. Pinnacles DV Trends

Pinnacles Ozone Design/Designation Values				
Year	State (1Hr)	National (1Hr)	State (8Hr)	National (8Hr)
AAQS	**0.09**	*****	**0.070**	**0.075**
2009	0.10	0.098	0.087	0.077
2008	0.10	0.100	0.089	0.079
2007	0.10	0.097	0.085	0.074
2006	0.09	0.095	0.085	0.075
2005	0.10	0.095	0.084	0.076
2004	0.10	0.104	0.090	0.081
2003	0.10	0.106	0.090	0.081
2002	0.10	0.104	0.090	0.081
2001	0.10	0.100	0.089	0.079
2000	0.11	0.107	0.088	0.082

Figure 4. 10 Year Trend of State 8Hr Design Values

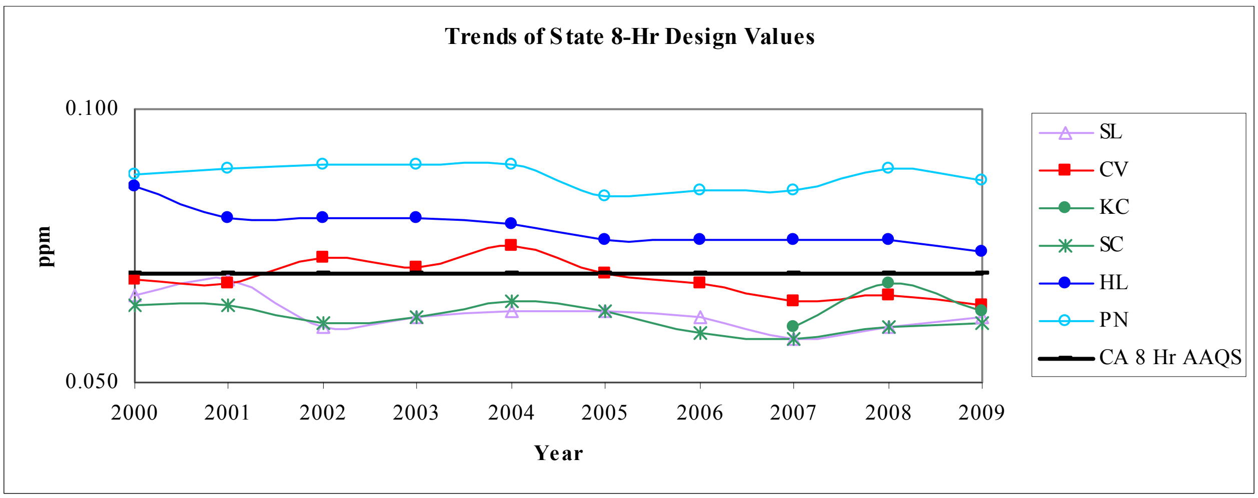


Figure 5. 10 Year Trend of National 8Hr Designation Values

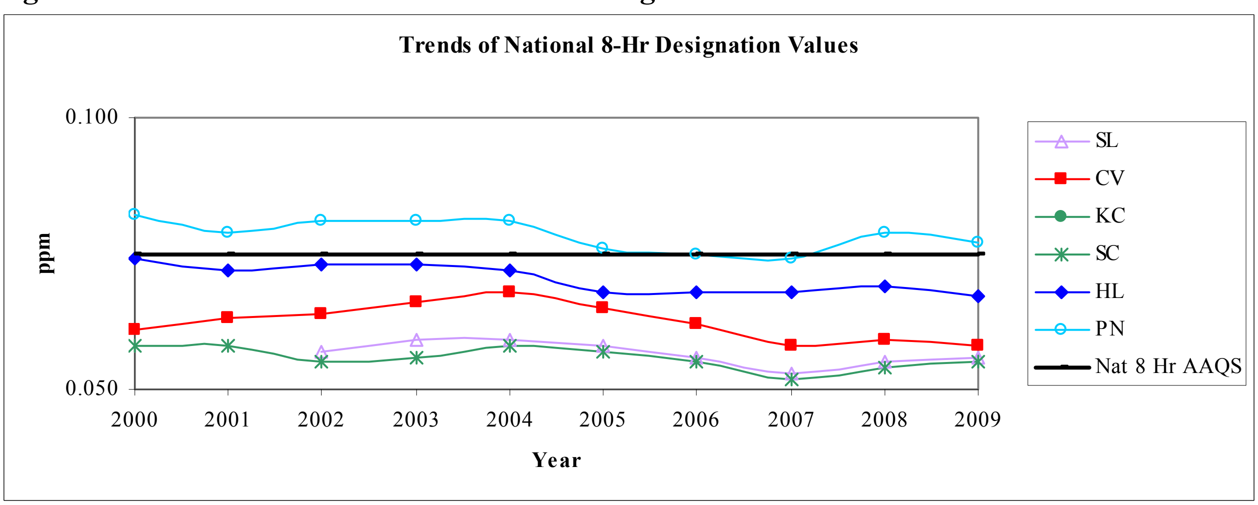


Table 21. Ranking Based on State 8Hr Design Values for Ozone

Ranking	Site	AIRS Site Code	CA 8Hr DV 2006 (ppm)	CA 8Hr DV 2007 (ppm)	CA 8Hr DV 2008 (ppm)
1	Pinnacles	06-069-0003	.085	.085	.089
2	Hollister	06-087-0002	.076	.076	.076
3	Carmel Valley	06-053-0002	.068	.065	.066
4	King City 2	06-053-0008	*	.060	.068
5	Salinas-3	06-053-1003	.062	.058	.060
6	Santa Cruz	06-087-0007	.059	.058	.060

Table 22. Ranking Based on National 8Hr Designation Values for Ozone

Ranking	Site	AIRS Site Code	National 8Hr DV 2006 (ppm)	National 8Hr DV 2007 (ppm)	National 8Hr DV 2008 (ppm)
1	Pinnacles	06-069-0003	.075	.074	.079
2	Hollister	06-087-0002	.068	.068	.069
3	Carmel Valley	06-053-0002	.062	.058	.059
4	Salinas-3	06-053-1003	.056	.053	.055
5	Santa Cruz	06-087-0007	.055	.054	.052
U	King City 2	06-053-0008	*	*	*

Table 23. Ranking Based on Deviation of State 8Hr Design Values from AAQS for Ozone

Ranking	Site	AIRS Site Code	CA 8Hr DV 2006 (ppm)	CA 8Hr DV 2007 (ppm)	CA 8Hr DV 2008 (ppm)
1	Carmel Valley	06-053-0002	0.002	0.005	0.004
2	Hollister	06-087-0002	0.006	0.006	0.006
3	King City 2	06-053-0008	*	0.010	0.002
4	Salinas-3	06-053-1003	0.008	0.012	0.010
5	Santa Cruz	06-087-0007	0.011	0.012	0.010
6	Pinnacles	06-069-0003	0.015	0.015	0.019

Table 24. Ranking Based on Deviation of National 8Hr Designation Values from AAQS for Ozone

Ranking	Site	AIRS Site Code	National 8Hr DV 2006 (ppm)	National 8Hr DV 2007 (ppm)	National 8Hr DV 2008 (ppm)
1	Pinnacles	06-069-0003	0.000	0.001	0.004
2	Hollister	06-087-0002	0.007	0.007	0.006
3	Carmel Valley	06-053-0002	0.013	0.017	0.016
4	Salinas-3	06-053-1003	0.019	0.022	0.020
5	Santa Cruz	06-087-0007	0.020	0.023	0.021
Unranked	King City 2	06-053-0008	*	*	*

Measured Concentrations and Deviation from the AAQS (PM2.5)

Table 25 depicts both the calculated State Annual Design Values, and the National 24Hr and Annual Ozone Designation Values, from 2006-2009, for the sites currently operating in 2010. These yearly values for all three stations are all about half of the AAQS. Because of the similar low design/designation values for the three sites, and because the each site represents a different MSA they are considered equally valuable and have been ranked equally. This data was taken from CARB's data and statistics website at http://www.arb.ca.gov/adam/.

Table 25. PM2.5 State Design/National Designation Trends for All Sites in the District

	Salinas (06-053-1003)			Santa Cruz (06-087-0007)			Hollister (06-087-0002)		
Year	Annual SD		24Hr SD	Annual SD		24Hr SD	Annual SD		24Hr SD
	Nat'l	CA	Nat'l	Nat'l	CA	Nat'l	Nat'l	CA	Nat'l
2006	6.9	7	14	*	7	*	*	*	*
2007	6.9	7	14	*	7	*	*	6	*
2008	7.1	7	14	6.7	7	14	*	7	*
2009	6.7	7	14	6.3	7	13	6.2	7	17
AAQS	15	12	35	15	12	35	15	12	35

Measured Concentrations and Deviation from the AAQS (PM10)

Tables 26 to 28 portray the calculated State PM10 24Hr Averages and PM10 Annual Arithmetic Means, and the National PM10 24Hr Averages, from 2006-2008, for the sites that are currently operating in 2010. King City consistently has the highest concentrations, followed by Salinas 3, Santa Cruz, and Hollister. The ranking of sites (Tables 29-31), based on deviation from the AAQS changes, depends on which standard is being used. This data was taken from CARB's data and statistics website at http://www.arb.ca.gov/adam/.

Table 26. Rankings based on State Annual Averages for PM10

Ranking	Site	AIRS Site Code	CA Annual Average 2006 (µg/m^3)	CA Annual Average 2007 (µg/m^3)	CA Annual Average 2008 (µg/m^3)	AAQS CA Annual Mean
1	King City 2	06-053-0008	*	*	27.4	20
2	Salinas-3	06-053-1003	19.9	18.2	20.6	20
3	Santa Cruz	06-087-0007	18.4	18.0	18.8	20
4	Hollister	06-087-0002	16.0	17.2	19.7	20

Table 27. Rankings based on State 24Hr Averages for PM10

Ranking	Site	AIRS Site Code	CA 24Hr Average 2006 (µg/m^3)	CA 24Hr Average 2007 (µg/m^3)	CA 24Hr Average 2008 (µg/m^3)	AAQS CA 24Hr Average
1	King City 2	06-053-0008	*	52.0	65.0	50
2	Salinas-3	06-053-1003	51.0	39.0	52.0	50
3	Santa Cruz	06-087-0007	37.0	34.0	45.0	50
4	Hollister	06-087-0002	46.0	40.0	40.0	50

Table 28. Rankings based National 24Hr Averages for PM10

Ranking	Site	AIRS Site Code	National 24Hr Average 2006 (µg/m^3)	National 24Hr Average 2007 (µg/m^3)	National 24Hr Average 2008 (µg/m^3)	AAQS National 24Hr Average
1	King City 2	06-053-0008	*	50.0	63.0	150
2	Salinas-3	06-053-1003	49.0	37.0	50.0	150
3	Santa Cruz	06-087-0007	37.0	32.0	44.0	150
4	Hollister	06-087-0002	45.0	40.0	39.0	150

Table 29. Rankings based Deviation of State Annual Averages from AAQS for PM10

Ranking	Site	AIRS Site Code	Deviation from AAQS (µg/m^3)	Deviation from AAQS (µg/m^3)	Deviation from AAQS (µg/m^3)
1	Salinas-3	06-053-1003	0.1	1.8	0.6
2	Santa Cruz	06-087-0007	1.6	2.0	1.2
3	Hollister	06-087-0002	4.0	2.8	0.3
4	King City 2	06-053-0008	*	*	7.4

Table 30. Rankings based Deviation of State 24Hr Averages from AAQS for PM10

Ranking	Site	AIRS Site Code	Deviation from AAQS (µg/m^3)	Deviation from AAQS (µg/m^3)	Deviation from AAQS (µg/m^3)
1	Salinas-3	06-053-1003	1	11	2
2	Hollister	06-087-0002	4	10	10
3	King City 2	06-053-0008	*	2	15
4	Santa Cruz	06-087-0007	13	16	5

Table 31. Rankings based Deviation of National 24Hr Averages from AAQS for PM10

Ranking	Site	AIRS Site Code	Deviation from AAQS (µg/m^3)	Deviation from AAQS (µg/m^3)	Deviation from AAQS (µg/m^3)
1	King City 2	06-053-0008	*	100	87
2	Salinas-3	06-053-1003	101	113	100
3	Hollister	06-087-0002	105	110	111
4	Santa Cruz	06-087-0007	113	118	106

Area Designations and Attainment Status

CARB and the EPA are responsible for state and national designations, respectively. State designations are updated annually and national designations are updated when either the standards change, or when a district requests that they be re-designated due to changes in the area's air quality. Designations are made by air basin, and in some cases, at the county level.

Designations are made by pollutant according to the following categories:

- **Attainment** – Air quality in the area meets the standard.
- **Nonattainment Transitional** – Air quality is approaching the standard (State only).
- **Nonattainment** – Air quality in the area fails to the applicable standard.
- **Unclassified** – Data is insufficient to designate area, or designation has yet to be made.

Nonattainment designations are of most concern because they indicate that unhealthy levels of the pollutant exist in the area, which typically triggers a need to develop a plan to achieve the applicable standard. State and national designations are shown in Table 32.

Table 32. Attainment Status for the North Central Coast Air Basin

Pollutant	State	Federal
Ozone (O_3)	Nonattainment	Attainment
Inhalable Particulates (PM_{10})	Nonattainment	Attainment
Fine Particulates ($PM_{2.5}$)	Attainment	Attainment
Carbon Monoxide (CO)	Monterey Co. – Attainment San Benito Co. – Unclassified Santa Cruz Co. - Unclassified	Attainment
Nitrogen Dioxide (NO_2)	Attainment	Attainment
Sulfur Dioxide (SO_2)	Attainment	Attainment
Lead	Attainment	Attainment

(Table taken from the MBUAPCD 2008 Air Quality Management Plan)

Notes:

1) In 2006, the Federal 24-hour standard for $PM_{2.5}$ was revised from $65 \mu g/m^3$ to $35 \mu g/m^3$.

2) Effective July 26, 2007, the ARB designated the NCCAB a nonattainment area for the State ozone standard.

Tools Supplied by the EPA for Network Assessments

Several tools were presented by the EPA to all of the districts at the National Air Monitoring conference in Nashville in 2009 to be used in the 5 year network assessment. They include the area served, removal bias, correlation matrix, and new site analysis tools. These tools were designed to work with Google Maps™ and were set up by the EPA to utilize the air monitoring data sets during the years from 2005 to 2008 for any district in the nation. The three year, 2006–2008, interval was used in this assessment because it was slightly more complete than the 2005-2007 interval. There are several limitations to these tools. Pollution sources, population dynamics, and geographical topography are not accounted for, so these tools are better utilized in conjunction with other station rankings and each other, and not by themselves.

Area Served Analysis (Ozone Sites)

This tool consists of Voronoi/Thiessen polygons that overlay a Google Earth™ map. Each polygon encloses a site and an area of points that are closer to that particular site than any other site. These polygons therefore represent the area served by a particular site when no other factors, such as population, geographical topography, or political boundaries are taken into consideration. Voronoi/Thiessen polygons tend to give weight to remote and urban boundary sites that help interpolate data in an area. Since several of the District's ozone sites are seen to represent areas that extend outside the boundaries of the district, and across mountain ranges (Figure 6), the results of this analysis were not taken literally, but were instead used in conjunction with other analyses and rankings in determining the usefulness of a site. District air monitoring sites were ranked according to area served as represented by the polygons as shown by Table 33. The ozone monitoring sites that are currently closed were unranked, except Davenport, which is expected to resume ozone monitoring this upcoming year.

Figure 6. Map of the NCCAB and a Representation of the Area Served by Each Ozone Site

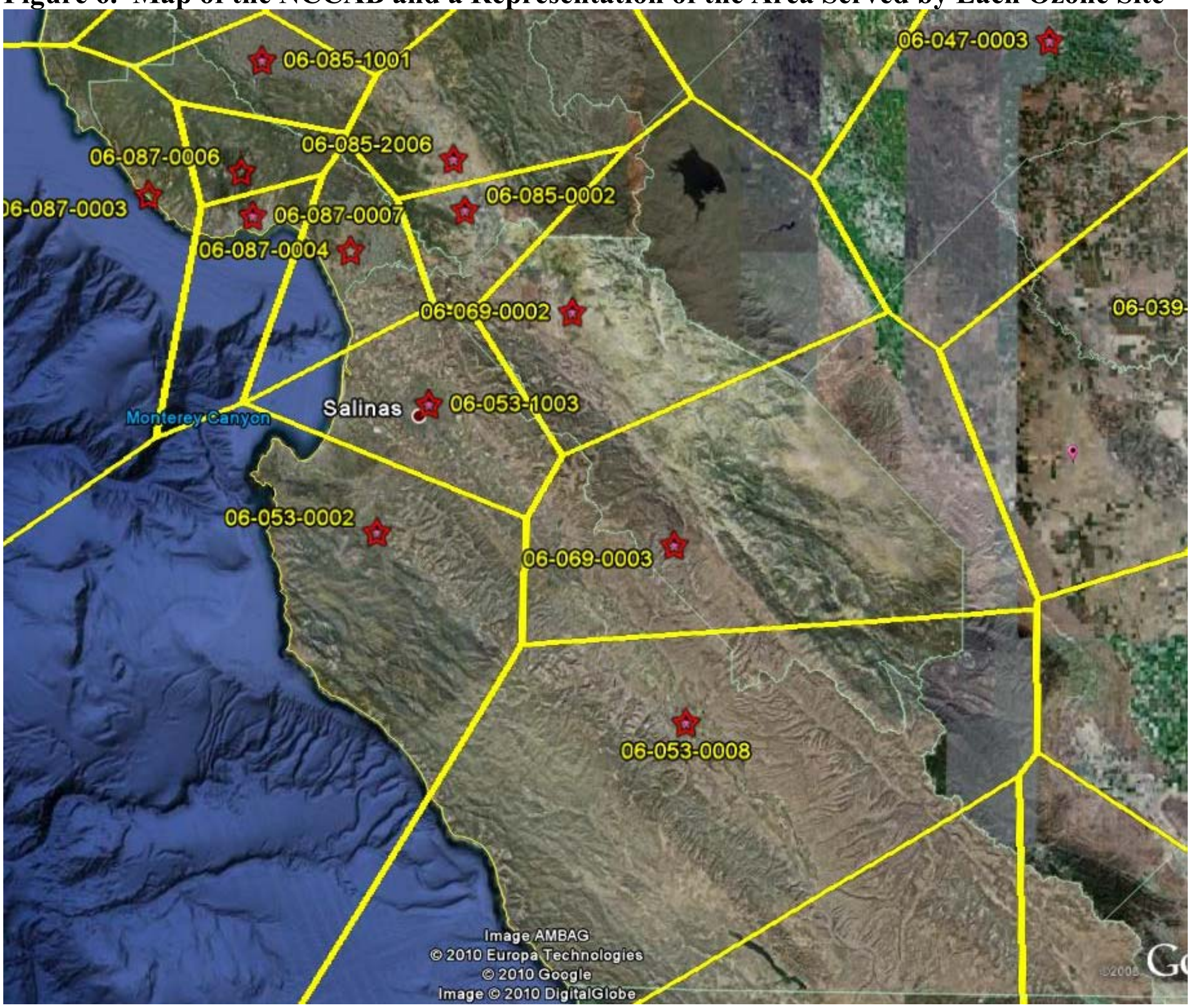


Table 33.

Ranking: 1	King City
AIRS Site Code	06-053-0008
Area	1883 sqmi
2000 Population	23040 (12 people/sqmi)
2008 Population	23412 (12 people/sqmi)

Ranking: 2	Pinnacles
AIRS Site Code	06-069-0003
Area	1804 sqmi
2000 Population	28118 (16 people/sqmi)
2008 Population	29371 (16 people/sqmi)

Ranking: 3	Carmel Valley
AIRS Site Code	06-053-0002
Area	838 sqmi
2000 Population	124352 (148 people/sqmi)
2008 Population	126357 (151 people/sqmi)

Ranking: 4	Hollister
AIRS Site Code	06-069-0002
Area	811 sqmi
2000 Population	51655 (64 people/sqmi)
2008 Population	53628 (66 people/sqmi)

Ranking: 5	Salinas
AIRS Site Code	06-053-1003
Area	394 sqmi
2000 Population	220126 (559 people/sqmi)
2008 Population	223677 (568 people/sqmi)

Ranking: 6	Davenport
AIRS Site Code	06-087-0003
Area	113 sqmi
2000 Population	4191 (37 people/sqmi)
2008 Population	4151 (37 people/sqmi)

Ranking: 7	Santa Cruz
AIRS Site Code	06-087-0007
Area	55 sqmi
2000 Population	110395 (1991 people/sqmi)
2008 Population	109332 (1972 people/sqmi)

Unranked: Site Closed	Watsonville
AIRS Site Code	06-087-0004
Area	164 sqmi
2000 Population	101880 (620 people/sqmi)
2008 Population	101353 (616 people/sqmi)

Unranked: Site Closed	Scotts Valley
AIRS Site Code	06-087-0006
Area	114 sqmi
2000 Population	50591 (445 people/sqmi)
2008 Population	50103 (441 people/sqmi)

Removal Bias and Correlation Matrix Analyses

The removal bias analysis, when applied to an ambient air monitoring network, gives an indication of the uniqueness of each site for a given pollutant. The analysis also gives a relative indication of a site's pollutant level with respect to the surrounding sites. If redundant sites are indicated, low priority sites may be removed in the analysis to remove to redundancy.

When the analysis was run on the District's ozone monitoring network, each of the sites was compared to 7-14 surrounding sites both inside and outside the district as shown on Table 34. The open circles representing each of the District's sites (Figure 7) indicate that they are all statistically significant from each other. No redundant sites, depicted by solid circles, are apparent. All of the sites except the Pinnacles site show a positive bias as indicated by a reddish circle (Figure 7) which means that they consistently monitor lower amounts of ozone than they surrounding sites they were compared to. The Pinnacles site is indicated by a bluish circle (Figure 7), since it measures higher ozone levels than its surrounding sites. The presence or absence of the Watsonville and Scotts Valley sites, which closed in 2009, did not alter the uniqueness of the remaining District sites.

The District's PM10 monitoring network was also analyzed using the removal bias tool. Each of the sites was compared to 12-20 surrounding sites both inside and outside the district as shown on Table 35. The open circles representing each of the District's PM10 sites (Figure 9) indicate that they are all statistically significant from each other. Santa Cruz and Hollister show positive biases as indicated by reddish circles, while the Salinas and King City 2 sites show negative biases as indicated by bluish circles (Figure 9). Closure of the Davenport, Watsonville, and Carmel Valley sites significantly altered the importance of the remaining District sites. King City 2 was indicated by a closed red circle prior to the closure of these monitors, which indicated that it was potentially redundant.

This correlation matrix serves a similar function to that provided by the Removal Bias tool in that it is intended to point out redundant sites in a network. A site that correlates well with all the other sites that it was paired with (R^2>0.6), and shows low relative differences with these sites despite distances may be considered redundant. Correlation between various sites typically decreases as distance increases. This analysis was performed for the ozone monitoring sites (Figure 8) and for the PM10 monitoring sites (Figure 10). The analysis was also performed on the Salinas and Santa Cruz PM2.5 monitoring sites indicating a very low correlation. There was not enough data for Hollister for it to be included in the PM2.5 analysis.

Figure 7. Removal Bias Results for Ozone Sites

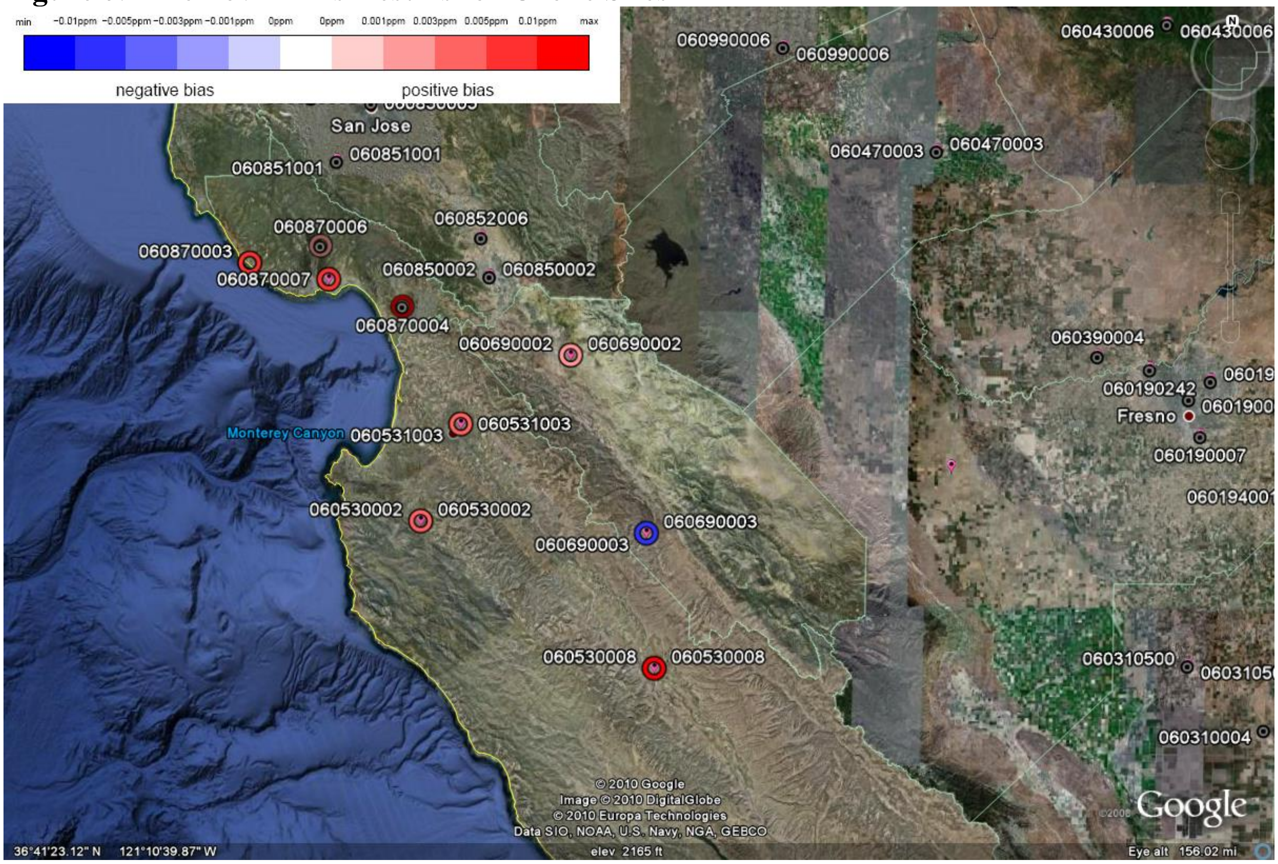


Figure 8. Correlation Matrix for District Sites (Ozone)

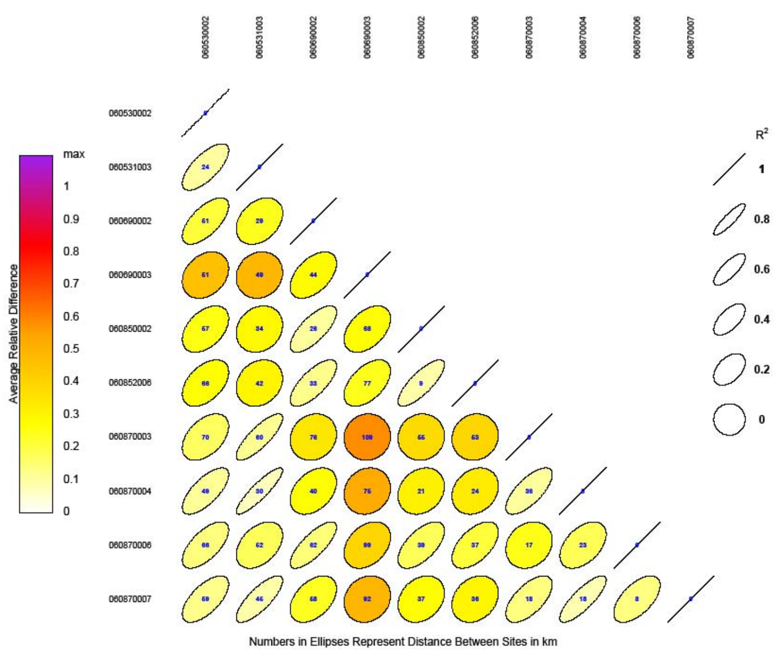


Table 34. Sites used in Removal Bias Analysis of District Ozone Sites

King City 2	
Airs Site Code	060530008
2006-2008 Design Value	N/A ppm
Average Bias	0.014 ppm
Sites Used in Bias Calculation	
060190242	060798001
060310500	060798005
060390004	060798006
060470003	060850002
060793001	060851001

Watsonville	
Airs Site Code	060870004
2006-2008 Design Value	0.055 ppm
Average Bias	0.011 ppm
Sites Used in Bias Calculation	
060793001	060851001
060798001	060852006
060811001	
060834003	
060850002	

Pinnacles	
Airs Site Code	060690003
2006-2008 Design Value	0.079 ppm
Average Bias	-0.005 ppm
Sites Used in Bias Calculation	
060190242	060798001
060310500	060798005
060390004	060798006
060470003	060850002
060793001	060851001

Santa Cruz 4	
Airs Site Code	060870007
2006-2008 Design Value	0.054 ppm
Average Bias	0.006 ppm
Sites Used in Bias Calculation	
060231004	060834003
060410001	060850002
060450008	060851001
060750005	060852006
060793001	060852007
060811001	

Salinas 3	
Airs Site Code	060531003
2006-2008 Design Value	0.055 ppm
Average Bias	0.011 ppm
Sites Used in Bias Calculation	
060190242	060798005
060310500	060811001
060390004	060834003
060470003	060850002
060793001	060851001
060798001	

Hollister	
Airs Site Code	060690002
2006-2008 Design Value	0.069 ppm
Average Bias	0.004 ppm
Sites Used in Bias Calculation	
060190242	060798005
060310500	060798006
060390004	060850002
060470003	060852006
060793001	060990006
060798001	

Davenport	
Airs Site Code	060870003
2006-2008 Design Value	0.052 ppm
Average Bias	0.005 ppm
Sites Used in Bias Calculation	
060231004	060834003
060410001	060851001
060450008	060852007
060750005	060870004
060793001	060870006
060811001	060971003

Scotts Valley-4	
Airs Site Code	060870006
2006-2008 Design Value	0.061 ppm
Average Bias	0.002 ppm
Sites Used in Bias Calculation	
060231004	060834003
060410001	060850002
060450008	060851001
060750005	060852006
060793001	060852007
060811001	

Carmel Valley	
Airs Site Code	060530002
2006-2008 Design Value	0.059 ppm
Average Bias	0.005 ppm
Sites Used in Bias Calculation	
060190242	060793001
060231004	060798001
060310500	060798005
060390004	060834003
060410001	060850002
060450008	060870004
060470003	060870006

Figure 9. Removal Bias Results for PM10 Sites

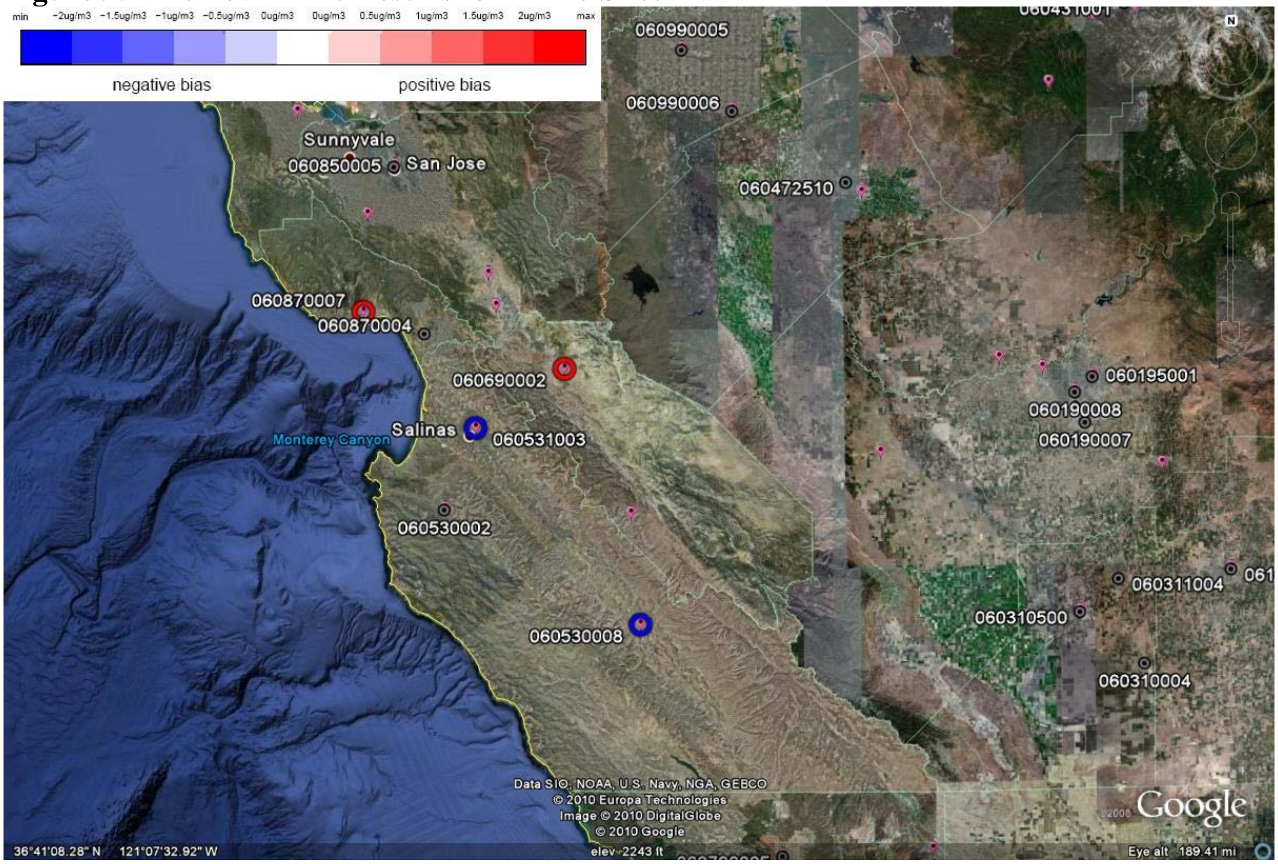


Figure 10. Correlation Matrix for District Sites (PM10)

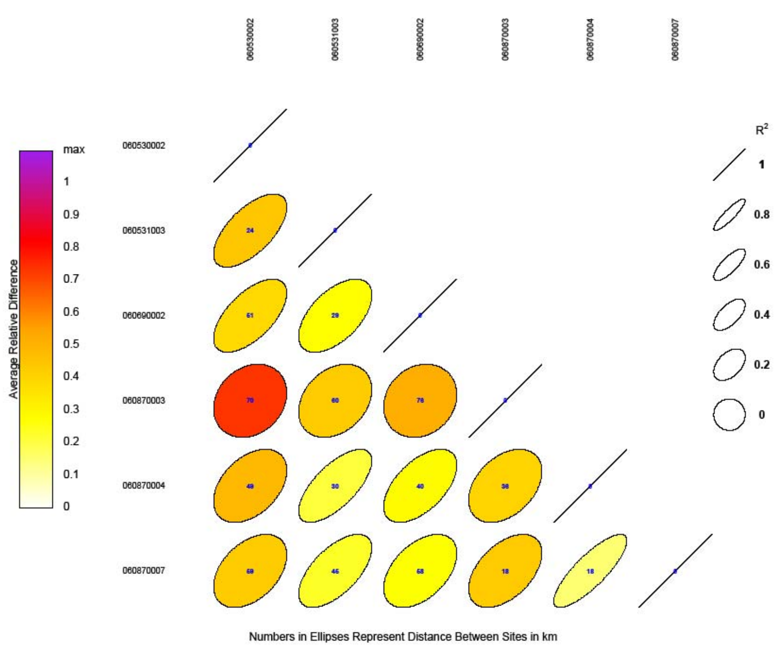


Table 35. Sites used in Removal Bias Analysis of District PM10 Sites

Salinas 3	
AQS ID	60531003
2006-2008 24-Hour Design Value	NA ug/m3
2006-2008 24-Hour Expected Exceedances	NA
Average Bias	-2.6 ug/m3
Sites Used in Bias Calculation:	
60110007	60773005
60190007	60773010
60190008	60790005
60310004	60793001
60310500	60850005
60431001	60870003
60452001	60870004
60472510	60990005
60510005	60990006
60530002	

Hollister 2	
AQS ID	60690002
2006-2008 24-Hour Design Value	45 ug/m3
2006-2008 24-Hour Expected Exceedances	0
Average Bias	3.8 ug/m3
Sites Used in Bias Calculation:	
60170011	60773005
60190007	60773010
60190008	60790005
60310004	60834003
60310500	60850005
60452001	60870003
60472510	60870004
60510005	60990005
60530002	60990006
60771002	

Santa Cruz	
AQS ID	60870007
2006-2008 24-Hour Design Value	44 ug/m3
2006-2008 24-Hour Expected Exceedances	0
Average Bias	4.5 ug/m3
Sites Used in Bias Calculation:	
60510005	60850005
60530002	60870003
60750005	60870004
60773005	60973002
60834003	60990006

King City 2	
AQS ID	60530008
2006-2008 24-Hour Design Value	NA ug/m3
2006-2008 24-Hour Expected Exceedances	NA
Average Bias	-2.9 ug/m3
Sites Used in Bias Calculation:	
60110007	60510005
60170011	60530002
60190007	60773005
60190008	60773010
60231004	60790005
60310004	60792006
60310500	60793001
60311004	60831008
60452001	60870003
60472510	60870004

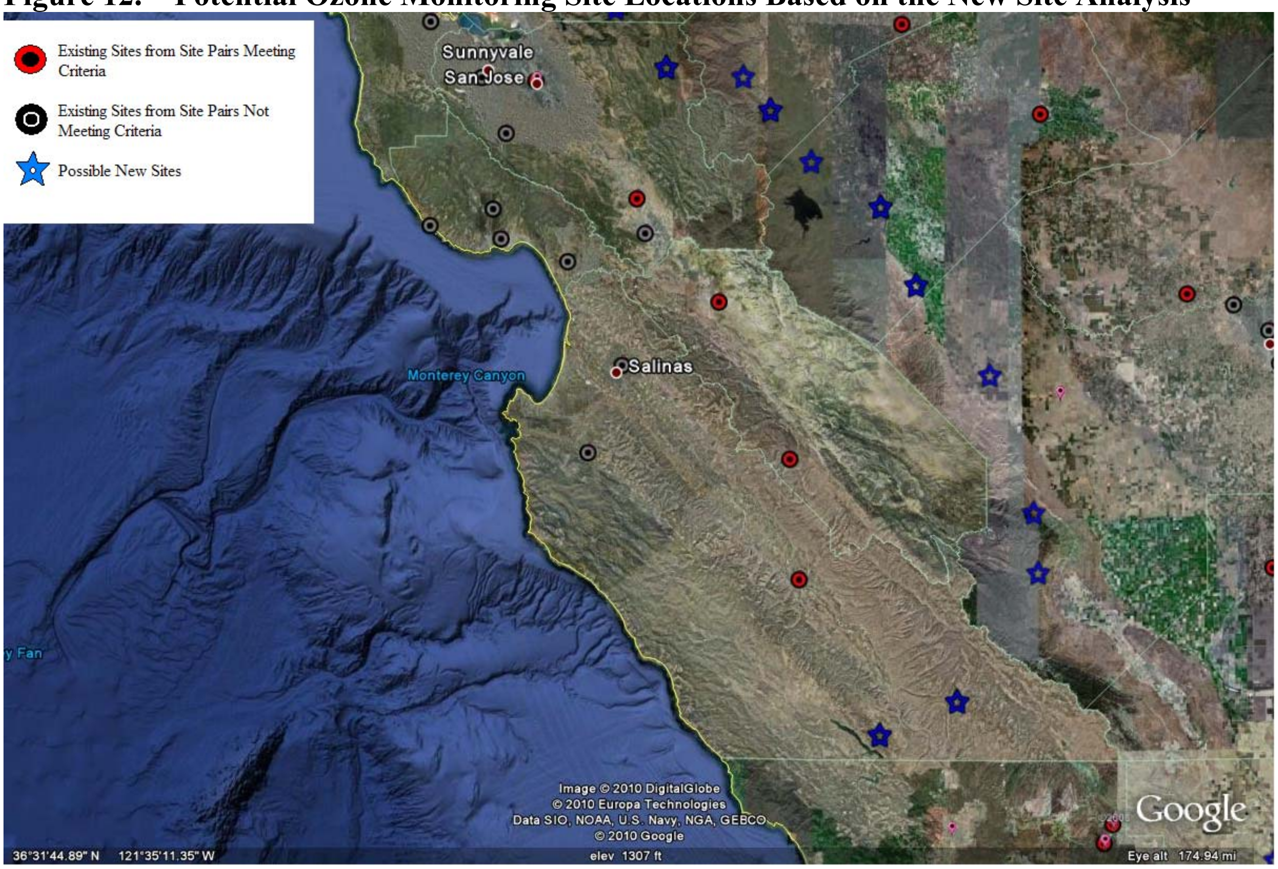
New Site Analysis for Potential Monitoring Sites (Ozone)

The new site analysis involved comparisons of site pairs that met with selected criteria (Table 36). Potential new site locations were placed midway between two sites depending on how their ozone monitoring data from 2006-2008 correlated with each other. Recommended defaults were used except that minimum distance between sites was reduced to 50km due to the District's highly variable terrain. The analysis was also run using the CA AAQS of .070ppm with no change in the results. Potential ozone monitoring sites appear in southern Monterey County (Figure 12).

Table 36. Criteria Selected for New Ozone Site Analysis

Criteria:	**Settings**
Site Pair Correlation:	<0.50
Minimum Distance Between Site Pairs:	50km
Difference Between Site Pairs:	0ppm
Probability of Exceeding 85% of 8-hour NAAQS of 0.075ppm:	80%

Figure 12. Potential Ozone Monitoring Site Locations Based on the New Site Analysis



New Site Analysis for Potential Monitoring Sites (PM10)

The District's PM10 sites were also analyzed. The criteria and results are shown in Table 37 and Figure 14, respectively. Recommended defaults were used except that minimum distance between sites was again reduced to 50km due to the District's highly variable terrain. The analysis was also run using the California AAQS of 50µg/m^3 with no change in the results, other than that Hollister and Davenport no longer met the criteria. No new PM10 sites were recommended to be placed in the NCCAB. It should be noted that Davenport has historically displayed erroneously elevated readings due to aerosolized sea salt and is likely that it would not have exceeded the state AAQS with no sea salt present on the filter.

Table 37. Criteria Selected for New PM10 Site Analysis

Criteria:	Settings
Site Pair Correlation:	<0.50
Minimum Distance Between Site Pairs:	50km
Difference Between Site Pairs:	0ppm
Probability of Exceeding 85% of 24-hour NAAQS of 150µg/m^3:	80%

Figure 14. Potential PM10 Monitoring Site Locations Based on the New Site Analysis

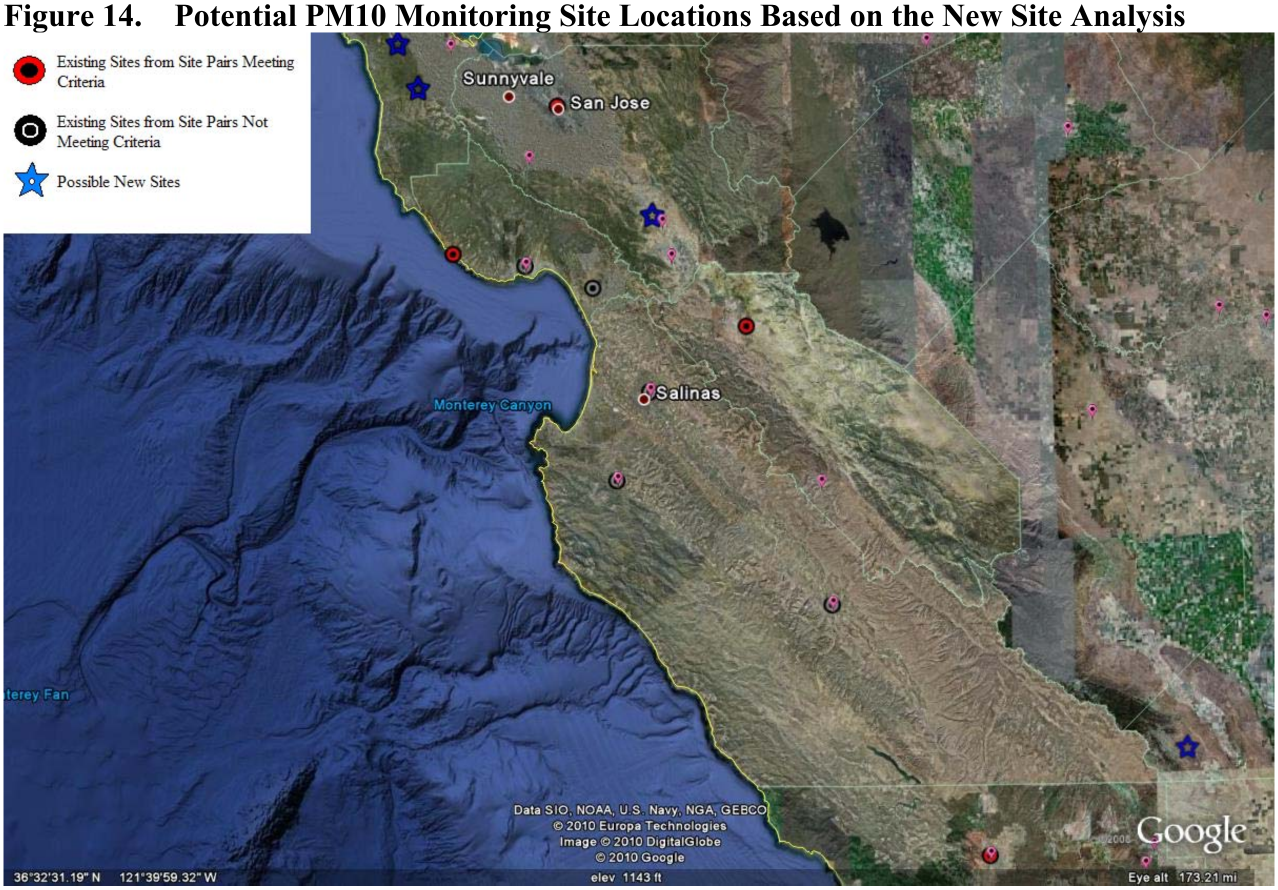
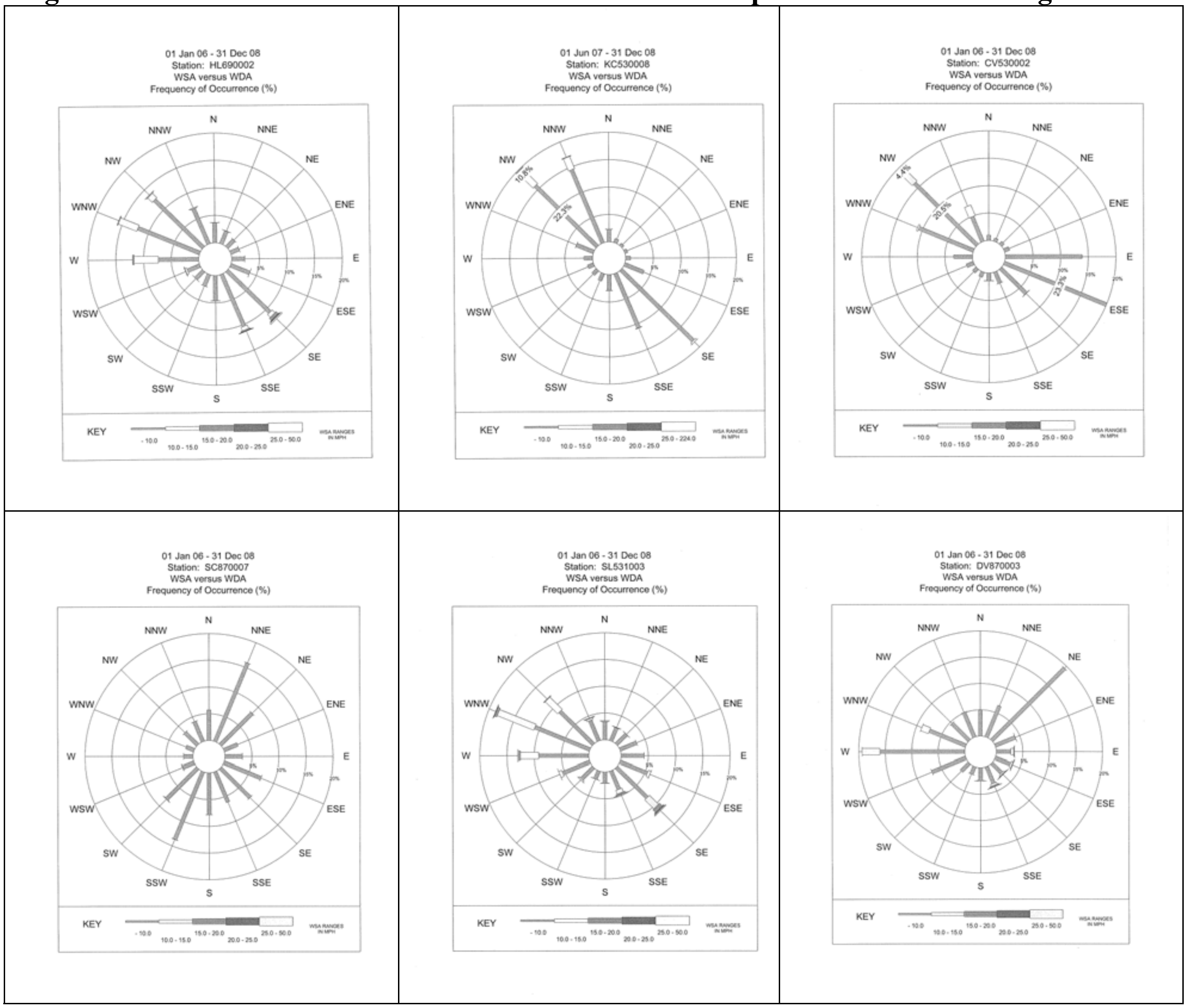


Figure 15. Wind Rose Charts for the Current District Operated Air Monitoring Sites



Discussion

The District currently collects ambient monitoring data from seven stations. Six of the stations are operated by the District, and the seventh station as mentioned previously, is operated by the National Park Service. The three largest stations, as described in terms of the number of parameters measured, are Salinas, Santa Cruz, and Hollister. They operate within the largest population centers for each MSA within the District's jurisdiction, and form the backbone of the ambient air monitoring network. The Hollister and Pinnacles stations help with monitoring ozone transport into the NCCAB and they document the District's highest ozone concentrations. The 2006-2008 wind patterns are shown on figure 15. The King City station serves to monitor a large portion of the southern part of Monterey County within the Salinas Valley, and helps with monitoring potential ozone transport through the District. The Davenport station was set up to monitor potential pollutants from the nearby CEMEX cement plant. With the closure of the plant, the Davenport station will be maintained with an ozone monitor. There is also the possibility that the cement plant will reopen under new ownership. The Davenport station will remain in operation as a special purpose monitoring site. The Carmel Valley station has been useful for smoke monitoring, particularly during two major wildfire events, the Basin Complex and the Indians Fire during the summer of 2008.

The movement and closures of some of the air monitoring stations played a part on how some analyses were done and on how much weight was given to their individual results. The monitoring times listed in Table 14 represent the stations only in their present locations. A few of the District's current stations were once located in nearby sites but had to be moved as the old sites became unsuitable for various reasons. Except for King City which moved three years ago, the stations have been at their present locations long enough to observe 10 years of ozone trends for comparison and to be able to run comparative analyses using 2006-2008 data. The Scotts Valley and Watsonville stations, while closed presently, did play a part in the analysis of the District's monitoring network since both stations were operating during the years used for the, removal bias, correlation matrix, and new sites analyses. Both stations were also included in the area served analysis, but were left unranked.

The results of the removal bias and correlation matrix analyses indicate that the current network consists of no redundant stations for both ozone and PM10. All of the stations appear to be monitoring separate and distinct air masses. For PM2.5, the Salinas and Santa Cruz stations are distinct from one another, but Hollister station could not be analyzed for that time period. The Hollister station however, is distinct from the other two stations in terms of ozone and PM10, and it is geographically separate by its presence in another valley, so it will be assumed at this time that PM2.5 at this site will also be distinct from the other two sites.

New Site analyses were performed for both ozone and PM10 monitors; however this tool was not yet available for PM2.5 monitors. These analyses indicated that the District is well covered at this time for both PM10 and ozone monitoring. Potential sites were indicated near the southern border of Monterey County, however the population in that area of Monterey is very low and scattered and maintaining a site there would be costly in terms of time and distance. There is currently no good practical reason to operate a station in that area. Future proposals for potential monitors will be discussed in upcoming annual network plans.

It is also to be noted that the District has switched from R&P FRM-2000 PM2.5 filter based instruments to FEM BAM-1020 continuous PM2.5 monitoring instruments at the start of 2010.

North Coast Unified
Air Quality Management District

Air Monitoring
Network Assessment and Plan -
2010

NCUAQMD
2300 Myrtle Ave
Eureka, Ca 95501

Table of Contents

Definition of Terms

AQS: Air Quality System
ARB: Air Resources Board
E-BAM: Emergency Beta-Attenuation Monitor
FEM: Federal Equivalency Method
FRM: Federal Reference Method
MSA: Micropolitian Statistical Area
NAAQS: National Ambient Air Quality Standards
NOAA: National Oceanographic and Atmospheric Administration
NCUAQMD: North Coast Unified Air Quality Management District
SIP: State Implementation Plan
SLAMS: State and Local Air Monitoring Site

Executive Summary

The District maintains a network of air pollution monitoring equipment throughout the North Coast. The network has developed slowly, beginning in 1986 with a solitary PM10 monitoring station. Currently there are four stations in operation, and a fifth location is expected to come on line the summer of 2010. This document combines the annual Network Plan with the Network Assessment Plan. The purpose is to provide a review of the current status of monitoring within NCUAQMD, and evaluate that network. Future plans for developing the network further are discussed in detail.

NCUAQMD is located in the far northwestern portion of California. It is comprised of three counties: Humboldt, Del Norte, and Trinity, which together cover 7,753 square miles. It is bordered on the west by the Pacific Ocean and extends from the Oregon Border south approximately 140 miles to the Mendocino County line. Eureka, the county seat of Humboldt County, is 284 miles north of San Francisco, 466 miles south of Portland, Oregon and on the coast of the Pacific Ocean. Inversions and diurnal offshore wind patterns are common. The area is made up of extremely complex terrain, from coastal wetlands to rugged mountains.

Major sources located in the Humboldt Bay region (Eureka, Arcata) include the Freshwater Pulp Mill, Fairhaven Power Plant, and PG&E's Humboldt Bay Power Plant. The first two sources are located on the Samoa Peninsula just east of Eureka. The PG&E plant is located just south of Eureka. Near the City of Arcata, a few miles north of Eureka, is the Humboldt Flake Board Plant, a particleboard manufacturing facility. Hambro Flake Board operates in Crescent City.

In addition to these Title 5 sources, NCUAQMD is impacted by mobile and large industrial sources. The District is also impacted by wood smoke in the winter and agricultural crop residue burning and wild fires in the summer.

The air monitoring network of the NCUAQMD has been thoroughly assessed. It has been found that all current monitoring instruments are needed and well located. The most pressing current needs for better monitoring are for continuous particulate matter instruments and an increased cash of EBAMS.

Network Plan

Overview of Network Operation

Network Design.

The North Coast Unified Air Quality Management District operated 4 monitoring sites in 2009. The following maps show the locations of the monitoring sites. Tables 1 and 2 list the pollutants measured at each site.

Table 1. List of Special Purpose Monitoring Sites

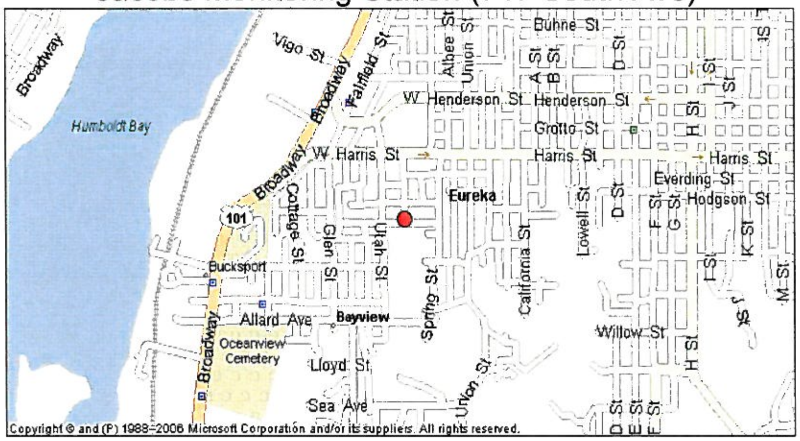
Site	Site Name	Pollutant Monitored
A	Jacobs	PM_{10}, $PM_{2.5}$, O_3, NO_2, CO, SO_2

Table 2. List of State and Local Air Monitoring Sites

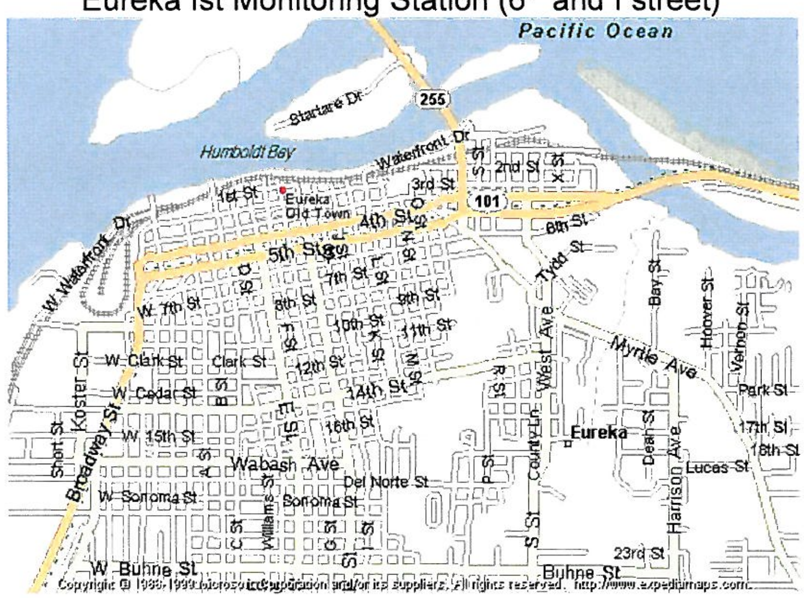
Site	Site Name	Pollutants Monitored
B	Eureka Ist	PM_{10}, $PM_{2.5}$
C	Weaverville	PM_{10}, $PM_{2.5}$
D	Crescent City	PM_{10}

Maps of Monitoring Station Locations

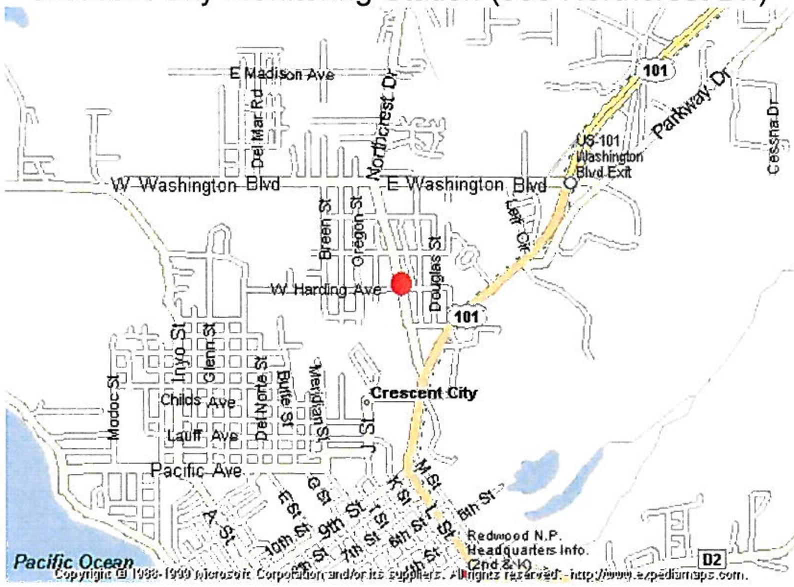
Jacobs Monitoring Station (717 South Ave)



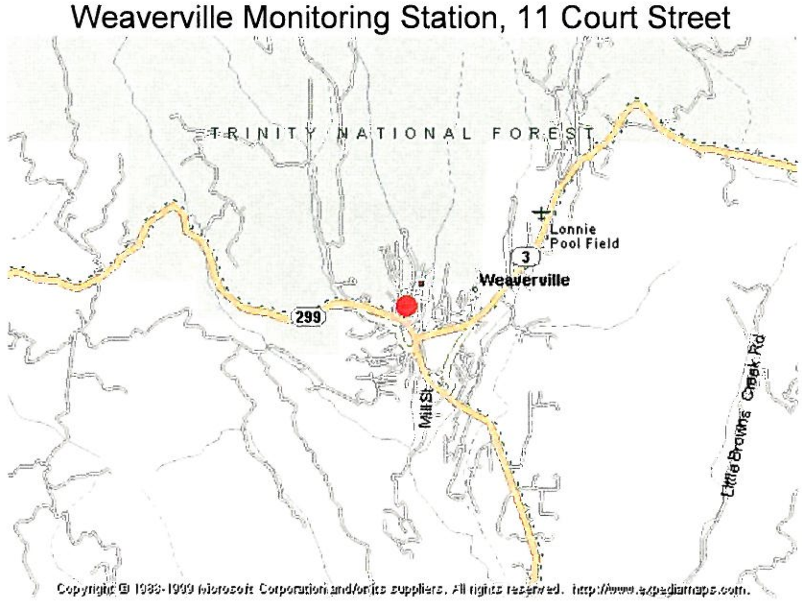
Eureka Ist Monitoring Station (6th and I street)



Crescent City Monitoring Station (880 Northcrest Dr.)



Weaverville Monitoring Station, 11 Court Street



Minimum Monitoring Requirements.

This network meets the minimum monitoring requirements for all criteria pollutants (Tables 3-9).

Ozone

Table 3. Minimum Monitoring Requirements for Ozone.

Micropolitian Statistical Area	County	Pop. In Year 2000	4th highest 8-hour max. (ppm) (2007-2009)	Monitors Required	Active Monitors	Monitors Needed
Eureka-Arcata-Fortuna	Humboldt	126,518	0.047	0	1	0
Crescent City	Del Norte	27,507	-	0	0	0
none	Trinity	13,022	-	0	0	0

No monitors are required for either a SIP or Maintenance Plan. The NCUAQMD monitors Ozone as an examination of population exposure levels.

PM 2.5

Table 4. Minimum Monitoring Requirements for $PM_{2.5}$.

Micropolitian Statistical Area	County	Pop. In Year 2000	Annual Design Value (*ug/m*^{3}) (2007-2009)	Daily Design Value (*ug/m*^{3}) (2007-2009)	Monitors Required	Monitors Active	Monitors Needed
Eureka, Arcata, Fortuna	Humboldt	126,518	I street 7.2	I street 23.6	0	2	0
			Jacobs 7.3	Jacobs 23.6			
Crescent City	Del Norte	27,507		-	0	0	0
none	Trinity	13,022		-	0	1	0

No monitors are required for either a SIP or Maintenance Plan. The NCUAQMD participates in the Federal Fine Particulates monitoring program by operating a sampler at the Eureka Ist station. The NCUAQMD monitors $PM_{2.5}$ at the Jacobs site monitoring station as an examination of population exposure. Both Humboldt County $PM_{2.5}$ monitors are FRMs suitable for national comparison. The NCUAQMD monitors $PM_{2.5}$ in Trinity County for an examination of population exposure. This monitor is not an FRM. It began operation in May 2009, thus to date it has not obtained enough data to calculate an annual design value, nor a daily design value.

PM 10

Table 5. Minimum Monitoring Requirements for PM_{10}.

Micropolitian Statistical Area	County	Population in Year 2000	Max Concentration (2007-2009) (ug/m^3)	Monitors Required	Monitors Active	Monitors Needed
Eureka, Arcata, Fortuna	Humboldt	126,518	I street 54	1	2	0
			Jacobs 61			
Crescent City	Del Norte	27,507	49	1	1	0
none	Trinity	13,022	301	1	1	0

NCUAQMD is non-attainment for the State PM_{10} standard. For our maintenance plan we are required by the State of California to operate a sampler in each of the three counties on a 1 in 6 schedule. NCUAQMD also operates a fourth sampler in Eureka, to examine population exposure more closely.

NO2

Table 6. Minimum Monitoring Requirements for NO_2.

Micropolitian Statistical Area	County	Pop. in Year 2000	Annual Design Value (ppm) (2007-2009)	Monitors Required	Active Monitors	Monitors Needed
Eureka-Arcata, Fortuna	Humboldt	126,518	0.0031	0	1	0
Crescent City	Del Norte	27,507	-	0	0	0
none	Trinity	13,022	-	0	0	0

No monitors are required for SIP or Maintenance Plans. NCUAQMD is not required to monitor NO_2. NCUAQMD monitors NO_2 at the Jacobs Station to examine population exposure.

SO2

Table 7. Minimum Monitoring Requirements for SO_2.

Micropolitian Statistical Area	County	Pop. in Year 2000	Annual Design Value (ppm) (2007-2009)	Max 24 hour (ppm) (2007-2009)	Max 3 hour (ppm) (2007-2009)	Monitors Required	Active Monitors	Monitors Needed
Eureka-Arcata, Fortuna	Humboldt	126,518	0.001	0.003	0.008	0	1	0
Crescent City	Del Norte	27,507	-	-		0	0	0
none	Trinity	13,022	-	-		0	0	0

No monitors are required for SIP or Maintenance Plans. The NCUAQMD is not required to monitor SO_2. NCUAQMD monitors SO_2 at the Jacobs Site Station to examine population exposure.

CO

Table 8. Minimum Monitoring Requirements for CO.

Micropolitian Statistical Area	County	Pop. in Year 2000	8-hour Design Value (ppm) (2007-2009)	1 hour. Design Value (2007-2009)	Monitors Required	Active Monitors	Monitors Needed
Eureka-Arcata-Fortuna	Humboldt	126,518	1.3	2.0	0	1	0
Crescent City	Del Norte	27,507	-	-	0	0	0
none	Trinity	13,022	-	-	0	0	0

No monitors are required for SIP or Maintenance Plans. The NCUAQMD is not required to monitor CO. NCUAQMD monitors CO at the Jacobs Site Station to examine population exposure.

Pb

Table 9. Minimum Monitoring Requirements for Pb.

MSA	County	Pop. In Year 2000	Annual Design Value (years)	Monitors Required	Active Monitors	Monitors Needed
Eureka, Arcata, Fortuna	Humboldt	126,518	-	0	0	0
Crescent City	Del Norte	27,507	-	0	0	0
none	Trinity	13,022	-	0	0	0

No monitors are required for SIP or Maintenance Plans. The NCUAQMD is not required to monitor Pb and does not do so.

Quality Control

All NCUAQMD ambient air monitoring meets stringent ARB Quality Control and Quality Assurance requirements. ARB audit records and site information for NCUAQMD can be found on the ARB website at http://www.arb.ca.gov/aaqm/qmosqual/qmosqual.htm. If you desire audit information, and do not have access to the web, please contact NCUAQMD directly at (707) 443-3093.

Recent or Proposed Modifications to Network

A new special purpose monitoring station located on Humboldt Hill, Eureka, is slated to begin operation during the summer of 2010. This station is designed to meet a permit requirement of the newly designed Pacific Gas and Electric plant, which is located at the foot of Humboldt Hill. The new station will monitor O3, NO2, SO2, CO, NH3, PM10, PM2.5, air toxics, wind direction, wind speed, temperature, pressure, and rH.

Review of Changes to PM2.5 Monitoring Network

The NCUAQMD has not changed the location of any violating PM2.5 monitor. Any changes to the NCUAQMD's PM2.5 network are reviewed by EPA Region 9's review process. NCUAQMD has never removed a PM2.5 monitor, and has added two monitors since the inception of its 2.5 monitoring program. If a violating PM2.5 monitor ever needed to be moved, we would use the annual network plan inspection/comment process to provide for the review of this change.

Data Submission Requirements

Precision/Accuracy reports are submitted to the ARB no later than 60 days after the quarter of record. The ARB uploads NCUAQMD data to AQS no later than 90 days after the quarter of record. The ARB submits the annual data certification no later than May each year.

Data Availability

NCUAQMD air quality data is available on the National Air Quality System (AQS) database. It can also be obtained directly from NCUAQMD, in the form of monthly or yearly reports. Please contact NCUAQMD at 707-443-3093 to request copies of these reports.

Detailed Site Information

Site Name: Jacobs

The Jacobs site was established in December of 2006 it is located on the South side of Eureka and is expected to represent neighborhood scale air quality.

Site Name	Jacobs					
AQS ID	060231004					
GIS coordinates	103.91015E 4514.83731N WGS84					
Location	Alice Birney Elementary School					
Address	717 South Ave, Eureka					
County	Humboldt					
Dist. to road	50 meters					
Traffic count	3100 AADT					
Groundcover	grass					
PEP audit?	Information maintained by EPA					
NPAP audit?	Information maintained by EPA					
Flow audit?	Performed monthly					
Representative Area	Humboldt County Micropolitian Statistical Area, Eureka-Arcata-Fortuna, suburban					
Pollutant	O3	NO2	CO	SO2	PM2.5	PM10
Monitor objective	Typical Concentration	Typical Concentration	Typical Concentration	Typical Concentration	Typical Concentration	Typical Concentration
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Sampling method	Photometric EQOA-0880-047	Chemiluminescence RFNA-1289-074	Gas Filter correlation RFCA-0981-054	Pulsed Florescence EQSA-0486-060	Low Volume RFPS-0498-117	High Volume RFPS-1287-063
Analysis method	N/A	N/A	N/A	N/A	Weighed by BAAQMD	Weighed by NCUAQMD
Start date	Dec 15, 2006	Dec 15, 2006	Dec 15, 2006	Dec 15, 2006	Dec 25, 2006	Dec 15, 2006
Operation schedule	continuous	continuous	continuous	continuous	1:3 Oct-Mar 1:6 Apr-Sept	1:3 Oct-Mar 1:6 Apr-Sept
Sampling season	Year round	Year round	Year round	Year round	Year round	Year round
Probe height	4.5 meters	4.5 meters	4.5 meters	4.5 meters	N/A	N/A
Distance from supporting structure	1.9 meters	1.9 meters	1.9 meters	1.9 meters	N/A	N/A
Distance from obstructions on roof	N/A	N/A	N/A	N/A	N/A	N/A
Distance from obstructions not on roof	19 meters	19 meters	19 meters	19 meters	19 meters	19 meters
Distance from trees	15 meters	15 meters	15 meters	15 meters	15 meters	17 meters

Pollutant	O3	NO2	CO	SO2	PM2.5	PM10
Distance to furnace or incinerator flue	N/A	N/A	N/A	N/A	N/A	N/A
Distance between collocated monitors	N/A	N/A	N/A	N/A	N/A	N/A
Unrestricted airflow	360 degrees	360 degrees	360 degrees	360 degrees	360 degrees	360 degrees
Probe material	Teflon	Teflon	Teflon	Teflon	N/A	N/A
Residence time	9.6 seconds	9.6 seconds	5.5 seconds	11.4 seconds	N/A	N/A
Will there be changes within the next 18 months?	No	No	No	No	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	N/A	Yes	N/A

Site Name: Eureka I Street

The Ist site was established in 1986. It is located downtown Eureka near HWY 101 and is expected to represent neighborhood scale air quality.

Site Name	Eureka Ist			
AQS ID	060231002			
GIS coordinates	103.92619E 4517.39332N WGS84			
Location	Humboldt County Health Department			
Address	529 Ist, Eureka			
County	Humboldt			
Dist. to road	9 meters to 6th St, 30 meters to 5th St.			
Traffic count	6th street has ADT of 8,000 , 5th street has ADT of 37,000			
Groundcover	Paved			
PEP audit?	Information maintained by EPA			
NPAP audit?	Information maintained by EPA			
Flow audit?	monthly			
Representative Area	Humboldt County Micropolitian Statistical Area, Eureka-Arcata-Fortuna, Urban			
Pollutant	PM2.5	PM10		
Monitor objective	Typical Concentration	Typical Concentration		
Spatial scale	Neighborhood	Neighborhood		
Sampling method	Low Volume RFPS-0498-117	High Volume RFPS-1287-063		
Analysis method	Weighed by BAAQMD	Weighed by NCUAQMD		
Start date	Jan 1999	Nov 1986		
Operation schedule	1:3 Oct-Mar 1:6 Apr-Sept	1:3 Oct-Mar 1:6 Apr-Sept		
Sampling season	Year round	Year round		
Probe height	6 meters	6 meters		
Distance from supporting structure	2 meters	2 meters		
Distance from obstructions on roof	5 meters	5.5 meters		
Distance from obstructions not on roof	25 meters	25 meters		
Distance from trees below probe height	6.5 meters	4.6 meters		
Distance to furnace or incinerator flue	5 meters	5 meters		
Distance between collocated monitors	N/A	N/A		
Unrestricted airflow	270 degrees	270 degrees		
Probe material	N/A	N/A		
Residence time	N/A	N/A		
Will there be changes within the next 18 months?	No	No		
Is it suitable for comparison against the annual PM2.5?	Yes	N/A		

Site Name: Weaverville

The Weaverville site was established in 1995. It is located downtown Weaverville near HWY 299 and is expected to represent neighborhood scale air quality.

Site Name	Weaverville	
AQS ID	061050002	
GIS coordinates	104.95617E 4509.31330N WGS84	
Location	Trinity County Courthouse	
Address	11 Court Street, Weaverville	
County	Trinity	
Dist. to road	7 meters to side road, 21 meters to highway 299	
Traffic count	1408 AADT for Garden Gulch, 2003 data; 2950AADT for HWY 299, 2006 data	
Groundcover	Paved	
PEP audit?	Information maintained by EPA	
NPAP audit?	Information maintained by EPA	
Flow audit?	Bi-monthly	
Representative Area	Rural, no MSA in Trinity County	
Pollutant	PM2.5	PM10
Monitor objective	Typical Concentration	Typical Concentration
Spatial scale	Neighborhood	Neighborhood
Sampling method	BAM1020, non FEM	High Volume RFPS-1287-063
Analysis method	BAM1020	Weighted by NCUAQMD
Start date	May 2009	Jan 1995
Operation schedule	Continuous	1:3 Oct-Mar 1:6 Apr-Sept
Sampling season	Year round	All year
Probe height	9.4 meters	7 meters
Distance from supporting structure	3 meters	1.5 meters
Distance from obstructions on roof	10 meters	7 meters
Distance from obstructions not on roof	20 meters	20 meters
Distance from trees	15 meters	15 meters
Distance to furnace or incinerator flue	N/A	N/A
Distance between collocated monitors	N/A	N/A
Unrestricted airflow	270 degrees	270 degrees
Probe material	N/A	N/A
Residence time	N/A	N/A
Will there be changes within the next 18 months?	No	No
Is it suitable for comparison against the annual PM2.5?	No	N/A

Site Name: Crescent City

The Crescent City site was established in 1998. It is located at the Del Norte County Health Department near HWY 101 and is expected to represent neighborhood scale air quality.

Site Name	Crescent City
AQS ID	060150006
GIS coordinates	103.90908E 4624.31858N WGS84
Location	Del Norte County Health Department
Address	880 Northcrest Dr
County	Del Norte
Dist. to road	600 meters to HWY 101 200 meters to Northcrest
Traffic count	39,000 ADT HWY101 8,222 ADT Northcrest
Groundcover	Paved/grass
PEP audit?	Information maintained by EPA
NPAP audit?	Information maintained by EPA
Flow audit?	monthly
Representative Area	Del Norte County, Micropolitian Statistical Area, Crescent City Urban
Pollutant	PM10
Monitor objective	Typical Concentration
Spatial scale	Neighborhood
Sampling method	High Volume RFPS-1287-063
Analysis method	Weighed by NCUAQMD
Start date	Mar-1998
Operation schedule	1:6
Sampling season	Year round
Probe height	5.5 meters
Distance from supporting structure	1.5 meters
Distance from obstructions on roof	N/A
Distance from obstructions not on roof	N/A
Distance from trees	90 meters
Distance to furnace or incinerator flue	N/A
Distance between collocated monitors	N/A
Unrestricted airflow	360 degrees
Probe material	N/A
Residence time	N/A
Will there be changes within the next 18 months?	No
Is it suitable for comparison against the annual PM2.5?	N/A

Network Assessment

Monitoring Objectives

The monitoring objectives of the North Coast Unified Management District are the same as those found in the Code of Federal Regulations, part 58, appendix D: 1) To determine the highest concentrations expected to occur in the area covered by the network 2) To determine representative concentrations in areas of high population density 3) To determine the impact on ambient pollution levels of significant sources or source categories 4)To determine background concentration levels 5) To determine extent of regional pollution transport among populated area, and in support of secondary standards and 6) To determine welfare-related impacts in more rural and remote areas- such as visibility impairment and effects on vegetation. The domain of responsibility of the NCUAQMD is the three counties which make up the northern portion of the North Coast Air Basin. These objectives are met to the greatest extent allowed by the size and funding of the NCUAQMD agency.

The number of pollutants monitored has increased from 4 in 2005, to 12 in 2010. In 2011, it is expected that NCUAQMD will monitor for over 20 pollutants. This increase in monitoring is directly related to the Districts goal of meeting all objectives listed in CFR part 58.

Monitoring Efficiency

The primary users of the monitoring data are the NCUAQMD itself, users of the ARB ADAM database, users of the EPA Air Quality System, and the County Health Departments of Humboldt, Trinity, and Del Norte Counties. The monitoring data becomes particularly important to the Health departments during times of wildfire. NCUAQMD data has been used to substantiate Health related Federal Declarations of Emergency in both Humboldt and Trinity Counties. These are the only counties within California that have declared emergencies based on air quality data.

The District compares its monitoring data the Federal Ambient Air Quality Standards, and the California State Ambient Air Quality Standards. The California AAQSs are listed in the table below:

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1] Concentration [3]	California Standards [1] Method [4]	Federal Standards [2] Primary [3,5]	Federal Standards [2] Secondary [3,6]	Federal Standards [2] Method [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m³)		0.075 ppm (147 µg/m³)		
Respirable Particulate Matter (PM10)	24 Hour	50 µg/m³	Gravimetric or Beta Attenuation	150 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m³		—		
Fine Particulate Matter (PM2.5)	24 Hour	No Separate State Standard		35 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m³	Gravimetric or Beta Attenuation	15.0 µg/m³		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10 mg/m³)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m³)	None	Non-Dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m³)		35 ppm (40 mg/m³)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m³)		—	—	—
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (57 µg/m3)	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m³)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.18 ppm (339 µg/m³)		0.100 ppm (see footnote 8)	None	
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	—	Ultraviolet Fluorescence	0.030 ppm (80 µg/m³)	—	Spectrophotometry (Pararosaniline Method)
	24 Hour	0.04 ppm (105 µg/m³)		0.14 ppm (365 µg/m³)	—	
	3 Hour	—		—	0.5 ppm (1300 µg/m³)	
	1 Hour	0.25 ppm (655 µg/m³)		—	—	—
Lead [8]	30 Day Average	1.5 µg/m³	Atomic Absorption	—	—	—
	Calendar Quarter	—		1.5 µg/m³	Same as Primary Standard	High Volume Sampler and Atomic Absorption
	Rolling 3-Month Average [10]	—		0.15 µg/m³		
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer — visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		No Federal Standards		
Sulfates	24 Hour	25 µg/m³	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride [9]	24 Hour	0.01 ppm (26 µg/m³)	Gas Chromatography			

See footnotes on next page ...

For more information please call ARB-PIO at (916) 322-2990

California Air Resources Board (02/16/10)

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM10, PM2.5, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.
Contact U.S. EPA for further clarification and current federal policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
7. Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.
8. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).
9. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
10. National lead standard, rolling 3-month average: final rule signed October 15, 2008.
For more information please call ARB-PIO at (916) 322-2990 California Air Resources Board (02/16/10)

Station Assessment

NCUAQMD operates four monitoring stations. These stations have been summarized in the Network Plan. Assessments of each individual station follow:

Jacobs

This is the only gaseous monitoring station within the NCUAQMD. It measures 6 pollutants. It also has a meteorological station.
PM10: During 2007-2009 conditions exceeded the state standard two times. The highest concentration recorded in that time was 61 ug/m^3.
PM2.5 During 2007-2009, conditions did not exceed the federal standard. The highest concentration recorded in that time was 29.1 ug/m^3.
CO: From 2007-2009, CA AAQSs have not been exceeded.
O3: From 2007-2009, CA AAQSs have not been exceeded.
NOX From 2007-2009, CA AAQSs have not been exceeded.
SO2: From 2007-2009, CA AAQSs have not been exceeded.
This station is used to: establish regulatory compliance, complete emission reduction evaluations, monitor air quality impacts of an emission source, and perform accountability and performance measurements. It is valuable both because of its location downwind of several title five sources, and because it is a full station, allowing for a comparison of the various pollutants at a single location. This station is needed for geographical and population representation. It sample particulates, as does the nearby Eureka Ist location. It consistently measures slightly lower PM levels than does Eureka Ist.

Eureka I Street

Eureka Ist samples two pollutants.
PM10: During 2007-2009 conditions exceeded the state standard two times. The highest concentration recorded in that time was 54 ug/m^3
PM2.5 During 2007-2009, conditions did not exceed the federal standard. The highest concentration recorded in that time was 33.8 ug/m^3.
This station is needed for geographical and population representation, and because of the exceedances of the 24-hr stds for PM10 and PM2.5 This station represents conditions in a large part of the northern half of the North Coast Air Basin. Eureka's population exceeds 26,000 (U.S. Census, 2000). It is used to: establish regulatory compliance, complete emission reduction evaluations, perform trend tracking, historical consistency comparisons and accountability/performance measurements.

Weaverville

The Weaverville Courthouse site is the only monitoring site in Trinity County. It monitors two pollutants:
PM10: During 2007-2009 conditions exceeded the state standard 14 times. The highest concentration recorded in that time was 301.
PM2.5: PM2.5 is measured with a non-FEM continuous method. Data from this unit will be reported in next year's Network Plan.
This station is used to: establish regulatory compliance, complete emission reduction evaluations, and to perform accountability and performance measurements. The station is needed for geographical representation and due to the exceedances of the state 24 hr PM10 std.

Crescent City

The Crescent City Northcrest Drive site is the only monitoring site in Del Norte County. PM10 is the only pollutant monitored.
PM10: During 2007-2009 conditions exceeded the state standard one time. The highest concentration recorded in that time was 49.
This station represents conditions in a large part of the northwestern portion of the North Coast Air Basin. The PM10 monitor is needed for geographical representation. It is used to establish regulatory compliance, evaluate emission reductions, track trends, and assess the effects of air pollution control programs.

Humboldt Hill

This will be a full monitoring station, and is expected to go on line in the summer of 2010. Its primary function is to monitor the air quality impacts of an emission source. It will be located within ten miles of the Jacobs station, however, due to meteorological conditions; the Jacobs station is not suitable to monitor the emissions from this facility. The Humboldt Hill Station will largely employ instruments of the same manufacturer as used at the Jacobs station. This choice will decrease District training and spare part needs.

Mobile Units

NCUAQMD owns one E-BAM. This unit is used primarily during wildfire season. It is also used to investigate air quality complaints. Data from the unit has been used for air quality model evaluation, public reporting of AQI, and air quality impacts of an emission source. While this unit is not FEM, it has proved extremely valuable in assisting NCUAQMD to prepare public service announcements during wildfires.

Conclusions

All monitoring stations are recommended to continue at their current level. All stations are required due to geographical need, or number of parameters measured. Monitoring objectives have been met to the greatest extent allowed by the size and funding of the NCUAQMD agency. The highest pollutant concentrations populations are exposed to are expected to be discovered at the stations. The impact on ambient pollution levels of significant sources or source categories is measured by monitoring downwind of significant contributors of pollution. Background concentration levels are not obtained by the network, due to the existence of major sources prior to the beginning of monitoring, and limitations on monitoring funding. However, a NOAA Observatory is located within the District, which can be leveraged to obtain background levels for some pollutants. The determination of regional pollution transport among populated areas, and in support of secondary standards is beyond current funding constraints upon the District. The District owns one EBAM, and monitoring data from that unit has been used to establish welfare-related impacts in rural and remote areas.

Transition to continuous methods for particulate matter is the highest priority in the NCUAQMD network monitoring plan. This is both to obtain more complete monitoring data, and to reduce costs. The Trinity county location has a continuous PM2.5 measuring system, however it is not FEM. It is hoped to replace the aging unit with an approved continuous FEM as soon as budget constraints will allow. It is further hoped to transition to a continuous PM10 measurement system at this location. The instrument of choice for these conversions can measure both PM2.5 and PM10 simultaneously, thus requiring only one instrument. The technology used for this continuous method is relatively new. The instrument is currently in the process of obtaining 2.5 FEM status (application number 10-096-15). However, the PM10 portion of this instrument is not FEM. It will not go through the FEM approval process for PM10 because it does not have the required 16.7 lpm flow rate. Due to decreased interest by the EPA in PM10, flow requirements for the PM10 approved methods will not be re-evaluated. Because of the reduced interest in PM10, and District interest in having an instrument which does not require frequent service, it is being considered to institute this non-FEM method for continuous PM10 in Weaverville

The Del Norte County location is hoped to institute a continuous FEM PM10 monitor in Crescent City. It is planned to move the existing FEM PM10 continuous monitor from its current location in Weaverville, to Crescent City. (It is currently used as a non-FEM PM2.5 unit). The Eureka Ist station is planned to be maintained as a filter based sampling location, to allow for historical comparisons of data, using a consistent method. The proximity of this station to the NCUAQMD office will not make this a burden on staff time.

If funding allows, the NCUAQMD is interested in transitioning the filter based FRM PM methods to FEM continuous methods at the Jacobs location. This would result in a savings of staff time, and filter analysis costs. The shelter already exists, so the cost to transition would only be for the instrument itself, rather than associated paraphernalia.

The outcome of this transition would be that the network would have both continuous and filter based PM methodology in place in Eureka.

NCUAQMD would like to increase its arsenal of EBAMs. The District lies in an area prone to severe wildfire. NCUAQMD has needed to call on the California Air Resources Board and the California State Forest Service for assistance during every significant wildfire it has experienced. During the wildfires of 2008, the ARB and Forest Service had deployed 7 EBAMs within the district. The overall cost to the state for the ARB and the Forest Service to deploy assistance is far greater than the cost would be for the NCUAQMD to maintain its own EBAMs. NCUAQMD is actively seeking funding for EBAM purchases.

The Executive Office of the North Coast Unified Air Quality Management District hereby approves the "Air Monitoring Network Assessment and Plan for 2010" and direct staff to begin implementation effective immediately.

Richard Martin

Mr. Richard L. Martin Jr

7/6/10

date

Network Assessment

of the

Santa Barbara Air Pollution Control District

Ambient Air Monitoring Network

July 1, 2010

Prepared by the

Santa Barbara County

Air Pollution Control District

Network Assessment of the Santa Barbara Air Pollution Control District Ambient Air Monitoring Network

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1.0 Introduction

This report was prepared by the Santa Barbara County Air Pollution Control District (SBCAPCD) as an assessment of the air quality surveillance system in Santa Barbara County. Title 40, Part 58, Section 10 of the Code of Federal Regulations (40 CFR 58.10) requires that an assessment be performed every 5 years to determine if the network meets the monitoring objectives of this title. There are three basic monitoring objectives:

1. Provide air pollution data to the general public in a timely manner.
2. Support compliance with ambient air quality standards and emissions strategy development.
3. Support for air pollution research studies.

The assessment is also required to help determine if new sites are needed or existing sites can be terminated and whether new technologies are appropriate for incorporation into the ambient air monitoring network.

This is the first assessment of the Santa Barbara County Air monitoring network.

2.0 Santa Barbara County Setting

Santa Barbara County is located on the Pacific coast of California bordered to the north by San Luis Obispo County and to the east by Ventura County. The Pacific Ocean forms the west and southern borders of the county. The Santa Ynez mountain range, which runs east/west parallel to the southern coast of the county is one of the predominate land features of the county which serves as a dividing feature between the northern and southern portions of the county.

Local air quality is highly dependent upon the climate and meteorology of the area because meteorological conditions control the transport and diffusion of emitted pollutants. Climate is a long term average of daily and seasonal weather conditions while meteorology deals with the day by day and hour by hour specific weather conditions. Understanding the climate of Santa Barbara County helps to explain annual cycles of local air quality. Understanding the meteorology of Santa Barbara County helps to explain shorter term variations in local air quality.

2.1 Climate of Santa Barbara County

Santa Barbara County has a Mediterranean climate characterized by warm, dry summers, and cooler, relatively damp winters. Mild temperatures occur throughout the year, particularly near the coastline. Maximum summer temperatures average 70 degrees Fahrenheit near the coast and in the high 80s to low 90s inland. During winter, average minimum temperatures range from the 40s along the coast to the 30s inland.

The climate of Santa Barbara is strongly influenced by a persistent high pressure area which lies off the Pacific Coast. As a result, sunny skies are common throughout most of the area. Rain storms periodically occur, mostly from October to April. Annual rainfall amounts range from 10 to 18 inches along the coast, with more substantial amounts in the higher elevations. On occasion, tropical air masses produce rainfall during the summer months.

Cool, humid, marine air causes frequent fog and low clouds along the coast, generally during the night and morning hours in the late spring and early summer months. The fog and low clouds can persist for several days at a time until broken up by a change in the weather pattern.

2.2 Meteorology of Santa Barbara County

Meteorology deals with shorter time periods and smaller spatial scales than climate. Understanding the interaction between local meteorology and emitted pollutants is essential in understanding how elevated levels of pollutants can occur in the atmosphere. This relationship between local meteorology and elevated pollutant levels is necessary in evaluating the design of an ambient air monitoring network.

2.2.1 Surface Winds

The airflow around the county plays an important role in the movement of pollutants. In northern Santa Barbara County (north of the ridgeline of the Santa Ynez Mountains), the sea breeze (from sea to land) is typically northwesterly throughout the year. During summer months, these northwesterly winds are stronger and persist later into the night. At night, the sea breeze dies, and as air adjacent to the surface cools, it descends down the coastal mountain and mountain valleys resulting in light land breezes (from land to sea). This land/sea breeze cycle combined with local topography greatly influence the direction and speed of the winds throughout the county. In addition, the alternation of the land-sea breeze cycle can sometimes produce a "sloshing" effect, where pollutants are swept offshore at night and subsequently carried back onshore during the day. This effect is exacerbated during periods when wind speeds are low.

Topography plays another role in wind patterns experienced in the county. The terrain around Point Conception, combined with the change in orientation of the coastline from north-south north of Pt. Conception to east-west south of Pt. Conception can cause counter-clockwise circulations (eddies) to form east of the Point. These eddies fluctuate from time-to-time and place-to-place often leading to highly variable winds along the southern coastal strip. Point Conception also marks the change in the prevailing surface winds from northwesterly north of Pt. Conception to southwesterly south of Pt. Conception.

Another type of wind regime that influences air quality in Santa Barbara is the "Santa Ana" wind condition. Santa Ana winds are dry northeasterly winds that occur primarily during the fall and winter months. These are warm, dry winds which descend down the slopes of a mountain range. Wind speeds associated with Santa Ana are generally 15-20 mph, though they can reach speeds in excess of 60 mph. During Santa Ana conditions, pollutants emitted in Santa Barbara, Ventura County, and the South Coast Air Basin (the Los Angeles region) are moved out to sea. These pollutants can then be moved back onshore into Santa Barbara County (via the Santa Barbara Channel) in what is called a "post Santa Ana condition." The effects of the post Santa Ana can be experienced throughout the county. However, not all post Santa Ana conditions lead to high pollutant concentrations.

2.2.2 Upper Level Wind and Temperature

Upper-level winds in the atmosphere are also critical to the air quality of Santa Barbara County. The winds at 1,000 feet and 3,000 feet are generally from the north or northwest throughout the year. Occurrences of southerly and easterly winds are most frequent in winter, especially in the morning. Upper-level winds from the southeast are infrequent during the summer months, though they are usually associated with periods of high ozone levels. As with the surface winds, upper level winds can move pollutants that originate in other areas into the county.

Another factor that affects the concentrations of pollutants in the air is the stability of the atmosphere. Atmospheric stability regulates the amount of air exchange (referred to as mixing) both horizontally and vertically. Restricted mixing (a high degree of stability) and low wind speeds are generally associated with higher pollutant concentrations. These conditions are typically related to temperature inversions (temperature increase with height) which cap the pollutants that are emitted below or within them.

Surface inversions (0-500 ft), as measured at Vandenberg Air Force Base, are most frequent during the winter, and subsidence inversions (1000-2000 ft) are most frequent during the summer. Generally, the lower the inversion base height and the greater the rate of temperature increase from the base to the top, the more pronounced effect the inversion will have on inhibiting dispersion. The subsidence inversion is very common along the California coast and is one of the principle causes of air stagnation.

Poor air quality is often associated with "air stagnation" (high stability/restricted air movement). Therefore, it is reasonable to expect a higher frequency of pollution events in the southern portion of the county where light winds are frequently observed, as opposed to the North County where the prevailing winds are strong and persistent.

2.3 Santa Barbara County Population Distribution

The 2010 population of Santa Barbara County is estimated to be 430,200 according to the report “Regional Growth Forecast 2005 – 2040” produced by the Santa Barbara County Association of Governments (SBCAG) in August 2007. This is a 7.7 percent increase from the year 2000 Census count of 399,347. SBCAG also forecast the population to be 444,900 in the year 2015, a 3.4 percent growth in the next five years.

The population is concentrated in the areas surrounding the cities of the south coast, Lompoc, Santa Maria, and Santa Ynez/Solvang. The remaining areas of the county are very scarcely populated, especially the large area of National Forest in the northeastern area of the county. Most of the forecasted growth in the next five years is predicted to occur in the north county: Buellton and Santa Maria. The Goleta valley area of the south coast is also predicted to see significant population growth.

3.0 Air Monitoring Network

The SBCAPCD and the California Air Resources Board (CARB) began monitoring air quality within the populated urban areas of Santa Barbara County in the early to mid-1970's, as required under the 1970 federal Clean Air Act. Between the mid-1970's and the mid-1980's, the number and location of monitoring stations did not change. No new large industrial sources of air pollution were permitted in the county during this period.

A number of changes occurred in the early to mid-1980's which resulted in an expansion of the monitoring network. First, Santa Barbara County adopted its New Source Review/Prevention of Significant Deterioration Rule, as required by the federal Clean Air Act Amendments of 1977, Part D. This rule guides all aspects of the SBCAPCD's air quality permitting program and includes federal requirements for air monitoring.

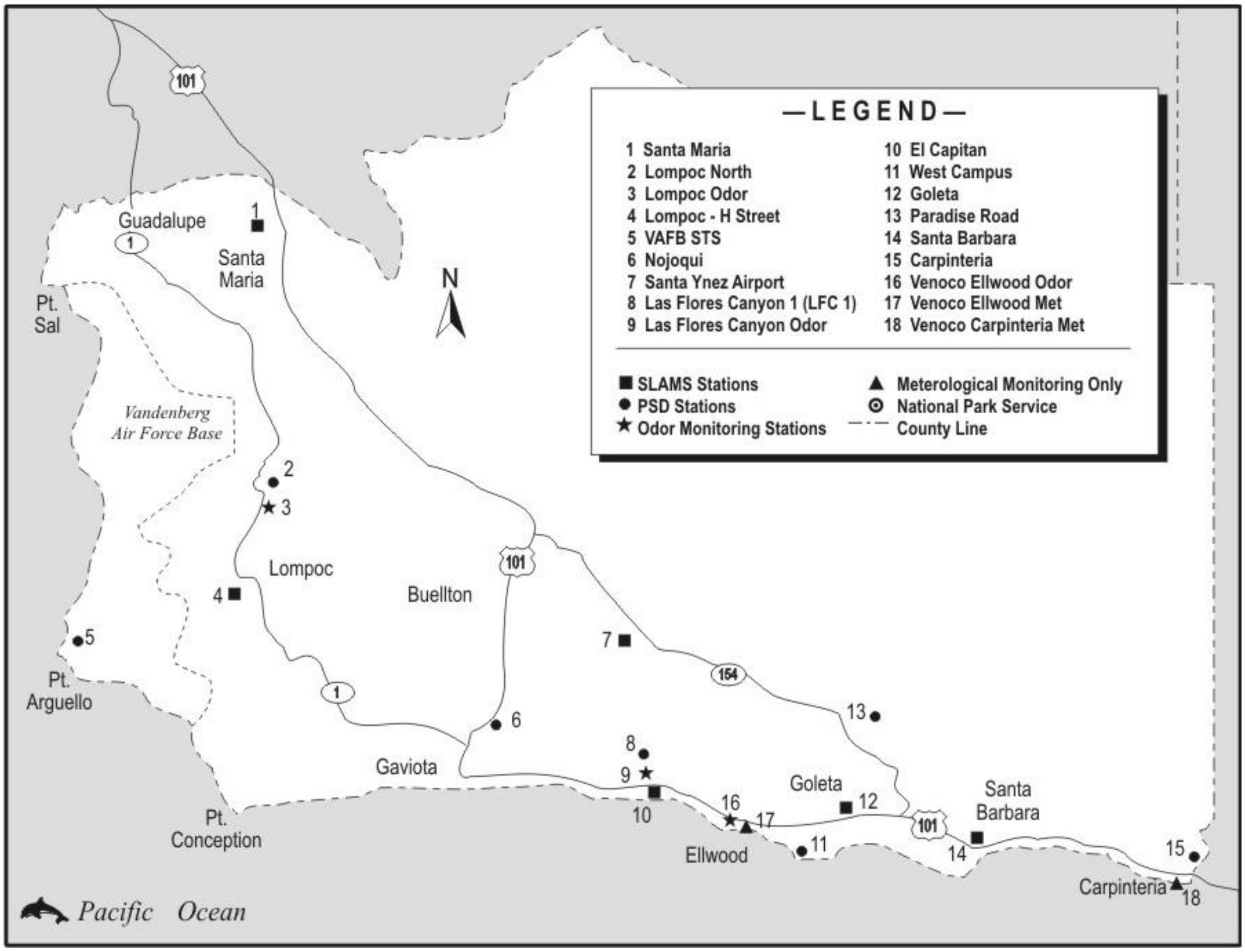
At the same time, a number of oil companies requested development permits from the County and the SBCAPCD for major onshore industrial facilities associated with large-scale offshore oil development projects. This triggered monitoring requirements as part of the Prevention of Significant Deterioration (PSD) program which requires major industrial pollution sources to conduct air monitoring for various purposes. Prior to constructing the facilities, air monitoring is used to determine baseline conditions and to provide input to computer models used to estimate air quality impacts. After construction, air monitoring is used to determine the impacts that facility operations may have on overall air quality and to validate the assumptions used for issuing the permit. The primary purpose of all these requirements is to protect public health and welfare.

The next change came in the early 1990s when these major facilities were at peak operational capacity and reducing operations. The sites operating under the PSD program were evaluated and a number of them were allowed to shut down because there was enough data to characterize the emissions around the facilities.

Currently, there are 18 ambient air quality monitoring stations in operation within Santa Barbara County (Figure 3.1). The network consists of state and local air monitoring stations (SLAMS) and special purpose monitors (SPM). The sites are operated by the SBCAPCD, CARB or private contractors. The SPMs can be subdivided into PSD monitors (source specific monitors and regional air quality monitors), research, and safety monitors

Figure 3.1

2009 Santa Barbara County Air Quality Monitoring Stations



The SLAMS sites were set up to monitor air quality in populated urban areas. The PSD stations monitor local impacts of specific industrial facilities. Regional PSD stations were also established to monitor cumulative impacts of large facilities on regional air quality in the county. A particular monitoring station can serve a dual purpose when its location satisfies the objectives of more than one classification, or for more than one facility. Many of the county's large industrial facilities, however, are located in areas of complex topography with complex meteorological conditions, for example, in separate canyons along the coast between Goleta and Gaviota, limiting the ability of a single station to represent multiple facilities.

3.1 SLAMS Sites

There are six SLAMS monitoring stations in operation within Santa Barbara County. They are located in Santa Barbara, Goleta, Lompoc, Santa Maria, El Capitan State Park, and at the Santa Ynez Airport. The CARB operates the downtown Santa Barbara and Santa Maria stations, while the SBCAPCD is responsible for the operation of the remaining sites. These sites have been operating in these areas since the late 70's or early 80's which have provided long term air quality trend data.

3.2 PSD Monitoring Sites

There are seven PSD sites which are set up to measure maximum pollutant concentrations, regional air quality, background levels or transport emissions. All of these sites are required to be operated by various permit to operate conditions.

The Paradise Road site is located downwind of the populated areas of northern Santa Barbara County. It is sited to measure the maximum ozone levels of the county. Las Flores Canyon site 1 (LFC1) is located in the foothills on the south side of the Santa Ynez Mountains and records maximum ozone levels in the southern section of the county.

Two sites were setup to measure the impacts from transport. Carpinteria is located in the southeastern portion of the county which measures transported pollutants from the Los Angeles basin. Nojoqui is located at the top of the Gaviota pass and is designed to measure the transport of pollutants between northern and southern portions of the county.

LFC1, Lompoc HS&P, and VAFB are three which serve dual purposes. They are sited downwind of major facilities to measure the impacts of those facilities on the local environment. However, ozone is also measured at these sites as part of the regional ozone monitoring network.

The West Campus site is set up to measure the impacts from oil storage tanks and barge loading/unloading activities. The data from this site is also used by UCSB researchers for various studies.

3.3 Odor Sites

There are three sites set up to measure odorous compounds which could potentially be emitted from certain oil and gas facilities. These sites typically measure hydrogen sulfide, and total reduced sulfur, wind and temperature. These three sites are LFC

Odor, Elllwood Odor, and Lompoc Odor. These sites are required by permit to operate conditions for these facilities.

3.4 Meteorological Sites

Two sites are set up specifically for monitoring meteorological conditions. These two sites are Venoco Ellwood Met and Venoco Carpinteria Met. These sites measure wind speed, wind direction and temperature. The data from these sites are used to characterize where emissions from these facilities will be dispersed.

4.0 Pollutants Monitored

EPA has established as set of air quality standards known as the National Ambient Air Quality Standards or NAAQS. The standards were established to protect human health and welfare. They include: ozone, nitrogen dioxide, sulfur dioxide, carbon monoxide, particulate less than 10 microns and particulate less than 2.5 microns. The SBCAPCD monitors these pollutants at a number of locations to determine if we meet the standards. Other pollutants are also monitored in the county. Some are monitored for state air quality standards, some for safety and others for research. These pollutants include: hydrogen sulfide, total reduced sulfur, and total hydrocarbons. Wind speed/direction and temperature are also measured at each site to help characterize the source of the measured pollutants. This report is only evaluating the pollutants measured for comparison with the NAAQS.

4.1 Ozone Monitors

Ozone is monitored at twelve locations in the county. Santa Barbara, Goleta, Lompoc H Street, Santa Maria, Santa Ynez are located in the major populated areas of the county for population exposure. Paradise Road, LFC1, Lompoc HS&P, Nojoqui, Carpinteria, VAFBSTS and El Capitan were sited as part of a regional network. Paradise Road and LFC1 have consistently measured the highest concentrations of ozone in the county. Paradise Road is north of the Santa Ynez mountain range and represents air in the north county while LFC1 is south of the Santa Ynez mountain range and is representative of the foothill region of the south county.

Summary statistics were compiled for these sites and summarized in Table 4.1. The fourth highest eight hour ozone value was determined for each year from 2007 through 2009. These fourth highest values were averaged for each site and compared with the NAAQS standard of 0.075 ppm. The sites were ranked based on the percent of the standard.

Table 4.1
Ozone Summary

AQS #	STREET_ADDRESS	2007 4th Max ppm	2008 4th Max ppm	2009 4th Max ppm	3 year Average ppm	% of Std 0.075 ppm	Rank
06-083-1025	Las Flores Canyon #1	0.078	0.07	0.083	0.077	103	1
06-083-1014	Paradise Road	0.077	0.068	0.071	0.072	96	2
06-083-1021	Carpinteria	0.066	0.072	0.079	0.072	96	3
06-083-1013	Lompoc HS&P	0.066	0.067	0.064	0.065	87	4
06-083-3001	Santa Ynez Airport	0.063	0.067	0.064	0.064	85	6
06-083-4003	VAFB STS	0.069	0.065	0.059	0.064	85	5
06-083-0011	Santa Barbara	0.063	0.062	0.058	0.061	81	7
06-083-0008	El Capitan	0.057	0.066	0.058	0.060	80	8
06-083-2011	Goleta	0.057	0.062	0.059	0.059	79	9
06-083-1018	Nojoqui	0.055	0.056	0.06	0.057	76	10
06-083-2004	Lompoc H Street	0.056	0.062	0.055	0.057	76	11
06-083-1008	Santa Maria	0.048	0.056	0.055	0.053	71	12

LFC1 was the highest and the only site which is above the NAAQS standard. Paradise Road and Carpinteria were both 96 percent of the standard. The SBCAPCD believes that these three sites were influenced by the Guiberson fire in September 23, 24 and 25 2009 and are requesting that data for these dates be excluded as an exceptional event. The concurrence or non-concurrence of this exclusion request will affect this statistical summary. Overall, there are eight sites which are within 20 percent of the standard.

The ozone NAAQS is currently under revision and the new standard is expected to be in a range of 0.070 ppm to 0.060 ppm. If it is lowered to 0.060 ppm, there would be up to eight sites at 100 percent of the standard or above.

4.2 Nitrogen Dioxide Monitors

Nitrogen Dioxide (NO2) is monitored at 11 locations in the county, every site that measures ozone except Santa Ynez. NO2 is sited in conjunction with the ozone monitors to characterize the precursors to ozone.

In February of 2010, a new 1 hour NAAQS was set at 100 ppb for NO2. The form of the standard is based on the three year average of the 98th percentile of the daily maximum 1-hour average. Table 4.2 shows the summary of the county's NO2 concentrations from 2007 – 2009 compared with this new standard. No sites in the county exceed the standard. Santa Barbara, Santa Maria and Goleta measure the highest concentrations. They are located in urban areas and are influenced by exhaust from automobile traffic.

Table 4.2
Nitrogen Dioxide Summary

AQS #	STREET_ADDRESS	2007 98th ppb	2008 98th ppb	2009 98th ppb	3 Yr Avg 98th ppb	% of Std 100 %	Rank
06-083-0011	Santa Barbara	35	34	31	33	33	1
06-083-1008	Santa Maria	31	28	25	28	28	2
06-083-2011	Goleta	26	25	23	25	25	3
06-083-0008	El Capitan	21	20	17	19	19	4
06-083-2004	Lompoc H Street	21	19	18	19	19	5
06-083-1018	Nojoqui	15	14	13	14	14	6
06-083-1021	Carpinteria	11	11	9	10	10	7
06-083-1025	Las Flores Canyon #1	8	8	7	8	8	8
06-083-1013	Lompoc HS&P	4	4	5	4	4	9
06-083-4003	VAFB STS	3	4	4	4	4	10
06-083-1014	Paradise Road	4	3	3	3	3	11

El Capitan is the 4^{th} highest followed by Lompoc H street and Nojoqui. El Capitan is located south of the 101 freeway and train track. Lompoc H Street is located in an urban area and Nojoqui is located near the 101 freeway at the top of a grade separating the North and South County. LFC1, Lompoc HS&P, VAFB STS and Paradise Road are located in rural settings which are sited as part of permit required regional network.

4.3 Sulfur Dioxide Monitors

Sulfur Dioxide (SO2) is measured at six locations in the county. Lompoc H is located in an urban area while the other five sites are located in more rural settings which are installed as part of permit conditions for major oil and gas sources.

In June 2010, EPA established a new 1-hour NAAQS standard of 75 ppb for SO2. The standard is in the form of the 3-year average of the 99^{th} percentile of the annual distribution of daily maximum 1-hour average concentrations. Table 4.3 compares the county concentrations from 2007 – 2009 with this new standard. All of the sites are below the standard. All of the sites are located in areas near potential SO2 sources.

Table 4.3
Sulfur Dioxide Summary

AQS #	STREET_ADDRESS	**2007 99th ppb**	**2008 99th ppb**	**2009 99th ppb**	**3 Yr Avg ppb**	**% ofStd 75 %**	Rank
06-083-1025	Las Flores Canyon #1	3	4	3	3	4	1
06-083-2004	Lompoc H Street	3	2	2	2	3	2
06-083-0008	El Capitan	2	2	2	2	3	3
06-083-1013	Lompoc HS&P	1	2	2	2	2	4
06-083-1020	West Campus	1	2	2	2	2	5
06-083-4003	VAFB STS	1	2	2	2	2	6

4.4 Carbon Monoxide Monitors

Carbon Monoxide (CO) is measured at six locations in the county. Santa Barbara, Lompoc H Street, Santa Maria, and Goleta are located in the major urban areas in the county. LFC1 and VAFB STS are sited at part of permit conditions for major sources.

The 1 hour standard for CO is set at 35 ppm. The form of the standard is not to exceed more than once per year. Table 4.4 compares the 2nd maximum daily hourly maximum value for years 2007 – 2009. No site exceeds the standard with the highest reading being 10% of the standard at Santa Barbara.

Table 4.4
Carbon Monoxide Summary

AQS #	**STREET_ADDRESS**	**2007 2nd Max ppm**	**2008 2nd Max ppm**	**2009 2nd Max ppm**	**3 Year Avg 2nd Max ppm**	**% of Std 35 %**	**Rank**
06-083-0011	Santa Barbara	3	**3**	**3**	**3**	10	1
06-083-2004	Lompoc H Street	2	**2**	**2**	**2**	5	2
06-083-1025	Las Flores Canyon #1	1	**3**	**1**	**2**	5	3
06-083-2011	Goleta	2	**1**	**2**	**2**	4	4
06-083-1008	Santa Maria	1	**2**	**1**	**1**	4	5
06-083-4003	VAFB STS	1	**1**	**0**	**1**	2	6

4.5 Particulate (< 10 Microns)

Particulate less than 10 microns in diameter (PM10) is currently being measured in standard conditions at four locations in the county. The monitor at Santa Maria was removed in early 2009. A real-time monitor which measures the PM10 in local conditions was installed at Santa Barbara and Santa Maria.

The standard for PM10 is based on the daily averages. The maximum daily concentration shall not exceed 150 ug/m3 more than once per year measured in standard conditions. The Santa Maria and Santa Barbara monitors are not comparable to the standard because they are collected in local conditions. Table 4.5 compares the PM10 data collected from 2007 – 2009 in the county. All sites are below the standard. Santa Maria is the highest where the concentrations are 37 percent of the standard.

Table 4.5
Particulate < 10 Microns Summary

AQS #	STREET_ADDRESS	2007 2nd Max ug/m3	2008 2nd Max ug/m3	2009 2nd Max ug/m3	3 Year Avg ug/m3	% of Std 150	Rank
06-083-1008	Santa Maria	53	57		55	37	1
06-083-0008	El Capitan	72	50	41	54	36	2
06-083-1025	Las Flores Canyon #1	52	49	33	45	30	3
06-083-4003	VAFB STS	39	44	42	42	28	4
06-083-2004	Lompoc H Street	38	38	45	40	27	5

4.6 Particulate (< 2.5 Microns)

Particulate less than 2.5 microns in diameter (PM2.5) is measured at four locations. Santa Barbara and Santa Maria data are collected using FRM samplers on a one in six day schedule. These are the only two monitors which are currently comparable to the NAAQS. CARB plans on installing real time FEM samplers in June of 2010 which will replace the FRM samplers. The other sites where PM2.5 is measured is at Lompoc H Street and Goleta. Theses samplers are real-time samplers but are not FEM so they are not comparable to the NAAQS.

The 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard of 35 ug/m3. Table 4.6 compares the concentrations from 2007 – 2009 to this standard. Santa Barbara is 60 percent of the standard while Santa Maria is 41% of the standard.

Table 4.6
Particulate < 2.5 Micons Summary

AQS #	STREET_ADDRESS	2007 98th ug/m3	2008 98th ug/m3	2009 98th ug/m3	3 YEAR AVG. 98% ug/m3	% of Std 35	Rank
06-083-0011	Santa Barbara	21	17	25	21	60	1
06-083-1008	Santa Maria	16	15	14	14	41	2

4.7 Particulate Real Time Monitors

PM2.5 BAMS real-time particulate monitors were first installed at Santa Barbara and Santa Maria in 2004 and 2005 to report hourly particulate air quality index (AQI) values to the public and AIRNOW. This was expanded with a PM2.5 and PM10 BAMS monitor at Lompoc H Street in 2008 and at Goleta in 2010. This expansion was done to provide particulate air quality data to the public via web sites. The PM2.5 BAMS are not comparable with the NAAQS and are just used for real-time reporting as they do not have FEM status.

5.0 Data Users

Data is collected from all of the monitoring sites and stored in a data base by a central data acquisition system (DAS) located at the SBCAPCD office. Internet connections were added to all 18 sites to allow the DAS to poll data every minute. This data is screened for outliers before being reported to the public and other end users of the air quality data.

Every hour, data is sent to several outside agencies. Some data is used for reporting air quality data to the public and some data is used by researchers and scientists. Ozone, PM10, PM2.5, wind and temperature data are posted to the SBCAPCD website hourly. This data is posted as AQI values and engineering units. Ozone and PM2.5 data are also sent to the AIRNOW system hourly for AQI reporting on a national scale. All hourly values are sent to CARB's AQMIS system for reporting data on a state wide level. Wind and temperature data are sent to the national weather service and naval weapons group.

On a monthly basis a quality assurance review is performed on the data. The final data are then submitted to the AQS data base for compliance with the NAAQS.

Periodically throughout the year, the SBCAPCD will receive various data requests. A UCSB researcher is using hydrocarbon and wind data to study oil and gas seeps in the ocean off of our coast. Other researchers will use wind data to study beach erosion or sand migrations. Other data users are National Weather Service, US Fish and Game, and private consultants.

6.0 Conclusions and Future Changes

The air monitoring network in Santa Barbara County meets the objectives discussed at the beginning of this report. Air quality data is reported to several end users on an hourly basis. Quality assured data is submitted for compliance purposes and data is readily available for research and or general air quality purposes.

Looking forward to the next five years, the SBCAPCD does not plan any major changes to the network. Some changes that will be made or evaluated include the following.

1. The PM2.5 BAMS monitor at Santa Barbara and Santa Maria will be replaced with FEM BAMS in July 2010 by CARB. This will provide daily concentrations for comparison to the NAAQS instead of the current one in six day schedule.
2. Relocation of the Santa Ynez air station due to trees growing up around the existing location. This station has been in operation in the current area since 1977 so the SBCAPCD is looking for another location in the general area to preserve the long-term trend.
3. The new location for the Santa Ynez site will be evaluated for the installation of real-time particulate samplers. The Santa Ynez Valley does not currently have any particulate samplers.
4. The Ellwood Odor monitoring station will be relocated west of the current location which is going to be developed into an assisted living center.
5. New software for the current DAS will be installed to meet the needs of future reporting requirements and end users needs.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
5 YEAR NETWORK ASSESSMENT

July 2010

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Table of Contents

I. INTRODUCTION

A periodic Network Assessment of the Ambient Air Monitoring Network is required by Federal Regulations as a key tool to help ensure that criteria pollutants are measured in important locations and that monitoring resources are used in the most effective and efficient manner to meet the needs of multiple stakeholders. Network assessments help identify new data needs and associated technologies, find opportunities for consolidation of individual sites into multi-pollutant sites, and identify geographic areas where network coverage should be increased or decreased based on changes in the population and/or emissions. The Environmental Protection Agency (EPA) requires that local agencies perform an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in Title 40, Part 58, Section 10 of the Code of Federal Regulations (40 CFR § 58) Appendix D, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the Ambient Air Monitoring Network. This report describes the assessment of the Ambient Air Monitoring Network operated by the South Coast Air Quality Management District (AQMD) and fulfills the requirements for a periodic network review as listed in 40 CFR § 58.10. Regulation requires that the report be submitted to the EPA by July 1 2010.

SOUTH COAST AQMD HISTORY

Early efforts to control air pollution in California began in Los Angeles with legislation proposing counties establish Air Pollution Control Boards. The proposed legislation was approved and signed into law on June 10, 1945 and the Los Angeles County Air Pollution Control District was established in October 1947. Orange County, San Bernardino, and Riverside formed Air Pollution Control Districts by 1957. Realizing that air pollution was a regional problem, the four counties merged to form the South Coast AQMD in 1977. Geographically, South Coast AQMD encompasses 10,750 square miles and is located within the South Coast Air Basin (SCAB), which is the second most populated area in the United States. Southern California consistently records the highest levels of ozone (O3) and particulates in the nation. As the local air pollution control agency, South Coast AQMD is responsible for controlling air quality emissions from various sources to meet National Ambient Air Quality Standards (NAAQS) as well as ambient air quality standards established by the California Air Resources Board (CARB). Every three years an Air Quality Management Plan is developed and adopted by the South Coast AQMD Board, which describes what actions will be taken to bring the SCAB into compliance with State and Federal clean air standards. To assess compliance with State and Federal standards, a surveillance network of 40 permanent air monitoring sites are maintained to measure criteria pollutants. The air quality data collected by the surveillance network is used for comparison to air quality standards, developing control strategies and regulations to meet those standards, and to provide public information on current and forecasted air quality.

South Coast AQMD operates 40 permanent air monitoring sites in the SCAB and a portion of the Salton Sea Air Basin in Coachella Valley. This area includes Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. South Coast AQMD also operates numerous temporary monitoring sites for shorter-term objectives such as air toxic studies, community-based monitoring, and compliance with air quality regulations.

MONITORING NETWORK HISTORY

The earliest air monitoring station was operated by the Los Angeles County Air Pollution Control District at 5201 Santa Fe St. before being relocated to the agency's headquarters at 434 South San Pedro in 1955. The oldest monitoring location still in existence is located in Azusa and opened in 1957. The newest permanent site was added in 2008 in Compton to replace the Lynwood air monitoring location. Table 1 provides a list of monitoring locations, EPA Air Quality System (AQS) site codes, and the pollutants measured at each site. Table 2 provides monitoring objectives and the spatial scale of representativeness for monitors at each site. Table 3 describes the monitoring purpose for monitors at each site. Table 4 describes the monitoring objective, purpose, and spatial scale for continuous particulate analyzers at each site. Monitoring objectives are defined as:

Background Level monitoring is used to determine general background levels of air pollutants as they enter the SCAB.

High Concentration monitoring is conducted at sites to determine the highest concentration of an air pollutant in an area within the monitoring network. A monitoring network may have multiple high concentration sites (i.e., due to varying meteorology year to year).

Pollutant Transport is the movement of a pollutant between air basins or areas within an air basin. Transport monitoring is used to assess and mitigate upwind areas when a transported pollutant affects neighboring downwind areas. Also, transport monitoring is used to determine the extent of regional pollutant transport among populated areas and to rural areas.

Population Exposure monitoring is conducted to represent the air pollutant concentrations a populated area is exposed to.

Representative Concentration monitoring is conducted to represent the air quality concentrations for a pollutant expected to be similar throughout a geographical area. These sites do not necessarily indicate the highest concentrations in the area for a particular pollutant.

Source Impact monitoring is used to determine the impact of significant sources or source categories of air quality emissions on ambient air quality. The air pollutant sources may be stationary or mobile.

Trend Analysis monitoring is useful for comparing and analyzing air pollution concentrations over time. Usually, trend analysis show the progress or lack of progress in improving air quality for an area over a period of many years.

Site Comparison monitoring is used to assess the effect on measured pollutant levels of moving a monitoring location a short distance (usually less than two miles). Some monitoring stations become unusable due to development, change of lease terms, or eviction. In these cases, attempts are made to conduct concurrent monitoring at the old and new site for a period of at least one year in order to compare pollutant concentrations.

Real Time Reporting/Modeling is used to provide data to the EPA's AIRNOW system, which reports conditions for air pollutants on a real time basis to the general public. Data is also used to provide accurate and timely air quality forecast guidance to residents of the South Coast basin.

Multiple purposes for measuring a pollutant at a particular site are possible. There is some overlap between monitoring objectives as defined by the EPA and given in Table 2, and the monitoring purposes provided in Table 3.

A brief description of the network for each criteria pollutant monitored and monitoring program is provided below:

Ozone

The South Coast AQMD operates 30 sites where ozone (O3) measurements are made as part of the Air Monitoring Network. Figure 2 in Section III shows the spatial distribution of these sites.

Carbon Monoxide

Ambient carbon monoxide (CO) monitors measure concentrations at 26 locations. Figure 5 in Section III shows the spatial distribution of these sites.

Nitrogen Dioxide

The nitrogen dioxide (NO2) network consists of 26 sites. These sites are mostly located in areas of highest NO2 concentration. The spatial distribution of NO2 monitors is shown in Figure 7, Section III.

Sulfur Dioxide

Sulfur dioxide (SO2) monitors are located at 7 sites. Figure 9 in Section III shows the spatial distribution of the sites.

Particulate Lead

Total suspended particulate (TSP) lead (Pb) measurements are collected at 19 sites as part of the network. Five sites are source-oriented and the remaining 10 sites are population-oriented. The spatial distribution of these sites is shown in Figure 11, Section III.

PM10

Size-selective inlet high volume samplers are operated at 22 sites to meet the requirements for PM10 Federal Reference Method (FRM) sampling. Of the 22 sites, 13 also include continuous PM10 analyzers. Figure 13 in Section III shows the spatial distribution of the sampling sites.

PM2.5

A network of 17 FRM samplers was first implemented in January 1999. Since then, the network has expanded to include 20 sites depicted in Figure 16, Section III and listed in Table 5. Continuous PM2.5 Met One Beta Attenuation Monitors (BAMs) were first deployed in 2001. Sixteen continuous PM2.5 monitors are now operating in the Basin.

PM2.5 speciation sampling is also a part of the South Coast AQMD PM2.5 monitoring program. The network includes two Speciation Trends Network (STN) samplers and four permanent South Coast AQMD speciation monitoring locations.

The following is a brief description of specific programs that are operated within the Ambient Air Monitoring Network:

Photochemical Assessment Monitoring Stations (PAMS)

The PAMS network was initiated in June 1994 and consists of 7 air monitoring locations. PAMS are used to collect data for a target list of Volatile Organic Compounds (VOCs), Nitrogen Oxides (NOx), Reactive Oxides of Nitrogen (NOy), O3, and meteorological measurements. The PAMS network was established to provide information about the effectiveness of control strategies, emissions tracking, trends, and exposure. To address regulatory changes, site-specific observations from the recent National PAMS Network Assessment, and to address potential synergies between programs, South Coast AQMD made changes in June 2009 to the PAMS monitoring network based on specific recommendations:

- Burbank was reclassified from Type 2/1 to Type 2. This change addressed the National PAMS Network Assessment observation that Burbank should be reclassified to a Type 2 precursor site. The recommendation is consistent with the heavily urbanized/industrialized area, which is impacted by high levels of O3 precursor emissions.
- Santa Clarita was reclassified as Type 3 from Type 2. Although the National PAMS Network Assessment observed that Santa Clarita was consistent with a Type 2 site, recent data was more consistent with a Type 3 maximum O3 concentration site rather than a Type 2 O3 precursor site.
- Banning was relocated to Los Angeles (Main). The National PAMS Network Assessment observed that Banning had the lowest O3 concentrations of all the Type 2 sites and should be reclassified to a Type 3 or 4 site. Instead, to create synergies between programs, South Coast AQMD relocated the Banning PAMS site to the Los Angeles (Main) site as Type 2. This satisfies the EPA recommendation for use of the same monitoring platform and equipment to meet the objectives of multiple programs. Los Angeles (Main) is also a National Air Toxics Trends Station (NATTS), a future National Core-Multi-pollutant Monitoring Station (NCore), and an STN site.
- Azusa was reclassified from Type 3 to Type 2. This proposed change addresses the National PAMS Network Assessment observation that Azusa has high VOC and NOx concentrations, with lower O3 concentrations. The site now more closely resembles a Type 2 O3 precursor site.
- Upland was relocated to the Rubidoux site. The National PAMS Network Assessment observed that Upland was no longer consistent with a Type 4 site and recommended reclassification to Type 3. South Coast AQMD relocated the Upland PAMS site to Rubidoux as a Type 3 location where synergies can be created among the NATTS, NCore, and the STN programs.

- LAX Hastings and Pico Rivera remained unchanged.

Currently, manual VOC canisters are in operation at the Azusa, LAX Hastings, Rubidoux, Los Angeles (Main), and Santa Clarita air monitoring stations. During the intensive season from July 1 until September 30, VOC canisters are run every three hours for a period of twenty-four hours every 3rd day and a twenty-four hour sample is run every 6th day. During the non-intensive season from October 1 through June 30, twenty-four hour VOC canister samples are run every 6th day.

At Los Angeles (Main) and Santa Clarita air monitoring stations, during the intensive season from July 1 until September 30, carbonyl samples are run every three hours for a period of twenty-four hours every 3rd day and a twenty-four hour sample is run every 6th day. During the non-intensive season from October 1 through June 30, twenty-four hour carbonyl samples are run every 6th day.

Automated gas chromatography flame ionization detector (GC\FID) VOC systems are in operation at the Pico Rivera and Burbank air monitoring stations. During the intensive sampling season from July 1 until September 30, the GC\FID is run to collect 3-hour samples and twenty-four hour VOC canisters are run every 6th day. Like the other PAMS sites, carbonyl samples are run every three hours with one additional twenty-four hour sample run every 6th day. During the non-intensive season from October 1 through June 30, the GC/FID is idle and twenty-four hour VOC canister samples are run every 6th day and twenty-four hour carbonyl samples are run every 6th day. Rubidoux is a collocated site for VOC canister sampling and Pico Rivera is a collocated site for VOC canister and carbonyl sampling.

The first South Coast AQMD upper air meteorological monitoring station was established at Los Angeles International Airport (LAX) in 1994. Subsequent upper air stations include Ontario International Airport (ONT) installed in 1996, Moreno Valley (MOV) installed in 2001 at the Moreno Valley Municipal Water Treatment Plant in Riverside County, Irvine installed at the University of California Research and Extension Center in 2006, and Pacoima at Whiteman Airport during May 2007. The upper air stations use a combination of remote sensing and surface meteorological instrumentation, including the Vaisala (formerly Radian/URS) LAP-3000 radar wind profiler with a Radio Acoustic Sounding System (RASS), the Atmospheric Systems Corporation (formerly AeroVironment Inc.) mini Sodar acoustic wind profiler, and tower-mounted meteorological measurements of wind, pressure, temperature, relative humidity, solar radiation and ultraviolet radiation.

The PAMS network monitoring objectives and requirements are summarized in Table 6.

NATTS

The NATTS program was developed to fulfill the need for long-term hazardous air pollutant (HAP) monitoring data of consistent quality nationwide. South Coast AQMD has conducted several air toxics measurement campaigns in the past, which demonstrated the variety and spatial distribution of air toxics sources across SCAB. A single air toxics measurement site cannot reflect the levels and trends of air toxics throughout the basin. For this reason, two NATTS sites are used to characterize the SCAB's toxics levels. The first site is a central urban core site in Los Angeles that reflects concentrations and trends due primarily to urban mobile source emissions. A second, more rural, inland site at Rubidoux captures the transport of pollutants from a variety of upwind mobile and industrial sources in the most populated areas of the air basin. NATTS monitoring began in February 2007 and continues at the Los Angeles (Main) and Rubidoux air monitoring sites. During April 2010, a system audit was conducted by the EPA, which assessed the South Coast AQMD NATTS program. The audit found no major issues with the operation of the network but recommended implementation of blanking and low level concentration challenge samples. Blanking will be implemented in 2010 and low level challenge samples will be implemented in 2011.

NCore

In October 2006, the EPA issued amendments to ambient air monitoring regulations for criteria pollutants. One of the most significant changes in regulations was the requirement to establish NCore stations. These stations provide pollutant data at much lower detection limits than the existing air monitoring network. NCore monitoring regulations require that South Coast AQMD make NCore stations operational by January 1, 2011. To meet this goal, South Coast AQMD has installed trace level analyzers for CO, NOy, SO2, and Continuous FEM BAM PM2.5 in Rubidoux and Los Angeles (Main), both of which are existing STN and NATTS sites.

NETWORK ASSESSMENTS

Regulatory Requirements

The earliest air monitoring sites in the United States were established over 50 years ago with sites added to the national network as needed to fulfill Federal monitoring requirements and other objectives. Since the time of inception, air quality, population, and behaviors have changed, and there is a general need for re-evaluation of the overall network design and objectives. Recognizing this need, the U.S. EPA finalized an amendment to the ambient air monitoring regulations on October 17, 2006 to address the issue. In the amendment, the U.S. EPA required State and local air monitoring agencies to conduct a network assessment once every five years, with the first assessment due by July 1, 2010.

> The state or where applicable local agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in 40 CFR § 58 Appendix D, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the Ambient Air Monitoring Network. The Network Assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals, and for any sites

that are being proposed for discontinuance. The assessment must also consider the effect on data users other than the agency itself, such as nearby States and Tribes or health effects studies. For PM2.5, the assessment must also identify needed changes to population-oriented sites. The state or where applicable local agency must submit a copy of this assessment along with a revised annual network plan to the Regional Administrator. (40 CFR § 58.10d 236)

In general, air monitoring networks must be designed to meet three basic objectives according to 40 CFR § 58. First, they must provide air pollution data to the general public in a timely manner. Second, they must support compliance with ambient air quality standards shown in Table 7, and third, they must support research studies on health effects assessments. In order to achieve these goals, networks must meet the 40 CFR § 58 Appendix D, Network Design, and Appendix E, Probe Siting Criteria.

Network Design Criteria

Ambient air monitoring network design is specified by U.S. EPA and include monitoring objectives and general criteria, as outlined in 40 CFR § 58 Appendix D. Each objective is related to a specific type of air monitoring site, and air monitoring networks must be designed for each criteria pollutant and must meet specific objectives. Monitoring objectives and corresponding scales of representativeness are shown in Table 8.

Minimum Number of Sites

As a general requirement, the U.S. EPA specifies the minimum numbers of sites required in a network based on the latest census population data and design value concentrations for specific criteria pollutants. The minimum number of O3 sites required is based upon the Metropolitan Statistical Area (MSA) population and the most recent 3-year design value as shown in Table 9. As of July 2009, there were no minimum requirements for the number of CO, NO2, and SO2 monitoring sites in an air monitoring network, other than NCore requirements. New regulations for NO2 and SO2 require minimum numbers of monitoring locations taking effect in 2013, but they will not be addressed in this assessment. Local agencies are required to conduct ambient air Pb monitoring taking into account:

- Pb sources which are expected or have been shown to contribute to a maximum Pb concentration in ambient air in excess of the NAAQS.
- The potential for population exposure and logistics.

At a minimum, there must be one source oriented SLAMS site located to measure the maximum Pb concentration in ambient air resulting from sources of Pb, which emit 1.0 or more tons per year based on the latest National Emission Inventory (NEI) or other justifiable methods or data. Local Agencies are also required to conduct Pb monitoring in each Core Based Statistical Area (CBSA) with a population equal to or greater than 500,000 people. At a minimum, there must be one non-source oriented SLAMS site located to measure neighborhood scale Pb concentrations in urban areas impacted by re-entrained dust from roadways, closed industrial sources of Pb, hazardous waste sites, construction and demolition projects and other fugitive sources of Pb. The number of PM10 sites required is based upon MSA population data and shown in Table 10. The number of PM2.5 sites required is based upon MSA population data and shown in Table 11. The final number of sites in a network is subject to U.S. EPA Regional Administrator approval via the Annual Network Plan.

Probe Siting Criteria

Once a site has been selected based on monitoring objective and spatial scale, the site must also meet specific siting criteria for each spatial scale and each pollutant as specified in 40 CFR § 58 Appendix E. These criteria include the placement of the pollutant measuring device inlet probe, spacing from minor sources of pollution, spacing from obstructions to the monitoring probe, spacing from trees, spacing from roadways, probe material and residence time.

<u>Horizontal and Vertical Placement</u>

Inlet probes must be placed both horizontally and vertically so that at least 90 percent of the area over which pollutants are being measured and averaged is 1 meter (m) from walls or any supporting structure. For measurement of particulates, a minimum of 2 m is required. Inlet probes must also be placed between 2 m and 15 m above the ground level for all criteria pollutants at the neighborhood scale. Particulate probe inlets at middle and micro scale are to be between 2 m and 7 m above ground level. Near roadway, and CO micro scale measurements are to be 3 +/- ½ m above ground level. A summary of horizontal and vertical placement is shown in Table 12.

<u>Spacing from Minor Sources</u>

Spacing requirements are dependent upon the monitoring objective. If the objective is to measure the *impact* of a stationary source's primary pollutant emissions, then the probe may be located close to the source and be classified as a micro-scale site. A micro-scale site typically represents an area up to 100 m in size. If the objective is to measure pollutants over a larger area such as a neighborhood or city, then the monitoring location should be located away from minor sources of pollutants so as not to impact air quality data collected at the site. Particulate matter sites should not be located in unpaved areas where windblown dust can influence data collected. Special attention should be placed on horizontal and vertical probe placement from furnace or incineration flues to prevent scavenging of O3 by NO and O3 reactive hydrocarbons.

<u>Spacing from Obstructions</u>

Buildings and other obstacles may scavenge SO2, O3, or NO2 and restrict airflow for any pollutant measured. To prevent this influence, the probe must have unrestricted airflow and be located away from obstacles. The distance from an obstacle to the probe should be twice the height that the obstacle protrudes above the inlet. For particulate sampling, a minimum of 2 m separation is required between monitors, walls, parapets, and structures.

<u>Spacing from Trees</u>

Trees can scavenge SO2, O3, and NO2 by adsorption and provide a surface for particle deposition. Trees also act as obstructions and special attention should be made to adhere to correct spacing. To reduce interference, the probe inlet should be at least 10 m from the drip line of the tree. For micro-scale sites, no trees should exist between the probe inlet and the source being measured.

Spacing from Roadways

O3 and NO2 in particular are susceptible to interference from roadway emissions. When siting monitors for neighborhood scale and urban scales, it is important to minimize roadway interference. Recommended spacing from roadways for O3, NO2, CO, and PM samplers are summarized in Tables 13, 14, and Figure 1. Recent requirements for micro-scale NO2 monitoring near roadways are not addressed in this assessment.

EPA Guidance and Memos

To facilitate the Network Assessment, the EPA issued guidance for local air quality agencies. During March 1998, the EPA Office of Air Quality Planning and Standards (OAQPS) issued State and Local Air Monitoring Stations (SLAMS), National Air Monitoring Stations (NAMS), and PAMS Network Review Guidance. Guidance advocated examination of compliance with Network Design Criteria, monitoring objectives, and minimum number of sites required. Guidance also recommended examination of 40 CFR § 58 Appendix E Probe Siting Criteria. In February 2007, the EPA issued Ambient Air Monitoring Network Assessment Guidance, which included analytical techniques for assessments of Ambient Air Monitoring Networks. In the guidance, the EPA summarized the context of network assessments, provided an overview of requirements in 40 CFR § 58, and an overview of the assessment process. The EPA provided steps in the assessment process and technical approaches including identification of monitoring needs, correlation analysis, and population change in order to assess high and low value monitors. The final step in the guidance was to suggest changes to the network, obtain input from State, Federal, and local stakeholders, and revise recommendations based on input.

EPA Tools

To supplement guidance, the EPA presented an overview of the network assessment process at the 2009 National Ambient Air Monitoring Conference. Training focused on the process of conducting network assessments, providing guidance on analytical techniques used for assessments, and emphasized the goal of identifying and removing low value monitors such that resources can be re-allocated to areas that are under-represented. To further aid in the process, the following tools were made available that are used in this analysis:

Population Animation

The population animation tool is a Google Earth display that shows the change in population over 19 years relative to the 1990 population at the census tract level. Accompanying the population changes are the monitoring network changes from 1990 to 2008. The sites will be displayed as either black circles or gray triangles representing active and inactive sites, respectively. Clicking on a site gives details of the sites start and end year. The animation serves as clear example of how populations have changed within the country over the past 19 years and how the monitoring networks have evolved to serve those shifting populations. In many cases around urban areas across the country, the population has shifted away from the urbanized core to the suburbs and the monitoring networks have not evolved to take into account this change.

Correlation Matrix Analysis

The Correlation Matrix Analysis shows the correlation, relative difference, and distance between pairs of sites within a monitoring network. The purpose of the analysis/tool is to provide a means of determining possible redundant sites that could be removed if pollution trends in that area are captured adequately by a nearby site.

TABLE 1 Ambient Air Monitoring Locations

Location	AQS No.	Pollutants Monitored	Start Date
Anaheim	060590007	CO,NO2,O3,PM10,PM2.5	08/01
ATSF (Exide)	060371406	Pb	1/99
Azusa	060370002	CO,NO2,O3,PM10,PM2.5,SO4	01/57
Banning Airport	060650012	NO2,O3,PM10, PM2.5	04/97
Big Bear	060718001	PM2.5	02/99
Burbank	060371002	CO,NO2,SO2,O3,PM10,PM2.5	10/61
Closet World (Quemetco)	060371404	Pb	10/08
Compton	060371302	CO,NO2,O3,Pb,PM2.5	01/04
Costa Mesa	060591003	CO,NO2,SO2,O3	11/89
Crestline	060710005	O3,PM10	10/73
Fontana	060712002	CO,NO2,SO2,O3,PM10,PM2.5,SO4	08/81
Glendora	060370016	CO,NO2,O3,PM2.5,PM10	08/80
Indio	060652002	O3,PM10,PM2.5	01/83
La Habra	060595001	CO,NO2,O3	08/60
Lake Elsinore	060659001	CO,NO2,O3,PM2.5,PM10	06/87
LAX Hastings	060375005	CO,NO2,O3,PM10,Pb,SO4	04/04
Long Beach (North)	060374002	CO,NO2,SO2,O3,PM10,PM2.5,Pb,SO4	10/62
Los Angeles (Main St.)	060371103	CO,NO2,SO2,O3,PM10,Pb,PM2.5,SO4	09/79
Mira Loma (Jurupa)[2]	060650004	CO,NO2,O3,PM10	10/93
Mira Loma (Van Buren)	060658005	CO,NO2,O3,PM10,PM2.5	11/05
Mission Viejo	060592022	CO,O3,PM10,PM2.5	06/99
Norco	060650003	PM10	12/80
Ontario Fire Station	060710025	PM10,PM2.5	01/99
Palm Springs	060655001	CO,NO2,O3,PM10,PM2.5	04/71
Pasadena	060372005	CO,NO2,O3,PM2.5,SO4	04/82
Perris	060656001	O3,PM10	05/73
Pico Rivera #2	060371602	CO,NO2,O3,Pb,PM2.5,SO4,PM10	09/05
Pomona	060371701	CO,NO2,O3	06/65
Redlands	060714003	O3,PM10	09/86
Rehrig (Exide)	060371405	Pb	11/07
Reseda	060371201	CO,NO2,O3,PM2.5	03/65
Riverside (Magnolia)	060651003	CO,Pb,PM2.5,SO4	10/72
Rubidoux	060658001	CO,NO2,SO2,O3,PM10,Pb,PM2.5,SO4	09/72
San Bernardino	060719004	CO,NO2,O3,PM10,Pb,PM2.5	05/86
Santa Clarita	060376012	CO,NO2,O3,PM10,PM2.5	05/01
South Long Beach	060374004	PM10,Pb,PM2.5,SO4	06/03
Temecula[1]	TBD	O3, PM2.5	
Uddelholm (Trojan Battery)	060371403	Pb	11/92
Upland	060711004	CO,NO2,O3,Pb,PM2.5,PM10,SO4	03/73
Van Nuys Airport	060371402	Pb	1/10
West Los Angeles	060370113	CO,NO2,O3,SO4	05/84

[1] Site to begin operation in 2010
[2] Site to be closed in 2010 or 2011

TABLE 2 FRM/FEM Criteria Pollutant Monitoring Objective and Spatial Scales

MONITORING OBJECTIVE
HC – High Concentrations
RC – Representative Concentrations
IM – Impact
BL – Background

SPATIAL SCALE
MI – Microscale
MS – Middle Scale
NS – Neighborhood Scale
US – Urban Scale

Location	CO	NO2	SO2	O3	PM10	PM2.5	Pb
Anaheim	NS/RC	US/RC		NS/RC	NS/RC	NS/RC	
ATSF (Exide)							MI/IM
Azusa	NS/RC	US/RC		US/HC	NS/RC	NS/RC	
Banning Airport		NS/RC		NS/RC	NS/RC		
Big Bear						NS/RC	
Burbank	NS/HC	NS/RC	NS/RC	US/HC	NS/RC	NS/RC	
Closet World (Quemetco)							MI/IM
Compton	MS/HC	MS/RC		NS/RC		NS/RC	NS/RC
Costa Mesa	NS/RC	NS/RC	NS/RC	NS/RC			
Crestline				NS/HC	NS/RC		
Fontana	NS/RC	US/RC	NS/RC	US/RC	NS/HC	NS/RC	
Glendora	NS/RC	NS/RC		NS/HC			
Indio				NS/RC	NS/HC	NS/RC	
La Habra	NS/RC	US/RC		NS/RC			
Lake Elsinore	NS/RC	NS/RC		NS/RC			
LAX Hastings	MS/RC	MS/RC	NS/RC	MS/RC	NS/RC		NS/RC
Long Beach (North)	MI/HC	MS/RC	NS/HC	MS/RC	MI/RC	NS/HC	MI/RC
Los Angeles (Main St.)	NS/RC	NS/HC	NS/RC	NS/RC	NS/RC	NS/HC	NS/RC
Mira Loma (Jurupa)[2]	NS/RC	NS/RC		NS/RC	NS/HC		
Mira Loma (Van Buren)	NS/RC	NS/RC		NS/RC	NS/HC	NS/RC	
Mission Viejo	NS/RC			NS/RC	NS/RC	NS/RC	
Norco					NS/RC		
Ontario Fire Station					NS/HC	NS/RC	
Palm Springs	NS/RC	NS/RC		NS/RC	NS/RC	NS/RC	
Pasadena	MS/RC	MS/HC		NS/RC		NS/RC	
Perris				NS/RC	NS/RC		
Pico Rivera #2	NS/RC	NS/HC		NS/HC		NS/RC	NS/RC
Pomona	MI/RC	MS/RC		MS/HC			
Redlands				NS/RC	NS/RC		
Rehrig (Exide)							MI/IM
Reseda	NS/RC	US/RC		US/HC		NS/RC	
Riverside	MI/HC	US/RC				NS/RC	MI/HC
Rubidoux	MS/RC	US/RC	NS/RC	US/HC	NS/HC	NS/HC	NS/RC
San Bernardino	MS/RC	US/RC		NS/HC	NS/HC	NS/RC	NS/RC
Santa Clarita	NS/RC	NS/RC		US/HC	NS/RC	NS/RC	
South Long Beach					NS/HC	NS/RC	NS/HC
Temecula[1]							
Uddelholm (Trojan Battery)							MI/IM
Upland	NS/RC	NS/RC		NS/RC			NS/RC
Van Nuys Airport							MI/IM
West Los Angeles	NS/RC	MS/HC		MS/RC			

[1] Site to begin operation in 2010
[2] Site to be closed in 2010 or 2011

TABLE 3 FRM/FEM Criteria Pollutant Monitoring Purposes

MONITORING PURPOSE

BK – Background Level
HC – High Concentration
TP – Pollutant Transport
EX – Population Exposure
SO – Source Impact
RC – Representative Concentration
SPM – Special Purpose Monitoring
TR – Trend Analysis
CP – Site Comparisons

Location	CO	NO2	SO2	O3	PM10	PM2.5	Pb
Anaheim	TR	TR/RC		TR	TR	TR/EX	
ATSF (Exide)							SO
Azusa	TR	TR/RC		TR	TR	TR/EX	
Banning Airport		TP/RC		TP	TP		
Big Bear						EX/SO/TP	
Closet World (Quemetco)							SO
Burbank	TR	TR/RC	TR	TR	TR	TR/EX	
Compton	TR/HC	TR/RC		TR/RC		EX/RC	EX
Costa Mesa	RC	TR/RC	TR	RC			
Crestline				HC	TP/RC		
Fontana	RC	TP/RC	TR	RC	HC	EX/TP	
Glendora	RC	TR/RC		HC			
Indio				TP	HC	TP/EX	
La Habra	RC	TR/RC		RC			
Lake Elsinore	TP/RC	TP/RC		TP/RC			
LAX Hastings	BK	BK	BK	BK	BK		BK
Long Beach (North)	HC	TR/RC	TR/HC	TR	TR/RC	EX/HC	EX
Los Angeles (Main St.)	SO/RC	SO/HC	TR	TR/RC	TR/RC	EX/HC	EX
Mira Loma (Jurupa)[2]	TP/RC	TP/RC		TR/RC	HC/CP		
Mira Loma (Van Buren)	CP	CP		CP	HC/CP	CP	
Mission Viejo	RC			TR/RC	TR/RC	EX/RC	
Norco					TR/RC		
Ontario Fire Station					HC	EX/RC	
Palm Springs	TP/RC	TP/RC		TP	TP/RC	EX/TP	
Pasadena	TR/RC	TR/HC		TR/RC		EX/RC	
Perris				TP	TR		
Pico Rivera #2	RC	HC		HC		EX/RC	EX
Pomona	RC	RC		HC			
Redlands				TP/RC	TP/RC		
Rehrig (Exide)							SO
Reseda	RC	TR/RC		HC		EX/RC	
Riverside	HC	TR/RC				EX/RC	EX
Rubidoux	TR/RC	TR/RC	TR	TR/HC	TR/HC	EX/TR/HC	EX
San Bernardino	TR/RC	TP/RC		TR/HC	TR/HC	EX/TR	EX
Santa Clarita	RC	TP/RC		TP/HC	RC	EX/RC	
South Long Beach					HC	EX/SO	EX
Uddelholm (Trojan Battery)							SO
Temecula[1]							
Upland	RC	TR/RC		TR/RC			EX
Van Nuys Airport							SO
West Los Angeles	RC	TR/HC		RC			

[1] Site to begin in 2010
[2] Site to be closed in 2010 or 2011

TABLE 4 Continuous PM10/PM2.5 Monitoring Purpose, Objective, and Spatial Scales

MONITORING OBJECTIVE	SPATIAL SCALE	TYPE
HC – High Concentrations	MI – Microscale	TEOM
RC – Representative Concentrations	NS – Neighborhood Scale	BAM (NON-FEM)
		BAM (FEM)

MONITORING PURPOSE

SO – Source Impact
TP – Pollutant Transport
TR – Trend Analysis
RM – Real-Time Reporting/Modeling
SPM – Special Purpose Monitoring

Location	Continuous PM10				Continuous PM2.5			
	Type	Purpose	Objective	Scale	Type	Purpose	Objective	Scale
Anaheim [1]	BAM	RM	RC	NS	BAM/FEM	SPM	RC	NS
Banning Airport					BAM/NON-FEM	RM	RC	NS
Burbank [1]	TEOM	RM	RC	NS	BAM/FEM	SPM	RC	NS
Crestline					BAM/NON-FEM	RM	RC	NS
Glendora	BAM	RM	RC	NS	BAM/NON-FEM	RM	RC	NS
Indio	TEOM	RM	HC	NS				
Lake Elsinore	TEOM	RM	RC	NS	BAM/NON-FEM	RM	RC	NS
Long Beach (North) [1]	BAM	RM	RC	NS	BAM/FEM	SPM	RC	NS
Los Angeles (Main St.) [1]	BAM	RM	RC	NS	BAM/FEM	SPM	HC	NS
Mira Loma (Jurupa)	TEOM	RM	HC	NS				
Mira Loma (Van Buren) [1]	BAM	RM	HC	NS	BAM/FEM	SPM	HC	NS
Palm Springs	TEOM	RM	HC	NS				
Reseda					BAM/NON-FEM	RM	RC	NS
Riverside	BAM	RM	HC	NS	BAM/NON-FEM	RM	HC	NS
Rubidoux [1]	TEOM	RM	HC	NS	BAM/FEM & NON-FEM	SPM/RM	HC	NS
San Bernardino	TEOM	RM	RC	NS				
Santa Clarita					BAM/NON-FEM	RM	RC	NS
South Long Beach [1]					BAM/FEM	SPM	RC	NS
Temecula [2]					BAM/NON-FEM	RM	RC	NS
Upland	BAM	RM	RC	NS	BAM/NON-FEM	RM	RC	NS

[1] PM2.5 FEM BAM Samplers replaced NON-FEM Samplers during FY 2008-2009 and designated as special purpose monitors
[2] Site planned during Fiscal Year 2010-2011

TABLE 5 PM2.5 FRM Monitoring Stations Assigned Site Numbers

Location	Site Code	CARB No.	AQS No.	Start Date	Schedule
Anaheim	ANAH	30178	060590007	01/03/99	Daily
Azusa	AZUS	70060	060370002	01/04/99	1-in-3
Big Bear	BGBR	36001	060718001	02/08/99	1-in-6
Burbank[1]	BURK	70069	060371002	01/21/99	Daily
Compton	COMP	70112	060371302	11/08	1-in-3
Fontana	FONT	36197	060712002	01/03/99	1-in-3
Indio "A"	INDI	33157	060652002	01/30/99	1-in-3
Indio "B"	INDI	33157	060652002	05/12/00	1-in-6
Long Beach (North)	LGBH	70072	060374002	01/03/99	Daily
Los Angeles "A" (Main St.)	CELA	70087	060371103	01/03/99	Daily
Los Angeles "B" (Main St.)	CELA	70087	060371103	01/06/99	1-in-6
Mira Loma (Van Buren)	MRLM	33165	060658005	11/09/05	Daily
Mission Viejo	MSVJ	30002	060592022	06/15/99	1-in-3
Ontario Fire Station	ONFS	36025	060710025	01/03/99	1-in-3
Palm Springs	PLSP	33137	060655001	12/26/99	1-in-3
Pasadena	PASA	70088	060372005	03/04/99	1-in-3
Pico Rivera #2	PICO	70185	060371602	09/12/05	1-in-3
Reseda	RESE	70074	060371201	01/24/99	1-in-3
Riverside	RIVM	33146	060651003	01/06/99	1-in-3
Rubidoux "A"	RIVR	33144	060658001	01/03/99	Daily
Rubidoux "B"	RIVR	33144	060658001	01/03/99	1-in-6
San Bernardino	SNBO	36203	060719004	01/03/99	1-in-3
South Long Beach	SLGB	70110	060374004	06/20/03	Daily

[1] Changed to daily on 04/16/09 for comparison to FEM BAM

TABLE 6 PAMS Network

			July 1 to September 30		October 1 to June 30		
Site Type	**Date Established as PAMS**	**Site / AQS ID#**	**VOC**	**Carbonyl**	**VOC**	**Carbonyl**	**Additional Requirements**
1	04/01/2004	LAX Hastings (replaced Hawthorne)	8 x 3 hr samples every 3rd day and 1 x 24 hr sample every 6th day	No Sampling	1 x 24 hr sample every 6th day	No Sampling	
2	06/01/1995	Azusa	8 x 3 hr samples every 3rd day and 1 x 24 hr sample every 6th day	No Sampling	1 x 24 hr sample every 6th day	No Sampling	No/NOx required
2	07/01/1997	Burbank	Continuous GC and 1 x 24 hr sample every 6th day	8 x 3 hr samples every day and 1 x 24 hr sample every 6th day	1 x 24 hr sample every 6th day	1 x 24 hr sample every 6th day	
2	06/01/2009	Los Angeles (Main)	8 x 3 hr samples every 3rd day and 1 x 24 hr sample every 6th day	8 x 3 hr samples every 3rd day and 1 x 24 hr sample every 6th day	1 x 24 hr sample every 6th day	1 x 24 hr sample every 6th day	Trace level CO required at one type 2 site.
2	08/01/2005	Pico Rivera #2	Continuous GC and 1 x 24 hr sample every 6th day	8 x 3 hr samples every day and 1 x 24 hr sample every 6th day	1 x 24 hr sample every 6th day	1 x 24 hr sample every 6th day	
3	06/09/2009	Rubidoux	8 x 3 hr samples every 3rd day and 1 x 24 hr sample every 6th day	No Sampling	1 x 24 hr sample every 6th day	No Sampling	NOy required
3	05/01/2001	Santa Clarita	8 x 3 hr samples every 3rd day and 1 x 24 hr sample every 6th day	8 x 3 hr samples every 3rd day and 1 x 24 hr sample every 6th day	1 x 24 hr sample every 6th day	1 x 24 hr sample every 6th day	

SITE TYPES:
1 – Upwind and background characterization site (type 1 or 3)
2 – Maximum O3 precursor emissions impact site or above 8 hr zone
3 – Maximum O3 concentration site
4 – Extreme downwind monitoring site

MONITORING REQUIREMENTS:
One type 1 or type 3 site required per area
One type 2 site required per area
No type 4 required

REDUCED REQUIREMENTS:
Speciated VOC only required at type 2 and one other
Carbonyl only required in areas classified as serious
NO/NOx required only at type 2
NOy required at one site per PAMS area (type 1 or 3)

TABLE 7 Ambient Air Quality Standards

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		Federal Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.08 ppm (157 µg/m^3)		
Respirable Particulate Matter (PM10)	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)	24 Hour	No Separate State Standard		35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	15 µg/m^3		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Non-Dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	—
Nitrogen Dioxide (NO_2) *	Annual Arithmetic Mean	0.030 ppm (56 µg/m3)	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m^3)	0.053 ppm	Gas Phase Chemiluminescence
	1 Hour	0.18 ppm (338 µg/m^3)		0.100 ppm	None	
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	—	Ultraviolet Fluorescence	0.030 ppm (80 µg/m^3)	—	Spectrophotometry (Pararosaniline Method)
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (365 µg/m^3)	—	
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	1 Hour	0.25 ppm (655 µg/m^3)		0.075 ppm	None	—
Lead[8]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	—
	Calendar Quarter	—		1.5 µg/m^3	Same as Primary Standard	High Volume Sampler and Atomic Absorption
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer — visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		No Federal Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[8]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

* The Nitrogen Dioxide ambient air quality standard was amended on February 22, 2007, to lower the 1-hr standard to 0.18 ppm and establish a new annual standard of 0.030 ppm. These changes become effective after regulatory changes are submitted and approved by the Office of Administrative Law, expected later this year.

See footnotes on next page ...

For more information please call ARB-PIO at (916) 322-2990 — California Air Resources Board (02/22/07)

TABLE 8 Relationship Between Monitoring Objective/Site Type and Scale of Representativeness

Monitoring Objective/Site Type and Scale of Representativeness	
Highest concentration	Micro, middle, neighborhood (sometimes urban for secondary formed pollutants such as ozone)
Population oriented	Neighborhood, urban
Source Impact	Micro, middle, neighborhood
Background and regional transport	Urban, regional
Welfare based	Urban, regional

TABLE 9 Minimum Ozone Monitoring Requirements

MSA population	Most recent 3 year design value > 85% of O3 NAAQS	Most recent 3 year design value < 85% of O3 NAAQS[1]
> 10 million	4	2
4 - 10 million	3	1
350,000 - < 4 million	2	1
50,000 - 350,000	1	0
[1] - mimimum monitoring requirements apply in absence of a design value		

TABLE 10 Minimum PM10 Monitoring Requirements

MSA population	Most recent 3 year design value > 85% of $PM_{2.5}$ NAAQS	Most recent 3 year design value < 85% of $PM_{2.5}$ NAAQS
> 1,000,000	3	2
500,000-1,000,000	2	1
50,000-500,000	1	0

TABLE 11 Minimum PM2.5 Monitoring Requirements

Population	High Concentration[1]	Medium Concentration[2]	Low Concentration[3]
>1,000,000	6-10	4-8	2-4
500,000-1,000,000	4-8	2-4	1-2
250,000-500,000	3-4	1-2	0-1
100,000-250,000	1-2	0-1	0

[1] - High concentrations are those that exceed $PM_{2.5}$ NAAQS by 20% or more

[2] - Medium concentrations are those where ambient concentrations > 80% NAAQS

[3] - Low concentrations ar those where ambient concentrations are < 80% NAAQS

TABLE 12 Horizontal and Vertical Inlet Probe Placement

Measurement	Spacing from obstructions	Inlet probe height
All neighborhood scale criteria pollutants	>1 m	2 - 15 m
Middle and micro scale particulate pollutants[1]	>2 m	2 - 7 m
Near roadway microscale CO	> 1 m	3 +/- 1/2 m

[1] 2 m apart for flow rates > 200 lpm and 1 m apart for flow rates < 200 lpm

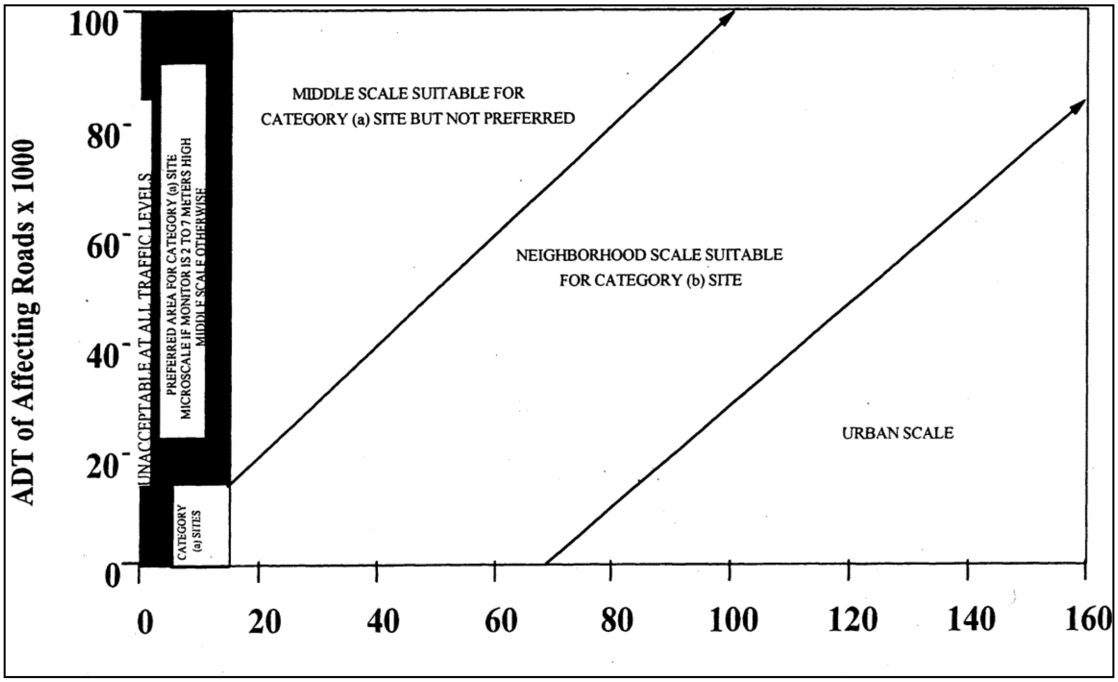
TABLE 13 Minimum Seperation Between Nearest Traffic Lane and Probe Inlet

Roadway Average DailyTraffic	O3 & NO2 at neighborhood and urban scale
≤ 1,000	10
10,000	20
15,000	30
20,000	40
40,000	60
70,000	100
> 110,000	250

TABLE 14 Minimum Separation Between Nearest Traffic Lane and Probe Inlet

Roadway Average DailyTraffic	CO at neighborhood scale
≤ 10,000	10
15,000	25
20,000	45
30,000	80
40,000	115
50,000	135
> 60,000	150

FIGURE 1 Distance of PM Samplers to Nearest Traffic Lane in Meters
Source: CFR 40 § 58 Appendix E



II. SITE ASSESSMENTS

OVERVIEW

This section describes the process that was undertaken for assessing individual sites in the South Coast AQMD monitoring network. It describes criteria used to assess sites, which include site history, security of future occupancy, infrastructure, monitoring objectives, probe siting criteria, data uses, and cost. The assessment criteria also include potential synergies that are considered in assessing the importance of a monitoring site.

SITE ASSESSMENT CRITERIA DESCRIPTIONS

Site History/Longevity

Many sites in the South Coast AQMD network have been in operation for more than 20 years. Establishing historical data trends over a period of time assists in determining the effectiveness of control measures.

Security of Future Occupancy

Many of the sites in the South Coast AQMD network are established at properties that are leased on a monthly or annual basis. Many sites are located at municipal properties where continuance of the current agreement will not change in the foreseeable future. There are however, locations where property owner needs such as refusal to establish long term lease, expansion of facilities, remodeling, or increases in rent make security of future occupancy uncertain.

Infrastructure

Consideration of the infrastructure at air monitoring locations is a crucial part of the site assessment. The condition of the building, electrical capabilities, data communication capabilities, and space for expansion are evaluated.

Probe Criteria

The earliest monitoring stations were established in the late 1950's and since that time urban development and changes in land use, population, and air quality trends have affected monitoring objectives and the probe siting criteria so that air pollution data may no longer adequately represent the intended area. Requirements for probe siting criteria includes an examination of the horizontal and vertical probe placement, spacing of the probe from obstructions, spacing of the probe in relation to minor sources, and spacing of the probe from roadways based on the individual criteria pollutant spatial scale of representativeness and Average Daily Traffic (ADT).

Non-NAAQS Data Uses

Besides NAAQS compliance status evaluation and progress demonstrations, data from South Coast AQMD air monitoring stations is used for real-time public notification of air pollution events, air quality forecasting, and the analysis and modeling for strategic plan development, including the preparation of the Air Quality Management Plan (AQMP). Due to the large population in Southern California and the complexity of the geography and meteorology, a relatively large number of air monitoring stations are needed to adequately describe air quality and meteorology in South Coast AQMD's jurisdiction. As a whole, the South Coast AQMD air monitoring network successfully meets the needs for planning, public notification, and forecasting purposes.

Public Notification

Data from the criteria pollutants that are measured continuously are available to the public in near real time, through the South Coast AQMD, U.S. EPA AirNow, and California Air Resourced Board websites, as well as through the South Coast AQMD Interactive Voice Response (IVR) automated phone system. Warnings of current air pollution events that occur are transmitted to the public via the South Coast AQMD website, fax, email, recorded phone messages, and press releases. The U.S. EPA EnviroFlash alert system is used to alert subscribers of measured unhealthy air quality by email, RSS feeds or Twitter alerts. At this time, air quality notifications are primarily driven by PM2.5 and summertime O3 measurements, although PM10 episodes can also occur occasionally during exceptional events (e.g., natural windblown dust events, wildfires, and fireworks displays). A robust real-time network is needed to support the accurate mapping of data and transmittal of episodic health information for the large population and geographic diversity of the SCAB and the Coachella Valley.

Air Quality Forecasting

South Coast AQMD provides daily air quality forecasts to the public, predicting day-in-advance concentrations and Air Quality Index (AQI) values of O3, PM2.5, PM10, CO, and NO2 for 38 source-receptor areas throughout South Coast AQMD's jurisdiction. The forecasts are disseminated to the public through the South Coast AQMD and U.S. EPA AirNow websites, the South Coast AQMD IVR phone system, and through the news media, as well as by subscription via fax, email, RSS feeds, and Twitter (using EnviroFlash). South Coast AQMD also provides high wind/windblown dust forecasts for the Coachella Valley for South Coast AQMD Rule 403.1, agricultural and wildland prescribed fire burn forecasts and, starting in November 2010, residential wood burning forecasts. South Coast AQMD air quality forecast tools utilize forecaster experience, empirical/statistical models, and prognostic grid models. Current and historical air quality and meteorological data are critical to the forecasting process. The South Coast AQMD measurements are used to develop the empirical models and to provide current inputs during daily forecast preparation. The monitoring data is also used to evaluate and refine the prognostic grid models.

Air Quality Planning

South Coast AQMD measurements are important for the air quality planning process, including strategic plan development to demonstrate future year attainment of the NAAQS. Current levels and historic air quality trends are documented as a component of the AQMP and reasonable further progress analysis. Meteorological and air quality models are used to simulate representative past episodes or longer periods, as compared to measured air quality data throughout the region. Emissions are then be adjusted in the model for future years based on projected population, business growth, infrastructure and the effect of control measures to evaluate the efficacy of potential emissions control strategies. A relatively dense monitoring network of pollutants and their precursors is needed throughout the modeling domain to adequately evaluate the ability of the models to simulate air quality.

Health Studies
Support for air pollution research studies is prime objective in assessing the value of an air monitoring location. Air pollution data collected is used to supplement data collected by researchers working on health effects assessments. Sites used as platforms for scientific studies involved with health or welfare impacts, measurement methods development, or used as collaborative efforts with researchers are considered here due to their important role in supporting the air quality management program.

Environmental Justice (EJ)
Following the South Coast AQMD Board's EJ initiatives in October 1997, the South Coast AQMD has been a leader in identifying and addressing community EJ concerns, particularly as raised by low income, ethnic minority communities who may be disproportionately impacted by localized emissions and mobile source pollutants. In support of the program, toxics monitoring and periodic health effects studies take place at air monitoring locations throughout the network. Support of these studies is taken into consideration while determining the value of an air monitoring location.

Cost
Assessment of the cost to relocate a site is an important factor is determining the value of a monitoring location. Cost assessment takes into account the availability of sampling locations in the area, as well as the cost of rent and the number of monitors at the sampling site.

Synergies
Consideration of potential synergies between monitoring programs and external objectives are taken into account while establishing the value of the monitoring location. Establishing synergies between monitoring programs such as NCore, PAMS, NATTS, Health Studies, and South Coast AQMD's EJ programs enhance the value of the monitoring location. Synergies external to the air monitoring network that are taken into consideration while determining the value of the site include use of facilities by South Coast AQMD field inspection personnel for office space and data communications.

INDIVIDUAL SITE ASSESSMENTS

The current AQMD air monitoring network meets or exceeds U.S. EPA monitoring requirements and satisfies multiple monitoring purposes. Over the last twenty years, population, sources of pollution, ambient levels of pollution, and the surveillance air monitoring network have been modified such that the original monitoring objectives of each site may no longer apply. The effects of these factors, as well as data and monitoring needs, are assessed by site. Measurements taken at each air monitoring site, AQS number, and date of inception are shown in Table 1. The probe siting criteria assessment is shown in Table 15.

Anaheim

The Anaheim site was established at its current location at 1630 Pampas Lane in August 2001 after moving from 1010 Harbor Blvd. due to sale of the Orange County Agricultural Department facility where the site had resided since 1981. We currently hold a 5 year lease with the Anaheim School District for our current monitoring location and do not anticipate any changes in the near future. The infrastructure of the facility requires attention. The current monitoring platform began as a temporary location, and therefore was not supported adequately. The monitoring platform needs to be removed, and supported properly with a cement base. Concurrently, the compound in which the site is housed needs to be expanded and electrical wiring upgraded to accommodate the necessary changes to meet probe siting criteria. The site does not currently meet 40 CFR § 58 Appendix E Probe Siting Criteria, specifically spacing from trees requirement and probe distance from traffic lane. Spacing from trees for all pollutants should be at least 10 m and distance from traffic land should be a minimum of 10 m and 15 m respectively for gaseous and particulate pollutants. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include speciated PM2.5 sampling, Radnet program, EJ, and regional toxics air monitoring studies. The cost to relocate the site to meet probe siting criteria is high due to the number of instruments at the site, cost of rent in the area, and length of service.

ATSF (Exide)

The ATSF site was established at its current location in January 1999 to monitor Pb source emissions from the Exide facility in the City of Commerce. We currently have an agreement with the owners of the property to allow air monitoring and do not anticipate any changes in the near future. The infrastructure is adequate and probe siting criteria meets requirements for source impact siting. The cost to move the location is low, however, the current site is the best available location.

Azusa

The Azusa site was established at its current location in January 1957. We currently hold a 5 year lease for our monitoring location and do not anticipate any changes in the near future. The infrastructure meets the needs of the air monitoring network. The site is in compliance with 40 CFR § 58 Appendix E Probe Siting Criteria. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include PAMS, CARB, and administrative synergies include use of office space for Air Quality Inspectors. The cost to relocate the site is high due to the number of instruments at the site, cost of rent in the area, and length of service.

Banning Airport
The Banning Airport site was established at its current location during April 1997, after moving from the Banning-Alessandro air monitoring location. We hold a 4 year lease with the airport for our monitoring location and do not anticipate any changes in the near future. The infrastructure of the facility meets the needs of the air monitoring network. The site meets 40 CFR § 58 Appendix E Probe Siting Criteria. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Administrative synergies include use of office space for Air Quality Inspectors. The cost to relocate the site to meet probe siting criteria is high due to the number of instruments at the site, cost of rent in the area, and length of service.

Big Bear
The Big Bear site was established at its current location in February 1999 to assess PM2.5 winter wood smoke. We currently have a 2 year agreement with airport management and do not anticipate any changes in the near future. The infrastructure is adequate and meets 40 CFR § 58 Appendix E Probe Siting Criteria. The cost to move the location is low, and there have been no exceedances of the PM2.5 standard, however the cost to maintain the site is high due to the distant location.

Burbank
The Burbank site was established at its current location at 228 West Palm Avenue during October 1961. We currently hold a 3 year lease with the owners of the monitoring location and do not anticipate any changes in the near future. The infrastructure of the facility is adequate. The site however does not currently meet 40 CFR § 58 Appendix E Probe Siting Criteria, specifically spacing from traffic lane for O3 and NO2 are 6.2 meters short of requirement. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include PAMS, BioWatch, Regional Toxics studies, and CARB Toxics monitoring. Administrative synergies include use of office space for Air Quality Inspectors. The cost to relocate the site to meet probe siting criteria will be higher than the current location due to the high cost of rent in the area and number of monitors.

Closet World (Quemetco)
The Closet World site was established at its current location in October 2008 to monitor Pb source emissions from the Quemetco facility in the City of Industry. We currently have an agreement with the owners of the property to allow us to sample and do not anticipate any changes in the near future. The infrastructure is adequate and probe siting criteria meets requirements for source impact siting. The cost to relocate is low due to a single instrument at the site.

Compton
The Compton site was established at its current location at 700 North Bullis Road in January 2004 after moving from the Lynwood site due to inadequate site infrastructure. We currently hold a 10 year lease with the City of Compton for our current monitoring location and do not anticipate any changes in the near future. The infrastructure of the

site meets the needs of the air monitoring network. The site meets requirements of 40 CFR § 58 Appendix E Probe Siting Criteria, spacing from roadways, trees, and obstructions. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Administrative synergies include use of office space for Air Quality Inspectors. The cost to relocate the site is high due to the number of instruments at the site and cost of rent in the area.

Costa Mesa
The Costa Mesa site was established at its current location in November 1989. We currently hold a 5 year lease with the owners for our current monitoring location and do not anticipate any changes in the near future. The site lacks adequate space to expand to include particulate sampling. The site meets requirements of 40 CFR § 58 Appendix E Probe Siting Criteria, spacing from roadways, trees, and obstructions. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Administrative synergies include use of office space for Air Quality Inspectors. The cost of relocating the site is significant; however, finding a site that can accommodate particulate sampling will add value to the network.

Crestline
The Crestline site was established at its current location at Lake Gregory in October 1973. We currently hold a month to month contract for our current monitoring location with the San Bernardino County Regional Parks Department, but do not anticipate any changes in the near future. The infrastructure of the facility requires attention. The current monitoring platform is outdated and lacks sufficient space. Money has been set aside for a new monitoring platform but basic infrastructure must be installed first. The site does not currently meet 40 CFR § 58 Appendix E Probe Siting Criteria, specifically spacing from trees requirement. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. The cost to relocate the site to meet probe siting criteria is high due to the number of instruments at the site, cost of rent, and length of service.

Fontana
The Fontana site was established at its current location at 14360 Arrow Highway during August 1981. We currently hold a month to month lease with San Bernardino County Fire for the monitoring location and do not anticipate any changes in the near future. The infrastructure meets the needs of the air monitoring network; however, there is no room for further expansion. The site is in compliance with 40 CFR § 58 Appendix E Probe Siting Criteria, however, the adjacent property is a large dirt lot which contains vegetation which will cause siting problems in the coming years. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include speciated PM2.5 sampling, Radnet program, EJ, and Regional Toxics Air Monitoring Studies. The cost to relocate the site to meet probe siting criteria is high due to the number of instruments at the site, cost of rent in the area, and length of service.

Glendora

The Glendora site was established at its current location at 840 E. Laurel during August 1980. We currently hold a month to month lease with the city of Glendora for our monitoring location and are concerned about the future stability of remaining at the location. The current monitoring platform is housed in a structure which requires attention. The site was established by California Air Resources Board in a now outdated housing. The monitoring platform needs to be removed, and supported properly with a cement base. Concurrently, the compound in which the site is housed needs to be expanded and electrical wiring upgraded to accommodate the necessary changes to meet probe siting criteria. The site is in compliance with 40 CFR § 58 Appendix E Probe Siting Criteria; however, the area is surrounded by a vacant dirt lot which can have an impact on particulate readings. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include the BioWatch program, regional toxics studies, and regional health studies. The cost to relocate is high due to the number of instruments at the site, cost of rent in the area, and length of service. Cost can be mitigated by consolidating the site with nearby air monitoring locations.

Indio

The Indio site was established at its current location at 46-990 Jackson Street during January 1983. We currently hold a month to month lease with the city of Indio and do not anticipate any changes in the near future. The current monitoring platform is a modular wood structure, which requires extensive maintenance. Money has been set aside for a new monitoring platform. The site is in compliance with 40 CFR § 58 Appendix E Probe Siting Criteria; however, the area is surrounded by a dirt lot occasionally used as parking which can have an impact on particulate readings. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. The cost to relocate the site to meet probe siting criteria is high due to the number of instruments at the site, cost of rent in the area, and length of service.

La Habra

The La Habra site was established at its current location at 621 West Lambert Road during August 1960. We currently hold a month to month lease with the city of La Habra and do not anticipate any changes in the near future. The site lacks adequate space to expand to include particulate sampling and the monitoring structure requires attention. The site does not currently meet 40 CFR § 58 Appendix E Probe Siting Criteria, specifically spacing from trees requirement and probe distance from traffic lane. Spacing from trees for all pollutants should be at least 10 m and distance from traffic land should be a minimum of 10 and 15 m respectively for gaseous and particulate pollutants. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include speciated PM2.5 sampling, Radnet program, and regional toxics air monitoring studies. The cost to relocate the site to meet probe siting criteria is high due to the number of instruments at the site, cost of rent in the area, and length of service. Although the cost is significant, finding a site which can accommodate particulate sampling will add value to the network and costs can be mitigated by consolidation with an existing air monitoring location.

Lake Elsinore

The Lake Elsinore site was established at its current location at 506 West Flint St. during June 1987. We currently hold a 4 year lease with the City of Lake Elsinore for the monitoring location and do not anticipate any changes in the near future. The infrastructure meets the needs of the air monitoring network. The site is in compliance with 40 CFR § 58 Appendix E Probe Siting Criteria; however, the adjacent property contains vegetation which will cause siting problems in the coming years. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include regional health studies. The cost to relocate the site to meet probe siting criteria is high due to the number of instruments at the site, cost of rent in the area, and length of service.

LAX Hastings

The LAX Hastings site was established at its current location at 7201 W. Westchester Parkway during April 2004. The site was established to replace the Hawthorne air monitoring location located on the grounds of Anza Elementary School in Hawthorne, which was established to replace the Lennox air monitoring location. We currently hold a month to month lease with Los Angeles International Airport for the monitoring location and do not anticipate any changes in the near future. The infrastructure meets the needs of the air monitoring network; however, there is no room for further expansion within the current compound. The site is in compliance with 40 CFR § 58 Appendix E Probe Siting Criteria. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include PAMS and regional toxics air monitoring studies. The cost to relocate the site to meet probe siting criteria will be significant due to the number of samplers and the current low cost lease.

Long Beach (North)

The North Long Beach site was established at its current location at 3648 N Long Beach Blvd during October 1961. We currently hold a 4 year lease with the owners of the monitoring location and do not anticipate any changes in the near future. The infrastructure of the facility is adequate. The site however, does not currently meet 40 CFR § 58 Appendix E Probe Siting Criteria, specifically spacing from traffic lane for O_3, CO, NO_2, PM_{10}, and Pb. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include Speciated $PM_{2.5}$, Regional Health Studies, EJ, Regional Toxics studies, and CARB Toxics monitoring. Administrative synergies include use of office space for Air Quality Inspectors. The cost to relocate the site to meet probe siting criteria is high due to the number of instruments at the site, cost of rent in the area, and length of service.

Los Angeles (Main Street)
The Los Angeles Main Street site was established at its current location at 1630 North Main Street in September 1979. We currently hold a month to month lease with the Los Angeles Department of Water and Power (LADWP) for our current monitoring location and do not anticipate any changes in the near future. The infrastructure of the facility requires attention. The current monitoring platform lacks adequate space and power. Arrangements have been made with LADWP to update the space and power to meet the needs of the network during FY2010-11. The site is currently in compliance with 40 CFR § 58 Appendix E Probe Siting Criteria. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include speciated PM2.5 sampling, PAMS, STN, NATTS, NCORE, EJ, regional health studies, regional toxics studies, and CARB Toxics monitoring. The cost to relocate the site is high due to the number of instruments at the site, cost of rent in the area, and length of service.

Mira Loma (Jurupa)
The Mira Loma Jurupa site was established at its current location at 10551 Bellegrave during December 1993 by CARB as part of the Children's Health Study. We currently have a no cost agreement with the Jurupa Unified School District for our monitoring location and are unsure about the future stability of remaining at the location. The current monitoring platform is housed in a structure which requires attention. The current monitoring platform began as a temporary location with no room for expansion and poor electrical infrastructure. The site does not meet 40 CFR § 58 Appendix E Probe Siting Criteria, specifically spacing from obstructions, which is detailed in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include regional health studies. The cost to relocate the site will be low due to a site established nearby to replace this site due to the poor infrastructure.

Mira Loma (Van Buren)
The Mira Loma Van Buren was established at its current location at 5130 Poinsettia Drive during November 2005. This location served as a replacement for the Mira Loma Jurupa site due to the location's poor instrument siting and infrastructure. We currently have a no cost agreement with the Jurupa Unified School District for our monitoring location and do not anticipate any changes in the near future. The site is in compliance with the requirements of 40 CFR § 58 Appendix E Probe Criteria. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include regional health studies and regional toxics studies.

Mission Viejo
The Mission Viejo site was established at its current location at 26081 Via Pera during June 1999. We currently hold a 5 year lease with the El Toro Water District for the monitoring location and do not anticipate any changes in the near future. The infrastructure meets the needs of the air monitoring network; however, there is no room for further expansion within the current compound. The site is in compliance with 40

CFR § 58 Appendix E Probe Siting Criteria. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. The cost to relocate the site to meet probe siting criteria will be significant due to the number of samplers and the current low cost lease.

Norco

The Norco site was established at its current location on the grounds of the Naval Surface Warfare Center in December 1980 to examine O3 and particulates. We currently have a 5 year contract through 2014 and do not anticipate any changes in the near future. The infrastructure of the facility meets the needs of particulate sampling, but there are no facilities for continuous analyzers. The site is in compliance with 40 CFR § 58 Appendix E Probe Siting Criteria. The cost to maintain the site is high, with a technician traveling to the site to maintain a single instrument. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. There are no synergies between air monitoring programs or use of office space by inspectors. The cost to relocate the site is low to a single instrument at the site. This cost can be further mitigated by consolidation with a nearby site.

Ontario Fire Station

The Ontario Fire Station site was established at its current location at 1408 E. Francis during January 1999. We currently hold a 4 year lease with the City of Ontario for our current monitoring location and do not anticipate any changes in the near future. The infrastructure of the facility meets the needs of particulate sampling, but there are no facilities for continuous analyzers. The site does not currently meet 40 CFR § 58 Appendix E Probe Siting Criteria, specifically spacing from obstructions surrounding the instrumentation. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. There are no synergies between air monitoring programs or use of office space by inspectors. The cost to relocate the site is high due to the number of samplers but this can be mitigated by consolidation with a nearby site.

Palm Springs

The Palm Springs site was established at its current location at 590 Racquet Club Road during April 1971. We currently hold a 4 year lease with the City of Palm Springs for our current monitoring location and do not anticipate any changes in the near future. The infrastructure of the facility currently meets the needs of the monitoring network, but there is no room for future expansion. The site does not currently meet 40 CFR § 58 Appendix E Probe Siting Criteria, specifically spacing from obstructions and probe distance from traffic lane. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. There are no synergies between air monitoring programs or use of office space by inspectors. The cost to relocate the site to meet probe siting criteria will be high due to number of analyzers and length of service.

Pasadena
The Pasadena site was established at its current location at 752 Wilson Ave during April 1982. We currently hold a month to month lease with the California Institute of Technology for our current monitoring location and do not anticipate any changes in the near future. The infrastructure of the facility requires attention. The current monitoring platform is housed in a structure, which is outdated. Money has been set aside for a new monitoring platform but basic infrastructure is lacking and the compound in which the site is housed needs to be expanded. The site does not currently meet 40 CFR § 58 Appendix E Probe Siting Criteria, specifically spacing from trees requirement. Spacing from trees for all pollutants should be at least 10 m. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. There are no synergies between air monitoring programs or use of office space by inspectors. The cost to relocate the site to meet probe siting criteria will be higher due to the number of samplers, length of service, and cost of space in the area.

Perris
The Perris site was established at its current location at 237 North D Street during May 1973. We currently hold a 2 year lease for our current monitoring location with Riverside County and do not anticipate any changes in the near future. The current monitoring platform is housed in a structure which requires attention. The site does not currently meet 40 CFR § 58 Appendix E Probe Siting Criteria, specifically spacing from obstructions. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. There are no synergies between air monitoring programs or use of office space by inspectors. The cost to relocate the site to meet probe siting criteria will be higher than the current location, which is at no cost due to its location on a public facility.

Pico Rivera #2
The Pico Rivera #2 site was established at its current location at 4144 San Gabriel River Parkway in September 2005 after moving from 3713-B San Gabriel River Parkway due to influences from surrounding facilities. We currently hold a 2 year lease with the Whittier Utility Authority and do not anticipate any changes in the near future. The infrastructure of the facility meets the needs of the air monitoring network. The site is in compliance with 40 CFR § 58 Appendix E Probe Siting Criteria. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include PAMS and Regional Toxics studies. The cost to relocate the site is high due to the number of samplers, length of service and cost of space in the area.

Pomona
The Pomona Fire Station site was established at its current location at 924 Garey Ave in June 1965 to investigate CO emissions from motor vehicles. We currently hold a 3 year lease and do not anticipate any changes in the near future. The infrastructure of the facility requires attention. The current monitoring building is outdated and does not allow for particulate sampling. The site does not currently meet 40 CFR § 58 Appendix E Probe Siting Criteria, specifically spacing from roadway for O_3 and NO_2. Distances

are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. There are no synergies between air monitoring programs; however, calibration and repair technicians use space as a workshop. The cost to relocate the site is high due to the number of samplers and length of service, but this can be mitigated by consolidation with a nearby sites.

Redlands
The Redlands site was established at its current location at 500 Deerborn Ave during September 1986. We currently hold a month to month lease with the City of Redlands and do not anticipate any changes in the near future. The infrastructure of the facility requires attention. The current monitoring platform is housed in a structure which is outdated. Money has been set aside for a new monitoring platform, but basic infrastructure is lacking and the compound in which the site is housed needs to be expanded. The site does not currently meet 40 CFR § 58 Appendix E Probe Siting Criteria, specifically spacing from trees requirement. Spacing from trees for all pollutants should be at least 10 m. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. There are no synergies between air monitoring programs or use of office space. The cost to relocate the site to meet probe siting criteria will be higher than the current location which is on a public facility.

Rehrig (Exide)
The Rehrig site was established at 4010 E. 26th Street in the City of Vernon during October 2007 to monitor Pb source emissions from the Exide facility in the City of Vernon. We currently have an agreement with the owners of the property to allow us to sample and do not anticipate any changes in the near future. The infrastructure is adequate and probe siting criteria meets requirements for source impact siting.

Reseda
The Reseda site was established at its current location at 18330 Gault Street during March 1965. We currently hold a 5 year lease with the owners of the monitoring location and do not anticipate any changes in the near future. The infrastructure of the facility is adequate. The site however does not currently meet 40 CFR § 58 Appendix E Probe Siting Criteria, specifically spacing from traffic lane for O3 and NO2. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. There are no synergies between air monitoring programs; however, administrative synergies include use of office space for Air Quality Inspectors. The cost to relocate the site to meet probe siting criteria will be higher than the current location due to the high cost of rent in the area, number of monitors, and length of service.

Riverside (Magnolia)
The Riverside site was established at its current location at 7002 Magnolia Avenue during October 1972 by the CARB to investigate CO emissions from motor vehicles. We currently have a 3 year lease with the owners of the facility for our monitoring location and do not expect any changes in the near future. The monitoring platform meets the

needs of the current monitoring program; however, there is no room for further expansion. The site does not meet 40 CFR § 58 Appendix E Probe Siting Criteria, specifically spacing from roadway which is detailed in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include health studies research; administrative synergies include use of office space for Air Quality Inspectors. The cost to relocate the site to meet probe siting criteria will be higher than the current location due to the high cost of rent in the area, number of monitors, and length of service.

Rubidoux

The Rubidoux site was established at its current location at 5888 Mission Boulevard during September 1972. We currently hold a 3 year lease with Southern California Edison for our current monitoring location and do not anticipate any changes in the near future. The infrastructure of the facility has been recently updated and meets the need of monitoring network. The site is currently in compliance with 40 CFR § 58 Appendix E Probe Siting Criteria. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include speciated PM2.5 sampling, PAMS, STN, NATTS, NCORE, CARB Toxics monitoring, and regional toxics air monitoring studies. The cost to relocate the site to meet probe siting criteria will be higher than the current location due to the number of monitors, length of service, and cost of rent in the area.

San Bernardino

The San Bernardino site was established at its current location at 24302 East 4th Street during May 1986. We currently hold a 3 year lease with the City of San Bernardino Unified School District and do not anticipate any changes in the near future. The infrastructure of the facility requires attention. The current monitoring platform is housed in a structure which is outdated. Money has been set aside for a new monitoring platform, but basic infrastructure is lacking and the compound in which the site is housed needs to be expanded. The site is in compliance with 40 CFR § 58 Appendix E Probe Siting Criteria with criteria shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include EJ and regional toxics studies. The cost to relocate the site to meet probe siting criteria will be higher than the current location due to the number of instruments, length of service, and cost of rent in the area.

Santa Clarita

The Santa Clarita site was established at its current location at 22224 Placerita Canyon Road during May 2001 after moving from 24875 San Fernando Road at the request of Los Angeles County Fire Station #73. We currently have an agreement with Los Angeles County for space and do not anticipate any changes in the near future. The infrastructure of the facility meets the needs of the air monitoring network. The site is in compliance with 40 CFR § 58 Appendix E Probe Siting Criteria. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include PAMS and

Regional Toxics studies. The cost to relocate the site is high due to the number of samplers, length of service, and cost of space in the area.

South Long Beach

The South Long Beach site was established at its current location at 1305 E Pacific Coast Highway during June 2003 to monitor particulate influence from port activities. We currently have an agreement to monitor with the Long Beach City College for our current monitoring location and do not anticipate any changes in the near future. The infrastructure of the facility meets the needs of particulate sampling, but there are no facilities for continuous analyzers and no room for expansion. The site does not currently meet 40 CFR § 58 Appendix E Probe Siting Criteria, specifically spacing from obstructions surrounding the instrumentation. Distances are shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. There are no synergies between air monitoring programs or use of office space by inspectors. The cost to relocate the site is low due to the number of samplers and this can be further mitigated by consolidation with a nearby site.

Temecula

The Temecula site was established at its current location at Lake Skinner MWD Facilities during July 2010. We currently hold an open ended lease with MWD for our current monitoring location and do not anticipate any changes in the near future. The infrastructure meets the needs of the monitoring network and is in compliance with 40 CFR § 58 Appendix E Probe Siting Criteria. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. There are no synergies between air monitoring programs and the site is restricted to operations personnel only.

Uddelholm

The Uddelholm site was established at 9313 Santa Fe Springs Road in the City of Santa Fe Springs during October 1992 to monitor Pb source emissions from the Trojan Battery facility. We currently have an agreement with the owners of the property to allow us to sample and do not anticipate any changes in the near future. The infrastructure is adequate and probe siting criteria meets requirements for source impact siting.

Upland

The Upland site was established at its current location at 1350 San Bernardino Road during March 1973. We currently hold a month to month lease with the Upland Cascade Mobile Home Park for our monitoring location and do not anticipate any changes in the near future. The monitoring platform is adequate for the current location and the site is in compliance with 40 CFR § 58 Appendix E Probe Siting Criteria. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. Synergies between air monitoring programs include the regional health studies. The cost to relocate the site will be high due to potential higher rent, number of samplers, and length of service. This can be mitigated by consolidating the site with nearby air monitoring locations.

Van Nuys Airport

The Van Nuys Airport site was established at 16345 Raymer during January 2010 to monitor Pb source emissions from the Van Nuys Airport. We currently have an agreement with the owners of the property to allow us to sample and do not anticipate any changes in the near future. The infrastructure is adequate and probe siting criteria meets requirements for source impact siting.

West Los Angeles

The West Los Angeles site was established at its current location at Wilshire and Sawtelle Boulevards on the grounds of the Veterans Administration Hospital during May 1984. We currently have an agreement with the VA Administration to monitor and do not anticipate any changes in the near future. The infrastructure of the facility requires attention. The current monitoring platform is housed in a structure which is outdated. The site is in compliance with 40 CFR § 58 Appendix E Probe Siting Criteria with criteria shown in Table 15. Non-NAAQS data uses include modeling and forecasting of daily pollution levels for public information. There are no synergies between air monitoring programs or use of office space. The cost to relocate the site to meet probe siting criteria will be higher than the current location due to the number of instruments, length of service, and cost of rent in the area.

TABLE 15 Probe Siting

Metric: Station	Metric: Pollutant	Horizontal and vertical placement	Spacing from minor sources	Spacing from obstructions	Spacing from trees: Actual	Spacing from trees: Required	Probe distance from traffic lane (m): Actual	Probe distance from traffic lane (m): Required	ADT Volume	Probe material and sample residence time
Anaheim	O3	1	None	None	**6**	>10	**7.5**	>10	<500	7.4
	CO	1	None	None	**6**	>10	**7.5**	>10	<500	6.4
	NO2	1	None	None	**6**	>10	**7.5**	>10	<500	7.5
	PM10	2	None	None	11	>10	**10.5**	>15	<500	NA
	PM2.5	1	None	None	**8**	>10	**10**	>15	<500	NA
Azusa	O3	1	26 [1]	None	23	>10	14.5	>10	<500	7.9
	CO	1	26 [1]	None	23	>10	14.5	>10	<500	6.7
	NO2	1	26 [1]	None	23	>10	14.5	>10	<500	8.5
	PM10	2	26 [1]	None	23	>10	18.5	>15	<500	NA
	PM2.5	1	26 [1]	None	23	>10	15.8	>15	<500	NA
Banning	O3	1	60 [2]	47	None		80	>20	<2000	8.2
	NO2	1	60 [2]	47	None		80	>20	<2000	9.1
	PM10	2	60 [2]	47	None		80	>15	<2000	NA
Big Bear	PM2.5	1	None	32	36	>10	114	>15	2876	NA
Burbank	O3	1	None	None	18	>10	**13.8**	>20	<2000	6.5
	CO	1	None	None	18	>10	13.8	>10	<2000	6.3
	NO2	1	None	None	18	>10	**13.8**	>20	<2000	7.8
	SO2	1	None	None	18	>10	13.8	NA	<2000	7.9
	PM10	2	None	None	19	>10	**13.8**	>15	<2000	NA
	PM2.5	1	None	None	20	>10	**13.8**	>15	<2000	NA
Compton	O3	1	None	None	16	>10	16.36	>10	<1000	7.6
	CO	1	None	None	16	>10	16.36	>10	<1000	8.7
	NO2	1	None	None	16	>10	16.36	>10	<1000	8.2
	PM2.5	1	None	None	13	>10	21	>15	<1000	NA
	Pb	2	None	None	17	>10	23	>15	<1000	NA
Costa Mesa	O3	1	None	None	18	>10	34	>20	<2000	6.7
	CO	1	None	None	18	>10	34	>10	<2000	7.4
	NO2	1	None	None	18	>10	34	>20	<2000	8.8
	SO2	1	None	None	18	>10	34	NA	<2000	9.5
Crestline	O3	1	None	None	**9**	>10	55	>20	<8000	10
	PM10	2	None	None	**8**	>10	55	>15	<8000	NA
	PM2.5	2	None	None	**7**	>10	55	>15	<8000	NA

[1] Welding shop

[2] Propeller airplane exhaust

TABLE 15 (cont) Probe Siting

Metric		Horizontal and vertical placement	Spacing from minor sources	Spacing from obstructions	Spacing from trees		Probe distance from traffic lane (m)		ADT Traffic Volume	Probe material and sample residence time
Station	Pollutant				Actual	Required	Actual	Required		
Fontana	O3	1	9 [3,4]	None	19	>10	92	>30	12500	5.5
	CO	1	9 [3,4]	None	19	>10	92	>25	12500	5.1
	NO2	1	9 [3,4]	None	19	>10	92	>30	12500	6.0
	SO2	1	9 [3,4]	None	19	>10	92	NA	12500	6.5
	PM10	2	9 [3,4]	None	14	>10	86	>15	12500	NA
	PM2.5	1	9 [3,4]	None	16	>10	86	>15	12500	NA
Glendora	O3	1	None	None	16	>10	121	>20	1834	7.6
	CO	1	None	None	16	>10	121	>10	1834	7.0
	NO2	1	None	None	16	>10	121	>20	1834	7.8
	PM10	2	6 [3]	None	16	>10	121	>15	1834	NA
	PM2.5	1	6 [3]	None	16	>10	121	>15	1834	NA
Indio	O3	1	6 [3]	60	None		88	>40	16528	12.5
	PM10	2	6 [3]	60	None		88	>17	16528	NA
	PM2.5	1	6 [3]	60	None		88	>17	16528	NA
La Habra	O3	1	28 [5]	None	3	>10	40	>100	66200	7.5
	CO	1	28 [5]	None	3	>10	40	>150	66200	6.1
	NO2	1	28 [5]	None	3	>10	40	>100	66200	7.4
Lake Elsinore	O3	1	None	None	17	>10	50	>20	<2000	5.1
	CO	1	None	None	17	>10	50	>10	<2000	5.1
	NO2	1	None	None	17	>10	50	>20	<2000	5.7
	PM10	2	None	None	10	>10	50	>15	<2000	NA
	PM2.5	1	None	None	10	>10	50	>15	<2000	NA
LAX Hastings	O3	1	600 [6]	None	20	>10	85	>20	<2000	6.1
	CO	1	600 [6]	None	20	>10	85	>10	<2000	6.5
	NO2	1	600 [6]	None	20	>10	85	>20	<2000	6.8
	PM10	2	600 [6]	None	16	>10	92	>15	<2000	NA
	Pb	2	600 [6]	None	16	>10	92	>15	<2000	NA

[3] Unpaved parking
[4] Diesel nearby
[5] Refueling station nearby
[6] Airport runway nearby

TABLE 15 (cont) Probe Siting

Metric		Horizontal and vertical placement	Spacing from minor sources	Spacing from obstructions	Spacing from trees		Probe distance from traffic lane (m)		ADT Traffic Volume	Probe material and sample residence time
Station	Pollutant				Actual	Required	Actual	Required		
Long Beach (North)	O3	1	None	5	**6**	>10	**8**	>40	19900	6.9
	CO (µs)	1	None	5	**6**	>10	8	2-10	19900	6.1
	NO2	1	None	5	**6**	>10	**8**	>40	19900	8.4
	SO2	1	None	5	**6**	>10	8	NA	19900	8.9
	PM10	2	None	5	**4**	>10	**8**	>20	19900	NA
	PM2.5	1	None	11	None		55	>20	19900	NA
	Pb (µs)	2	None	5	**4**	>10	10	2-10	19900	NA
Los Angeles (Main St.)	O3	1	45	30	None		71	>40	15276	7.1
	CO	1	45	30	None		71	>45	15276	7.2
	NO2	1	45	30	None		71	>40	15276	7.6
	SO2	1	45	30	None		71	NA	15276	9.5
	PM10	2	27	52	None		51	>15	15276	NA
	PM2.5	1	27	52	None		51	>15	15276	NA
	Pb	2	27	52	None		51	>15	15276	NA
Mira Loma (Jurupa)	O3	1	None	2	None		165	>60	25717	4.5
	CO	1	None	2	None		165	>80	25717	4.8
	NO2	1	None	2	None		165	>60	25717	6.1
	PM10	2	None	2	None		165	>25	25717	NA
Mira Loma (Van Buren)	O3	1	None	None	36	>10	14	>10	<1000	6.7
	CO	1	None	None	36	>10	14	>10	<1000	5.9
	NO2	1	None	None	36	>10	14	>10	<1000	7.0
	PM10	2	None	None	40	>10	15	>15	<1000	NA
	PM2.5	2	None	None	40	>10	15	>15	<1000	NA
Mission Viejo	O3	1	None	None	None		138	>20	<2000	11.4
	CO	1	None	None	None		138	>10	<2000	11.1
	PM10	2	None	None	None		175	>15	<2000	NA
	PM2.5	1	None	None	None		175	>15	<2000	NA
Norco	PM10	2	None	None	29	>10	25	>15	<500	NA
Ontario (Fire-Station)	PM10	2	96 [7]	7	18	>10	43	>15	<2000	NA
	PM2.5	1	96 [7]	7	20	>10	43	>15	<2000	NA

[7] Fire training facility

TABLE 15 (cont) Probe Siting

Metric		Horizontal and vertical placement	Spacing from minor sources	Spacing from obstructions	Spacing from trees		Probe distance from traffic lane (m)		ADT Traffic Volume	Probe material and sample residence time
Station	Pollutant				Actual	Required	Actual	Required		
Palm Springs	O3	1	None	None	22	>10	**17**	>20	<5000	9.3
	CO	1	None	None	22	>10	17	>10	<5000	8.3
	NO2	1	None	None	22	>10	**17**	>20	<5000	9.5
	PM10	2	None	3	19	>10	20	>15	<5000	NA
	PM2.5	1	None	3	19	>10	**13**	>15	<5000	NA
Pasadena	O3	1	None	None	**6**	>10	66	>20	<5000	6.7
	CO	1	None	None	**6**	>10	66	>10	<5000	6.1
	NO2	1	None	None	**6**	>10	66	>20	<5000	6.7
	PM2.5	1	None	None	**6**	>10	70	>15	<5000	NA
Perris	O3	1	None	7	30	>10	74	>60	39500	7.4
	PM 10	2	None	7	30	>10	74	>40	39500	NA
Pico Rivera	O3	1	9 [3]	None	30	>10	41	>40	<20000	6.8
	CO	1	9 [3]	None	30	>10	**41**	>45	<20000	6.7
	NO2	1	4 [3]	None	30	>10	41	>40	<20000	6.5
	PM2.5	1	4 [3]	None	27	>10	35	>20	<20000	NA
	Pb/SO4	2	4 [3]	None	27	>10	35	>20	<20000	NA
Pomona	O3	1	None	None	None		**7**	>60	25000	7.4
	CO (µs)	1	None	None	None		7	2-10	25000	7.0
	NO2	1	None	None	None		**7**	>60	25000	8.2
Redlands	O3	1	2 [3]	None	**8**	>10	26	>20	4709	17.5
	PM10	2	2 [3]	None	10	>10	26	>15	4709	NA
Reseda	O3	1	10 [10]	None	14	>10	**16**	>20	<2000	6.7
	CO	1	10 [10]	None	14	>10	16	>10	<2000	6.0
	NO2	1	10 [10]	None	14	>10	**16**	>20	<2000	7.8
	PM2.5	1	10 [10]	None	14	>10	19	>15	<2000	NA
Riverside	CO (µs)	1	None	None	15	>10	**27**	2-10	40,000	11.4
	NO2	1	None	None	15	>10	**27**	>60	40,000	12.9
	PM2.5	1	None	None	15	>10	**28**	>40	40,000	NA
	Pb/SO4(µs)	2	None	None	15	>10	**28**	2-10	40,000	NA

[3] Unpaved parking
[8] Print shop

TABLE 15 (cont) Probe Siting

Metric		Horizontal and vertical placement	Spacing from minor sources	Spacing from obstructions	Spacing from trees (m)		Probe distance from traffic lane (m)		ADT Traffic Volume	Probe material and sample residence time
Station	Pollutant				Actual	Required	Actual	Required		
Rubidoux	O3	1	None	38	10	>10	119	>40	<20,000	4.7
	CO	1	None	38	10	>10	119	>45	<20,000	5.6
	NO2	1	None	38	10	>10	119	>40	<20,000	7.6
	SO2	1	None	38	10	>10	119	NA	<20,000	7.5
	PM10	2	None	18	10	>10	119	>20	<20,000	NA
	PM2.5	1	None	20	10	>10	119	>20	<20,000	NA
	Pb/SO4	2	None	18	10	>10	119	>20	<20,000	NA
San Bernardino	O3	1	None	None	14	>10	23	>20	<2500	7.9
	CO	1	None	None	14	>10	23	>10	<2500	7.4
	NO2	1	None	None	14	>10	23	>20	<2500	8.7
	PM10	2	None	None	19	>10	16	>15	<2500	NA
	PM2.5	1	None	None	19	>10	16	>15	<2500	NA
	Pb	2	None	None	19	>10	16	>15	<2500	NA
Santa Clarita	O3	1	None	None	30	>10	91	>20	<5000	6.6
	CO	1	None	None	30	>10	91	>10	<5000	6.0
	NO2	1	None	None	30	>10	91	>20	<5000	6.5
	PM10	2	None	None	30	>10	91	>15	<5000	NA
	PM2.5	1	None	None	30	>10	91	>15	<5000	NA
Long Beach (South)	PM10	2	None	20	None		86	>15	<10000	NA
	PM2.5	1	None	20	None		86	>15	<10000	NA
	Pb/SO4	2	None	20	None		86	>15	<10000	NA
Temecula	O3	1	450 [10]	30 [9]	60	>10	1056	>20	6500	TBD
	PM10	2	450 [10]	30 [9]	60	>10	1056	>15	6500	TBD
Upland	O3	1	None	None	19	>10	80	>20	<10000	9.5
	CO	1	None	None	19	>10	80	>10	<10000	8.4
	NO2	1	None	None	19	>10	80	>20	<10000	8.7
	PM10	2	None	None	12	>10	80	>15	<10000	NA
	PM2.5	1	None	None	12	>10	80	>15	<10000	NA
	Pb/SO4	2	None	None	12	>10	80	>15	<10000	NA
West Los Angeles	O3	1	None	None	45	>10	23	>20	<10000	7.5
	CO	1	None	None	45	>10	23	>10	<10000	6.9
	NO2	1	None	None	45	>10	23	>20	<10000	7.9

[9] Microwave tower

[10] Water treatment facility

TABLE 16 Individual Site Assessment Summary

	Site Longevity (Years)	Security of Future Occupancy	Infrastructure				Probe and Monitoring Path Criteria		Data Use Other Than NAAQS	Cost to Move	Synergies Gained
			Building	Electricity	Communications	Space	Obstructions	Distance from Traffic Lane			
Anaheim	9	Secure	Inadequate	Inadequate	Adequate	Inadequate	Obstructed	Inadequate	Yes	High	No
ATSF	10	Secure	Adequate	Adequate	Adequate	Adequate	Unobstructed	Adequate	No	Low	No
Azusa	53	Secure	Adequate	Adequate	Adequate	Adequate	Unobstructed	Adequate	Yes	Low	Yes
Banning Airport	13	Secure	Adequate	Adequate	Adequate	Adequate	Unobstructed	Adequate	Yes	High	Yes
Big Bear	11	Secure	Adequate	Adequate	Adequate	Adequate	Unobstructed	Adequate	No	Low	No
Burbank	49	Secure	Adequate	Adequate	Adequate	Adequate	Unobstructed	Inadequate	Yes	High	Yes
Closet World	2	Secure	NA	Adequate	NA	Adequate	Unobstructed	Adequate	No	Low	No
Compton	6	Secure	Adequate	Adequate	Adequate	Adequate	Unobstructed	Adequate	Yes	High	Yes
Costa Mesa	21	Secure	No	No	Adequate	No	Unobstructed	Adequate	Yes	High	Yes
Crestline	37	Secure	No	No	Adequate	Adequate	Unobstructed	Adequate	Yes	High	No
Fontana	29	Secure	Adequate	Adequate	Adequate	No	Obstructed	Adequate	Yes	High	Yes
Glendora	30	No	No	Adequate	Adequate	No	Unobstructed	Adequate	Yes	Low	Yes
Indio	27	Secure	No	Adequate	Adequate	No	Obstructed	Adequate	Yes	High	No
La Habra	50	Secure	No	No	No	No	Obstructed	Inadequate	No	High	No
Lake Elsinore	23	Secure	Adequate	Adequate	Adequate	Adequate	Unobstructed	Adequate	Yes	High	Yes
LAX Hastings	6	Secure	Adequate	Adequate	Adequate	No	Unobstructed	Adequate	Yes	High	Yes
Long Beach (North)	48	Secure	Adequate	Adequate	Adequate	Adequate	Obstructed	Inadequate	Yes	High	Yes
Los Angeles (Main Street)	31	Secure	No	No	No	No	Unobstructed	Adequate	Yes	High	Yes
Mira Loma (Jurupa)	17	No	No	No	No	No	Obstructed	Adequate	Yes	Low	Yes
Mira Loma (Van Buren)	5	Secure	Adequate	Adequate	Adequate	Adequate	Unobstructed	Adequate	Yes	High	Yes
Mission Viejo	11	Secure	Adequate	Adequate	Adequate	No	Unobstructed	Adequate	No	High	No

TABLE 16 (cont) Individual Site Assessment Summary

	Site Longevity	Security of Future Occupancy	Infrastructure				Probe and Monitoring Path Criteria		Data Use Other Than NAAQS	Cost to Move	Synergies Gained
			Building	Electricity	Communications	Space	obstructed	Distance from Traffic Lane			
Norco	30	Secure	NA	Adequate	NA	Inadequate	Unobstructed	Adequate	No	Low	No
Ontario Fire Station	11	Secure	NA	Adequate	NA	Inadequate	Unobstructed	Adequate	No	High	No
Palm Springs	39	Secure	Adequate	Adequate	Adequate	Inadequate	Obstructed	Inadequate	No	High	No
Pasadena	28	Secure	Inadequate	Adequate	Adequate	Inadequate	Obstructed	Adequate	No	High	No
Perris	37	Secure	Inadequate	Adequate	Adequate	Inadequate	Obstructed	Adequate	No	High	No
Pico Rivera #2	5	Secure	Adequate	Adequate	Adequate	Adequate	Unobstructed	Adequate	Yes	High	Yes
Pomona	45	Secure	Inadequate	Adequate	Adequate	Inadequate	Unobstructed	Inadequate	No	High	No
Redlands	24	Secure	Inadequate	Adequate	Adequate	Adequate	obstructed	Adequate	No	High	No
Rehrig (Exide)	3	Secure	NA	Adequate	NA	Adequate	Unobstructed	Adequate	No	Low	No
Reseda	45	Secure	Adequate	Adequate	Adequate	Adequate	Unobstructed	Inadequate	No	High	No
Riverside (Magnolia)	38	Secure	Adequate	Adequate	Adequate	Inadequate	Obstructed	Inadequate	Yes	High	Yes
Rubidoux	38	Secure	Adequate	Adequate	Adequate	Adequate	Unobstructed	Adequate	Yes	High	Yes
San Bernardino	24	Secure	Inadequate	Adequate	Adequate	Inadequate	Unobstructed	Adequate	Yes	High	Yes
Santa Clarita	9	Secure	Adequate	Adequate	Adequate	Adequate	Unobstructed	Adequate	Yes	High	Yes
South Long Beach	7	Secure	NA	Adequate	NA	Inadequate	Obstructed	Adequate	Yes	High	No
Temecula	< 1 yr	Secure	Adequate	Adequate	Adequate	Adequate	Unobstructed	Adequate	No	High	No
Uddelholm (Trojan Battery)	18	Secure	NA	Adequate	Adequate	Adequate	Unobstructed	Adequate	No	Low	No
Upland	37	Secure	Inadequate	Adequate	Adequate	Adequate	Unobstructed	Adequate	Yes	High	Yes
Van Nuys Airport	< 1 yr	Secure	NA	Adequate	Adequate	Adequate	Unobstructed	Adequate	No	Low	No
West Los Angeles	26	Secure	Inadequate	Adequate	NA	Adequate	Unobstructed	Adequate	Yes	High	No

TABLE 17 Summary Table

Site	Issue	Description
Anaheim	Spacing from trees - proximity to tree s/b > 10 m from dripline	Anaheim is 6 m from palm tree.
	Probe distance from traffic lane	O3 CO and NO2 are 7.5 m s/b $\geq$ 10 m; PM10 and PM2.5 are 10 m s/b $\geq$ 15 m for neighborhood scale
Azusa	Spacing from minor sources	Azusa is 26 m down wind from welding shop.
Banning	Spacing from minor sources	Banning is 60 m from leaded gasoline aircraft runway.
Burbank	Probe distance from traffic lane	O3 and NO2 are 13.8 m s/b $\geq$ 20 m; PM10 and PM2.5 are 13.8 m s/b $\geq$ 15 m
Crestline	Spacing from trees - proximity to tree s/b > 10 m from dripline	Crestline is 8 m from pine tree.
Fontana	Spacing from minor sources	Fontana is 9 m from regularly idling diesel exhaust and unpaved parking. Particulate monitoring should not be located in unpaved areas.
Glendora	Spacing from minor sources	Glendora is 3 m from unpaved parking. Particulate monitoring should not be located in unpaved areas.
Indio	Spacing from minor sources	Indio is 3 m from unpaved parking. Particulate monitoring should not be located in unpaved areas.
La Habra	Spacing from minor sources	La Habra is 28 m from refueling facility.
	Spacing from trees - proximity to tree s/b > 10 m from dripline	La Habra is 3 m from cypress.
	Probe distance from traffic lane	O3 and NO2 are 40 m s/b $\geq$ 100 m; CO is 40 m s/b $\geq$ 150 m for neighborhood scale
Long Beach	Probe distance from traffic lane	O3 and NO2 are 8 m s/b $\geq$ 40 m; PM10 is 8 m s/b $\geq$ 20 m for neighborhood scale. Pb and CO are microscale
Long Beach (North)	Spacing from obstructions	North Long Beach is 5 m from building that exceeds height requirement for particulates.
	Spacing from trees - proximity to tree s/b > 10 m from dripline	North Long Beach is 4 m from tree.
Los Angeles (Main)	Probe siting - inlet probe height	Los Angeles (Main) inlet probe height > 2-15 m for neighborhood scale requirement
Mira Loma	Spacing from obstructions	Mira Loma (Jurupa) is 2 m from building which exceeds height requirement for particulates.
Palm Springs	Spacing from obstructions	Palm Springs is 3 m from building that exceeds height requirement for particulates.
	Probe distance from traffic lane	O3 and NO2 are 17 m s/b $\geq$ 20 m
Pasadena	Spacing from trees - proximity to tree s/b > 10 m from dripline	Pasadena is 6 m from tree.
Pico Rivera	Spacing from minor sources	Pico Rivera is 4 m from unpaved parking. Particulate monitoring should not be located in unpaved areas.
	Probe distance from traffic lane	CO is 41 m s/b $\geq$ 45 m
Pomona	Probe distance from traffic lane	O3 and NO2 are 7 m s/b $\geq$ 60 m; CO is microscale
Redlands	Spacing from minor sources	Redlands is 2 m from unpaved parking. Particulate monitoring should not be located in unpaved areas.
	Spacing from trees - proximity to tree s/b > 10 m from dripline	Redlands is 8 m from tree.
Reseda	Spacing from minor sources	Reseda is 10 m from print shop.
	Probe distance from traffic lane	O3 and NO2 are 16 m s/b $\geq$ 20 m
Riverside	Probe siting - inlet probe height	Riverside roadside microscale CO > 3 +/- 1/2 m requirement
	Probe distance from traffic lane	NO2 is 27 m s/b $\geq$ 60 m; particulate are 28 m s/b $\geq$ 42 m except Pb (microscale)

III. NETWORK ASSESSMENT

OVERVIEW

The current AQMD pollutant monitoring networks meet or exceed U.S. EPA monitoring requirements and satisfy multiple monitoring purposes. This section describes the process for assessing individual pollutant networks and monitoring programs in the South Coast AQMD monitoring network. The criteria for assessing the networks include the examination of overall network monitoring objectives, the spatial scales of representativeness, the minimum number of monitors required by regulation, and correlation analysis to determine redundancy or gaps within each network.

NETWORK ASSESSMENT CRITERIA DESCRIPTIONS

The criteria used for network assessment are described below. They include an assessment of monitoring objectives and spatial scales relative to 40 CFR § 58 Appendix D criteria. Another criteria was a correlation analysis using the provided U.S. EPA tools to identify redundant sites or geographical areas which may need additional sites within a monitoring network. Finally, networks were evaluated against the regulatory requirements for the minimum number of monitors using the latest census data available.

Monitoring Objectives

Over the last twenty years, population, sources of pollution, ambient levels of pollution, and the South Coast AQMD air monitoring network have been modified. A periodic reassessment of monitoring objectives will help ensure that the current network design meets the original and any new monitoring objectives.

Ambient air monitoring network design is specified, at a minimum, by the U.S. EPA and includes monitoring objectives and general criteria as outlined in 40 CFR § 58 Appendix D. Each pollutant measured at each air monitoring site is related to a specific monitoring objective. Depending on pollutant, air monitoring networks are designed to meet all or a subset of the following objectives:

- *Highest concentrations* expected to occur in the geographical area covered by the network.
- *Representative concentrations in areas of high population density* in the geographical area covered by the network.
- *Impact* of significant sources or source categories of pollution such as refineries or specific area sources such as residential fuel combustion.
- *Background* concentration levels, usually located upwind of the air monitoring network.
- *Regional transport* of pollution to areas outside of the monitoring network usually located downwind of the air monitoring network.
- The last type of site required measures air pollution impacts on visibility, vegetation damage, or other *welfare based* impacts.

Spatial Scale of Representativeness

Each monitoring objective or site type is also related to a specific spatial scale of representativeness as shown in Table 8. The goal in deciding on a location for a monitor is to correctly match the spatial scale of representativeness with the monitoring objective for the site being established. Spatial scale of representativeness is the physical dimension of the air parcel being represented by the air monitoring location. Spatial scales are defined as:

- Microscale – represents concentrations in an area ranging from several meters to 100 m.
- Middle scale – represents concentrations in an area from 100 m to .5 kilometers.
- Neighborhood scale – represents concentrations in an area that has uniform land use and is .5 kilometers to 4.0 kilometers.
- Urban scale – represents concentrations in an area the size of a city, from 4 to 50 kilometers in size. Influence from sources of pollution may prevent homogenous representation of a pollutant on an urban scale.
- Regional scale – represents concentrations in a homogenous geographical area without large sources of pollution, usually tens to hundreds of kilometers in size.

Correlation Analysis

The U.S. EPA provided tools to assist in the network assessment process. The Correlation Matrix Analysis shows the correlation, relative difference, and distance between pairs of sites within a Core Based Statistical Area (CBSA) or a region. During the static analysis, each CBSA displays a graphical matrix for O3, PM2.5 reference, and equivalent methods and continuous particulate sites. The shape of ellipses represents the Pearson squared correlation between sites with circles representing zero correlation and a straight diagonal line representing a perfect correlation. The correlation between two sites quantitatively describes the degree of relatedness between the measurements made at two sites. The correlation, however, may indicate whether a pair of sites is related, but it does not indicate if one site consistently measures pollutant concentrations at levels substantially higher or lower than the other. For this purpose, the color of the ellipses represents the average relative difference between sites where the daily relative difference is defined as:

$$\frac{abs(s1-s2)}{avg(s1,s2)}$$

Where *s*1 and *s*2 represent the concentrations at sites one and two in the pairing, *abs* is the absolute difference between the two sites and *avg* is the average of the two site concentrations. The average relative difference between the two sites is an indicator of the overall measurement similarity between the two sites. Site pairs with a lower average relative difference are more similar to each other than pairs with a larger difference. The distance between the sites influences both the correlation and the relative difference between sites. Usually sites with a larger distance between them will generally be more poorly correlated and have large differences in the corresponding pollutant concentrations. The distance between site pairs in the correlation matrix graphic is displayed in kilometers in the middle of each ellipse.

The purpose of this analysis tool is to provide a means of identifying potential redundant sites that could be removed. Potentially redundant sites exhibit fairly high correlations of 0.8 consistently across all of their pairings and have low average relative difference, despite the distance between it and other sites. Usually, it is expected that correlation between sites will decrease as distance increases. However, for a regional air pollutant such as O3, sites in the same air shed can have very similar concentrations and be highly correlated. More unique sites will tend to exhibit the opposite characteristics. They will not be very well correlated with other sites and their relative difference would be higher than other site-to-site pairs.

Note that results from such a correlation analysis are just one criteria in assessing the value of sites within a network. Other site-specific or network design factors, such as health studies, EJ, inter-program synergies, long-term trends, and logistical constraints may add value to a site even if the measured concentrations are similar to other nearby sites.

Minimum number of monitors

As a general requirement, the U.S. EPA specifies the minimum numbers of sites required in a criteria pollutant network based on the latest census population data. For instance, the minimum number of O3 sites required is based upon the MSA population and the most recent 3-year design value as shown in Table 9. These are minimum requirements and the total number of sites necessary to adequately satisfy all monitoring objectives may be higher. As of 2009, there were no minimum requirements for the number of CO, NO2, and SO2 monitoring sites in an air monitoring network. More recent minimum requirements for NO2 and SO2 are not considered in this assessment. Discontinuing operations within existing monitoring networks, even if not required by regulation, is usually subject to U.S. EPA Regional Administrator approval. One minimum requirement for the number of Pb sites is based upon estimated source emissions. A site must be located at maximum downwind concentration for each source that exceeds 1.0-tons/year Pb emissions within the boundaries of the air monitoring network. Another minimum monitoring requirement for Pb is based on population. The number of PM10 sites required is based upon MSA population data and design values as shown in Table 10. The number of PM2.5 sites required is based upon MSA population data and measured concentrations as shown in Table 11. The final number of sites required may be more than the regulatory minimums dependent upon U.S. EPA Regional Approval of Annual Network Plans.

The South Coast AQMD jurisdictional boundary encompasses two MSA's as defined by the U.S. Office of Management and Budget and the U.S. Census Bureau. The Los Angeles-Long Beach-Santa Ana MSA (Code 31100) had a population of 12,365,627 based on the year 2000 U.S. Census. The Riverside-San Bernardino-Ontario MSA (Code 40140) had a population of 3,254,821 in 2000. The minimum number of monitors for each pollutant is based on MSA population and measured concentrations as described in 40 CFR § 58 Appendix D. The South Coast AQMD network exceeds the minimum monitoring requirements for all criteria pollutants.

POLLUTANT NETWORK ASSESSMENTS

Ozone (O3)

O3 is formed when the precursor gases VOC and NOx react in the atmosphere with sunlight. Emissions from VOC and NOx sources are frequently trapped in the South Coast Basin by the surrounding mountains and a persistent inversion layer. This leads to high ozone values, especially during the summer and early fall months.

Regulatory Requirement

Local agencies must operate O3 monitoring sites at various locations depending upon population and O3 design values relative to the NAAQS. Ambient air quality standards for O3 have been set by both the State and Federal governments and continue to be made more stringent. The current ambient air quality standards for O3 are included in Table 7. To assess compliance with Federal and State standards, South Coast AQMD operates 30 sites with O3 measurements as part of the Air Monitoring Network. Figure 2 shows the spatial distribution of these sites.

Monitoring Objective

The majority of the O3 monitoring network sites have been designated as population exposure monitoring locations as depicted in Table 18. Sites downwind of the formation of O3 such as Santa Clarita, Crestline, Banning, Perris, Rubidoux, and San Bernardino areas tend to have much higher concentrations. The sites which recorded the highest 2008 O3 concentrations include: Central San Bernardino Mountains (Crestline), Central San Bernardino Valley 1 (Fontana), Santa Clarita, Central San Bernardino Valley 2 (San Bernardino), East San Gabriel Valley 2 (Glendora), North West San Bernardino Valley (Upland), East San Bernardino Valley (Redlands), and Banning. The preceding seven sites are representative of high concentration sites for O3. Background site designations are typically coastal areas. The following sites recorded the lowest O3 concentrations in 2008: South West Coastal LA County (LAX Hastings), Coastal LA County (North Long Beach), North Orange County (La Habra), Central Orange County (Anaheim), and South San Gabriel Valley (Pico Rivera 2). LAX Hastings and North Long Beach recorded the lowest concentrations and are more representative of background concentrations. As mentioned earlier, population trends show increasing development and population in the inland area. In general, the western sites in the O3 monitoring network provide lower value information than those inland sites to the north or east. The O3 monitoring network/population trend is depicted in Figure 3.

TABLE 18 O3 Network Design

Station	Monitoring objective	Spatial Scale	Site consistent with monitoring objective
Anaheim	Population oriented	Neighborhood	Yes
Azusa	High concentration	Urban	Yes
Banning	Population oriented	Neighborhood	Yes
Burbank	High concentration	Urban	Yes
Compton	Population oriented	Neighborhood	Yes
Costa Mesa	Population oriented	Neighborhood	Yes
Crestline	High concentration	Neighborhood	Yes
Fontana	Population oriented	Urban	Yes
Glendora	High concentration	Neighborhood	Yes
Indio	Population oriented	Neighborhood	Yes
La Habra	Population oriented	Neighborhood	Yes
Lake Elsinore	Population oriented	Neighborhood	Yes
LAX Hastings	Population oriented	Middle	No
Long Beach (North)	Population oriented	Middle	No
Los Angeles (Main St.)	Population oriented	Neighborhood	Yes
Mira Loma (Jurupa)	Population oriented	Neighborhood	Yes
Mira Loma (Van Buren)	Population oriented	Neighborhood	Yes
Mission Viejo	Population oriented	Neighborhood	Yes
Palm Springs	Population oriented	Neighborhood	Yes
Pasadena	Population oriented	Neighborhood	Yes
Perris	Population oriented	Neighborhood	Yes
Pico Rivera	High concentration	Neighborhood	Yes
Pomona	High concentration	Middle	Yes
Redlands	Population oriented	Neighborhood	Yes
Reseda	High concentration	Urban	Yes
Rubidoux	High concentration	Urban	Yes
San Bernardino	High concentration	Neighborhood	Yes
Santa Clarita	High concentration	Urban	Yes
Temecula	TBD	TBD	TBD
Upland	Population oriented	Neighborhood	Yes
West Los Angeles	Population oriented	Middle	No

Spatial Scale of Representativeness

Monitoring objectives are matched with specific spatial scales of representativeness as shown in Table 18. When compared to the U.S. EPA criteria, some potential changes in monitoring objectives may be possible within the South Coast AQMD O3 network. The LAX Hastings and North Long Beach site record low concentrations of O3 and may be more consistent with background concentrations at the urban scale of representativeness. Other factors such as nearby roadways may also contribute to low O3 levels at North Long Beach.

Individual site assessments of the Spatial Scale of Representativeness for O3 are shown in Table 18.

Correlation Analysis

The correlation matrix analysis shows the correlation, relative difference, and distance between sites. The shape of the ellipses represents the Pearson Squared Correlation between sites with a circle representing zero correlation and a straight line representing perfect correlation; correlation between the sites represents the degree of relatedness. The correlation however, does not indicate if one site measures concentrations substantially higher or lower than another, for this the color of the ellipses represents the average relative difference. This analysis aids in determining sites that are redundant. Confounding factors affecting analysis include AQS site data with < 75% completion is not used.

O3 correlation for 2008 between sites in Los Angeles, Orange, Riverside, and San Bernardino counties are shown in Figure 4. Site pairs that result in correlations greater than 0.8 and relative differences less than 0.3 for O3 are:

60370002 (Azusa) with	060370016 (Glendora) 060371701 (Pomona) 060372005 (Pasadena) 060710004 (Upland) 060712002 (Fontana).
060370016 (Glendora) with	060371701 (Pomona) 060372005 (Pasadena) 060711004 (Upland) 060712004 (Fontana)
060371002 (Burbank) with	060371103 (Central LA) 060372005 (Pasadena).
060371103 (Central L.A.) with	060371602 (Pico Rivera 2) 060372005 (Pasadena).
060371701 (Pomona) with	060372005 (Pasadena) 060658001 (Rubidoux) 060711004 (Upland) 060712002 (Fontana) 060719004 (San Bernardino)
060590007 (Anaheim) with	060595001 (La Habra)
060650012 (Banning Airport) with	060651016 Torres Martinez (Indian Reservation not operated by South Coast AQMD)

060658001 (Rubidoux) with	060712002 (Fontana) 060714003 (Redlands) 060719004 (San Bernardino)
060711004 (Upland) with	060712002 (Fontana)
060712002 (Fontana) with	060714003 (Redlands) 060719004 (San Bernardino)
060714003 (Redlands) with	060719004 (San Bernardino).

This analysis shows that for O3, many sites generate comparable data. This result is expected for ozone given the regional nature of the pollutant and the density of the current network. Even if sites measure somewhat comparable ozone levels, the need for public reporting of health alert and AQI levels necessitates a relatively dense ozone network to capture spatial variability. Clusters of sites with generally highest correlations, small average differences, and close proximities include Fontana/Redlands/San_Bernardino/Rubidoux, Azusa/Glendora/Pomona/Upland/Fontana, and Anaheim/La Habra.

O3 Minimum Monitoring Requirement

U.S. EPA criteria specify the minimum number of sites required in an air monitoring network based on MSA population and design value. Design values currently exceed the standard and population data was taken from the 2000 census to determine the required number of samplers for the SCAB and are shown in Table 19. The information shows that the South Coast AQMD air monitoring network significantly exceeds the required minimum numbers of samplers for O3.

Table 19 Minimum O3 Requirement

MSA	Min. # Monitors Required	# Monitors Active
31100	4	17
40140	2	13

Carbon Monoxide

Carbon monoxide (CO) is a colorless, odorless gas that is formed when carbon in fuel is not burned completely. It is a component of motor vehicle exhaust, which contributes about 56 percent of all CO emissions nationwide. In cities, 85 to 95 percent of all CO emissions may come from motor vehicle exhaust. The highest levels of CO in ambient air typically occur during the colder months of the year when inversion conditions are more frequent. South Coast AQMD operates 26 sites with CO measurements as part of the South Coast AQMD air monitoring network. Figure 5 shows the spatial distribution of these sites.

Regulatory Requirement
Starting in the early 1970's, the EPA set national standards that have considerably reduced emissions of CO and other pollutants from motor vehicles. Since 1970, CO emissions from on-road vehicles have been reduced by over 40 percent. The greatest reductions have been in emissions from cars (nearly 60 percent). Currently, there is no minimum requirement for the number of CO monitoring sites. Continued operation of existing SLAMS, FRM, or FEMS is required until discontinuation is approved by the EPA Regional Administrator. Where SLAMS CO monitoring is ongoing, at least one site must be a maximum concentration site for the monitoring network.

Monitoring Objective
The CO monitoring network and population trends are depicted in Figure 6. The majority of the CO monitoring network sites are designated as population exposure sites. Review of the 2008 data indicates that Lynwood and Central Orange County (Anaheim) sites recorded the highest 8-hour average for CO in 2008 as 4.3 ppm and 3.6 ppm respectively. The Lynwood air monitoring location was replaced in 2008 by the Compton location due to unstable infrastructure and after concurrent sampling showed that CO levels were comparable at the two sites. The lowest recorded values include the Palm Springs, Lake Elsinore, Santa Clarita, and Saddleback Valley (Mission Viejo) sites. The Compton site is consistent with high concentration levels of CO. The lowest levels are found at Palm Springs, Lake Elsinore, Santa Clarita, and Mission Viejo. All sites other than Compton and Anaheim are consistent with population exposure. The majority of sites remain on the west side where population growth has remained relatively stagnant. CO measurements in general are of lower value given the attainment status of the basin and the low design values. However, the prospect of new CO NAAQS adds value in terms of tracking long-term trends and spatial variability.

TABLE 20 CO Network Design

Station	Monitoring objective	Spatial Scale	Site consistent with monitoring objective
Anaheim	High concentration	Neighborhood	Yes
Azusa	Population oriented	Neighborhood	Yes
Burbank	Population oriented	Neighborhood	Yes
Compton	High concentration	Middle	Yes
Costa Mesa	Population oriented	Neighborhood	Yes
Fontana	Population oriented	Neighborhood	Yes
Glendora	Population oriented	Neighborhood	Yes
La Habra	Population oriented	Neighborhood	Yes
Lake Elsinore	Population oriented	Neighborhood	Yes
LAX Hastings	Population oriented	Middle	No
Long Beach (North)	Population oriented	Micro	Yes
Los Angeles (Main St.)	Population oriented	Neighborhood	Yes
Mira Loma (Jurupa)	Population oriented	Neighborhood	Yes
Mira Loma (Van Buren)	Population oriented	Neighborhood	Yes
Mission Viejo	Population oriented	Neighborhood	Yes
Palm Springs	Population oriented	Neighborhood	Yes
Pasadena	Population oriented	Middle	No
Pico Rivera	Population oriented	Neighborhood	Yes
Pomona	Population oriented	Micro	No
Reseda	Population oriented	Neighborhood	Yes
Riverside	Population oriented	Micro	Yes
Rubidoux	Population oriented	Middle	No
San Bernardino	Population oriented	Middle	No
Santa Clarita	Population oriented	Neighborhood	Yes
Upland	Population oriented	Neighborhood	Yes
West Los Angeles	Population oriented	Neighborhood	Yes

Spatial Scale of Representativeness

Most sites are consistent with the appropriate CO spatial scale of representativeness for the monitoring objective. Comparison of EPA criteria with Table 20 shows the LAX Hastings, Pasadena, Pomona, Rubidoux, and San Bernardino sites could be re-designated at different spatial scales that may be more consistent with monitoring objectives.

Correlation Analysis

Correlation analysis was not available for CO using EPA provided tools. This is due to the lack of a minimum number of required monitoring sites.

Minimum Number of Sites Required

For the CO monitoring network, there must only be one site designated as maximum concentration (Compton). All others may be considered for closure by demonstrating either attainment has been reached and expected to be maintained, a monitor is consistently low relative to other monitors, a monitor has not measured a violation with NAAQS, a monitor has siting issues, a monitor is upwind of the urban area, or a site has logistical problems beyond agency control.

EPA criteria specify minimum numbers of sites required in an air monitoring network based on MSA population. Population data was taken from the 2000 census to determine the required number of samplers for the SCAB and are shown in Table 21. The information shows that the South Coast AQMD air monitoring network significantly exceeds the required minimum numbers of samplers for CO.

Table 21 Minimum CO Requirement

MSA	Minimum Number of Monitors Required	Number of Monitors Active
31100	0	17
40140	0	9

Nitrogen Dioxide

Nitrogen dioxide (NO2) is one of a group of highly reactive gases known as "oxides of nitrogen," or "nitrogen oxides" (NOx). Some NO2 is emitted directly but most NO2 forms in the atmosphere from the NO emissions from cars, trucks, buses, power plants, and any high-temperature combustion process. In addition to contributing to the formation of ground-level O3 and fine particle pollution, NO2 is linked with a number of adverse effects on the respiratory system. The South Coast AQMD operates 26 sites as part of the NO2 monitoring network. The spatial distribution of NO2 monitors is shown in Figure 7. Review of 1992 through 2009 data indicates that the annual NAAQS for NO2 was not exceeded.

Regulatory Requirement

As of 2009, there was no minimum requirement for the number of NO2 monitoring sites. Continued operation of existing SLAMS sites is required until discontinuation is approved by the U.S. EPA Regional Administrator. Where SLAMS NO2 monitoring is ongoing, at least one site must be a maximum concentration site for the monitoring network.

On February 9, 2010, EPA made revisions to the NO2 NAAQS requiring monitoring where maximum NO2 concentrations are expected to occur, including within 50 m of major roadways, as well as monitors sited to measure the area-wide NO2 concentrations that occur more broadly across communities. To accomplish this, a two-tiered monitoring network is proposed for the NO2 NAAQS. One tier (the near-road network) will reflect the much higher NO2 concentrations that occur near-road and the second-tier (area-wide) characterizes the NO2 concentrations that occur in a larger area such as neighborhood or urban areas. However, these new NAAQS and monitoring regulations for NO2 are not considered in this assessment.

Monitoring Objective

There is no minimum requirement for the monitoring for NO2, but the U.S. EPA Regional Administrator must approve any reduction of the current operating monitoring network. The current NO2 monitoring network and population trends are shown in Figure 8. The majority of the NO2 monitoring network is designated as population exposure sites. A review of data indicates that the highest 1-hour concentrations in 2008 were recorded at the North Long Beach, Lynwood, and Central LA monitoring locations and the lowest concentrations were recorded at the Palm Springs and Lake Elsinore sites. During 2008, the Lynwood site was moved to the Compton location. The North Long Beach, Compton, and Central LA sites are more representative of high concentration sites than population exposure. The remainder of the sites are representative of population exposure. Monitors are distributed primarily in the western portion of the basin where higher NO2 levels are expected. Given the attainment status of the basin and the low ambient levels, these monitors are generally of lower value. However, the new 2010 NAAQS and monitoring requirements add value in terms of long-term trends and spatial variability.

TABLE 22 NO2 Network Design

Station	Monitoring objective	Spatial Scale	Site consistent with monitoring objective
Anaheim	Population oriented	Urban	Yes
Azusa	Population oriented	Urban	Yes
Banning	Population oriented	Neighborhood	Yes
Burbank	Population oriented	Neighborhood	Yes
Compton	High concentration	Middle	Yes
Costa Mesa	Population oriented	Neighborhood	Yes
Fontana	Population oriented	Urban	Yes
Glendora	Population oriented	Neighborhood	Yes
La Habra	Population oriented	Urban	Yes
Lake Elsinore	Population oriented	Neighborhood	Yes
LAX Hastings	Population oriented	Middle	No
Long Beach (North)	High concentration	Middle	Yes
Los Angeles (Main St.)	High concentration	Neighborhood	Yes
Mira Loma (Jurupa)	Population oriented	Neighborhood	Yes
Mira Loma (Van Buren)	Population oriented	Neighborhood	Yes
Palm Springs	Population oriented	Neighborhood	Yes
Pasadena	Population oriented	Neighborhood	Yes
Pico Rivera	Population oriented	Neighborhood	Yes
Pomona	Population oriented	Middle	No
Reseda	Population oriented	Urban	Yes
Riverside	Population oriented	Urban	Yes
Rubidoux	Population oriented	Urban	Yes
San Bernardino	Population oriented	Urban	Yes
Santa Clarita	Population oriented	Neighborhood	Yes
Upland	Population oriented	Neighborhood	Yes
West Los Angeles	Population oriented	Neighborhood	Yes

Spatial Scale of Representativeness

Most sites were consistent with NO2 spatial scale of representativeness. Comparison of Table 22 with EPA criteria showed that the LAX Hastings, and Pomona sites could be designated at spatial scales that are more consistent with monitoring objectives. North Long Beach is more representative of a high concentration site at the neighborhood scale. The remainder of the sites are representative of population-oriented sites at the neighborhood scale.

Correlation Analysis

Correlation analysis was not available for NO2 using EPA provided tools. This is due to the lack of a minimum number of required monitoring sites.

Minimum Number of Sites Required

For the NO2 monitoring network, there must only be one site designated as maximum concentration. All others may be considered for closure by demonstrating either attainment has been reached and expected to be maintained, a monitor is consistently low relative to other monitors, a monitor has not measured a violation with NAAQS, a monitor has siting issues, a monitor is upwind of the urban area, or a site has logistical problems beyond agency control.

EPA criteria specify minimum numbers of sites required in an air monitoring network based on MSA population. Population data was taken from the 2000 census to determine the required number of samplers for the SCAB and are shown in Table 23. The information shows that the South Coast AQMD air monitoring network significantly exceeds the required minimum numbers of samplers for NO2. Also included in the table is the new requirement for near roadway monitoring which is to begin operation by January 1, 2013.

Table 23 Minimum NO2 Requirement

MSA	Minimum Number of Monitors Required	Number of Monitors Active	New Minimum Requirement	
			Near Roadway	Area Wide
31100	0	17	2	1
40140	0	9	2	1

Sulfur Dioxide

Sulfur dioxide (SO2) is one of a group of highly reactive gasses known as oxides of sulfur (SOx). The largest sources of SO2 emissions are from fossil fuel combustion at power plants and other industrial facilities. Smaller sources of SO2 emissions include industrial processes such as extracting metal from ore and the burning of high sulfur containing fuels by locomotives, large ships, and non-road equipment. South Coast AQMD operates SO2 monitors at 7 sites. Figure 9 shows the spatial distribution of the sites. The monitors are clustered mostly in the areas where SO2 sources may be located. The federal standard has not been exceeded in the basin for nearly 30 years.

Regulatory Requirement

The EPA first set standards for SO2 in 1971. The EPA set a twenty-four hour primary standard at 140 ppb and an annual average standard at 30 ppb (to protect health). The EPA also set a 3-hour average secondary standard at 500 ppb. Currently, there is no minimum requirement for the number of SO2 monitoring sites. Continued operation of existing SLAMS sites are required until discontinuation is approved by The U.S. EPA Regional Administrator. Where SLAMS SO2 monitoring is ongoing, at least one site must be designated a maximum concentration site.

On June 2, 2010, the EPA strengthened the primary NAAQS for SO2. The EPA is also revising the ambient air monitoring requirements for SO2. States will need to make adjustments to the existing monitoring network in order to ensure that monitors meeting the new network design regulations are sited and operational by January 1, 2013. However, these new NAAQS and monitoring regulations for NO2 are not considered in this assessment.

The final monitoring regulations require monitors to be placed in Core Based Statistical Areas (CBSAs) based on a population weighted emissions index for the area. The final rule requires:

- 3 monitors in CBSAs with index values of 1,000,000 or more;
- 2 monitors in CBSAs with index values less than 1,000,000 but greater than 100,000; and
- 1 monitor in CBSAs with index values greater than 5,000.

Monitoring Objective

As of 2009, there was no minimum requirement for the monitoring of SO2, but the U.S. EPA Regional Administrator must approve any reduction of the current monitoring network. The current SO2 monitoring network and population trends are shown in Figure 10. All SO2 monitors are designated as population oriented with the exception of North Long Beach, which is designated as high concentration as shown in Table 24. A review of the annual data shows that the maximum 1-hour concentration in 2008 was .09 ppm at North Long Beach and the next highest concentration was .02 ppm at LAX Hastings; the remaining sites were generally below the threshold for the monitoring instrumentation. The majority of the SO2 sites are in the western portion of the Basin. This is appropriate, even though the population growth has occurred inland, because the majority of SO2 sources are oil refineries located near the coast. North Long Beach should remain a high concentration site and the inland locations are appropriately designated as population oriented.

TABLE 24 SO2 Network Design

Station	Monitoring objective	Spatial Scale	Site consistent with monitoring objective
Burbank	Population oriented	Neighborhood	Yes
Costa Mesa	Population oriented	Neighborhood	Yes
Fontana	Population oriented	Neighborhood	Yes
LAX Hastings	Population oriented	Neighborhood	Yes
Long Beach (North)	High concentration	Neighborhood	Yes
Los Angeles (Main St.)	Population oriented	Neighborhood	Yes
Rubidoux	Population oriented	Neighborhood	Yes

Spatial Scale of Representativeness

All SO2 spatial scales of representativeness were consistent with the monitoring objectives as shown in Table 24.

Correlation Analysis

Correlation analysis was not available for SO2 using EPA provided tools. This is due to the lack of a minimum number of required sites.

Minimum number of sites required

For the SO2 monitoring network, there must only be one site designated as maximum concentration. All others may be considered for closure by demonstrating either attainment has been reached and expected to be maintained, a monitor is consistently low relative to other monitors, a monitor has not measured a violation with NAAQS, a monitor has siting issues, a monitor is upwind of the urban area, or a site has logistical problems beyond agency control. EPA criteria specify the minimum number of sites required in an air monitoring network based on MSA population. Population data was taken from the 2000 census to determine the required number of samplers for the SCAB and are shown in Table 25. The information shows that the South Coast AQMD air monitoring network significantly exceeds the required minimum numbers of samplers for CO. Also included in the table is the new requirement for monitoring which is to begin operation by January 1, 2013.

Table 25 Minimum SO2 Requirement

MSA	Minimum Number of Monitors Required	Number of Monitors Active	New Minimum Requirement
			Monitors Required
31100	0	5	2
40140	0	2	2

Pb

Pb is a metal found naturally in the environment as well as in manufactured products. The major sources of Pb emissions have historically been motor vehicles (such as cars and trucks) and industrial sources. As a result of the EPA's regulatory efforts to remove Pb from gasoline, emissions of Pb from the transportation sector dramatically declined between 1980 and 1999, and levels of Pb in the air decreased by 94 percent between 1980 and 1999. Today, the highest levels of Pb in air are usually found near Pb smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers. Total Suspended Particulate (TSP) measurements are collected at 15 sites as part of the South Coast AQMD monitoring network; five of the sites are source-oriented microscale Pb sites, and 10 sites measure population-oriented ambient Pb. The spatial distribution of these sites is shown in Figure 11.

Regulatory Requirement

On November 12, 2008, the EPA issued final revisions to the NAAQS standards for Pb. New network design requirements were implemented for monitoring sources of Pb (source-oriented monitoring) and urban Pb monitoring (non-source oriented). To meet this requirement, a new source-oriented site was established on January 1st, 2010 at the Van Nuys Airport and monitoring will continue at existing sites near the Exide (Vernon), Quemetco (City of Industry), and the Trojan Battery (Santa Fe Springs) facilities.

Non source-oriented monitors are located in urban areas to gather information on general population Pb exposure. Starting January 1, 2011, one non source-oriented monitor is required in each CBSA with a population > 500,000 as determined by the most recent census data. South Coast AQMD's current Pb monitoring network exceeds the minimum required monitoring specified as part of the final revision to the NAAQS for Pb.

Monitoring Objective
The current Pb monitoring network and population trends are shown in Figure 12. All of the non-source-oriented Pb monitoring network sites are population-oriented. The Pb monitoring network was put in place when leaded gasoline was still being used in automobiles. With the mainstream use of unleaded gasoline, concentrations of Pb have decreased with no clear high concentration site. Therefore, all of the non-source-oriented Pb monitoring have been re-designated as population-oriented monitoring locations. The source-oriented sites are appropriately considered source impact sites.

TABLE 26 Pb Network Design

Station	Monitoring objective	Spatial Scale	Site consistent with monitoring objective
ATSF (Exide-Vernon)	Source impact	Micro	Yes
Closet World (Quemetco-City of Industy)	Source impact	Micro	Yes
Compton	Population oriented	Neighborhood	Yes
LAX Hastings	Population oriented	Neighborhood	Yes
Long Beach (North)	Population oriented	Neighborhood	Yes
Long Beach (South)	Population oriented	Neighborhood	Yes
Los Angeles (Main St.)	Population oriented	Neighborhood	Yes
Pico Rivera	Population oriented	Neighborhood	Yes
Rehrig (Exide-Vernon)	Source impact	Micro	Yes
Riverside	Population oriented	Neighborhood	Yes
Rubidoux	Population oriented	Neighborhood	Yes
San Bernardino	Population oriented	Neighborhood	Yes
Uddelholm (Trojan Battery-Santa Fe Springs)	Source impact	Mico	Yes
Upland	Population oriented	Neighborhood	Yes
Van Nuys Airport	Source impact	Micro	Yes

Spatial Scale of Representativeness
The proper scale for the five source-oriented sites is microscale. The scale for the non-source-oriented sites are neighborhood scale or greater as shown in Table 26.

Correlation Analysis

Correlation analysis was not available for Pb using EPA provided tools. This was because most agencies across the country do not have an existing Pb monitoring network.

Minimum Number of Sites Required

EPA criteria specify the minimum number of sites required in an air monitoring network based on MSA population. Population data was taken from the 2000 census to determine the required number of samplers for the SCAB and are shown in Table 27. Only two facilities exceed the 1.0 ton/year emissions threshold for source-oriented monitoring based on the latest data: Exide (Vernon) and Van Nuys Airport. The information shows that the South Coast AQMD air monitoring network significantly exceeds the required minimum numbers of samplers for Pb. Also included in the table is the new requirement for urban monitoring which is to begin operation by January 1, 2011.

Table 27 Minimum Pb Requirement

MSA	Minimum Number of Monitors Required		Number of Monitors Active		New Minimum Requirement
	Source Impact	Urban Monitoring	Source Impact	Urban Monitoring	Urban Monitoring
31100	2	0	5	6	1
40140	0	0	0	4	1

PM10

Particulate matter also known as particle pollution or PM, is a complex mixture of microscopic particles and liquid droplets. Particle pollution is made up of a number of components, including ions (such as nitrates and sulfates), organic chemicals, elemental carbon, metals, and soil or dust particles.

The size of particles is directly linked to their potential for causing health problems. The U.S. EPA regulates particles that are 10 micrometers (μm) in diameter or less (PM10) because these particles generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart, lungs and cause serious health effects. "Inhalable coarse particles," are defined as larger than 2.5 μm but smaller than 10 μm in diameter.

Regulatory Requirement

The nation's air quality standards for particulate matter were first established in 1971 and were not significantly revised until 1987, when the EPA changed the indicator of the standards to regulate inhalable particles smaller than or equal to 10 μm in diameter. PM10 measurements contain both fine (PM2.5) and coarse particles. In 2006, the U.S. EPA revoked the annual PM10 standard because the available evidence did not suggest a link between long-term exposure to PM10 and health problems. The 24-hour PM10 NAAQS was retained as well as minimum monitoring requirements for PM10 based on MSA population and PM10 design value as specified in 40 CFR § 58 Appendix D.

To meet this requirement, size-selective inlet high-volume samplers are operated at 22 sites to meet the requirements for PM10 FRM sampling. In addition PM10 continuous FEM analyzers are operated at 14 sampling sites providing hourly particulate concentration measurements. Figure 13 shows the spatial distribution of the sampling sites. Real-time monitors, for the most part, are clustered in the high concentration areas, with two located in the desert area where wind-blown crustal material can cause exceedances of the twenty-four hour standard during high wind events. Real time PM10 monitors also support ongoing health studies in the region. All PM10 FRM monitors currently operate on a one-in-six day schedule with the exception of Indio and Rubidoux, the maximum concentration sites in each air basin, which operate on an enhanced frequency one-in-three day schedule as required by 40 CFR § 58.12(e). The continuous PM10 FEM monitors also provide a daily record of PM10 values at many of the higher concentration sites.

Monitoring Objective

The majority of the PM10 sites are designated as population exposure sites as shown in Table 28. The 2007-2008 data shows that Mira Loma (Van Buren) reported the highest concentrations in the South Coast Basin at 142 and 135 $\mu g/m^3$ in 2007, and 2008 respectively (excluding exceptional events). This site began operation in 2006, and previous to that, Rubidoux was designated as the maximum concentration site requiring enhanced monitoring frequency as per 40 CFR § 58.12(e) based on 2000-2005 monitoring data. This assessment concludes that based on recent years monitoring data, Mira Loma will be designated the maximum concentration site and the required enhanced monitoring frequency will be provided by a continuous PM10 FEM BAM recently installed at the site. The remainder of the PM10 sites are consistent with population exposure at the neighborhood scale. Figure 14 shows the distribution of the PM10 monitors along with the population change from 1990 through 2009. Sites are concentrated inland, where particulate concentrations tend to be higher.

TABLE 28 PM10 Network Design			
Station	Monitoring objective	Spatial Scale	Site consistent with monitoring objective
Perris	Population oriented	Neighborhood	Yes
Anaheim	Population oriented	Neighborhood	Yes
Azusa	Population oriented	Neighborhood	Yes
Banning	Population oriented	Neighborhood	Yes
Burbank	Population oriented	Neighborhood	Yes
Crestline	Population oriented	Neighborhood	Yes
Fontana	Population oriented	Neighborhood	Yes
Glendora	Population oriented	Neighborhood	Yes
Indio	Population oriented	Neighborhood	Yes
Lake Elsinore	Population oriented	Neighborhood	Yes
LAX Hastings	Population oriented	Neighborhood	Yes
Long Beach (North)	Population oriented	Neighborhood	Yes
Los Angeles (Main St.)	Population oriented	Neighborhood	Yes
Mira Loma (Jurupa)	Population oriented	Neighborhood	Yes
Mira Loma (Van Buren)	High Concentration	Neighborhood	Yes
Mission Viejo	Population oriented	Neighborhood	Yes
Norco	Population oriented	Neighborhood	Yes
Ontario (Fire-Station)	Population oriented	Neighborhood	Yes
Palm Springs	Population oriented	Neighborhood	Yes
Redlands	Population oriented	Neighborhood	Yes
Rubidoux	Population oriented	Neighborhood	Yes
San Bernardino	Population oriented	Neighborhood	Yes
Santa Clarita	Population oriented	Neighborhood	Yes
Long Beach (South)	Population oriented	Neighborhood	Yes
Temecula	TBD	TBD	TBD
Upland	Population oriented	Neighborhood	Yes

Spatial Scale of Representativeness

The vast majority of sites showed consistency between the spatial scale of representativeness and monitoring objective. The North Long Beach site was designated at the middle scale but with a population-oriented monitoring objective. Population-oriented sites are more consistent with the neighborhood scale of representativeness.

Correlation Analysis

PM10 correlation analysis for data collected during 2008 between sites in Los Angeles, Orange, Riverside, and San Bernardino counties are shown in Figure 15. Site pairs with correlations greater than 0.8 and relative differences less than 0 .3 for PM10 are:

060370002 (Azusa) with 060710025 (Ontario)

060370016 (Glendora) with	060711004 (Upland)
060658001 (Rubidoux) with	060658001 (Norco)
0600658005 (Mira Loma VB) with	060658001 (Rubidoux)
060712002 (Fontana) with	060710025 (Ontario)
060719004 (San Bernardino) with	060712002 (Fontana)

This analysis shows that for PM10, few sites correlate in low concentration areas. The greatest correlation was found between Rubidoux and Mira Loma (Van Buren), the two sites with the highest 24-hour PM10 concentrations in the Basin.

Minimum Number of Sites Required

EPA criteria specify the minimum number of sites required in an air monitoring network based on MSA population and design value. Population data was taken from the 2000 census to determine the required number of samplers for the SCAB and are shown in Table 29. The information shows that the South Coast AQMD air monitoring network significantly exceeds the minimum required number of samplers for PM10.

Table 29 Minimum PM10 Requirement

MSA	Min. # Monitors Required	# Monitors Active
31100	2	9
40140	3	16

PM2.5

Particulate matter, also known as particle pollution or PM, is a complex mixture of extremely small particles and liquid droplets. Particle pollution is made up of a number of components, including ions (such as nitrates and sulfates), organic chemicals, elemental carbon, metals, and soil or dust particles. Fine particles, such as those found in smoke and haze, are 2.5 μm in diameter and smaller. These particles can be directly emitted from sources such as mobile sources, meat cooking and forest fires, or they can form when gases emitted from power plants, industries, and automobiles react in the air.

Regulatory Requirement

The nation's air quality standards for particulate matter were first established in 1971 and were not significantly revised until 1987, when the EPA changed the indicator of the standards to regulate inhalable particles smaller than or equal to 10 um in diameter. Ten years later, after a lengthy review, the EPA revised the PM standards, setting separate standards for fine particles (PM2.5) based on their link to serious health problems including increased symptoms, hospital admissions, emergency room visits, and premature death for people with heart and lung disease. The regulation also required local agencies to operate a minimum number of PM2.5 monitoring sites as specified in 40 CFR § 58 Appendix D.

To comply with regulatory requirements, a network of 17 Federal Reference Method (FRM) samplers was first deployed in early 1999. In December 1999, a second Coachella Valley PM2.5 sampling site was established in Palm Springs. On June 20, 2003, PM2.5 sampling began at the South Long Beach location. The final addition to the PM2.5 FRM network occurred in October 2005 at the newly established Mira Loma (Van Buren) site. The current number of PM2.5 FRM sampling sites remains at 20 and is depicted in Figure 16.

Prior to 2009, a network of continuous PM2.5 monitors was in operation, although they did not have FEM status. In January 2009, a network of seven PM2.5 FEM monitors were deployed and designated as Special Purpose Monitors (SPM) in order to provide time for comparison to collocated FRM samplers. The two-year maximum SPM status expires at the end of 2010 and comparability analysis will be completed before that time. A network of ten non-FEM PM2.5 continuous monitors continues operation.

Monitoring Objective
The PM2.5 monitoring network is shown in Figure 17 along with population trend from 1999 through 2009. Most PM2.5 sites are designated as population exposure at the neighborhood scale. Review of 2008 data shows that Central Los Angeles, Anaheim, Pasadena, South Long Beach, Rubidoux, Burbank, and North Long Beach recorded the highest concentrations of PM2.5. The lowest value recorded was at the Palm Springs monitoring location, which is more consistent with a regional transport site rather than a population-oriented site.

TABLE 30 PM2.5 Network Design

Station	Monitoring objective	Spatial Scale	Site consistent with monitoring objective
Anaheim	Population oriented	Neighborhood	Yes
Azusa	Population oriented	Neighborhood	Yes
Big Bear	Population oriented	Neighborhood	Yes
Burbank	Population oriented	Neighborhood	Yes
Compton	Population oriented	Neighborhood	Yes
Crestline	Population oriented	Neighborhood	Yes
Fontana	Population oriented	Neighborhood	Yes
Glendora	Population oriented	Neighborhood	Yes
Indio	Population oriented	Neighborhood	Yes
Lake Elsinore	Population oriented	Neighborhood	Yes
Long Beach (North)	High concentration	Neighborhood	Yes
Los Angeles (Main St.)	High concentration	Neighborhood	Yes
Mira Loma (Van Buren)	Population oriented	Neighborhood	Yes
Mission Viejo	Population oriented	Neighborhood	Yes
Ontario (Fire-Station)	Population oriented	Neighborhood	Yes
Palm Springs	Population oriented	Neighborhood	Yes
Pasadena	Population oriented	Neighborhood	Yes
Pico Rivera	Population oriented	Neighborhood	Yes
Reseda	Population oriented	Neighborhood	Yes
Riverside	Population oriented	Neighborhood	Yes
Rubidoux	High concentration	Neighborhood	Yes
San Bernardino	Population oriented	Neighborhood	Yes
Santa Clarita	Population oriented	Neighborhood	Yes
Long Beach (South)	Population oriented	Neighborhood	Yes
Upland	Population oriented	Neighborhood	Yes

Spatial Scale of Representativeness

All PM2.5 spatial scales of representativeness were consistent with the monitoring objectives as shown in Table 30.

Correlation Analysis

PM2.5 correlation for 2008 between sites in Los Angeles, Orange, Riverside, and San Bernardino counties are shown in Figure 18. Data for 2008 was used because it was the most recent complete data set for the South Coast AQMD PM2.5 monitoring network. Site pairs with correlations greater than 0.8 and relative differences less than 0.3 for PM2.5 are:

060370002 (Azusa) with	060372005 (Pasadena)
	060658001 (Rubidoux)
060374002 (North Long Beach) with	060374004(South Long Beach)
060651003 (Riverside Magnolia) with	060658001 (Rubidoux)

060710025 (Ontario) with	060712002 (Fontana)
060712002 (Fontana) with	060719004 (San Bernardino)

This analysis shows that for PM2.5, a number of clusters have a high level of correlation and a low average relative difference.

Minimum Number of Sites Required

EPA criteria specify minimum numbers of sites required in an air monitoring network based on MSA population and measured concentrations. Population data was taken from the 2000 census to determine the required number of samplers for the SCAB and are shown in Table 31. The information shows that the South Coast AQMD air monitoring network exceeds the required minimum numbers of samplers for PM2.5.

Table 31 Minimum PM2.5 Requirement

MSA	Minimum Number of Monitors Required	Number of Monitors Active
31100	6-10	12
40140	6-10	11

Figure 2 South Coast AQMD O3 Monitoring Locations

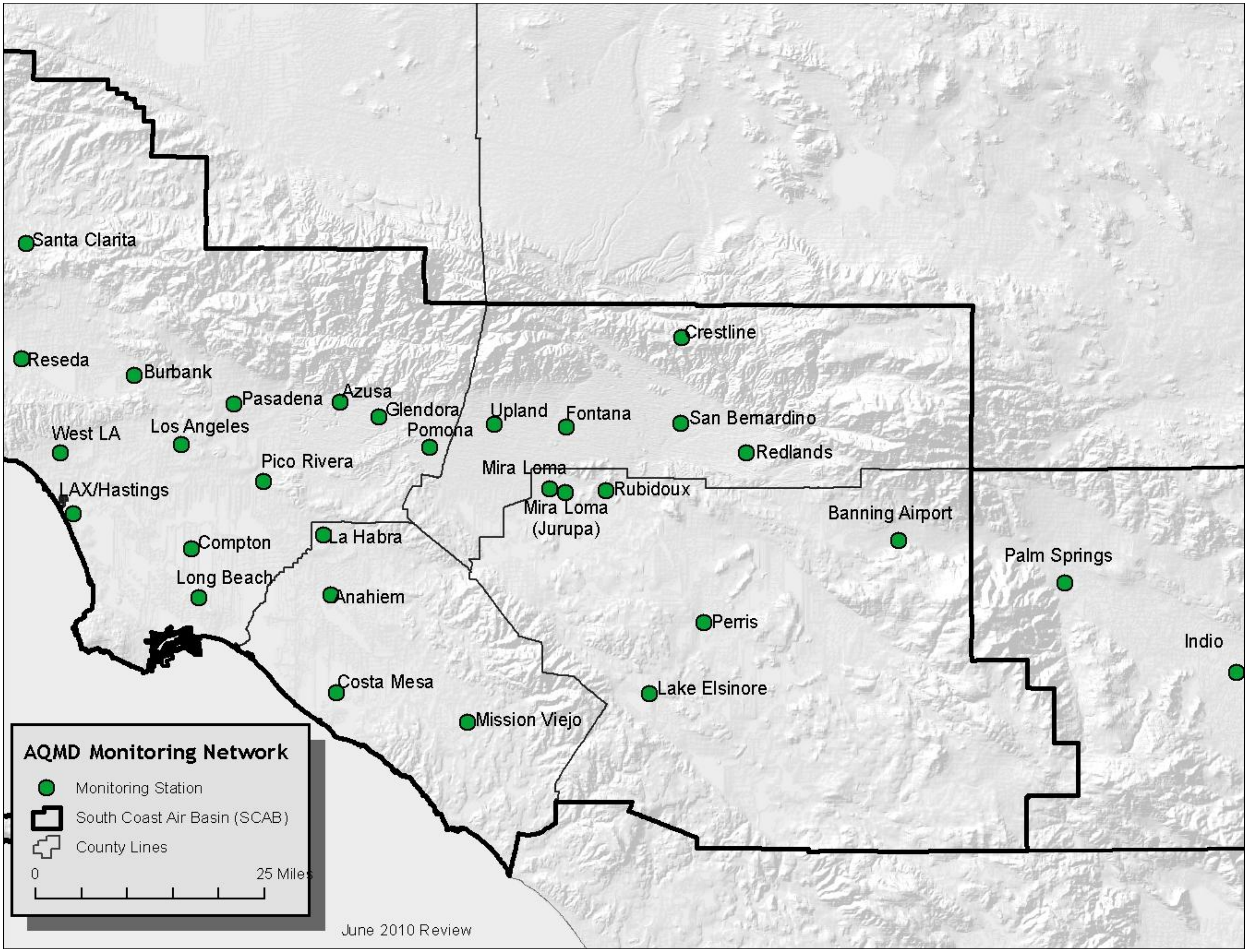


Figure 3 O3 Monitoring Locations and Change in Population 1990 Through 2009

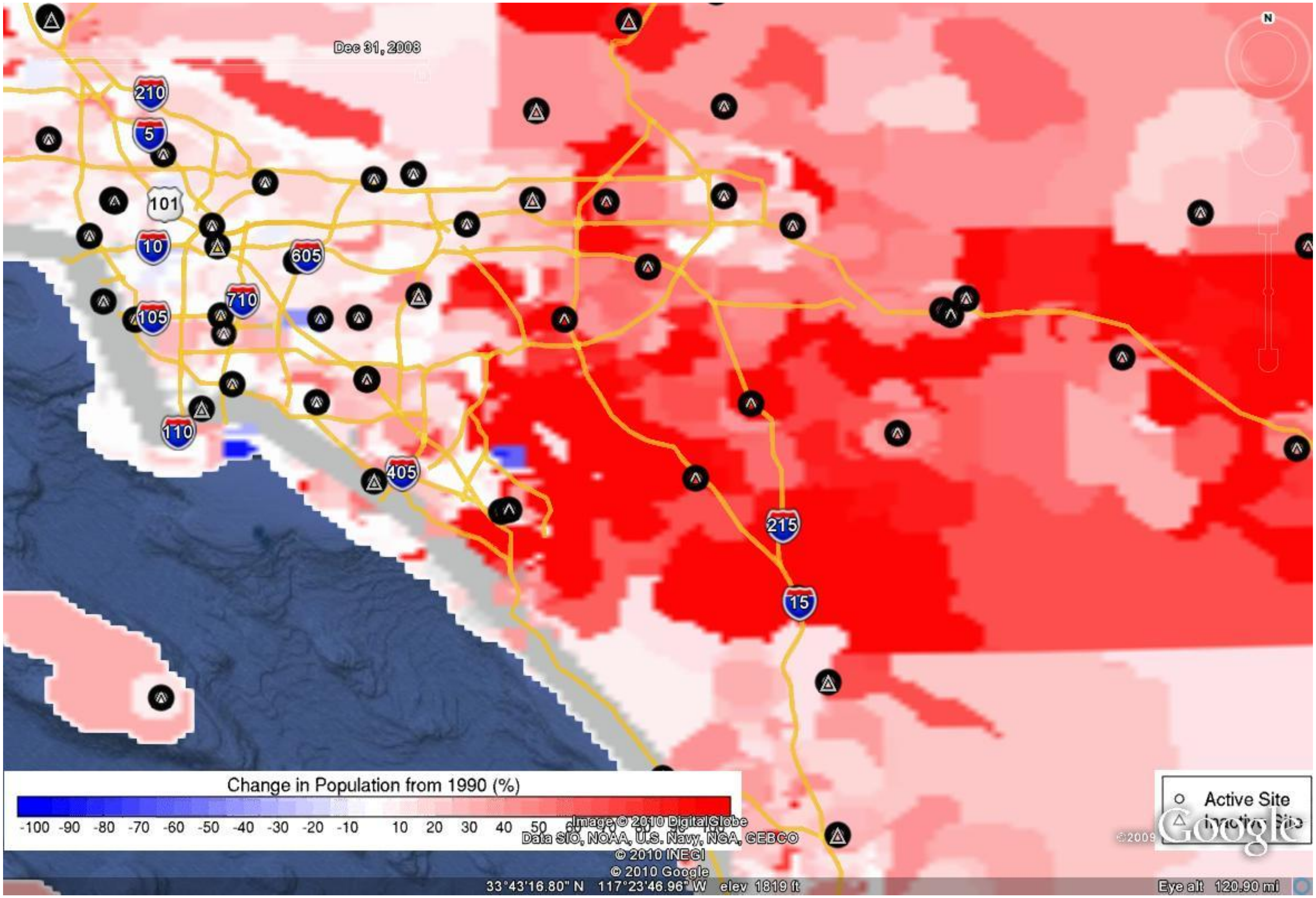


Figure 4 2008 Los Angeles, Orange, Riverside, and San Bernardino County O3 Site Correlation

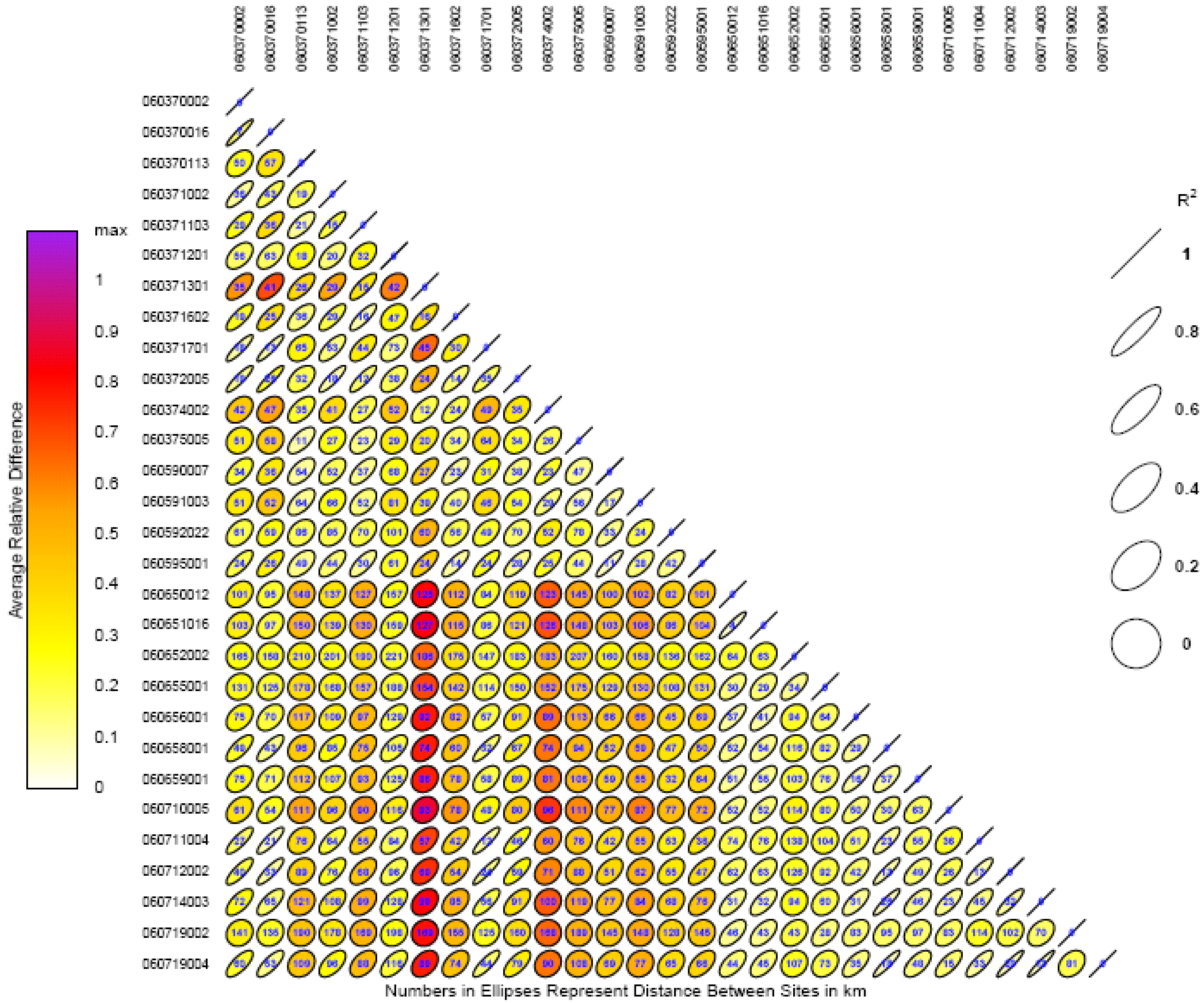


Figure 5 South Coast AQMD Monitoring Locations for CO

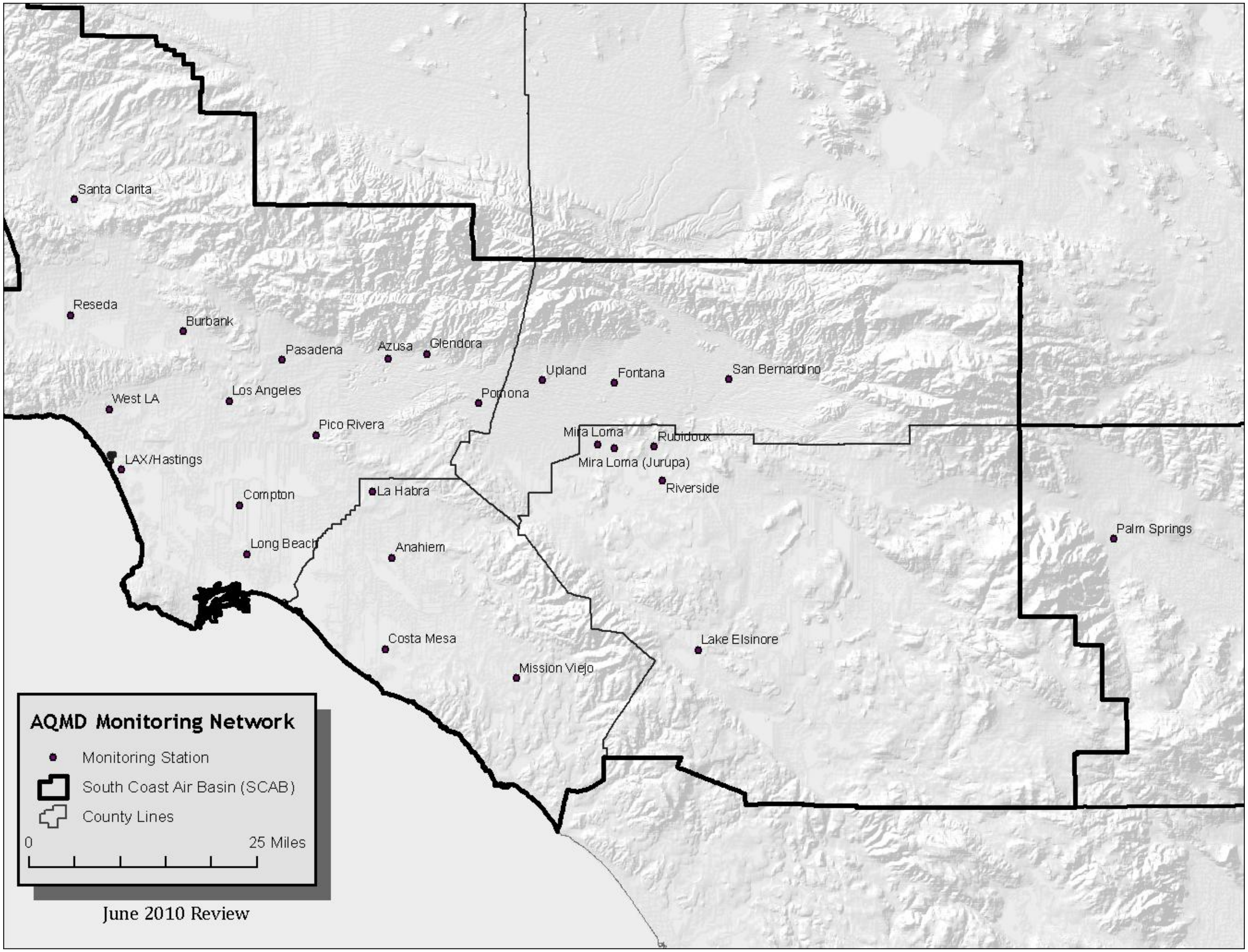


Figure 6 CO Monitoring Locations and Change in Population 1990 Through 2009

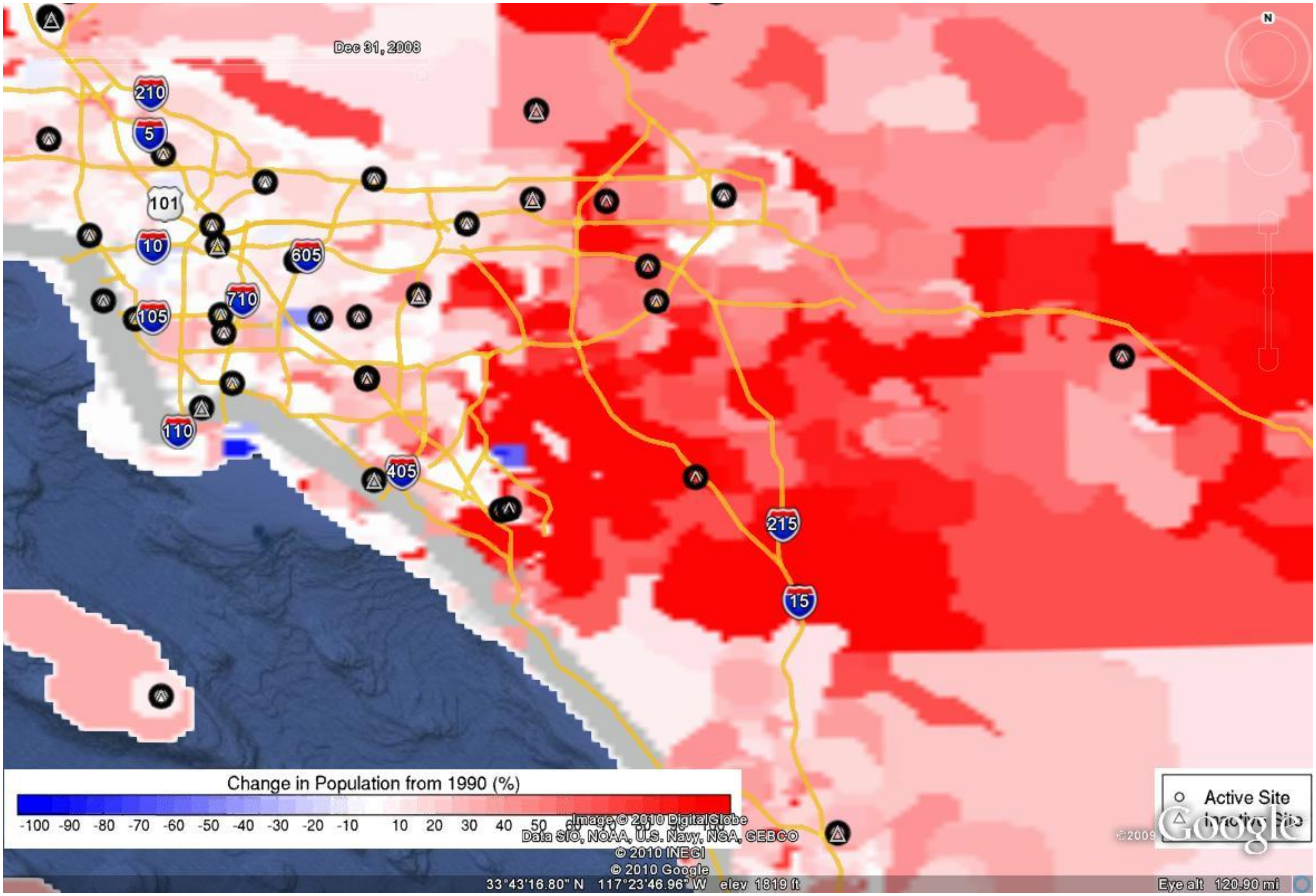


Figure 7 South Coast AQMD Monitoring Locations for NO2

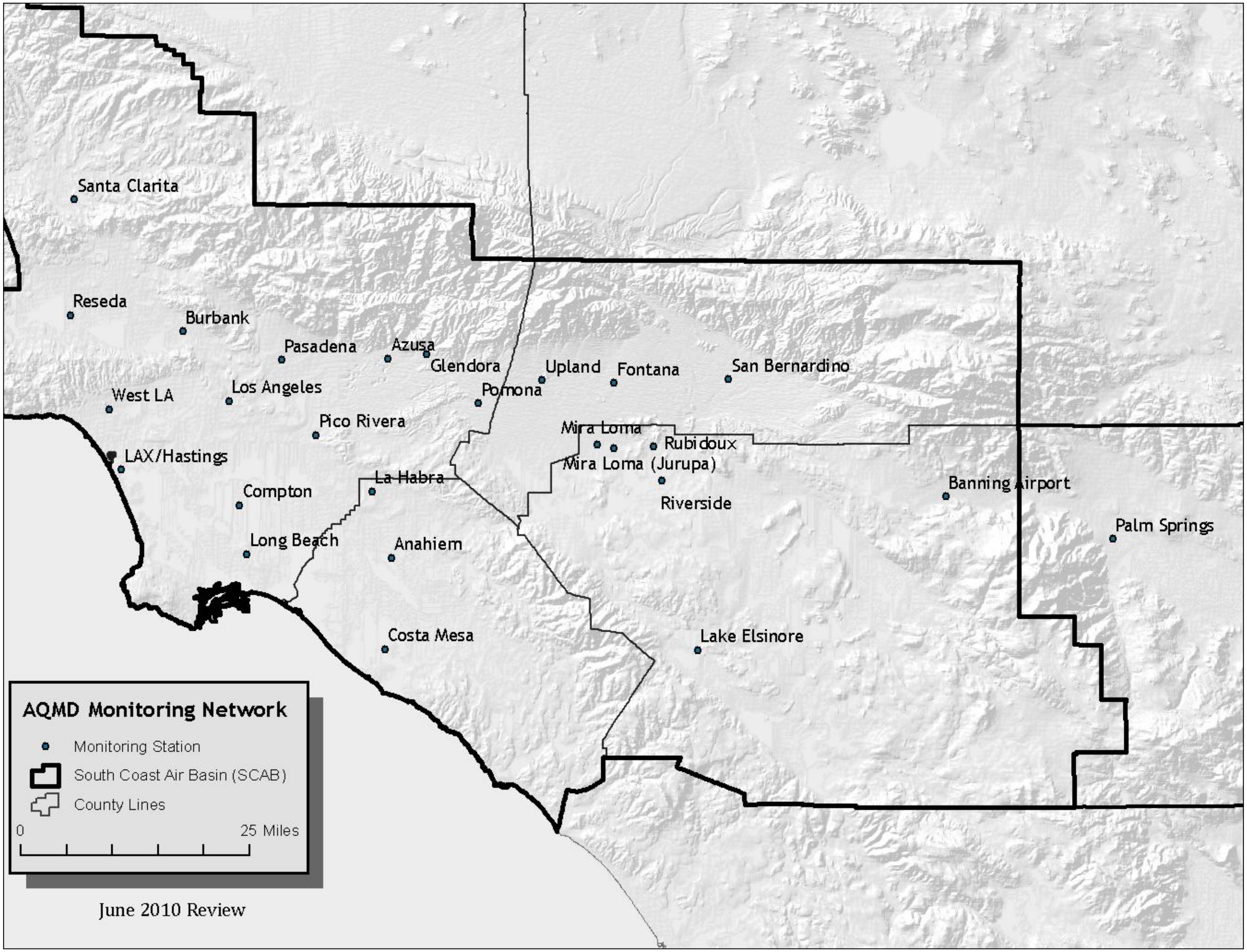


Figure 8 NO2 Monitoring Locations and Change in Population 1990 Through 2009

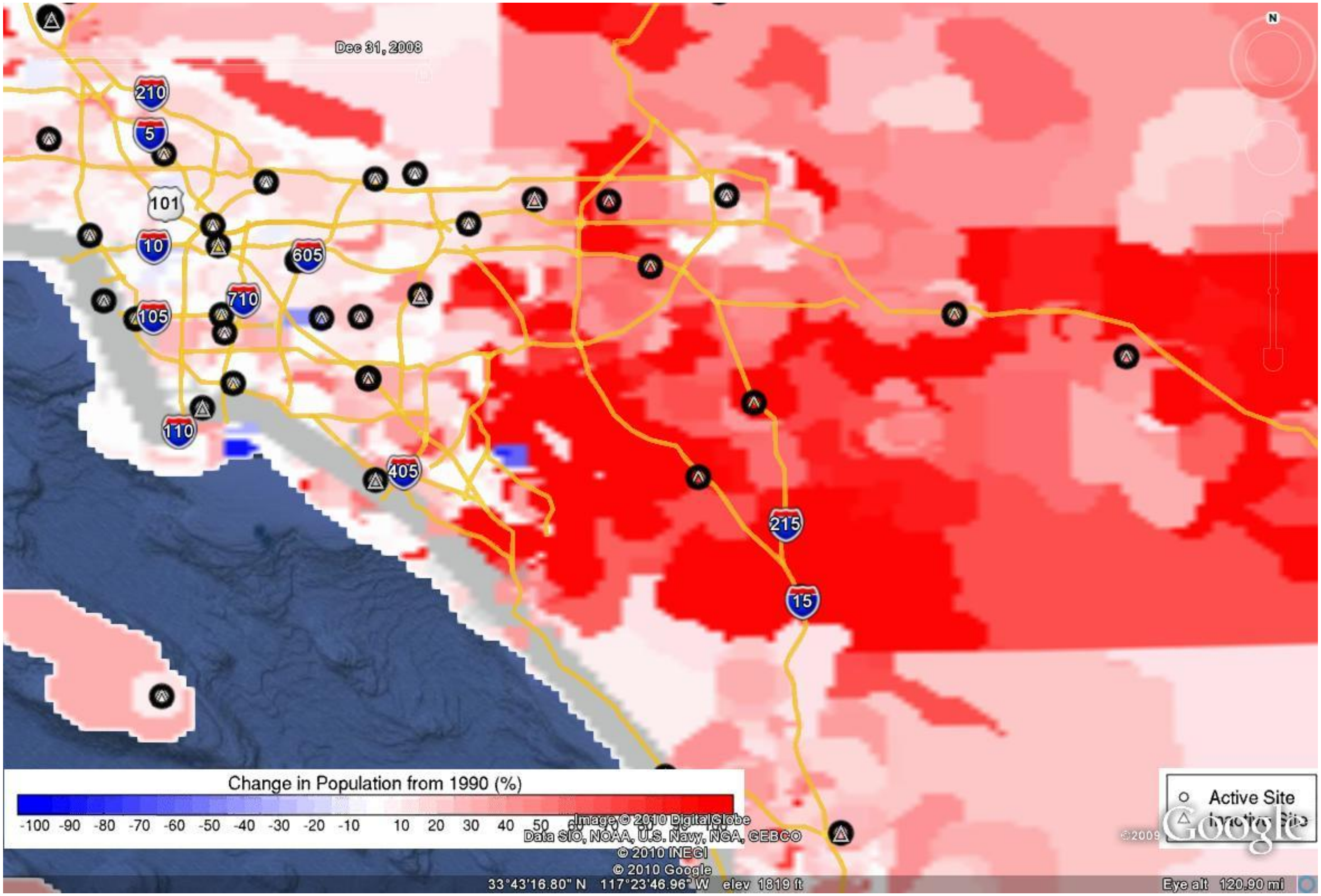


Figure 9 South Coast AQMD Monitoring Locations for SO2

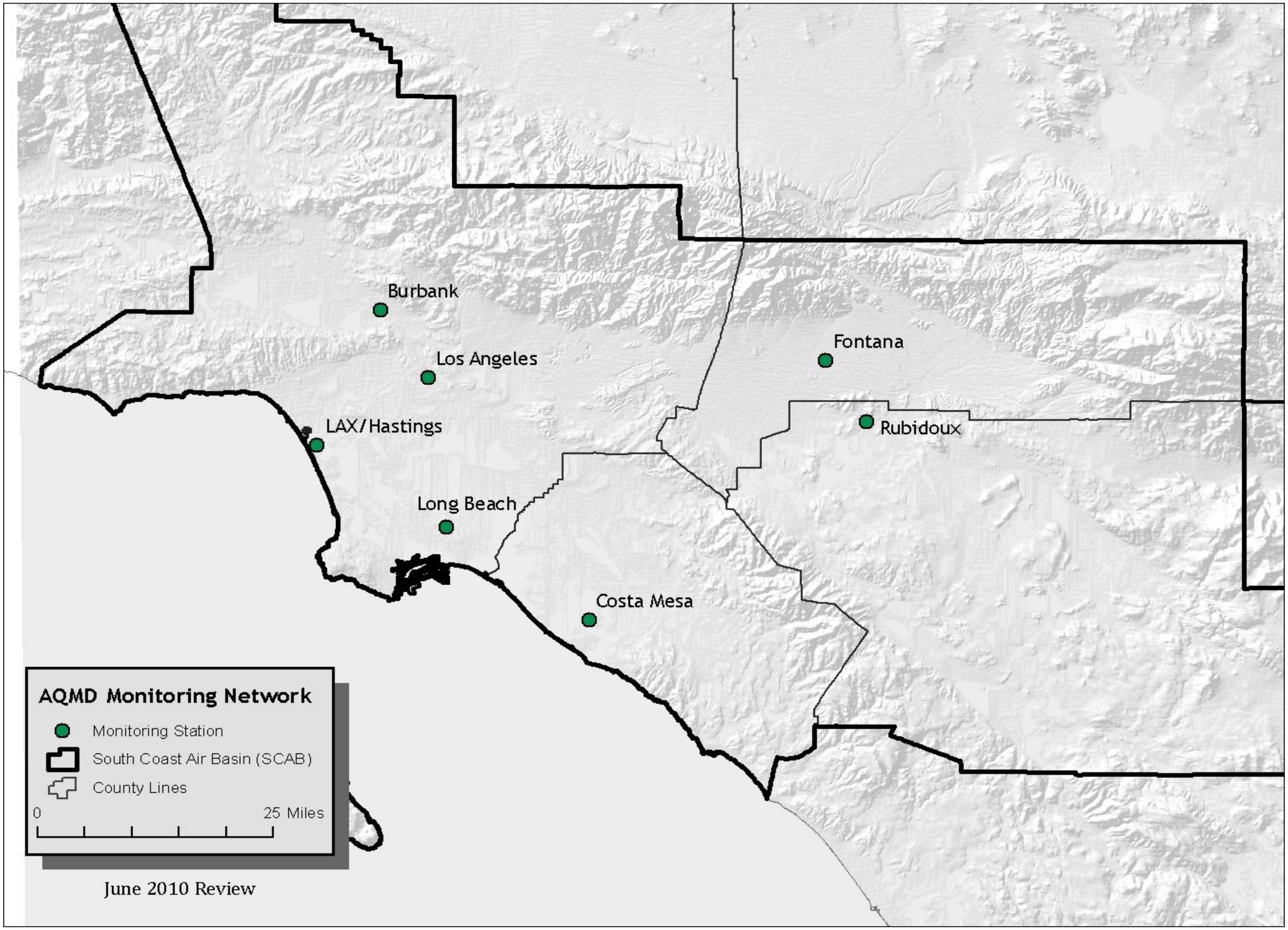


Figure 10 SO2 Monitoring Locations and Change in Population 1990 Through 2009

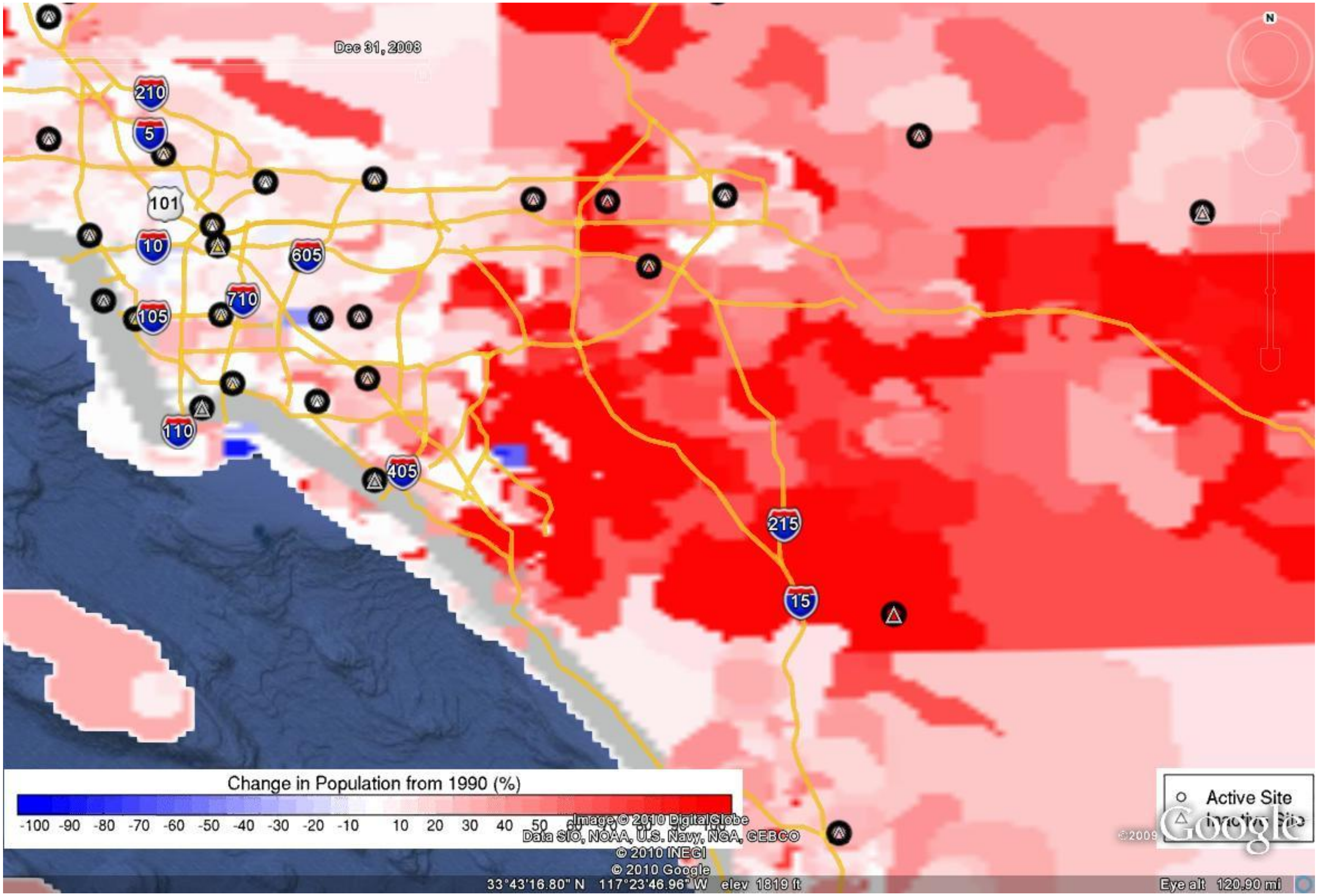


Figure 11 South Coast AQMD Source and Ambient Pb Monitoring Locations

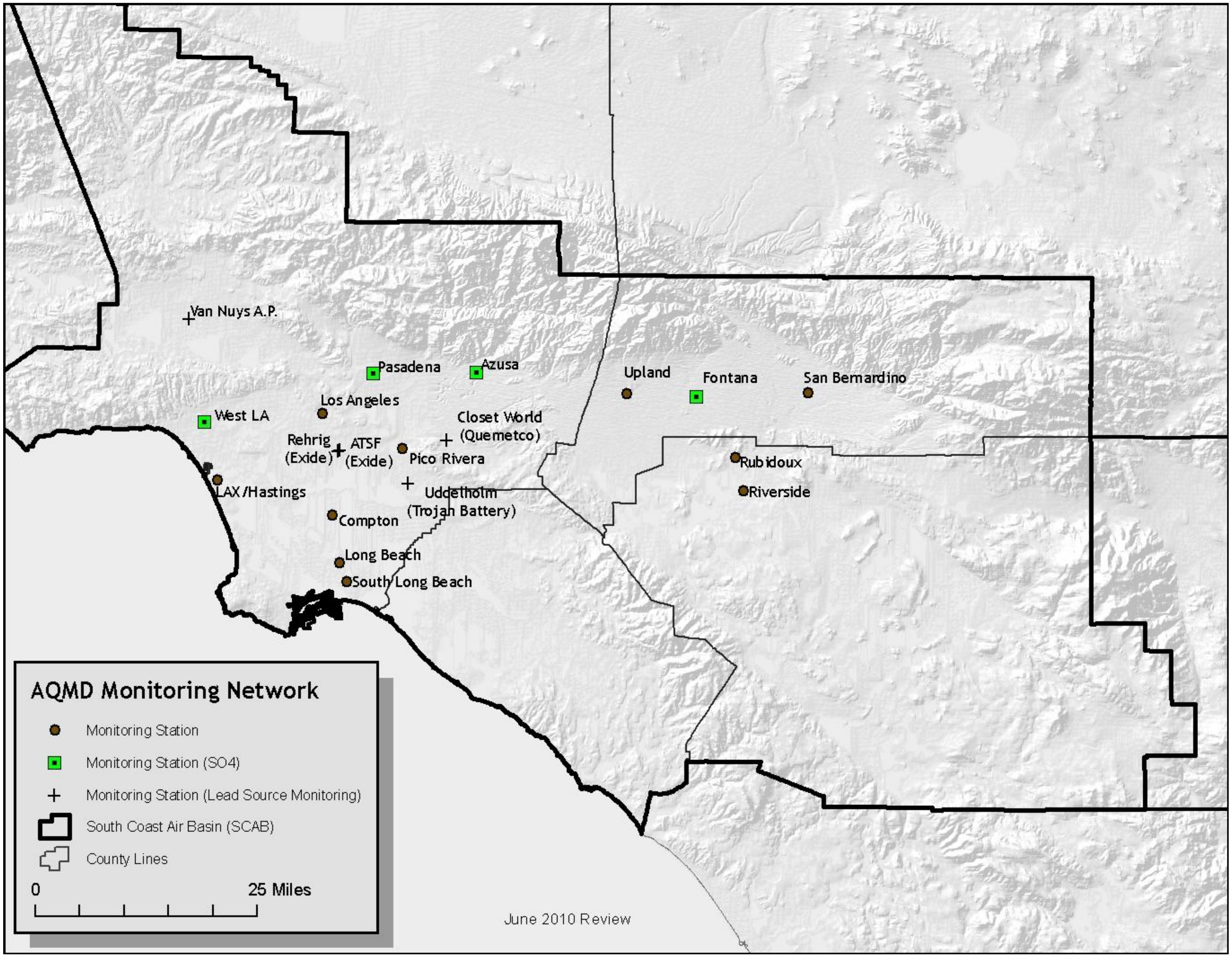


Figure 12 Pb Monitoring Locations and Change in Population 1990 Through 2009

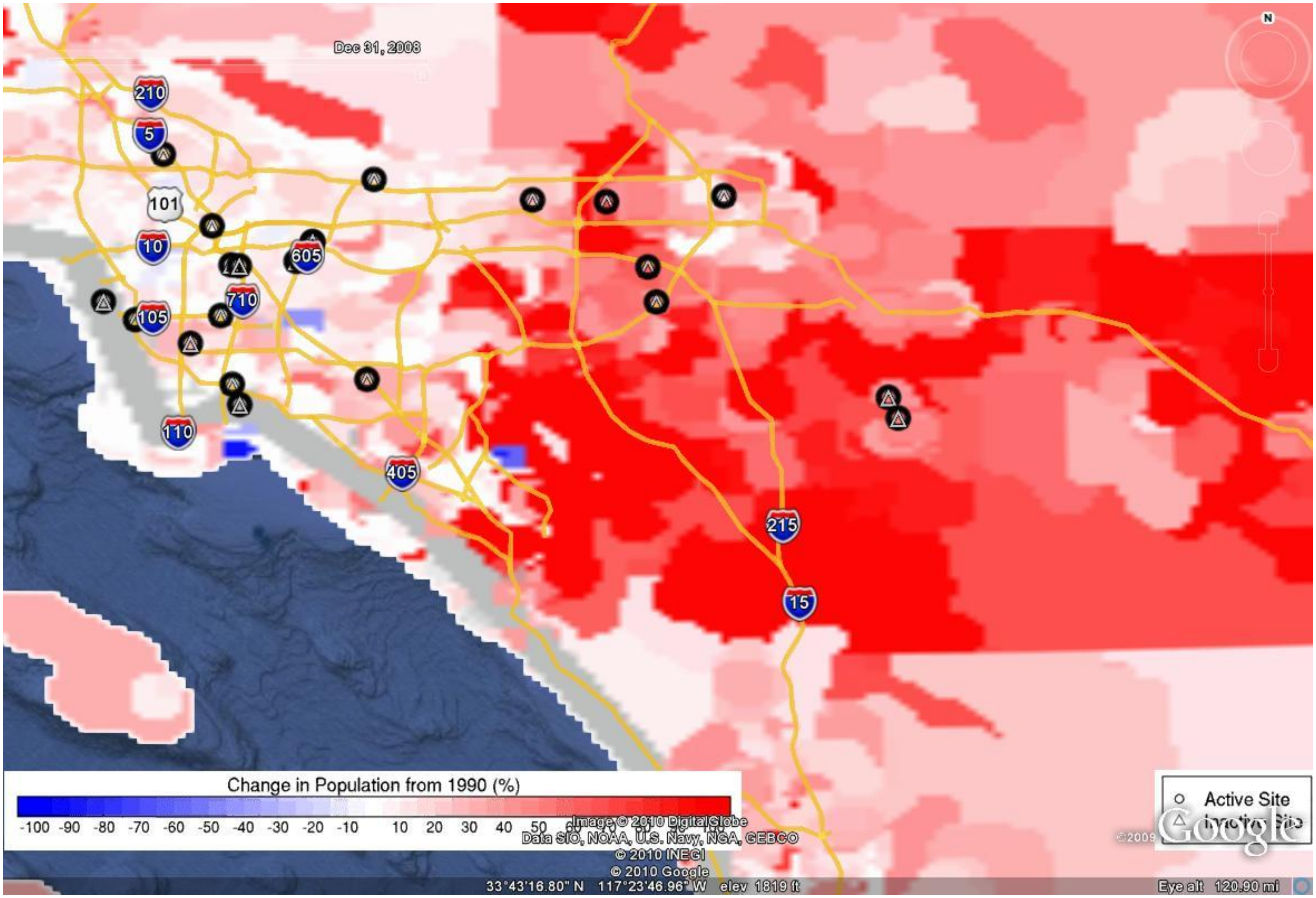


Figure 13 South Coast AQMD PM10 Monitoring

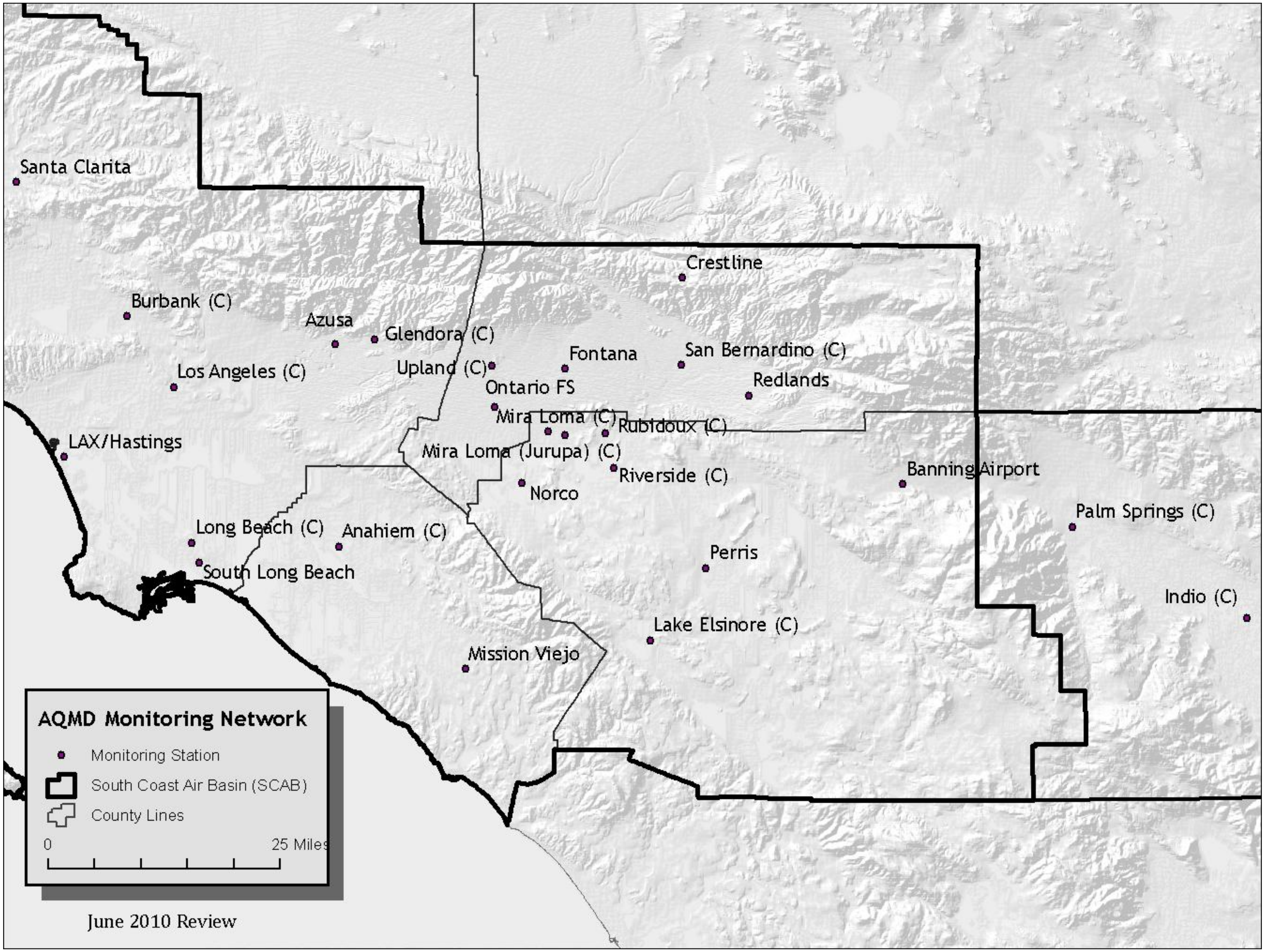


Figure 14 PM10 Monitoring Locations and Change in Population 1990 Through 2009

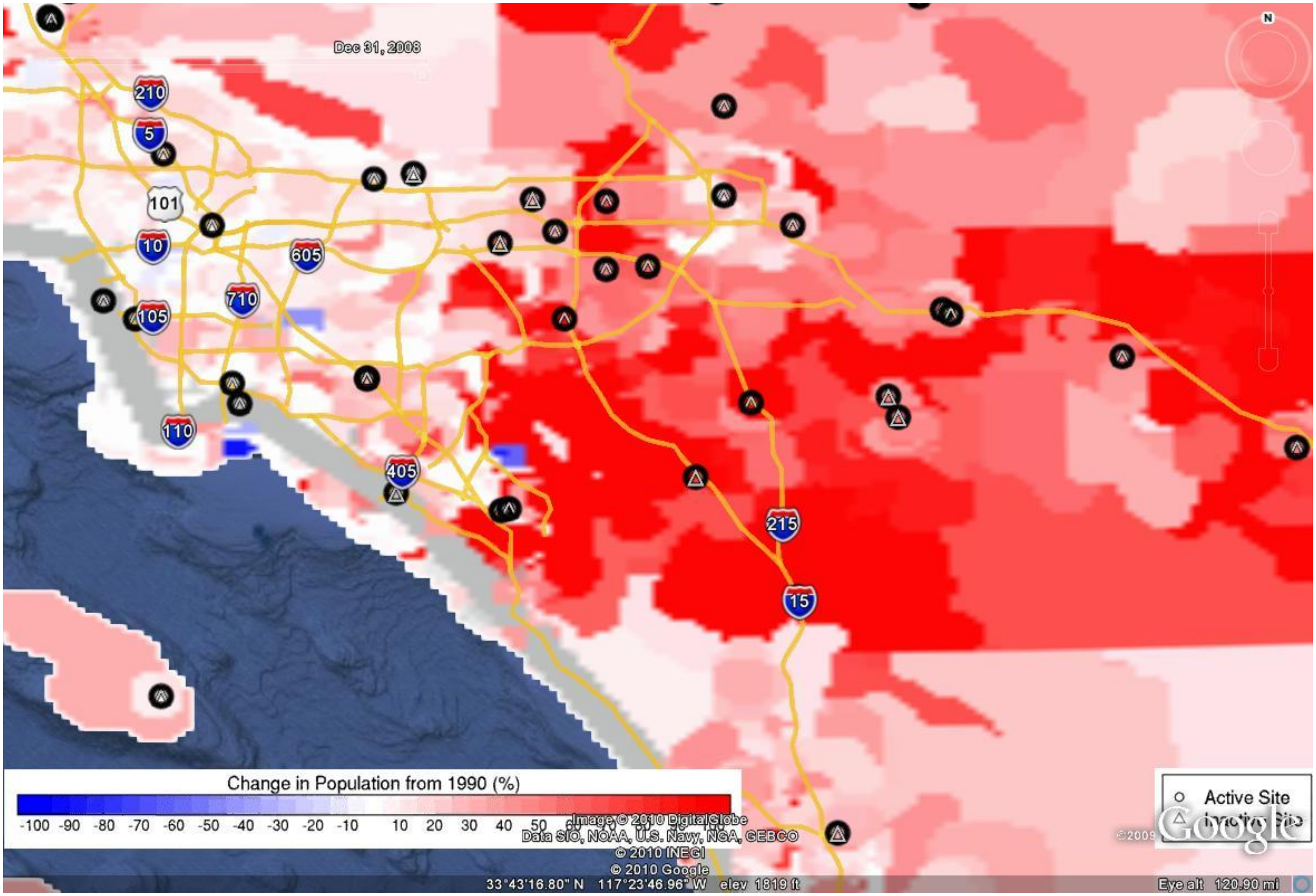
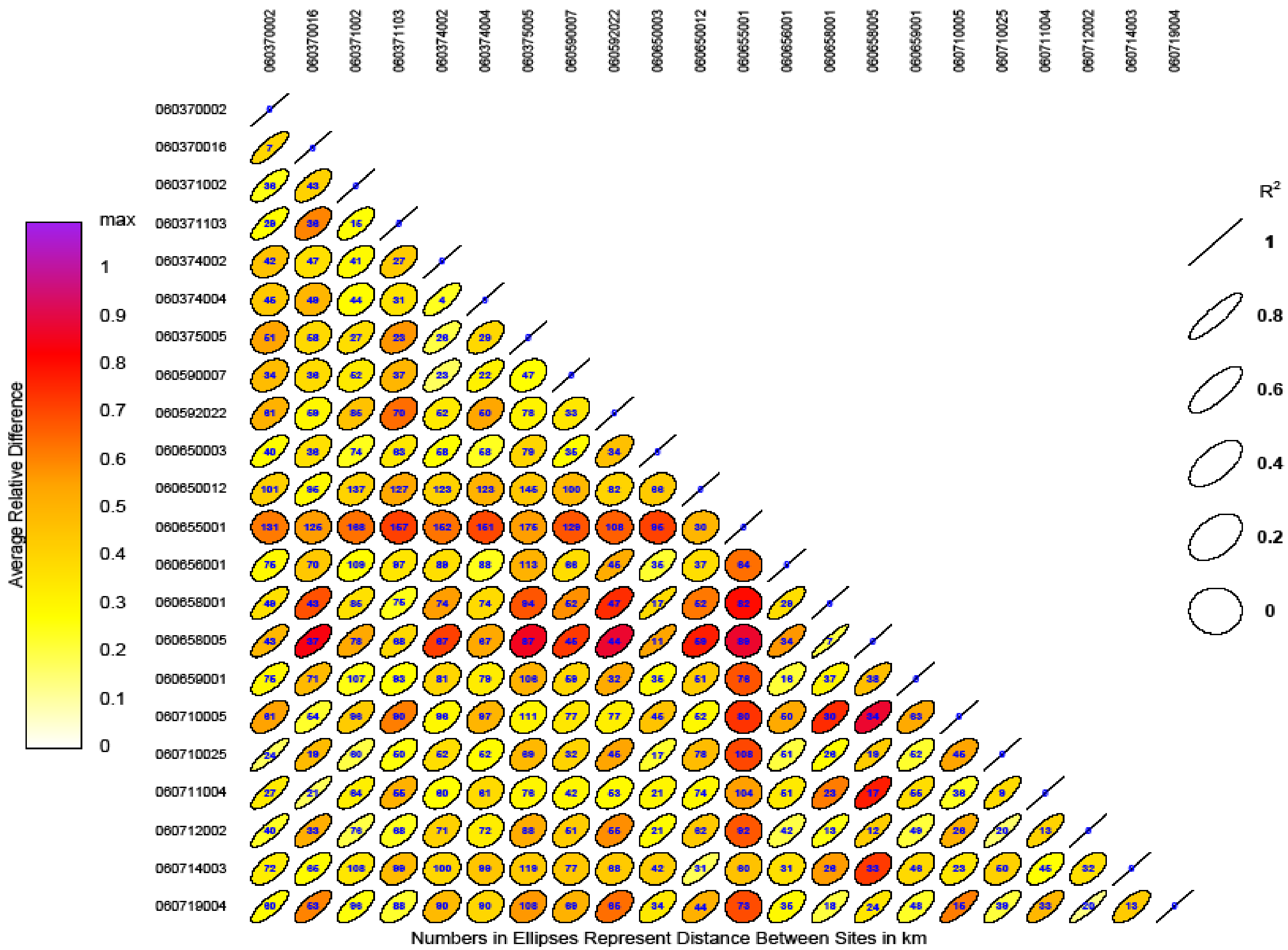


Figure 15 2008 Los Angeles, Orange, Riverside, and San Bernardino County PM10



B = BAM FEM
B1 = BAM

Figure 16 South Coast AQMD PM2.5 Monitoring Locations

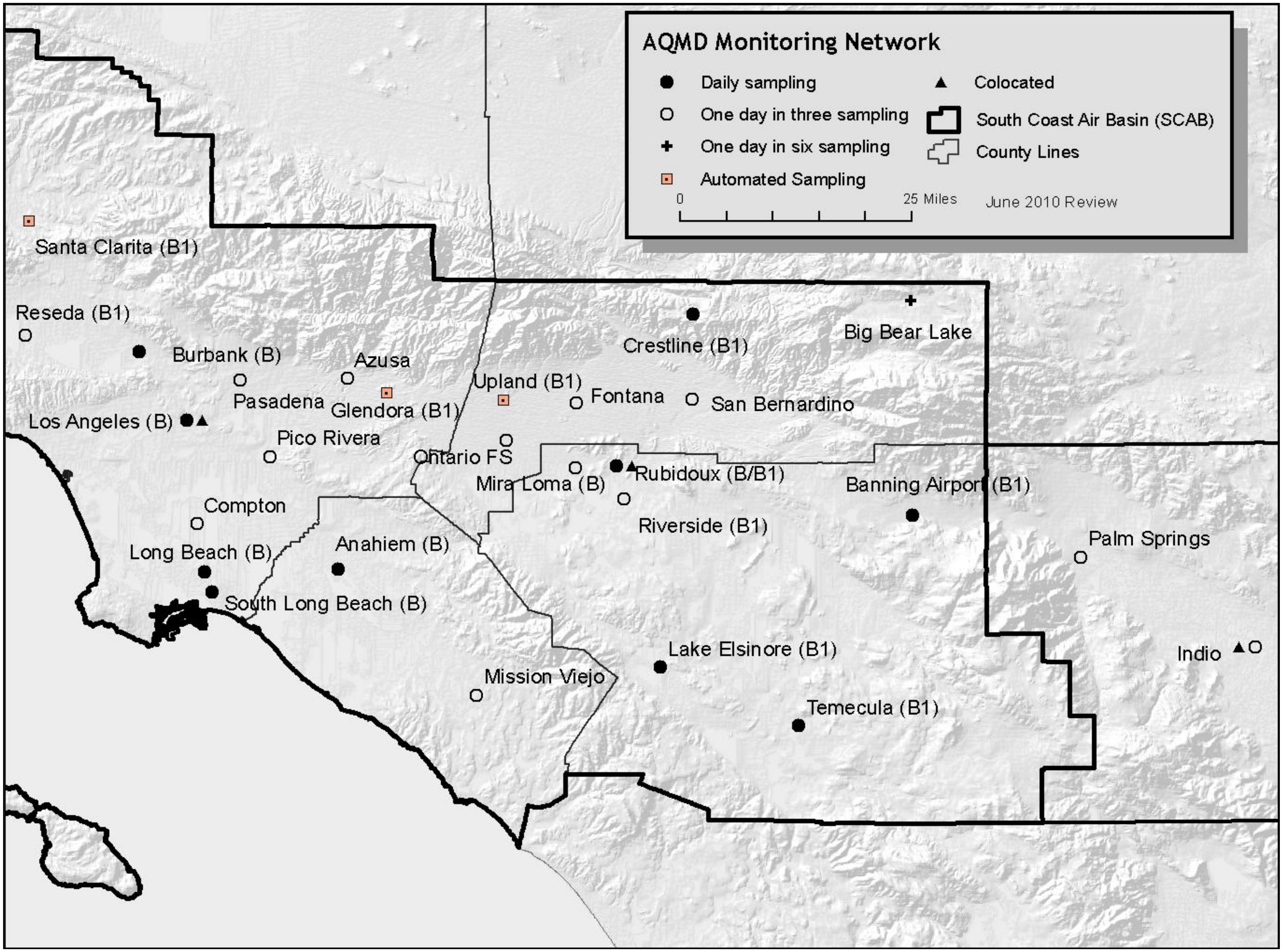


Figure 17 PM2.5 Monitoring Locations and Population Change 1999 Through 2009

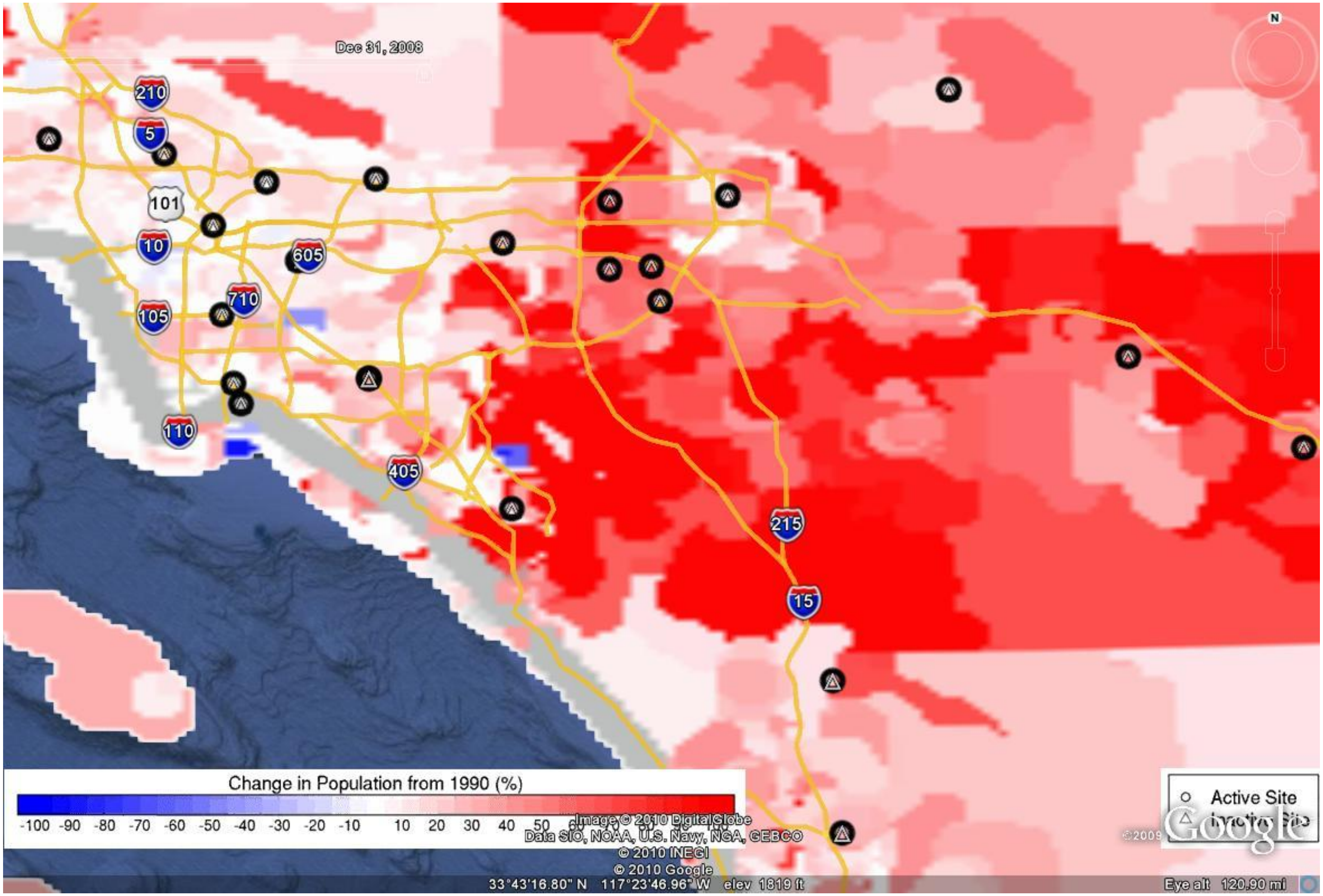


Figure 18 2008 Los Angeles, Orange, Riverside, and San Bernardino County PM2.5

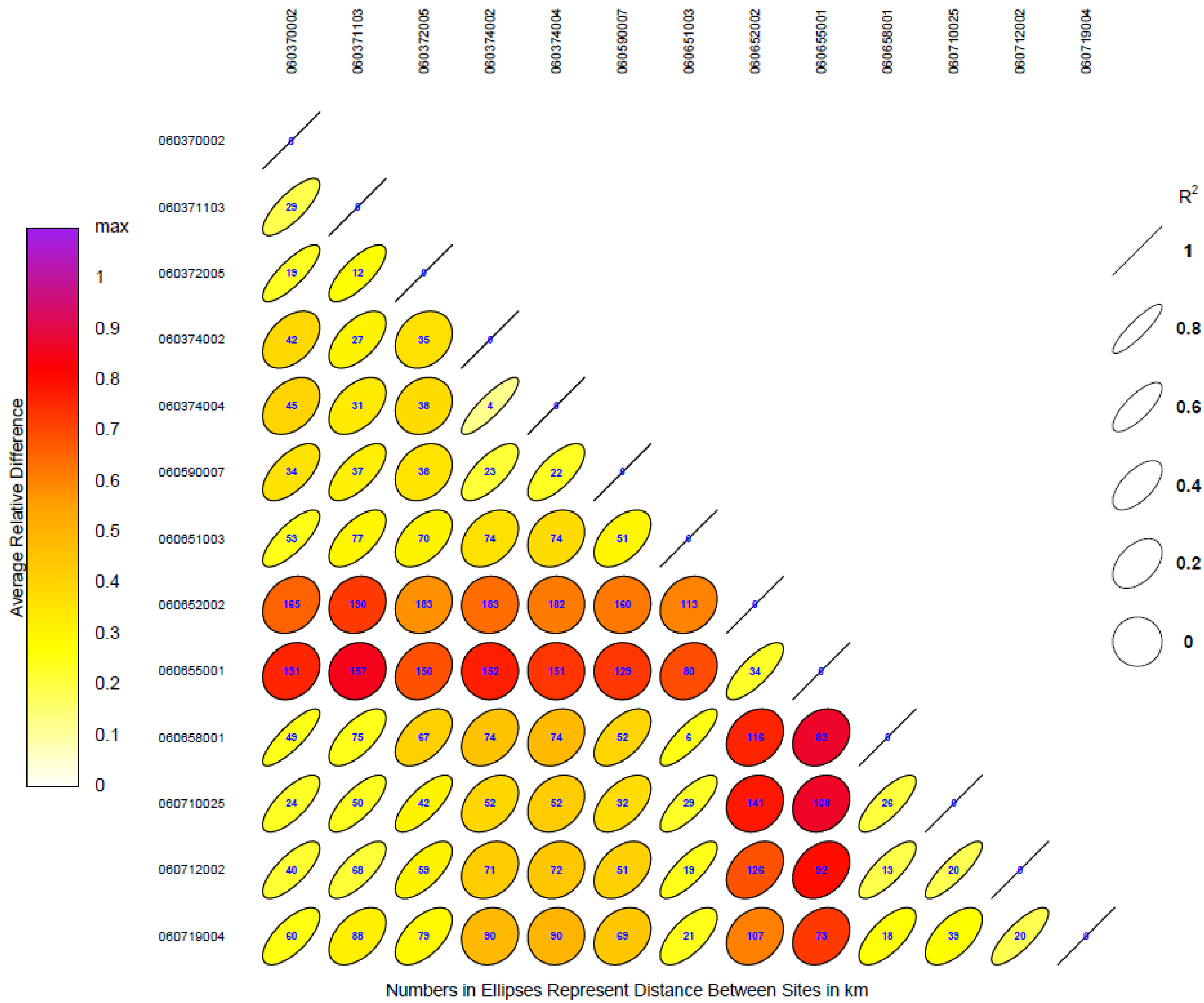


TABLE 32 Summary Table

Analysis	Issue	Conclusion
Network Design		
O3	Monitoring Objective	Crestline, Fontana, Santa Clarita, San Bernardino, Glendora, Upland, Redlands & Banning are consistent with High Concentration sites.
O3	Monitoring Objective	LAX Hastings and North Long Beach values are consistent with background levels
O3	Monitoring Objective	The remainder of the sites are consistent with Population exposure at neighborhood or urban level scale of representativeness; sites in the western portion should be examined for their data value
CO	Monitoring Objective	Lynwood and Anaheim values are consistent with high concentration sites. Lynwood was closed during 2008 and moved to Compton.
CO	Monitoring Objective	Palm Springs, Lake Elsinore, Santa Clarita, and Mission Viejo sites are more consistent with background concentrations
CO	Monitoring Objective	The remainder of the sites are consistent with population exposure at the neighborhood scale of representativeness; sites in the western portion should be further examined for their data value
NO2	Monitoring Objective	North Long Beach, Lynwood and Central LA are consistent with high concentration monitoring sites. Lynwood closed in 2008 and was relocated to Compton
NO2	Monitoring Objective	Palm Springs and Lake Elsinore are consistent with background concentrations
NO2	Monitoring Objective	The remainder of the sites are consistent with population exposure; sites in the western portion should be examined for their data value
SO2	Monitoring Objective	North Long Beach remains consistent with a high concentration site; the remainder of sites should be further examine for data value
PM10	Monitoring Objective	Mira Loma (Van Buren), Indio, Rubidoux, Azusa, Santa Clarita, and Ontario (Fire Station). Are consistent with high concentration monitoring sites
PM10	Monitoring Objective	Crestline, Mission Viejo, and LAX Hastings are consistent with background concentrations
PM10	Monitoring Objective	The remainder of the sites are consistent with population exposure at the neighborhood scale of representativeness.
PM2.5	Monitoring Objective	Central Los Angeles, Anaheim, Pasadena, South Long Beach, Rubidoux, Burbank and North Long Beach are consistent with their current designation as high concentration sites
PM2.5	Monitoring Objective	Palm Springs is consistent with background concentrations

TABLE 32 Summary Table (cont)

Analysis	Issue	Conclusion
Pb	Monitoring Objective	North Long Beach population oriented monitoring objective is not consistent with micro scale representation, is more consistent with a high concentration monitoring objective at microscale
Pb	Monitoring Objective	All sites should be examined further for their data value
Correlation Matrix	O3	Azusa & Glendora/Pomona/Pasadena/Upland/Fontana O3 correlation $\geq$ .8 & relative difference $\leq$ .3
Correlation Matrix	O3	Glendora & Pomona/Pasadena/Upland/Fontana O3 correlation $\geq$ .8 & relative difference $\leq$ .3
Correlation Matrix	O3	Burbank & Central LA/Pasadena O3 correlation $\geq$ .8 & relative difference $\leq$ .3
Correlation Matrix	O3	Central LA & Pico Rivera/Pasadena O3 correlation > .8 & relative difference < .3
Correlation Matrix	O3	Pomona & Upland/Fontana O3 correlation > .8 & relative difference < .3
Correlation Matrix	O3	Anaheim & La Habra O3 correlation > .8 & relative difference < .3
Correlation Matrix	O3	Banning Airport & Tribal site O3 correlation > .8 & relative difference < .3
Correlation Matrix	O3	Rubidoux & Fontana/Redlands/San Bernardino O3 correlation > .8 & relative difference < .3
Correlation Matrix	O3	Upland & Fontana O3 correlation > .8 & relative difference < .3
Correlation Matrix	O3	Fontana & Redlands/San Bernardino O3 correlation > .8 & relative difference < .3
Correlation Matrix	O3	Redlands & San Bernardino O3 correlation > .8 & relative difference < .3
Correlation Matrix	PM2.5	Burbank and Pasadena > .8 & relative difference < .3
Correlation Matrix	PM2.5	Central LA & Pasadena > .8 & relative difference < .3
Correlation Matrix	PM2.5	Riverside Magnolia & Fontana/San Bernardino/Rubidoux > .8 & relative difference < .3
Correlation Matrix	PM2.5	Fontana & San Bernardino > .8 & relative difference < .3
Correlation Matrix	PM2.5	San Bernardino & Rubidoux > .8 & relative difference < .3
Correlation Matrix	PM2.5	Rubidoux & Mira Loma Van Buren > .8 & relative difference < .3
Correlation Matrix	PM10	Azusa & Glendora/Ontario > .8 & relative difference < .3
Correlation Matrix	PM10	Glendora & Upland > .8 & relative difference < .3
Correlation Matrix	PM10	Norco & Rubidoux > .8 & relative difference < .3
Correlation Matrix	PM10	Rubidoux & Mira Loma Van Buren > .8 & relative difference < .3
Correlation Matrix	PM10	Ontario & Fontana > .8 & relative difference < .3
Correlation Matrix	PM10	Fontana & San Bernardino > .8 & relative difference < .3
Minimum number of sites required	Gaseous Criteria Pollutants	South Coast AM network exceeds minimum number of sites required for O3, CO, NO2, & SO2
Minimum number of sites required	Particulate Criteria Pollutants	South Coast AM network exceeds minimum number of sites required for PM2.5, PM10, & Pb

IV. POTENTIAL SOUTH COAST AQMD NETWORK CHANGES AND RECOMMENDATIONS

OVERVIEW

This section describes potential changes to the South Coast AQMD air monitoring network that would help to address the findings of the site-by-site assessments (Section II) and the pollutant network assessments (Section III). The overall goal of these potential modifications to the network design is to improve the ability to achieve multiple monitoring objectives while ensuring the efficient use of resources.

Note that the current AQMD air monitoring network meets or exceeds U.S. EPA monitoring requirements and satisfies multiple monitoring purposes. The dense network of monitoring locations covering a wide area provides the necessary data for NAAQS attainment decisions. It also provides a robust data set for air quality model validation, trend analysis, health studies, and real-time public communication of air quality status. The AQMD places a high value on all these monitoring purposes, all of which must be carefully considered before network changes are made.

Many of the findings described in the previous sections are site-specific issues that are addressed by South Coast AQMD on an ongoing basis. These include site infrastructure improvements and alterations such as vegetation trimming, soil stabilization or paving, replacement of shelters, moving probes and inlets to meet appropriate setback criteria, and increasing or improving power supplies. Through the Annual Network Plan and regular audit and maintenance schedules, issues such as these are continually being identified and addressed. However, when such issues cannot be addressed due to logistical constraints, then the value and monitoring objectives of a particular site could be reconsidered. Furthermore, the monitoring objectives and spatial scales of all sites are assessed as part of the Annual Network Plan, ensuring U.S. EPA minimum monitoring requirements are satisfied. Therefore, relatively minor changes to site infrastructure and monitoring objective/spatial scale designations are not explicitly addressed in this section, although these factors are important in determining the value of a site within a larger pollutant monitoring network.

What follows are some potential network modifications that address larger issues such as redundancies, gaps, efficiencies, and synergies within and between the South Coast AQMD pollutant monitoring networks. A summary of recommended network modifications to the South Coast AQMD monitoring network is provided at the end of this section. Note that there are many purposes for air quality monitoring, some beyond those described in this assessment. Closing, moving or creating monitoring sites requires significant resources and often a long period of concurrent monitoring to show comparability. Thus, these suggestions must be weighed against many other factors before being implemented.

SO2, NO2, AND CO MONITORING NETWORKS

The South Coast AQMD monitoring network far exceeds the minimum monitoring requirements for SO2, NO2, and CO, and South Coast AQMD areas are currently in attainment of the NAAQS for these pollutants. As of 2009, there were no minimum monitoring requirements for these criteria pollutants. In 2010, minimum monitoring requirements were added for NO2 and SO2, and these new regulations will require changes to the NO2 network by 2013. New NAAQS and monitoring regulations for CO are also anticipated with possible network modifications required.

In all cases, South Coast AQMD measurements of SO2, NO2, and CO are made at monitoring sites that are also part of the more essential O3 and PM monitoring networks for which the basin is not in attainment with the NAAQS. Thus, the cost of continuing to monitor for these pollutants is relatively low given that the site infrastructure and staff resources dedicated to the sites will continue as part of the PM and O3 networks. However, there are costs associated with the maintenance, calibration, replacement, and auditing of the SO2, NO2, and CO instruments as well as the resources required to validate and submit the data to U.S. EPA.

Given the recent and upcoming revisions to monitoring regulations for these pollutants, a reduction in the number of SO2, NO2, and CO monitors in the network is not recommended until network design decisions to meet the new requirements have been made. For instance, new NO2 sites will be needed near roadways and possibly in EJ areas. The shifting of resources to accommodate these new requirements will affect the current network configuration.

Once the new regulations for CO are final and network design decisions for NO2 and SO2 have been made, a reconsideration of the extent of the SO2, NO2, and CO networks is recommended. It is likely that the future South Coast AQMD monitoring networks for these pollutants will continue to exceed minimum requirements in order to meet other objectives such as model validation, maintenance plan requirements, and trend analysis. A careful consideration of these factors along with the costs of continued operation may lead to more efficient and effective monitoring networks for SO2, NO2, and CO.

OZONE MONITORING NETWORK

South Coast AQMD exceeds the minimum monitoring requirements for the O3 monitoring network. Due to the large population in Southern California and the complexity of the geography and meteorology, a relatively large number of air monitoring stations are needed to adequately describe air quality in South Coast AQMD's jurisdiction and provide important health information to the public. Both South Coast AQMD air basins (South Coast and Coachella Valley) are designated non-attainment for O3, and a wide, robust O3 network is critical for accurate assessment and modeling efforts.

However, as a regional pollutant, O3 concentrations generally do not vary significantly on short spatial scales, the exception being near busy roadways where NO titration occurs. Based on the correlation analysis in Section III, some sites in close proximity to one another provide very similar O3 readings. Three clusters of high similarity identified in Section III were:

- Fontana/Redlands/San Bernardino/Rubidoux

- Azusa/Glendora/Pomona/Upland/Fontana

- Anaheim/La Habra

In terms of siting criteria, findings related to these sites included:

- La Habra - is within 3 m of cypress trees surrounding inlet probe and does not meet distance from traffic lane requirement.

- Pomona - is less than the required distance from roadway.

Other assessment findings regarding these sites include:

- Glendora has been in operation for 30 years and was originally a CARB monitoring location. There have been difficulties securing a long-term rental contract and the City of Glendora requirements have made it difficult to upgrade the monitoring shelter. The site lacks adequate space and infrastructure to expand at the current location.
- La Habra has been in operation for 50 years; however, it lacks adequate space and infrastructure to expand to include particulate monitoring. The site has not typically been used for research or air toxics studies and there are few synergies at the site between air monitoring programs.
- Pomona has been in operation for 45 years; however, it lacks adequate space and infrastructure to expand. The data has not typically been used for research or air toxics studies and the site was originally intended as a micro-scale CO location. There are few synergies between air monitoring programs at this location.

The Fontana/Redlands/San Bernardino/Rubidoux cluster is well spaced in an area of generally the highest O3 levels in the basin. It is important to continue to monitor in this area and have a good spatial distribution of O3 levels given the frequent exceedances and need for public health advisories. Therefore, no changes are recommended to these O3 sites.

The Azusa/Glendora/Pomona/Upland cluster (excluding the more distant site Fontana) is geographically compact showing high degree of comparability in O3 measurements. In 2007 and 2008, Upland recorded the most exceedances of federal and state air quality standards of O3, although this area is no longer the highest O3 region in the basin. The Glendora site is only seven km from the Azusa site, and although it can record higher O3 levels than Azusa, readings are typically lower than Upland. The Pomona site is also relatively close to both Upland and Azusa. Upland and Azusa have been active sights for 37 and 53 years respectively providing the needed long-term trends. Given the proximity to other correlated stations and the siting and infrastructure issues mentioned above, both Glendora and Pomona could be considered potentially redundant in terms of O3 measurements.

The Anaheim/La Habra cluster show similar but relatively low levels of O3 according to recent data and the correlation analysis. Given these low levels, the unresolvable siting issues, and the few other measurements made at La Habra (CO and NO2 only), this site would be another potential candidate for reduction in size of the O3 network.

If O3 measurements cease at both La Habra and Pomona, a geographical gap might be created in northwestern Orange County. South Coast AQMD headquarters in Diamond Bar is at the center of that gap, and a new site at headquarters would fill the potential need for additional O3 measurements in the area while providing considerable efficiencies with a convenient location.

Two other changes to the O3 network are already underway. First, the Mira Loma Van Buren monitoring location was established as a replacement site for the Mira Loma Jurupa monitoring location. Ozone data for Jurupa was not included in the correlation analysis as it is not in the AQS database. The closure of the Jurupa station is planned within the coming year. Second, a new site in Temecula is already in place with O3 measurements planned. It is in an area that has grown significantly in recent years and may not be adequately represented by the current O3 monitoring network.

PM2.5 MONITORING NETWORK

The South Coast AQMD monitoring network exceeds the minimum monitoring requirements for PM2.5. Due to the large population in Southern California, the complexity of the geography, and the non-attainment status of the basin, a relatively large number of air monitoring stations are needed to adequately describe air quality and provide important health information to the public.

As a generally regional pollutant, PM2.5 concentrations generally do not vary significantly on short spatial scales unless very near strong sources of particulate matter. Based on the correlation analysis in Section III, some sites in close proximity to one another provide very similar PM2.5 readings. Two clusters of high similarity identified in Section III were:

- San Bernardino/Rubidoux/Fontana

- North Long Beach/South Long Beach

In terms of siting criteria, findings related to these sites included:

- Fontana is within 9 m of unpaved parking and within 9 m of regularly idling diesel exhaust.

- South Long Beach does not currently meet all 40 CFR § 58 Appendix E Probe Siting Criteria, specifically the spacing from obstructions surrounding the instrumentation.

Other assessment findings regarding these and other sites include:

- Big Bear Lake has been in operation for 11 years and was originally established to determine the extent of winter wood smoke particulate matter. Since that time, there have not been exceedances of the standard. It is the only measurement made at the site and thus there are no synergies between monitoring programs. Consideration must be given to the remoteness of the location and the cost to maintain the site.

- Fontana has been in operation for 29 years. However, the site lacks adequate space and infrastructure to expand at the current location.

- South Long Beach was established June 2003 to monitor particulate influence from port activities. The infrastructure of the facility meets the needs of particulate sampling, but there are no facilities for continuous analyzers and no room for expansion. There are no synergies between air monitoring programs or use of office space by inspectors. The cost to relocate the site is low due to the low number of samplers and there is potential to move this site to a location nearer to port activities.

The San Bernardino/Rubidoux/Fontana cluster is relatively well spaced in an area of generally the highest PM2.5 levels in the basin. It is important to continue to monitor in this area and have a good spatial distribution of PM2.5 levels given the frequent exceedances and need for public health advisories. Despite some potential siting issues at Fontana, no changes are recommended to these PM2.5 sites.

The North Long Beach/South Long Beach cluster is geographically compact with only four miles separating the sites. Data at the two sites is similar in terms of correlation, exceedances, averages, and maximum levels. The South Long Beach location was intended to measure the impact of the nearby port activities. However, no site closer to the Port area could be secured at the time. In 2007, a site for a temporary air monitoring study was secured much closer to Port activities, and this site is still available to be made permanent with sufficient infrastructure for expansion. Given the limitations of the current South Long Beach site with no room for gaseous measurements, and the original intended purpose of the site, the temporary site on Anaheim Street in Long Beach may be a better option. Therefore, a potential modification of the PM2.5 network is to move the South Long Beach measurements to this new site closer to the Port activities. Concurrent monitoring may need to be conducted to show that the new site records similar or higher PM2.5 levels than the current site.

The Big Bear Lake monitoring location only measures PM2.5, and has not been in violation of the 24-hour or annual PM2.5 NAAQS in 2007 or 2008. Sampling only occurs on a reduced, U.S. EPA approved, sampling frequency of one-in-six day due to the remote location. The original intent of the site was to determine if wintertime residential wood burning could lead to NAAQS violations. Given that violations have not been observed and that the remote location of the site requires significant staff resources to maintain even at the reduced sampling schedule, the value of the site should be reconsidered.

Another suggested change in the configuration of the PM2.5 network is to continue the transition to continuous PM2.5 FEM monitors. Currently, these monitors are being run collocated with FRM filter-based measurements to establish comparability and determine any biases. Once complete, the FEM continuous monitors can replace many existing FRM monitors in the network. This will reduce the considerable resources required to maintain the aging FRM samplers and to process and weigh the collected filter samples. It will also provide for daily data at sites that may only be one-in-three day sites currently, and it will provide useful hourly data for public reporting and air quality assessments.

PM10 MONITORING NETWORK

The South Coast AQMD monitoring network exceeds the minimum monitoring requirements for PM10. Due to the large population in Southern California, the complexity of the geography, and the current non-attainment status of the basin, a relatively large number of air monitoring stations are needed to adequately describe air quality and provide important health information to the public.

PM10 includes PM2.5, but concentrations can vary significantly on short spatial scales. However, based on the correlation analysis in Section III, some sites in close proximity to one another provide similar PM10 readings. These sites tend to be in the highest concentration areas (Rubidoux and Mira Loma Van Buren), but the correlated site clusters are not as clear as for O3 and PM2.5.

In terms of siting criteria, findings related to PM10 sites include:

- South Long Beach does not currently meet all 40 CFR § 58 Appendix E Probe Siting Criteria, specifically the spacing from obstructions surrounding the instrumentation.

Other assessment findings regarding these and other sites include:

- Norco has been in operation for 30 years. The infrastructure is inadequate as there are no indoor facilities which allow for monitoring of criteria pollutants. Data is not used for purposes other than NAAQS and there are no other measurements being made at the site.

- Ontario Fire Station –has been in operation for 11 years. The infrastructure is inadequate as there are no indoor facilities which allow for monitoring of criteria pollutants. Data are not used for purposes other than NAAQS and there are no synergies between programs.

Given the high levels of PM10 recorded at both Rubidoux and Mira Loma, no changes are recommended for PM10 measurements at these sites, despite their high level of correlation. However, given that Mira Loma has consistently recorded higher levels of PM10 over the last five years than Rubidoux, the Mira Loma site should be designated as the expected maximum concentration PM10 site as per 40 CFR § 58.12(e).

The only measurement at the Norco site is PM10 and thus does not provide any synergies with other programs. It consistently records lower PM10 concentrations than nearby Rubidoux and Mira Loma. Therefore, it can be considered for potential elimination from the PM10 monitoring network. A similar analysis can be made for the Ontario station, with few synergies with other programs and very similar PM10 statistics levels to Norco and other nearby sites. If both sites were eliminated, this may create a geographical gap in western Riverside and San Bernardino Counties. To provide spatial coverage in that area, the sites could be consolidated into a new location with better infrastructure between the current Norco and Ontario sites.

The potential move of the South Long Beach site closer to port activities suggested for the PM2.5 network also holds for the PM10 network.

Another suggested change in the configuration of the PM10 network is to transition towards continuous PM10 FEM monitors. New continuous PM10 monitors have recently been deployed for a regional health study and can eventually serve to replace many existing FRM monitors in the network. This will reduce the considerable resources required to maintain the aging FRM samplers and to process and weigh the collected filter samples. It will also provide for daily data at sites that may only be one-in-six day sites currently, and it will provide useful hourly data for public reporting and air quality assessments.

SUMMARY OF RECOMMENDED NETWORK MODIFICATIONS

The current AQMD air monitoring network meets or exceeds U.S. EPA monitoring requirements while satisfying a wide array of monitoring purposes, some beyond those described in this assessment. Meeting minimum monitoring requirements is just one factor in determining the value of sites and measurements. Given the challenges of meeting air quality standards in Southern California and the need for information to help in developing control strategies to achieve attainment, the South Coast AQMD monitoring network will continue to far exceed the minimum requirements. Furthermore, closing, relocating or creating monitoring sites requires significant resources and often a long period of concurrent monitoring to show comparability. Thus, the suggestions summarized below must be weighed against many other factors before being implemented. Most changes to the monitoring network are subject to approval by the U.S. EPA Regional Administrator.

- Once new monitoring regulations, attainment status, and network decisions are known for SO2, NO2, and CO, consider a general reduction in the number of sites monitoring for those pollutants in the network while still meeting all monitoring objectives and purposes.

- Reconsider the values of the Glendora, La Habra and Pomona sites, and potentially consolidate measurements at nearby sites or at a new site in Diamond Bar.

- Reconsider the value of the Big Bear Lake PM2.5 site.

- Consider moving all South Long Beach measurements to a new permanent site on Anaheim Street in Long Beach that is closer to port activities and will better achieve the original purpose of the site.

- Reconsider the value of the Norco and Ontario particulate sites, and potentially consolidate measurements at nearby sites or at a new site between the two.

- Continue to transition to continuous PM measurements that can eventually replace filter-based measurements.

Appendix C: STI 5-Year Network Assessment

The following document was compiled by STI under contract with the District to satisfy federal requirements under 40 CFR 58.10 (d). The opinions contained herein do not necessarily reflect the opinions of the District. Please see pages 34 – 36 of the District's 2010 Air Monitoring Network Plan for more information.

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AMBIENT AIR QUALITY MONITORING NETWORK ASSESSMENT FOR THE SAN JOAQUIN VALLEY

Final Report
STI-908072.04-3643-FR

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1. INTRODUCTION

The U.S. Environmental Protection Agency (EPA) recently drafted the National Ambient Air Monitoring Strategy (NAAMS). The purpose of NAAMS is to optimize U.S. air monitoring networks to achieve (with limited resources) the best possible scientific value while continuing to protect public and environmental health. An important element of NAAMS is a plan for periodic network assessments at national, regional, and local levels. A network assessment includes (1) evaluation of air monitoring objectives and budget, (2) evaluation of a monitoring network's effectiveness and efficiency relative to its objectives and cost, and (3) recommendations for network reconfigurations and improvements. The EPA expects that a multi-level network assessment will be conducted every five years, with the first to be completed by the end of 2010 (U.S. Environmental Protection Agency, 2005, 2006).

To proactively meet the EPA's network assessment mandate, the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) contracted with Sonoma Technology, Inc. (STI) to perform an assessment of the SJVUAPCD air and meteorological monitoring networks. This report contains the findings and recommendations resulting from the network assessment.

1.1 BACKGROUND

Ambient air monitoring objectives and demographic characteristics change over time, thus motivating air quality agencies to re-evaluate and reconfigure their monitoring networks. Several factors have prompted the changes in air monitoring objectives: improvement in air quality, changes in population distribution and behaviors, changes in air quality mandates, and advancements in the scientific understanding of air quality phenomena. As a result of these changes, air monitoring networks in some regions may have unnecessary or redundant monitors or ineffective monitoring locations for some pollutants, while other regions may lack necessary monitors altogether.

Changes in $PM_{2.5}$ and ozone National Ambient Air Quality Standards (NAAQS) and other air monitoring objectives are motivating air quality agencies to refocus their monitoring resources on pollutants of emerging interest or persistent challenge, such as particulate matter less than 2.5 microns ($PM_{2.5}$), air toxics, and ground-level ozone and precursor compounds. In addition, agencies are interested in designing networks to protect today's population and environment while maintaining a focus on long-term air quality trends. Moreover, agencies are using new air monitoring technologies and developing an improved scientific understanding of air quality issues.

Monitoring networks should be designed and configured to address multiple, interrelated air quality issues (i.e., a multipollutant approach) and to support other types of air quality studies (e.g., photochemical modeling and emission inventory assessments). Reconfiguring air monitoring networks to help meet the needs of current air quality research and issues will enhance their value to stakeholders, scientists, and the general public. Performing an air monitoring network assessment involves re-evaluation of the objectives and budget for air monitoring, evaluating a network's effectiveness and efficiency relative to its objectives and costs, and making recommendations for network reconfigurations and improvements. The assessment performed by STI did not take into account the operational costs associated with the monitoring network; the SJVUAPCD will evaluate the resources and costs of the assessment.

1.2 NETWORK ASSESSMENT OBJECTIVES

The SJV (San Joaquin Valley) is an area with rich agricultural resources, abundant industry, and a growing population. The SJVUAPCD seeks to ensure that its monitoring network is (1) capable of effectively characterizing air quality and meteorology in the region and (2) meeting its monitoring objectives. The objectives of the SJVUAPCD air monitoring network are to assure compliance with NAAQS, determine control strategy effectiveness, support air quality forecasting, provide information that helps inform the public of air quality conditions and potential public health risks, and support air quality modeling.

The objectives of this network assessment are to identify and recommend adjustments to the SJVUAPCD criteria pollutant, Photochemical Assessment Monitoring Stations (PAMS), and meteorological monitoring network that may be needed to address air quality improvements, emissions reductions, population increases, and the five-year network assessment requirements set forth by the EPA (40 CFR 58.10). These requirements address questions as to whether sites are appropriately located to

- determine the highest criteria pollutant concentrations expected to occur in the area covered by the network,
- measure typical concentrations in areas of high population density,
- determine the impact of significant sources or source categories on air quality
- determine general background concentration levels,
- determine the extent of regional pollutant transport among populated areas , and
- measure air pollution impacts on visibility, vegetation damage, or other welfare-based impacts to support secondary standards

Additionally, a network assessment can identify potentially redundant sites, areas where new sites may be needed, and new technologies that may add value to the air monitoring network.

1.3 NETWORK OVERVIEW

The SJVUAPCD air monitoring network is a rich network that measures a variety of pollutants and has a long record of criteria pollutant data. **Figure 1-1** shows a map of the SJVUAPCD's air monitoring network and the general network assessment study domain (gray boundary). In addition to the sites operated by the SJVUAPCD, several other sites located in the SJV are operated by other jurisdictions (i.e., the California Air Resources Board–CARB) that are located both within the study domain and along the periphery of the domain. The SJVUAPCD is planning to deploy five additional sites in the near future. The map in Figure 1-1 shows the sites operated by the SJVUAPCD (blue circles), the planned sites (stars), sites located in the SJV that are operated by the CARB (gray squares), and sites that are operated by the National Park Service (NPS) (orange squares).

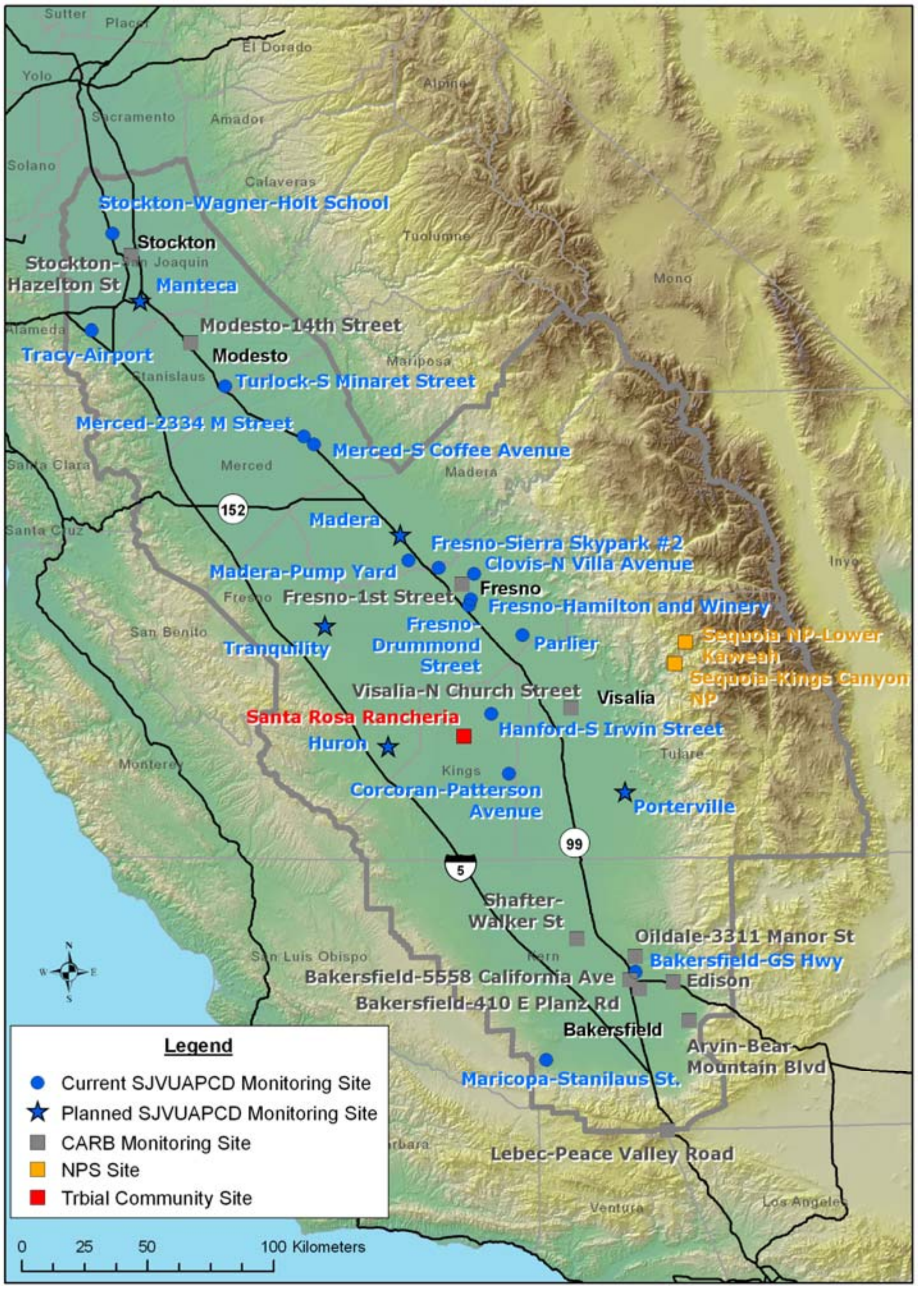


Figure 1-1. Map of the network assessment study domain and the air monitoring sites located in the SJV, including planned sites.

The SJV is geographically large and comprises eight counties with a combined area of approximately 27,000 square miles (Umbach, 2005). Overall, the SJV monitoring network is modest, with several agencies operating sites within the valley. The SJVUAPCD's monitoring network, that is, those sites currently operated by the SJVUAPCD, consists of 10 ozone monitors, 10 NO_2 monitors, 5 $PM_{2.5}$ monitors, 8 PM_{10} monitors, 5 CO monitors, and 6 PAMS monitoring sites that collect ozone, oxides of nitrogen (NO_x and NO_y), and volatile organic compound (VOC) data. The overall focus of air quality monitoring in the SJV is to capture representative population exposure pollutant concentrations. Most of the sites in the SJV are located in densely populated areas and areas of high urban emissions. Appendix A includes a table and more detailed information about the SJVUAPCD-operated sites.

1.4 GUIDE TO THIS REPORT

The remaining sections of this report detail the analysis approach, findings, and recommendations from this network assessment. Section 2 includes a discussion of the technical approach and findings of the air monitoring network assessment. The technical approach and findings of the meteorological network assessment are discussed in Section 3. Section 4 contains a synthesized discussion of findings, conclusions, and recommendations for adjustments to the network.

2. TECHNICAL APPROACH AND FINDINGS OF THE AIR MONITORING NETWORK ASSESSMENT

The overall technical approach for conducting the network assessment of the SJVUAPCD's criteria pollutant, PAMS, and meteorological monitoring network was divided into two main tasks: (1) performing the air monitoring network assessment and (2) performing the meteorological network assessment. The results of the air monitoring and meteorological analyses were first viewed independently and then synthesized and viewed holistically. Recommendations for adjustments to the overall network were then developed.

Table 2-1 lists the network assessment analyses that were used to address the monitoring objectives (as discussed in Section 1.2) and the following questions:

- Which sites provide the most value in terms of the number of pollutants measured, the length of data record, and data quality?
- Are sites appropriately located to determine the highest pollutant concentrations expected to occur in the area covered by the network?
- Are sites appropriately located to measure typical pollutant concentrations in areas of high population density?
- Are sites appropriately located to determine the impact of significant sources or source categories on air quality?
- Are sites appropriately located to determine general background concentration levels?
- Are sites appropriately located to determine the extent of regional pollutant transport among populated areas?
- Are sites appropriately located to measure air pollution impacts on visibility, vegetation damage, or other welfare-based impacts and to support secondary standards?
- Are there potentially redundant sites in the network?
- Are there areas where new sites may be needed?
- Are there new technologies that may add value to the air monitoring network?

The analyses listed in Table 2-1 are a subset of the analysis methods prescribed in the EPA's *Ambient Air Monitoring Network Assessment Guidance Document* (Raffuse et al., 2007).

Table 2-1. Summary of the analyses performed and the monitoring objectives or questions addressed.

	Site-by-Site Analyses							Bottom-up Analyses		
Objective or Question	**Data Above the Method Detection Limit (MDL)**	**Number of Parameters Measured**	**Length of Trend Record**	**Measured Concentrations**	**Deviation from NAAQS**	**Wind Rose Analyses**	**Correlation Analyses**	**Area-Served**	**Population Density/ Population Served/ Population Change**	**Emissions Served**
Which sites provide the most value in terms of the number of pollutants measured, the length of data record, and data quality?	X	X	X							
Are sites appropriately located to determine the highest pollutant concentrations expected to occur in the area covered by the network?				X	X					
Are sites appropriately located to measure typical pollutant concentrations in areas of high population density?		X						X	X	
Are sites appropriately located to determine the impact of significant sources or source categories on air quality?										X
Are sites appropriately located to determine general background concentration levels?				X				X	X	X
Are sites appropriately located to determine the extent of regional pollutant transport among populated areas?				X				X	X	
Are sites appropriately located to measure air pollution impacts on visibility, vegetation damage, or other welfare-based impacts and to support secondary standards?								X		
Are there potentially redundant sites in the network?							X	X	X	
Are there areas where new sites may be needed?								X	X	X
Is the meteorological network adequate for characterizing regional surface and upper-air meteorology?		X				X	X			

A network assessment comprises several analysis methods that address specific objectives. The overall approach when performing each analysis is to rank the sites highest that best meet the specified objectives for each analysis technique. It is important to note that no one analysis stands alone and that the results are synthesized, evaluated, and viewed in the context of the overall monitoring objectives. Recommendations are then made on the basis of the synthesized results. The remainder of this section presents a summary of key findings (Section 2.1), a discussion of the technical approach and findings for the site-by-site and bottom-up analyses for the criteria pollutant network (Section 2.2), and a discussion of the PAMS network (Section 2.3).

2.1 SUMMARY OF KEY FINDINGS FROM THE AIR MONITORING NETWORK ASSESSMENT

This section summarizes the key findings from the air monitoring network assessment. The sections that follow provide a more detailed discussion of the process used to arrive at the findings below. A discussion of these findings and the resulting recommendations are included in Section 4.

Criteria Pollutant Network

- Overall data completeness and percent above method detection limit (MDL) values are very good for all pollutants with the exception of CO. Data completeness is very good for CO; however, the percent above MDL values are low because CO concentrations are low in the SJV. The SJVUAPCD is currently operating low-sensitivity instruments but is planning to deploy high-sensitivity CO instruments in the future.
- Measured concentrations of ozone and $PM_{2.5}$ are high relative to the NAAQS throughout the SJV. The Tracy, Turlock, Madera, Fresno–Drummond, and Bakersfield–Golden State Highway (GSH) sites are the most valuable SJVUAPCD operated sites for determining NAAQS attainment.
- There is adequate data for examining long-term trends in ozone, $PM_{2.5}$, PM_{10}, NO_2, and PAMS species. The SJVUAPCD will be installing additional 1-hr continuous $PM_{2.5}$ sites in the near future.
- The sites operated by the CARB are important sites for monitoring criteria pollutants in the SJV. The results of this network assessment assume that the CARB will continue to operate these sites and that data of high quality will be routinely available. If one (or more) of these sites is discontinued, the SJVUAPCD should implement comparable measurements at or near the discontinued sites.
- The SJVUAPCD is planning to deploy two additional ozone monitors in Tranquility and Porterville. Analyses indicate that these sites will fill existing gaps in the network.

- The SJVUAPCD is planning to deploy two additional $PM_{2.5}$ 1-hr continuous monitors in Manteca and Madera. Analyses indicate that these sites will fill existing gaps in the network for monitoring population exposure.
- The SJVUAPCD is planning to deploy a PM_{10} 1-hr site in Madera. Analyses indicate that this site will fill an existing gap in the network along the north-south central corridor of the SJV. However, there are no PM_{10} 1-hr sites in the eastern and western regions of the SJV.
- Two main areas within the SJV may warrant additional criteria pollutant monitoring sites: (1) the region to the west of Merced (Los Banos area), and (2) the region to the northeast of Clovis. Unmonitored areas more than 50 km away from existing monitors are a concern. Unless the SJVUAPCD has special study data indicating low spatial variability in pollutant concentrations in the areas that lack monitors, additional sites in unmonitored regions should be considered. The SJVUAPCD should consider adding two criteria sites in the region west of Merced (Los Banos area) and in the region northeast of Clovis, where there appear to be existing gaps in the network.
- The area between Corcoran and Bakersfield may warrant an additional $PM_{2.5}$ 1-hr continuous monitoring site based on population density and PM emissions levels.
- Potential improvements to the PM_{10} 1-hr continuous network might include adding PM_{10} monitors at the planned $PM_{2.5}$ 1-hr sites (i.e., Huron, Manteca, and Tranquility) and/or augmenting the 24-hr PM_{10} monitors with 1-hr PM_{10} monitors at existing sites.
- A gap exists in the NO_2 network along the western side of the SJV. Deploying an NO_2 monitor at the planned Tranquility ozone site could help fill this gap.
- Four CO monitors are located in the greater Fresno area (three of which are run by the SJVUAPCD). In addition to adding a trace CO monitor at the Clovis site, relocating one or two of the CO sites in Fresno to area(s) outside Fresno could be beneficial, as there may be some redundancy in CO sites in the Fresno area.

PAMS Network

- The quality of the PAMS VOC data in the SJV is generally poor. The data quality assessment indicated that MDLs throughout the region are high. Despite high observed concentrations, more than 50% of VOC measurements are reported below the MDL at PAMS sites in the SJV.
- Based on an analysis of maximum concentrations, the SJV reported some of the highest precursor emission concentrations in the United States (McCarthy et al., 2008).
- All of the PAMS sites in the SJV have a data record that is suitable for trends analysis.
- Based on maximum concentration analyses for ozone, the Parlier PAMS site (a Type 3 site), generally does not appear to be measuring maximum ozone

concentrations. The SJVUAPCD should consider relocating this site to the foothill region east of Fresno or changing the site designation to Type 2 to better reflect measured concentrations.

2.2 TECHNICAL APPROACH AND FINDINGS FOR THE AIR MONITORING NETWORK ASSESSMENT

This section contains a description of the technical approach and findings of the site-by-site and bottom-up analyses. The site-by-site analyses focus on assessing individual sites within the network and include a determination of the number of parameters monitored; the fraction of data reported; the fraction of data above the MDL; the measured concentrations; the deviation from NAAQS; and the length of trend record at each site. While sites operated by both the SJVUAPCD and the CARB were included in the site-by-site analyses, comments and recommendations were focused on only those sites operated by the SJVUAPCD because the SJVUAPCD has direct jurisdiction and the authority to implement site-specific recommendations.

The spatial coverage analyses (bottom-up analyses) focus on the locations of sites relative to other sites within the network and include estimating the spatial representativeness of each site (area-served analysis); the population represented by each site (population-served), the growth in population around each site (population change), and the emissions represented by each site (emissions-served). The purpose of the bottom-up analyses is to identify potential gaps or redundancies in the network. Sites operated by both the SJVUAPCD, the CARB, and other agencies were considered in the bottom-up analyses to avoid recommending that a new site be placed where one may already exist.

2.2.1 Sources of Data

The following data (and sources) were acquired and used to perform the air monitoring network assessment:

- **Air quality data summaries:** Annual summary data were acquired for all sites within 20 miles of the SJV air basin from the EPA's AirData website (http://www.epa.gov/oar/data/) for 1997–2007. These data included statistical summaries for all monitor-site-method combinations. Additionally, ancillary and meta data including site locations, method codes, and sampling interval codes were acquired from the AirData website.
- **Population data:** Spatially resolved population data (block-group polygons) were acquired from the U.S. Census Bureau for the SJV for 2000 and 2007. Block-group polygon centroids, the center-point of a polygon, were mapped within a geographic information system (GIS), and population density values were calculated.

- **Emission inventory data:** The most recent gridded emissions data were collected from the CARB, and included total organic gases (TOG), NO_x, and PM emissions representative of a summer weekday in 2000.
- **PAMS data:** PAMS 2004-2006 data were acquired for the national PAMS network assessment (http://www.epa.gov/aqspubl1/annual_summary.html).

2.2.2 Number of Parameters Monitored

Air quality monitoring sites with instruments that measure many pollutants and meteorological parameters are generally more valuable than sites that measure fewer parameters, assuming that the data collected are of high or of similar quality. In addition, sites that measure several pollutants are generally more cost effective to operate. STI assessed and ranked each air quality and meteorological site by the number of parameters collected at each site. **Figure 2-1** shows the number of parameters monitored.

The PAMS sites (Madera–Pump Yard, Clovis–N. Villa Avenue, Parlier, Bakersfield–GSH, Shafter–Walker Street, and Arvin–Bear Mountain Blvd.) are valuable sites because they measure the most parameters. The Tracy Airport, Turlock–S. Minaret Street, Fresno–Sierra Skypark, and Fresno–Drummond Street sites are important SJVUAPCD sites for criteria pollutants because they measure several parameters. As previously mentioned, these conclusions are only meaningful if the data collected are complete and of good quality.

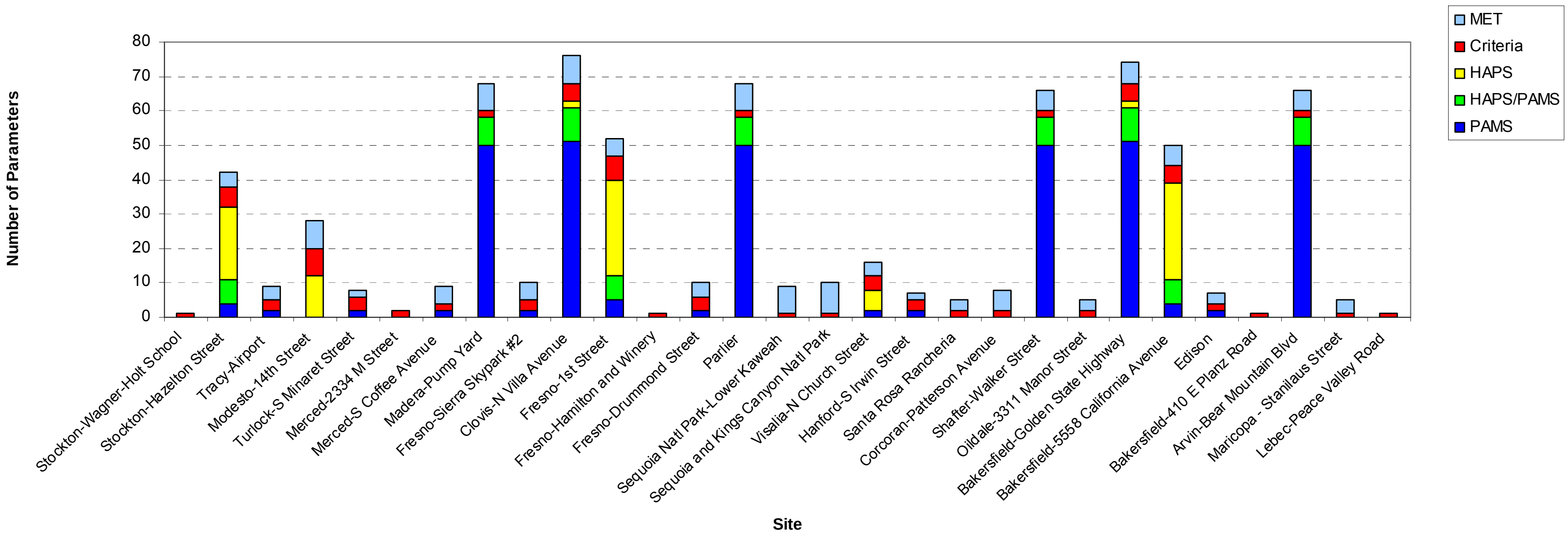


Figure 2-1. The number of parameters monitored at each site. Note that the operation of the Shafter–Walker Street and Arvin–Bear Mountain Blvd sites is shared between the SJVUAPCD and the CARB. The SJVUAPCD operates the PAMS VOC monitors at these sites. The height of each bar represents the total number of parameters monitored at that site. The bars are subdivided and color-coded by type (meteorological, criteria, hazardous air pollutants [HAPs], and PAMS). Sites are ordered from left to right along the x-axis corresponding to their north to south geographic locations in the SJV.

2.2.3 Data Completeness, Data Above MDL, Measured Concentrations, and Deviation from NAAQS Analyses

This section discusses the approach and results of several site-by-site analyses including data completeness, percent above the MDL, measured concentrations, and the deviation from NAAQS.

Data Completeness

Sites with complete data sets are more valuable for air quality analysis and tracking than sites that have long periods of missing or invalidated data. Data completeness is a measure of the number of actual data records collected and reported at a monitoring site relative to the number of expected data records based on the sampling interval and frequency for a given parameter or pollutant. Data completeness is calculated by dividing the actual number of data records reported by the expected number of data records. The expected number of data records for a given pollutant is based on the length of monitoring season and the sampling frequency. For example, a continuous ozone monitor operating year-round would be expected to have 8,760 data records for one year of operation (1 measurement per hour x 24 hours x 365 days per year = 8,760).

Data completeness is presented as the percent of data records reported taking into account the sampling frequency. The EPA recommends that data completeness of 85% is considered good for a given site, indicating that there are enough data to perform robust data analyses assuming the data are of high quality (Raffuse et al., 2007). Because of instrument calibration, the percentages for data completeness will generally be a few percent (3-5%) below 100 depending on how frequently an instrument is calibrated.

Percent Above the MDL

The MDL is a value at which a measured concentration is considered statistically distinguishable from zero. An assessment of the percent of data above the MDL is performed to identify the number of samples in a data set that are considered to have concentration values statistically distinguishable from zero. While samples below the MDL can be used for some purposes, such as stating that a concentration is below the MDL for comparison to NAAQS, they are not as useful for quantifying ambient concentrations, trends analysis, and/or air quality model validation. The percent above the MDL analysis provides an indicator of data quality and the usefulness of the data collected for performing air quality analyses.

Measured Concentrations

Measured concentrations analysis identifies sites that consistently measure high pollutant concentrations. For this analysis, the average and maximum concentration values were examined. Results of this analysis were used to determine whether each site is meeting its objective(s). For example, if the objective of a particular site is to measure high pollutant concentrations but that site routinely measures low concentrations, then we may conclude that the objective of the site should be changed or the site should be relocated to an area of high pollutant concentrations in order to meet its objective.

Deviation from NAAQS

The deviation from NAAQS analysis indicates sites that are important for monitoring NAAQS compliance. This analysis was not designed to determine attainment status but to provide an estimate of whether concentrations observed at a particular site are close to the NAAQS. Sites routinely measuring concentration values close to the NAAQS are considered important for meeting the monitoring objective of determining NAAQS attainment. The deviation from the NAAQS is the difference between the pollutant-specific design value observed at the site and the NAAQS compliance value (e.g., 1-hr, 8-hr, 4th highest maximum value, etc.). Small changes in measured pollutant concentrations can result in values above or below the NAAQS. In some cases, when information to determine the design value was not available, comparisons of the annual average or maximum pollutant concentrations were made. The deviation from NAAQS calculations presented here are not meant to be attainment calculations but general comparisons against the NAAQS to identify sites having measured values near (within 15% of) the NAAQS.

Summary and Discussion of Results

Tables 2-2 through 2-9 include a summary and discussion of the results of the analyses for data completeness, percent above MDL, measured concentrations, and deviation from NAAQS for ozone, nitrogen dioxide, PM_{10}, $PM_{2.5}$, and carbon monoxide. Tables 2-2 through 2-9 include all sites in the SJV. Sites in bold are operated by the SJVUAPCD. In Tables 2-2 through 2-9, the cells shaded blue indicate the following:

- Percent complete – sites with a percent complete value less than 85%
- Percent above MDL – sites with a percent above MDL value less than 85%
- Deviation from NAAQS – sites with a deviation from NAAQS value that is within 15% of the NAAQS for the pollutant indicated.

Overall, data completeness for 1-hr ozone is very good (Table 2-2). All sites with the exception of Maricopa have data completeness of 90% or greater. Overall, the percent above MDL results are good. Several sites (indicated in blue in Table 2-2) have percent above MDL values that are less than 85%; however, most of those values are greater than 80%. The Fresno–Drummond Street and Bakersfield–GSH sites have percent above MDL values of 78% and 74% (respectively). The values at these sites are worth noting because these sites are in urban areas and may likely measure chemically titrated ozone concentrations, which could account for the lower percent above MDL values for these two sites.

Measured concentrations results for ozone indicate that all sites measure high ozone concentrations relative to the NAAQS for both the hourly and 8-hr average time intervals. Bakersfield–GSH, Clovis–N. Villa Avenue, Parlier, and Fresno–Drummond Street are particularly valuable sites for measuring high concentrations.

The deviation from NAAQS analysis for ozone (Table 2-3) indicates that Turlock–S. Minaret Street, Madera–Pump Yard, Tracy–Airport, Fresno–Drummond Street, and Bakersfield–GSH are particularly important sites for determining NAAQS attainment because they measure concentration values that are close to (within 10%) the 8-hr ozone NAAQS. None of the 3-yr averages of the 4th highest 8-hr daily maximum measured concentrations were below the NAAQS for the SJVUAPCD-operated sites.

Overall, the data completeness and percent above MDL values for NO_2 are very good (Table 2-4). The measured concentrations and deviation from NAAQS analyses indicate that average NO_2 concentrations are well below the standard at all sites.

Table 2-2. Summary of data completeness, percent above MDL, and measured concentrations analyses for 1-hr ozone data.

Site Name	% Complete	% Above MDL	Maximum Value
Madera-Pump Yard	**95**	**83**	**91**
Fresno-Drummond Street	**94**	**78**	**110**
Turlock-S Minaret Street	**95**	**80**	**101**
Tracy-Airport	**94**	**94**	**97**
Bakersfield-Golden State Highway	**94**	**74**	**127**
Fresno-Sierra Skypark #2	**95**	**85**	**105**
Merced-S Coffee Avenue	**95**	**84**	**105**
Parlier	**93**	**88**	**113**
Hanford-S Irwin Street	**78**	**83**	**102**
Clovis-N Villa Avenue	**91**	**84**	**121**
Maricopa-Stanislaus Street	**77**	**100**	**97**
Fresno-1st Street	81	100	107
Edison	94	100	114
Bakersfield-5558 California Avenue	77	100	97
Oildale-3311 Manor Street	96	100	99
Arvin-Bear Mountain Blvd	100	100	120
Shafter-Walker Street	79	100	93
Santa Rosa Rancheria	86	100	100
Lebec-Peace Valley Road	99	98	74
Stockton-Hazelton Street	78	93	89
Modesto-14th Street	87	100	91
Sequoia Natl Park-Lower Kaweah	100	100	101
Sequoia and Kings Canyon Natl Park	100	100	109
Visalia-N Church Street	81	100	100

Table reflects data for 2007.
Concentration data are reported in units of ppb.
Ozone MDL = 5 ppb.
Maximum value equals the 1-hr annual maximum.
Deviation from NAAQS = maximum value at each site -75 ppb.
Cells highlighted in blue in the % Above MDL column indicate sites with fewer than 85% of data reported above the MDL.

Table 2-3. Summary of data completeness, measured concentrations, and deviation from NAAQS analyses for 8-hr average ozone data.

Site Name	% Complete	Maximum Value	4th Highest Value	Deviation From NAAQS
Turlock-S Minaret Street	**99**	**88**	**75**	**0**
Madera-Pump Yard	**99**	**83**	**77**	**2**
Tracy-Airport	**98**	**83**	**79**	**4**
Fresno-Drummond Street	**98**	**92**	**79**	**4**
Bakersfield-Golden State Highway	**99**	**102**	**80**	**5**
Merced-S Coffee Avenue	**100**	**96**	**87**	**12**
Fresno-Sierra Skypark #2	**99**	**96**	**88**	**13**
Parlier	**98**	**96**	**90**	**15**
Hanford-S Irwin Street	**82**	**91**	**80**	**5**
Clovis-N Villa Avenue	**95**	**101**	**92**	**17**
Maricopa-Stanislaus Street	**81**	**90**	**86**	**11**
Fresno-1st Street	99	94	85	10
Edison	99	93	75	0
Bakersfield-5558 California Avenue	99	85	63	-12
Oildale-3311 Manor Street	98	90	86	11
Arvin-Bear Mountain Blvd	98	102	87	12
Shafter-Walker Street	98	83	76	1
Santa Rosa Rancheria	99	88	83	8
Lebec-Peace Valley Road	23	63	91	16
Stockton-Hazelton Street	99	75	94	19
Modesto-14th Street	100	76	99	24
Sequoia Natl Park-Lower Kaweah	99	91	90	15
Sequoia and Kings Canyon Natl Park	68	99	88	13
Visalia-N Church Street	99	86	102	27

Table reflects data for 2007.
Concentration data are reported in units of ppb.
Maximum value equals the 8-hr average annual maximum.
Deviation from NAAQS = 4th highest value at each site -75 ppb.
Cells highlighted in blue in the Deviation from NAAQS column indicate sites that are valuable for determining NAAQS attainment.

Table 2-4. Summary of data completeness, percent above MDL, measured concentrations, and deviation from NAAQS analyses for NO_2.

Site Name	% Complete	% Above MDL	Maximum Value	Mean Value	Deviation From NAAQS
Tracy-Airport	**91**	**100**	**45**	**9.4**	**-43.6**
Turlock-S Minaret Street	**94**	**100**	**53**	**11.8**	**-41.2**
Merced-S Coffee Avenue	**94**	**100**	**50**	**9.4**	**-43.6**
Madera-Pump Yard	**93**	**100**	**47**	**10.1**	**-42.9**
Fresno-Sierra Skypark #2	**92**	**99**	**56**	**10.1**	**-42.9**
Clovis-N Villa Avenue	**91**	**100**	**64**	**14.8**	**-38.2**
Fresno-Drummond Street	**91**	**100**	**67**	**16.2**	**-36.8**
Parlier	**94**	**100**	**55**	**10.9**	**-42.1**
Hanford-S Irwin Street	**78**	**100**	**58**	**11**	**-42**
Bakersfield-Golden State Highway	**93**	**100**	**73**	**19.7**	**-33.3**
Fresno-1st Street	95	100	86	16.6	-36.4
Edison	95	99	48	9.7	-43.3
Bakersfield-5558 California Avenue	94	100	72	17.2	-35.8
Arvin-Bear Mountain Blvd	94	100	52	8.5	-44.5
Shafter-Walker Street	95	100	101	14.3	-38.7
Stockton-Hazelton Street	94	100	70	16.4	-36.6
Visalia-N Church Street	95	100	71	14.8	-38.2

Table reflects data for 2007.
Nitrogen dioxide MDL = 1 ppb.
Maximum value equals the 1-hr annual maximum concentration.
Annual average NO_2 NAAQS = 53 ppb.
Concentration data are reported in units of ppb.

Data completeness and percent above MDL are very good for PM_{10} (Tables 2-5 and 2-6). The measured concentrations and deviation from NAAQS analyses indicate that daily maximum concentrations are well below the NAAQS at all sites. The highest observed maximum concentration of FRM PM_{10} occurred at Bakersfield–GSH; it is the most valuable site for determining NAAQS attainment. The maximum 1-hr PM_{10} concentrations are highest at Corcoran and Bakersfield–GSH, and these sites are the most valuable for determining NAAQS attainment. Data analyses should be performed to understand the relationship between the 1-hr and 24-hr PM_{10} data, and to specifically examine the discrepancy between the maximum values in the 24-hr versus 1-hr data at Bakersfield–GSH.

Table 2-5. Summary of results of data completeness, percent above MDL, measured concentrations, and deviation from NAAQS analyses for Federal Reference Method (FRM) PM_{10} measurements.

Site Name	% Complete	% Above MDL	Maximum Value	Mean Value	Deviation from NAAQS
Stockton-Wagner-Holt School	**97**	**100**	**65**	**24**	**-85**
Turlock-S Minaret Street	**98**	**100**	**77**	**32**	**-73**
Merced-2334 M Street	**97**	**100**	**69**	**30**	**-81**
Clovis-N Villa Avenue	**90**	**100**	**111**	**34**	**-39**
Fresno-Drummond Street	**97**	**100**	**93**	**38**	**-57**
Corcoran-Patterson Avenue	**98**	**100**	**124**	**46**	**-26**
Bakersfield-Golden State Highway	**97**	**100**	**135**	**55**	**-15**
Hanford	**97**	**100**	**100**	**44**	**-50**
Fresno-1st Street	98	100	102	32	-48
Bakersfield-5558 California Avenue	97	100	118	49	-32
Oildale-3311 Manor Street	99	100	108	45	-42
Santa Rosa Rancheria	97	100	120	45	-30
Stockton-Hazelton Street	98	100	75	28	-75
Modesto-14th Street	97	100	87	28	-63
Visalia-N Church Street	98	100	99	42	-51
Mammoth Lakes Gateway	95	99	56	15	-94

Table reflects data for 2007.
Concentration data are reported in units of $\mu g/m^3$.
PM_{10} MDL = 4 $\mu g/m^3$ for 24-hr filter-based monitors.
NAAQS = 150 $\mu g/m^3$.
Maximum value equals the annual daily maximum concentration.
Deviation from NAAQS = 150 $\mu g/m^3$, the maximum value at each site.
Cells highlighted in blue in the Deviation from NAAQS column indicate sites that are valuable for determining NAAQS attainment.

Table 2-6. Summary of data completeness, measured concentrations, and deviation from NAAQS analyses for 1-hr continuous PM_{10}.

Site Name	% Complete	Maximum Value	Mean Value	Deviation from NAAQS
Tracy-Airport	97	75	20	-75
Corcoran-Patterson Avenue	98	128	39	-22
Bakersfield-Golden State Highway	100	172	43	22

Table reflects data for 2007.
Concentration data are reported in units of $\mu g/m^3$.
PM_{10} MDL = -50 $\mu g/m^3$ for continuous monitors.
Deviation from NAAQS = 150 $\mu g/m^3$, the maximum value at each site.
Maximum value equals the 24-hr maximum value calculated from 1-hr data.
NAAQS = 150 $\mu g/m^3$.
Cells highlighted in blue in the Deviation from NAAQS column indicate sites that are valuable for determining NAAQS attainment.
There is a 1-hr continuous PM_{10} site at Fresno 1st Street; however, the data from this site are not available in EPA's Air Quality System (AQS).

All FRM $PM_{2.5}$ 24-hr filter sites indicate good data completeness and percent above MDL (Table 2-7). The measured concentrations and deviation from NAAQS analyses indicate that the concentrations are higher than the annual standard at all sites. The Merced site is a valuable site for determining NAAQS attainment. Sites with $PM_{2.5}$ continuous measurements have good data completeness (Table 2-8). The measured concentrations and deviation from NAAQS analyses indicate that annual concentrations are higher than the standard at all sites with the exception of Tracy–Airport, which is slightly below the standard.

Maximum 1-hr $PM_{2.5}$ concentrations are high and do not appear in the 24-hr data. It appears that an exceptional event (the Fourth of July) was flagged in the 24-hr data but was not flagged in the 1-hr data. Both the Tracy and Turlock sites appear to be the most valuable for determining NAAQS attainment; however, note again, that the Deviation from NAAQS analysis is not meant to determine NAAQS compliance but to identify those sites that routinely measure concentrations close to the NAAQS. It should also be noted that it is not appropriate to use 1-hr FRM data to determine NAAQS attainment.

Table 2-7. Summary of data completeness, percent above MDL, measured concentrations, and deviation from NAAQS analyses for FRM $PM_{2.5}$ measurements.

Site Name	% Complete	% Above MDL	Maximum Value	Mean Value	Deviation from NAAQS
Merced-2334 M Street	**98**	**100**	**81.6**	**17.7**	**2.7**
Clovis-N Villa Avenue	**92**	**100**	**64.7**	**19.2**	**4.2**
Fresno-Hamilton and Winery	**98**	**100**	**65.1**	**19.5**	**4.5**
Corcoran-Patterson Avenue	**91**	**100**	**75**	**20.9**	**5.9**
Bakersfield-Golden State Highway	**88**	**100**	**86.6**	**22.6**	**7.6**
Bakersfield-410 E Planz Road	89	100	91	21.5	6.5
Bakersfield-5558 California Avenue	75	100	86	21.9	6.9
Fresno-1st Street	97	100	104	18.8	3.8
Modesto-14th Street	99	100	64	14.8	-0.2
Stockton-Hazelton Street	99	100	52	12.8	-2.2
Visalia-N Church Street	96	100	71	19.9	4.9

Table reflects data for 2007.
Concentration data are reported in units of μg/m^3.
$PM_{2.5}$ MDL = 2 μg/m^3 for 24-hr filter-based monitors.
NAAQS = 15 μg/m^3.
Maximum value equals the maximum daily average value.
Cells highlighted in blue in the Deviation from NAAQS column indicate sites that are valuable for determining NAAQS attainment.

Table 2-8. Summary of data completeness, percent above MDL, measured concentrations, and deviation from NAAQS analyses for 1-hr continuous $PM_{2.5}$ measurements.

Site Name	% Complete	% Above MDL	Maximum Value	Mean Value	Deviation from NAAQS
Tracy-Airport	**87**	**100**	**142**	**12.6**	**-2.5**
Turlock-S Minaret Street	**100**	**100**	**1001**	**17.7**	**2.7**
Clovis-N Villa Avenue	**95**	**100**	**759**	**25.1**	**10.1**
Corcoran-Patterson Avenue	**97**	**100**	**980**	**21.7**	**6.7**
Bakersfield-Golden State Highway	**98**	**100**	**1000**	**25.1**	**10.1**
Bakersfield-5558 California Avenue	97	100	259	22.1	7.1
Fresno-1st Street	98	100	537	22.4	7.4
Lebec-Peace Valley Road	98	100	64	7.2	-7.7
Modesto-14th Street	99	100	277	16	1
Stockton-Hazelton Street	99	100	84	13.5	-1.5
Visalia-N Church Street	98	100	168	22.3	7.3

Table reflects data for 2007.
Concentration data are reported in units of µg/m^3.
$PM_{2.5}$ MDL = 2 µg/m^3 for 24-hr filter-based monitors.
NAAQS = 15 µg/m^3.
Maximum value equals the 24-hr maximum value calculated from 1-hr data.
Cells highlighted in blue in the Deviation from NAAQS column indicate sites that are valuable for determining NAAQS attainment.

Data completeness for CO is very good at all sites; however, percent above MDL at all sites is less than 50% (Table 2-9). This is due to the low CO concentrations in the SJV relative to the NAAQS and the need for higher sensitivity instruments to achieve a higher percentage of data above MDL. The SJVUAPCD is planning to install high-sensitivity CO instruments in the future. These instruments will enhance the assessment of population exposure to CO.

Table 2-9. Summary of data completeness, percent above MDL, measured concentrations, and deviation from NAAQS analyses for 8-hr CO measurements.

Site Name	% Complete	% Above MDL	Maximum Value	Deviation From NAAQS
Turlock-S Minaret Street	**100**	**21**	**1.7**	**-7.3**
Fresno-Sierra Skypark #2	**97**	**15**	**1.4**	**-7.6**
Clovis-N Villa Avenue	**97**	**35**	**1.8**	**-7.2**
Fresno-Drummond Street	**99**	**28**	**2.4**	**-6.6**
Bakersfield-Golden State Highway	**98**	**48**	**2**	**-7**
Fresno-1st Street	99	14	2.6	-6.4
Stockton-Hazelton Street	98	20	2.3	-6.7
Modesto-14th Street	98	15	3.2	-5.8

Table reflects data for 2007
Concentration data are reported in units of ppm.
CO MDL = 0.5 ppm
NAAQS 8-hr = 9 ppm
Deviation from NAAQS = 9 ppm – maximum value
Cells highlighted in blue in the % Above MDL column indicate values that are below 85%.

Concentrations of SO_2 in the SJV are currently below the standard and have not exceeded the standard in the past 10 years (San Joaquin Valley Air Pollution Control District, 2008). Therefore, the SJVUAPCD does not currently operate any SO_2 sites.

Toxics monitoring in the SJV is conducted by the CARB at sites in Bakersfield, Fresno, and Stockton. The SJVUAPCD operates several PAMS sites that measure selected toxics compounds. The SJVUAPCD PAMS network assessment is discussed in Section 2.3. There are currently no airborne lead monitoring sites operated by the SJVUAPCD.

2.2.4 Length of Trend Record Analysis

Monitors that have a long historical data record are valuable for tracking pollutant trends and control strategy effectiveness. The length of trend record analysis identifies those sites that have sufficient data records to support pollutant trends analysis. For this analysis, the number of years of data collection was summed by site and pollutant. **Table 2-10** shows the trend length by site and pollutant.

Table 2-10. Summary of length of trend record analysis results by site and pollutant. The numbers in the table represent the number of years of data collected at each site. Sites for which there are five or more years of data are highlighted in green. Sites for which there are more than 10 years of data are marked “10+”. Sites in bold are operated by the SJVUAPCD.

Site Name	Ozone	1-hr PM10	24-hr PM10	1-hr PM2.5	24-hr PM2.5	NO2	CO	PAMS
Stockton-Wagner-Holt School	0	0	10+	0	0	0	0	0
Stockton-Hazelton Street	10+	9	10+	3	9	10+	10+	0
Tracy-Airport	2	2	0	1	0	2	0	0
Modesto-14th Street	10+	5	10	6	9	9	10+	0
Turlock-S Minaret Street	10+	0	10+	1	0	10+	10+	0
Merced-2334 M Street	0	0	9	0	9	0	0	0
Merced-S Coffee Avenue	10+	0	0	0	0	10+	0	0
Madera-Pump Yard	10+	0	0	0	0	10+	0	10+
Fresno-Sierra Skypark	10+	0	0	0	0	10+	10+	0
Clovis-N Villa Avenue	10+	0	10+	1	9	10+	10+	10+
Fresno-1st Street	10+	0	10+	6	9	10+	10+	5
Fresno-Hamilton and Winery	0	0	0	0	8	0	0	0
Fresno-Drummond Street	10+	0	10+	0	0	10+	10+	0
Parlier	10+	0	0	0	0	10+	0	10+
Sequoia Natl Park-Lower Kaweah	10+	0	0	0	0	0	0	0
Sequoia and Kings Canyon Natl Park	9	0	0	0	0	0	0	0
Visalia-N Church Street	10+	0	10+	6	9	10+	9	0
Visalia Airport	0	0	0	0	0	0	0	0
Santa Rosa Rancheria	2	0	2	0	0	0	0	0
Corcoran-Patterson Avenue	0	2	10+	1	9	0	0	0
Shafter-Walker Street	10+	0	0	0	0	10+	0	10
Oildale-3311 Manor Street	10+	0	10+	0	0	9	0	0
Bakersfield-Golden State Highway	10+	2	10+	1	9	10+	10+	10+
Bakersfield-5558 California Avenue	10+	6	10+	6	9	10+	9	0
Edison	10+	0	0	0	0	10+	0	0
Bakersfield-410 E Planz Road	0	0	0	0	8	0	0	0
Arvin-Bear Mountain Blvd	10+	0	0	0	0	10+	0	10+
Maricopa - Stanilaus Street	10+	0	0	0	0	0	0	0
Lebec-Peace Valley Road	2	0	0	1	5	0	0	0

Several sites in the SJV air basin have long data records for several parameters and are valuable for assessing pollutant trends and determining control strategy effectiveness. Most notably, the Clovis–N. Villa Avenue and Bakersfield–GSH sites have been monitoring many parameters for longer than a decade.

2.2.5 Area-Served, Population-Served, Population Change, and Emissions-Served Analyses

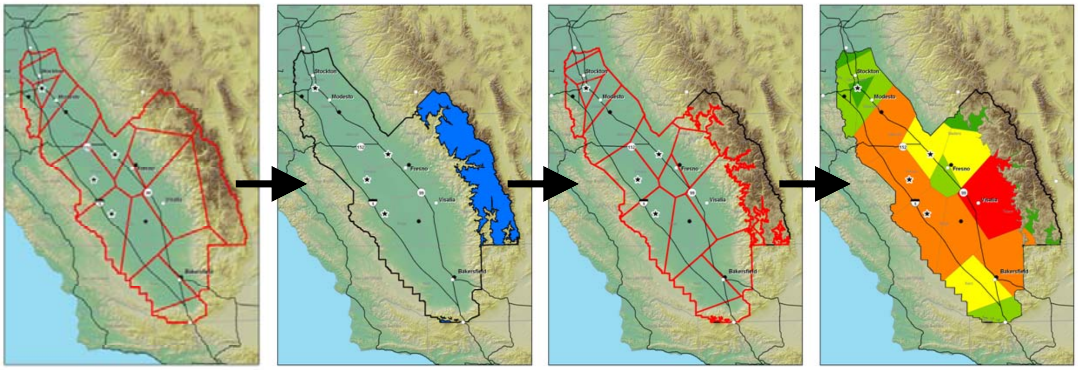
<u>*Area-served Analysis*</u>

The purpose of the area-served analysis was to estimate the spatial coverage of each monitoring site to identify potential spatial gaps or redundancies in the overall monitoring network. Performing the area-served analysis is a multi-step process. The first step in the area-served analysis was to compile a map of the air quality sites which included both the SJVUAPCD sites and other agency sites within and surrounding the district boundary, using GIS software.

The next step involved generating Thiessen polygons (also called Voronoi diagrams) within the GIS software. Thiessen polygons are applied as a standard technique in geography to assign a zone of influence or representativeness to the area around a given point—in this case, a monitoring site. The polygon defines the area closest to each site. Calculating Thiessen polygons is one of the simplest quantitative methods for estimating an area of representation around sites; however, the Thiessen polygons alone do not take into account study domain extents, geographic features, or meteorology. Thus, the next step in the area-served analysis was to consider the extent of the SJV study domain and the geography and terrain within each of the Thiessen polygon boundaries.

First, the initial area-served boundaries were clipped using the SJV study domain extents. Clipping the area-served boundaries within the study domain to the study domain extent eliminates the influence of area-served polygons for sites that lie outside of (in some cases, far outside of) the study domain. Next, high resolution Digital Elevation Model (DEM) data were used to better capture the influence of topography on each of the Thiessen polygon boundaries.

To improve the physical representation of the area-served boundaries, the boundaries were adjusted to a maximum elevation of 6,000 feet, thus accounting for topographic barriers. Because surface air parcels are not likely to travel across large mountain ranges, monitoring sites are not likely to represent the entire region defined by the Thiessen polygons; therefore, the areas of representativeness were restricted when geographic barriers were considered. Sites that are located outside of the boundary are used to constrain the area-served polygons within the SJVUAPCD boundary. The sites that lie outside of the SJVUAPCD boundary, and particularly those sites far beyond the boundary, do not effectively impact the area-served analysis within the SJVUAPCD boundary. **Figure 2-2** depicts the process for performing an area-served analysis.



Thiessen polygons developed for each monitoring network | Identify elevations above 6,000 feet | New polygons without areas where elevation is above 6,000 ft | Area Served analysis (area values of each site polygon)

Figure 2-2. The four-step process to perform an area-served analysis.

Population-served Analysis

After the area-served boundaries were developed for each site and pollutant, the population-served analysis was performed. The purpose of the population-served analysis was to determine the population coverage represented by each monitoring site and to identify the sites surrounded by the highest population densities. Those sites representing the greatest population are ranked highest in this analysis.

It is of interest to examine those areas within the SJV that have undergone substantial growth over the past several years and to examine monitoring site locations relative to areas of population growth. In many regions, areas that were once unpopulated are now fairly densely populated and, as a result, human encroachment and associated increases in emissions activity may impact monitoring sites. These impacts can change site characteristics (e.g., a former rural site may now be an urban site). In this analysis, the growth and spatial distribution of population throughout the study domain is examined.

To perform the population-served analysis, spatially resolved population data at the block-group level were acquired from the U.S. Census Bureau for 2000 and 2007 (ESRI, 2008) for the SJV. Block-group polygon centroids (the center-point of a polygon) were mapped within a GIS and population density values were calculated. The population density values were imposed on the area-served polygons from the previous analysis, and the population density within each polygon was calculated for 2000. The same procedure was performed for 2007, and the change in population density was calculated. The results of this analysis were used to identify areas of high population where there may be no monitoring sites and/or areas where population growth may have resulted in urban or suburban encroachment on a monitoring site. **Figure 2-3** depicts the process for performing the population-served analyses.

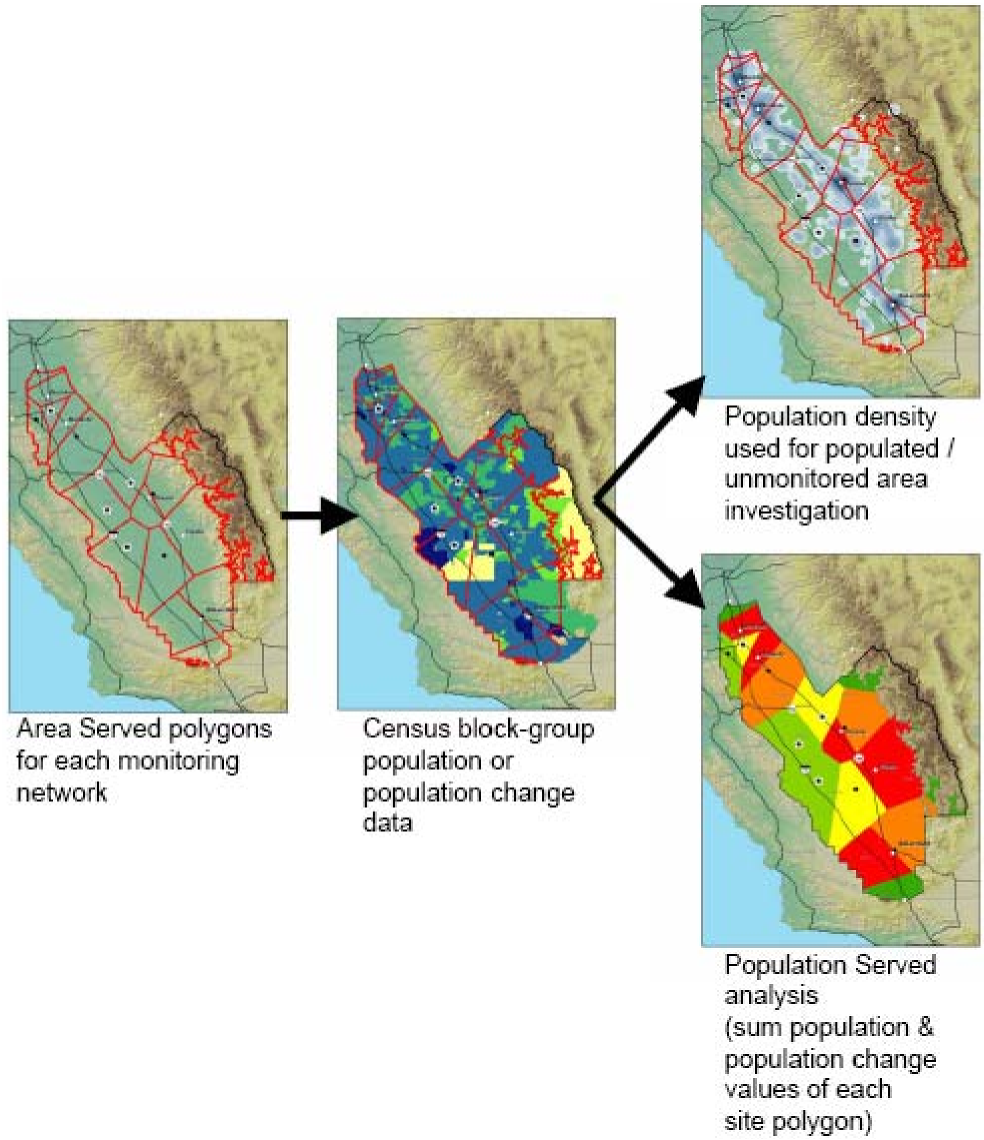


Figure 2-3. Illustration of the process for performing the population-served analysis.

Emissions-served Analysis

Taking the area- and population-served analyses one step further, an emissions-served analysis was performed. The emissions-served analysis examines the proximity of monitoring sites to emissions sources and emissions densities within each area-served boundary. This analysis was performed by overlaying spatially resolved emissions (or activity) data onto the area-served boundaries to investigate the potential emissions impacts on each monitoring site. The most recent gridded emissions data were collected from the CARB, and included TOG, NO_x, and PM emissions representative of a summer weekday in 2000. **Figure 2-4** depicts the process for performing the emissions-served analysis.

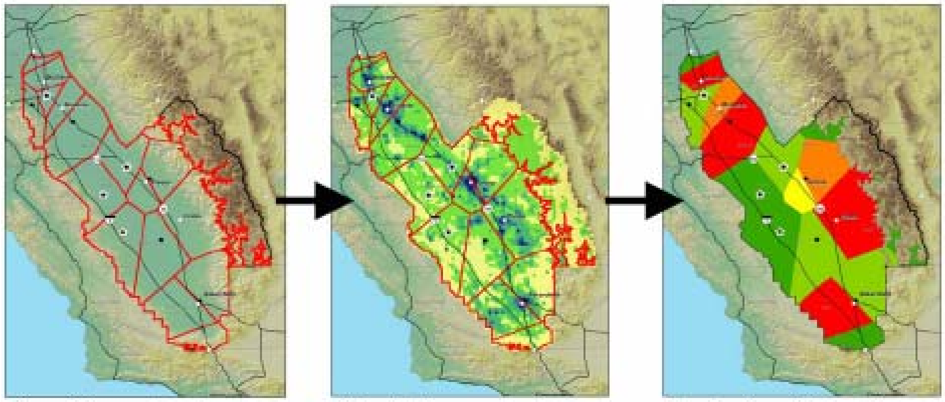


Figure 2-4. Illustration of the process for performing an emissions-served analysis.

Summary and Discussion of Results

The following sections discuss the findings of the area-, population-, and emissions-served analyses for ozone, $PM_{2.5}$, PM_{10}, NO_2, and CO. Because an individual monitoring site may measure a number of pollutants, the analyses are performed by first identifying the pollutant-specific networks and then performing the analyses for each individual network. The results below are presented for each of the pollutant networks in the SJV.

For each of the area-, population-, and emissions-served analyses, monitoring sites are ranked from highest to lowest. For the area-served analyses, the sites that represent the greatest area are ranked highest; for the population-served analyses, the sites that represent the greatest population are ranked highest; and for the emissions-served analyses, the sites that represent the most emissions are ranked highest. It is important to note that no one analysis stands alone and that the results are first viewed individually and then holistically in the context of the overall network.

Ozone Network

Table 2-11 depicts the area-, population-, population change, and emissions-served rankings for the ozone sites in the SJV. The sites are ordered such that moving from top to bottom down the left-hand column of the table corresponds to moving from the north to the south in the SJV. The results of this analysis indicate that the Turlock and Merced monitoring sites rank high in all categories, mainly due to the lack of monitors west of these sites (i.e., larger areas of representation result in larger population centers, and more emissions represented). Clovis and Parlier are also valuable sites based on this analysis.

Table 2-11. Summary of the area-, population-, population change, and emissions-served analyses for the ozone monitoring network. Red dots represent the high-ranking sites, green dots represent the mid-ranking sites, and blue dots represent the low-ranking sites.

Site Name (showing all sites within the SJV)	**Area Served**	**Population Served**	**Population Change**	**NO_x Emissions Served**	**TOG Emissions Served**
Stockton-Hazelton Street	🟢	🔴	🔴	🔴	🔴
Tracy-Airport	🟢	🟢	🔴	🟢	🟢
Modesto-14th Street	🟢	🔴	🔴	🔴	🔴
Turlock-S Minaret Street	🔴	🔴	🔴	🔴	🔴
Merced-S Coffee Avenue	🔴	🔴	🔴	🔴	🔴
Madera-Pump Yard	🟢	🟢	🟢	🟢	🟢
Fresno-Sierra Skypark #2	🟢	🟢	🔴	🟢	🟢
Clovis-N Villa Avenue	🔴	🔴	🔴	🟢	🔴
Fresno-1st Street	🔵	🔴	🟢	🟢	🔴
Fresno-Drummond Street	🟢	🔴	🟢	🟢	🔴
Tranquility	🔴	🟢	🟢	🔴	🟢
Parlier	🔴	🔴	🔴	🟢	🔴
Sequoia/Kings Canyon NP	🟢	🟢	🟢	🔵	🟢
Sequoia NP-Lower Kaweah	🟢	🔵	🔵	🔵	🟢
Visalia-N Church Street	🟢	🔴	🔴	🟢	🔴
Hanford-S Irwin Street	🟢	🟢	🟢	🟢	🟢
Santa Rosa Rancheria	🔴	🟢	🟢	🔴	🟢
Porterville	🔴	🟢	🟢	🟢	🔴
Shafter-Walker Street	🔴	🟢	🟢	🔴	🟢
Oildale-3311 Manor Street	🟢	🟢	🟢	🔴	🟢
Bakersfield-GSH	🔵	🟢	🟢	🔴	🟢
Bakersfield-5558 California Ave	🟢	🔴	🔴	🔴	🟢
Edison	🟢	🟢	🟢	🟢	🟢
Arvin-Bear Mountain Blvd	🟢	🟢	🟢	🟢	🟢
Maricopa-Stanislaus St	🔴	🟢	🟢	🟢	🟢
Lebec-Peace Valley Road	🟢	🟢	🟢	🟢	🔵

🔴 Highest ranking sites (e.g., largest area-/population-/etc.-served value): Top 25% of all sites within the analysis
🟢 Middle ranking sites: 25%-75% of all sites within the analysis
🔵 Lowest ranking sites (e.g., smallest NO_x emissions value): Bottom 25% of all sites within the analysis
Total ozone monitoring sites used in the analysis = 38

As indicated in the 2008 SJVUAPCD Network Plan, ozone monitoring in the SJV is directed toward measuring representative population exposures and maximum concentrations. As a result of these monitoring objectives, most ozone monitors operated by the SJVUAPCD are sited for either neighborhood- or urban-scale measurements as defined in the 2008 SJVUAPCD Network Plan (San Joaquin Valley Air Pollution Control District, 2008). The bar graph in **Figure 2-5** shows both the area-served and the population-served results for the ozone network in the SJV.

The dashed "Urban Scale" and "Neighborhood Scale" lines shown on the bar graphs in Figure 2-5 were estimated using the spatial scale guidelines in the SJVUAPCD Network Plan. Urban sites have an approximate radius of 4 to 50 km; neighborhood sites have an approximate radius of 0.5 to 4.0 km. The dashed lines on the graph indicate the approximate area around a site based on these radius designations. This information was used to help determine if sites are meeting their objectives and as a screening tool to identify sites that may warrant further investigation. The sites flagged with black stars above the bars in the figure indicate sites that were investigated in more detail.

Tracy, Turlock, and Clovis (marked with black stars in Figure 2-5) are designated as neighborhood-scale sites; however, based on the area-served analysis alone, they appear to be urban-scale sites. However, few of the sites are close enough to one another to be identified as neighborhood-scale sites using this approach.

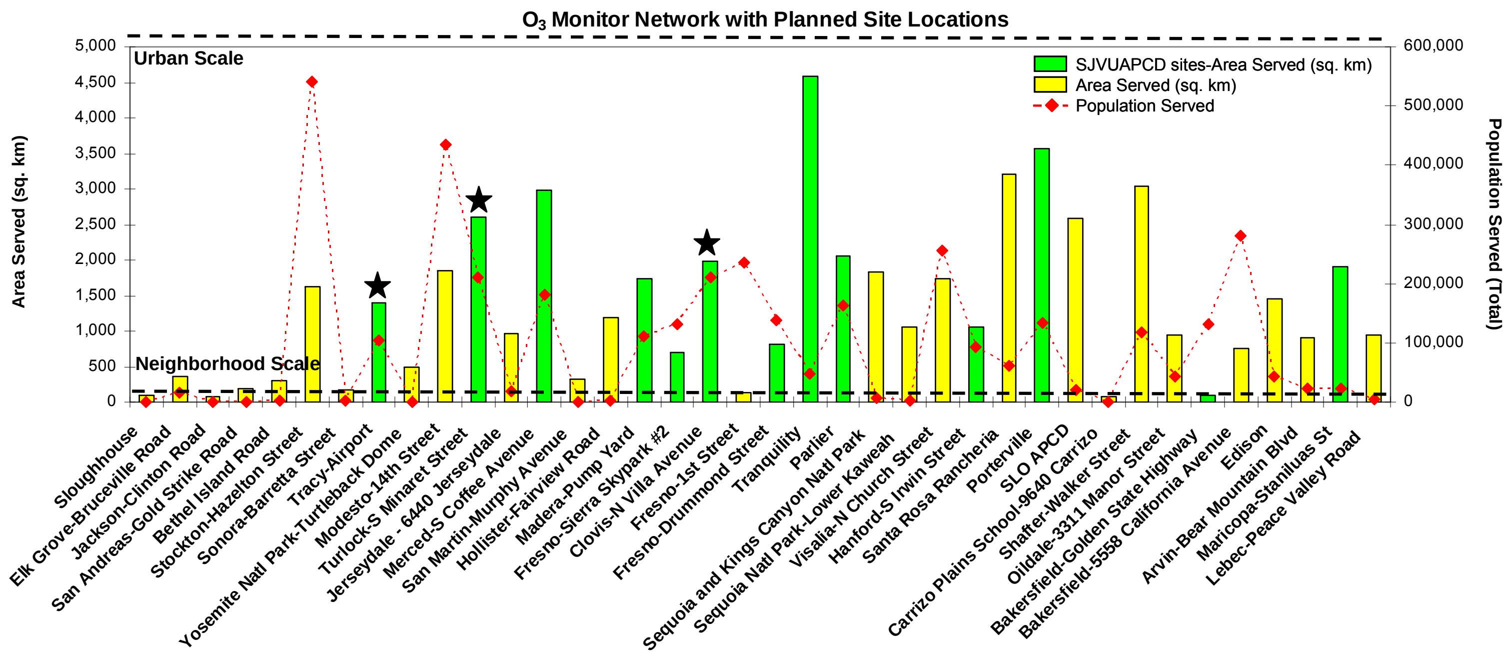


Figure 2-5. Summary of the area-served (in km^2 on the left axis) and population-served (people/km^2 on the right axis) analyses for ozone sites in the SJV. The SJVUAPCD-operated sites are shown as green bars and the sites operated by other agencies are indicated by yellow bars. The sites indicated with black stars above the bars are sites that were investigated in more detail.

Figure 2-6 shows a map of the area-served boundaries, the population density within each boundary, and the monitoring site locations. As shown in Figure 2-6, the Clovis site is situated in a fairly densely populated region of Clovis. A populated area northeast of Clovis in the foothill region appears to be unmonitored. The Tracy and Turlock sites appear to be situated to measure urban concentrations in densely populated areas, matching the objective of the sites.

There appears to be an area west of Merced (Los Banos area) that is populated and unmonitored (see the blue circle on the map). It should be noted that the planned ozone monitoring sites (Tranquility and Porterville) were included in this analysis. Both sites will represent a large area within the SJV; the Porterville site will be located in a fairly populated area and could therefore meet population exposure monitoring objectives. Also, the Tranquility site shrinks a potential gap in monitoring within the western side of the SJV. Tranquility and Porterville are appropriately sited to fill existing gaps in the network.

The findings of the population-change analysis were similar to those of the area- and population-served analyses. The areas northeast of Clovis and southwest of Turlock have high population growth and currently lack monitoring sites. Increases in population result in increased emissions activity. As shown in **Figure 2-7**, other areas with substantial population increases are Bakersfield, Visalia, and Merced, but the existing monitoring network coverage appears to be adequate in these areas.

The SJVUAPCD is planning to install two new sites in Porterville and Tranquility. The Porterville site will be placed in a fairly populated region, while the Tranquility site will be placed in an area with relatively low population. The map in Figure 2-7 indicates substantial growth in population south of the Tranquility site. This is mainly due to the construction of a new prison in that census block.

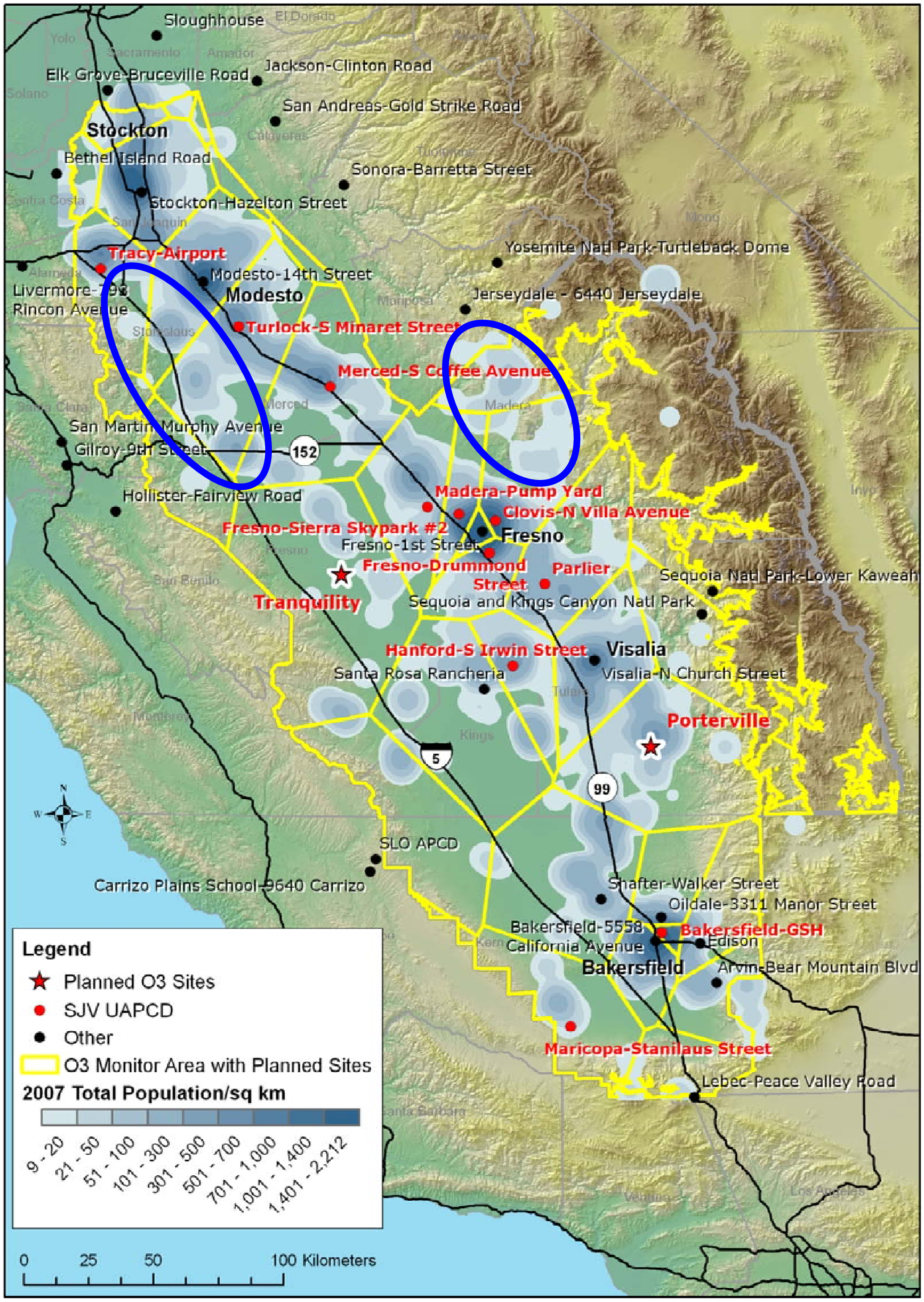


Figure 2-6. Map of the ozone monitoring sites, the area-served boundaries, and the population density in the SJV. Blue circles indicate areas that lack monitors and have substantial population.

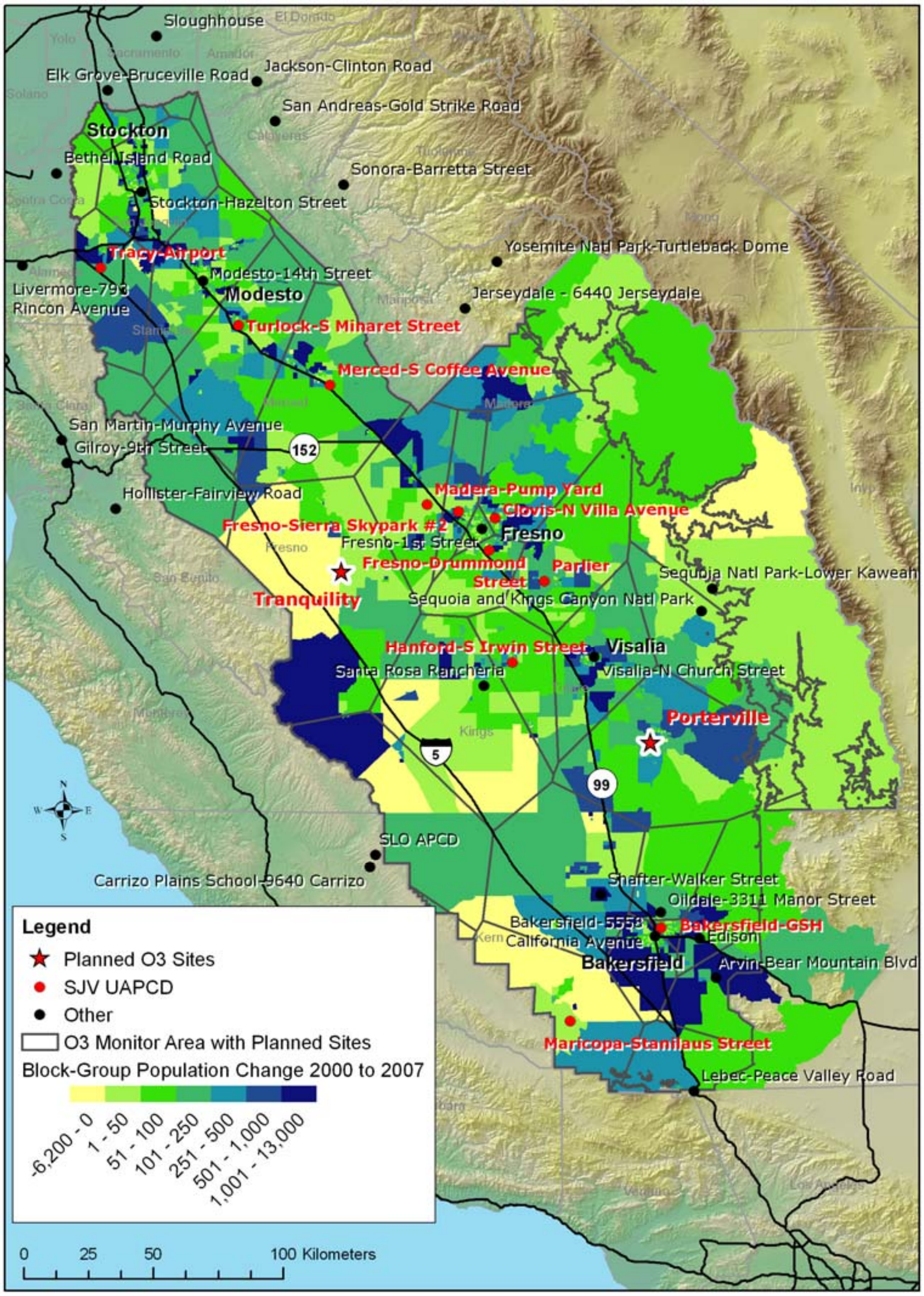


Figure 2-7. Map of the change in population from 2000 to 2007 for census block groups in the SJV overlaid with the area-served boundaries for the ozone monitoring network (ESRI, 2008).

Figure 2-8 depicts the area-served boundaries for the ozone monitor network overlaid on the TOG and NO_x spatially resolved (2-km) emissions inventory. The areas northeast of Clovis and west of Merced (Los Banos area) both have substantial TOG and NO_x emissions. Combined with the results of the area- and population-served analyses, this fact indicates that these areas may warrant monitoring sites.

(a) (b)

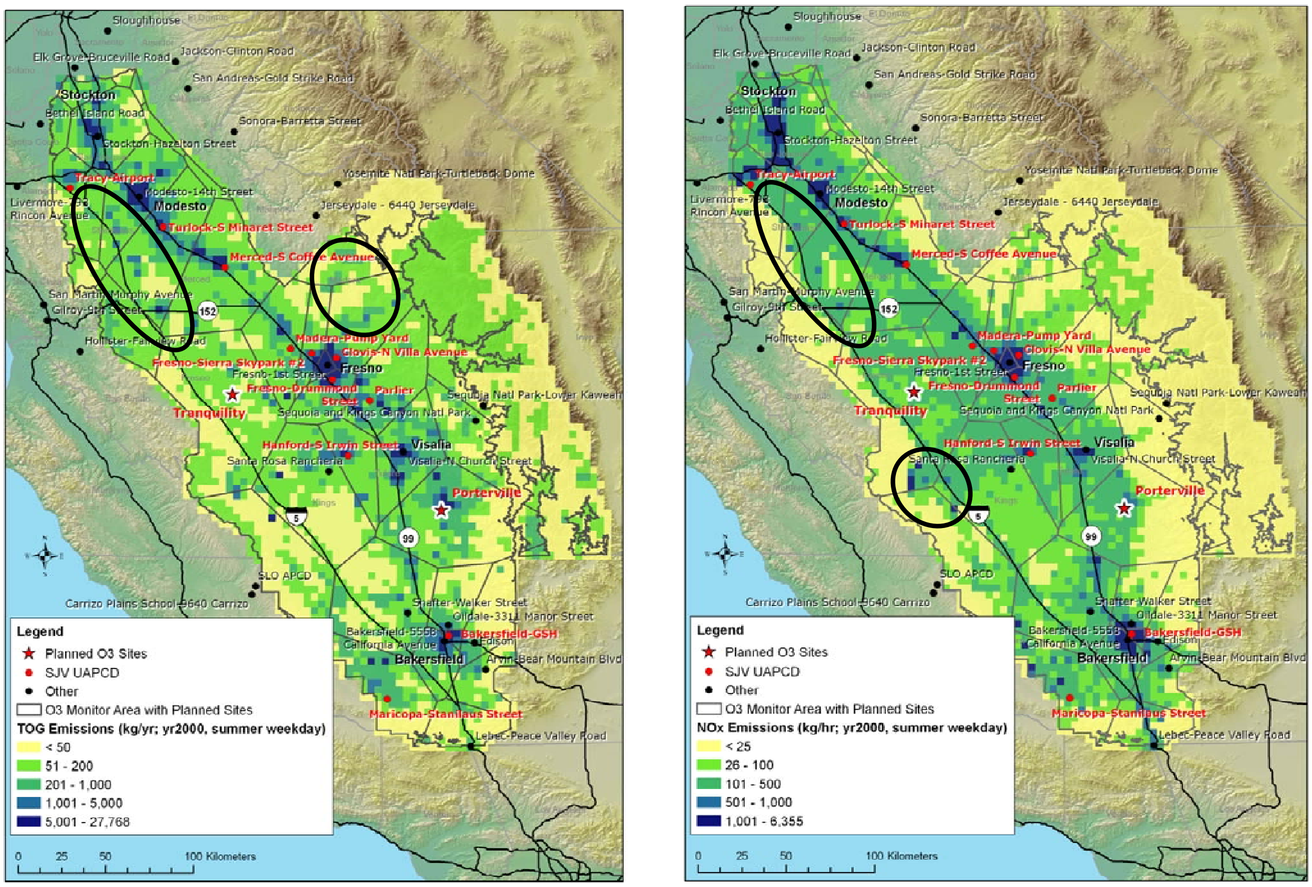


Figure 2-8. Area-served boundaries for the ozone monitor network overlaid on the spatially resolved (a) TOG and (b) NO_x emissions inventory. Black circles indicate areas of high emissions density that are unmonitored.

$PM_{2.5}$ 1-hr network

Table 2-12 shows the area-, population-, population change, and emissions-served results for the SJVUAPCD-operated $PM_{2.5}$ 1-hr continuous monitoring sites. The results of this analysis indicate that Turlock, Huron, and Corcoran cover the most area and that Turlock also ranks high for population-served, population change, and emissions-served. Note that Manteca is a planned site.

Table 2-12. Summary of area-, population-, population change, and emissions-served analyses for the $PM_{2.5}$ 1-hr continuous monitoring network. Red dots represent the high-ranking sites, green dots represent the mid-ranking sites, and blue dots represent the low-ranking sites.

Site Name (showing all sites within the SJV)	**Area Served**	**Population Served**	**Population Change**	**PM Emissions Served**
Stockton-Hazelton Street	🟢	🔴	🔴	🟢
Manteca	🔵	🟢	🟢	🔵
Tracy-Airport	🟢	🟢	🟢	🟢
Modesto-14th Street	🟢	🔴	🔴	🟢
Turlock-S Minaret Street	🔴	🟢	🔴	🔴
Madera	🟢	🟢	🟢	🟢
Clovis-N Villa Avenue	🟢	🟢	🟢	🔴
Fresno-1st Street	🔵	🔴	🟢	🔴
Tranquility	🟢	🔵	🔵	🟢
Visalia-N Church Street	🔴	🔴	🔴	🔴
Huron	🔴	🟢	🟢	🟢
Corcoran-Patterson Avenue	🔴	🟢	🟢	🟢
Bakersfield-GSH	🔴	🟢	🟢	🔴
Bakersfield-5558 California Ave	🟢	🔴	🔴	🟢
Lebec-Peace Valley Road	🟢	🔵	🔵	🔵

🔴 Highest ranking sites (e.g., largest area-/population-/etc.-served value): Top 25% of all sites within the analysis
🟢 Middle ranking sites: 25%-75% of all sites within the analysis
🔵 Lowest ranking sites (e.g., smallest PM emissions value): Bottom 25% of all sites within the analysis
Total $PM_{2.5}$ 1-hr monitoring sites used in the analysis = 18

$PM_{2.5}$ monitoring in the SJV is aimed at measuring representative pollutant concentrations. Because of these monitoring objectives, most $PM_{2.5}$ 1-hr monitors in the SJV are sited to monitor either neighborhood- or urban-scale concentrations. **Figure 2-9** shows the area- and population-served results for the continuous $PM_{2.5}$ network in the SJV. The results indicate that Clovis, Huron, Corcoran, and Bakersfield–GSH are designed as neighborhood-scale sites; however, based on the area-served analysis alone, these sites appear to be urban-scale sites. Further investigation of the area-served boundaries for Huron, Corcoran, and Bakersfield–GSH (**Figure 2-10**) showed little or no population beyond the immediate monitoring locations; therefore, these sites appear to be correctly sited given the monitoring objectives for these sites.

Figure 2-10 highlights areas that are populated and unmonitored for continuous $PM_{2.5}$. The areas northeast of Clovis and west of Merced (Los Banos area) appear to be candidate locations for new monitoring sites, as was found by the ozone monitoring network analyses. In addition, the area between Corcoran and Bakersfield may warrant an additional $PM_{2.5}$ monitoring site. The SJVUAPCD is currently planning to install four additional $PM_{2.5}$ 1-hr monitors in Manteca, Madera, Tranquility, and Huron. These planned sites were included in this analysis. The sites planned for Manteca and Madera appear to be in populated areas and should fulfill population exposure monitoring objectives, while the Huron and Tranquility sites will fulfill apparent existing monitoring gaps in the western side of the SJV.

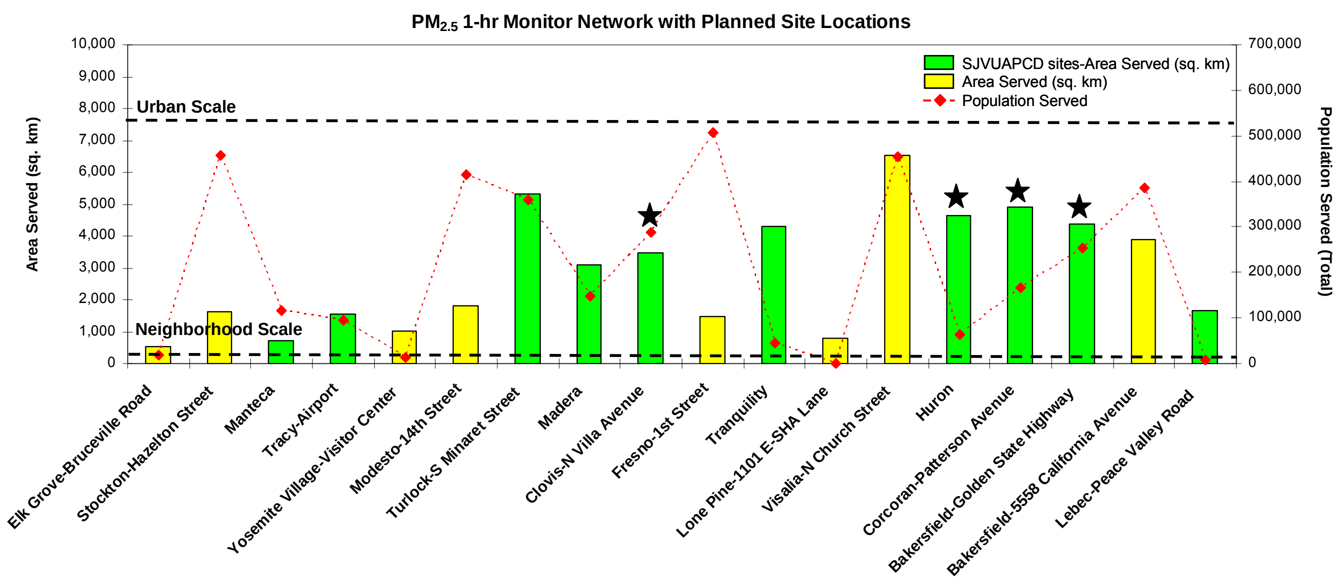


Figure 2-9. Summary of area-served (in km^2 on the left axis) and population-served (people/km^2 on the right axis) analyses for the $PM_{2.5}$ 1-hr continuous sites in the SJV. The sites indicated with black stars above the bars are sites that were investigated in more detail.

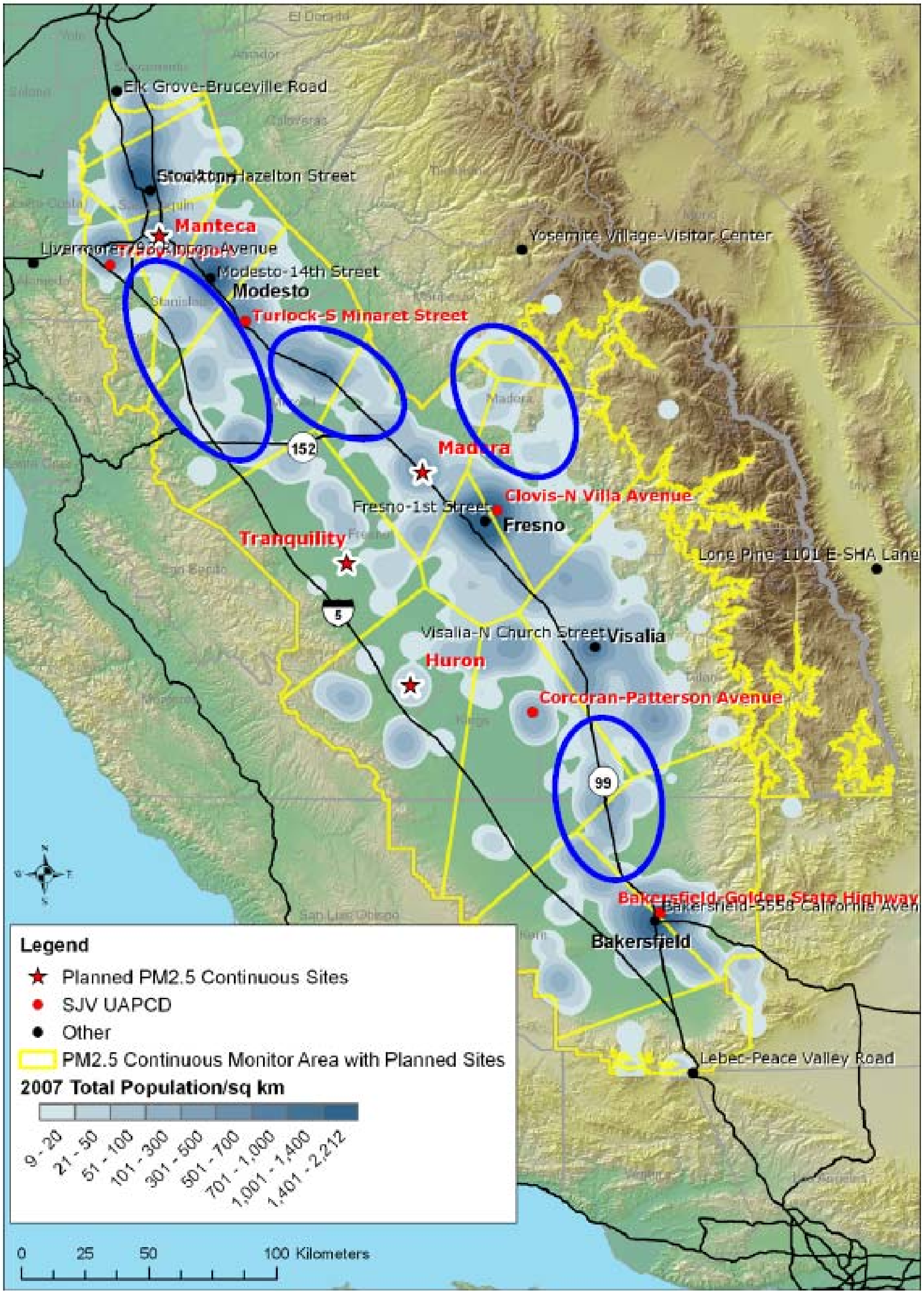


Figure 2-10. Map of the $PM_{2.5}$ 1-hr continuous monitoring sites, the area-served boundaries, and the population density in the SJV. Areas that have substantial population but are unmonitored are highlighted with blue circles.

The results of the population change analysis relative to the $PM_{2.5}$ 1-hr continuous monitoring network are shown in **Figure 2-11** and again indicate similar findings to the ozone network assessment. The areas northeast of Clovis, west of Merced (Los Banos area), and southeast of Corcoran all have high population growth, but there are currently no monitoring sites in these areas. The sites planned for Madera and Manteca will be placed in regions where population has grown; sites at Tranquility and Huron will be in areas with low population but will fill monitoring gaps in the western region of the valley. Again, note that the area just south of Tranquility is shown as an area of high population growth, mainly due to the construction of a new prison in the area.

Figure 2-12 shows the area-served boundaries for the $PM_{2.5}$ 1-hr monitor network overlaid on the 2-km PM emissions inventory. The results of the emissions-served analysis suggest potential benefits of adding continuous PM sites in the northwestern and central regions of the SJV (indicated with circles in Figure 2-12).

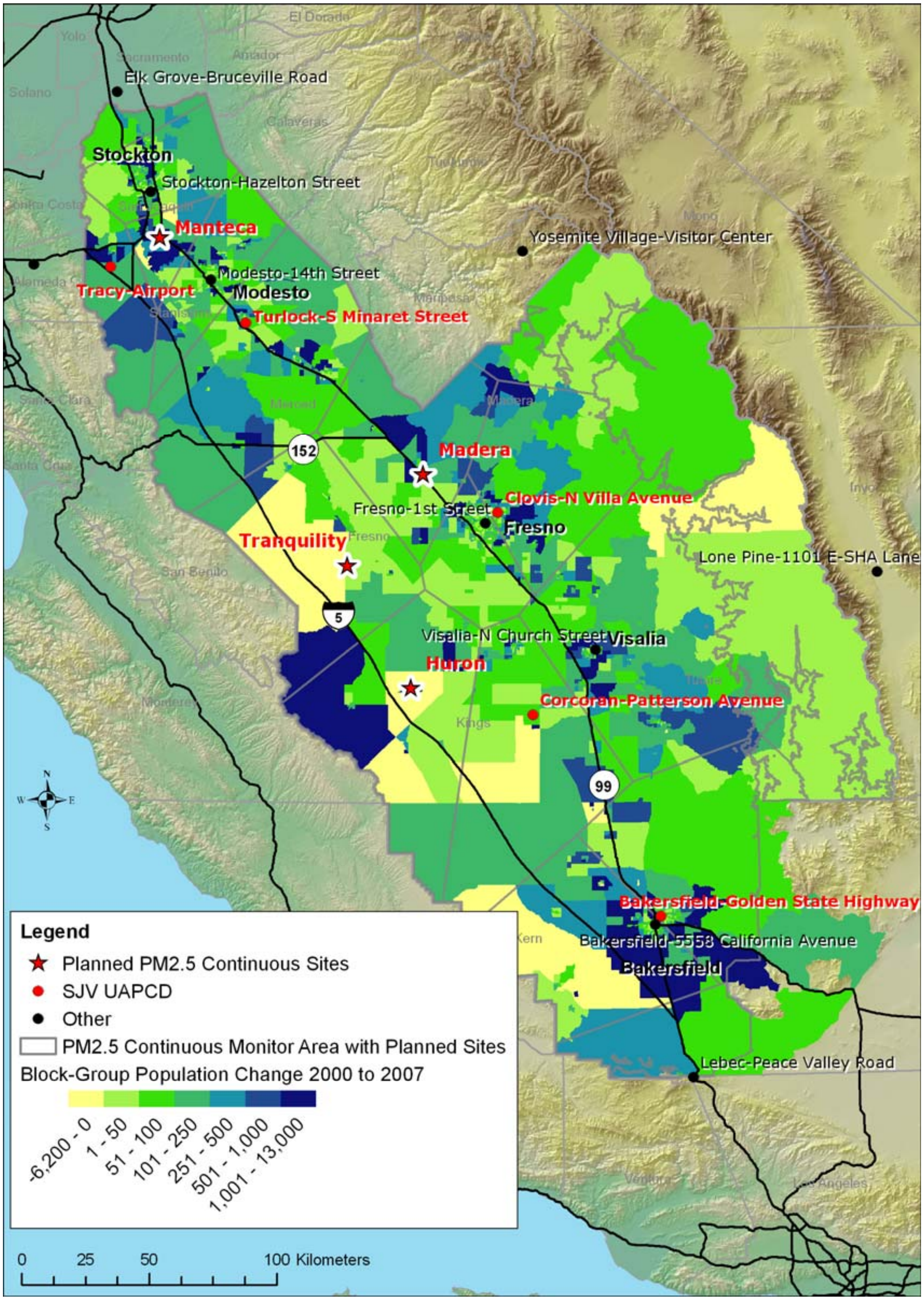


Figure 2-11. Map of the change in population from 2000 to 2007 for census block groups in the SJV overlaid with the area-served boundaries for the $PM_{2.5}$ network (ESRI, 2008).

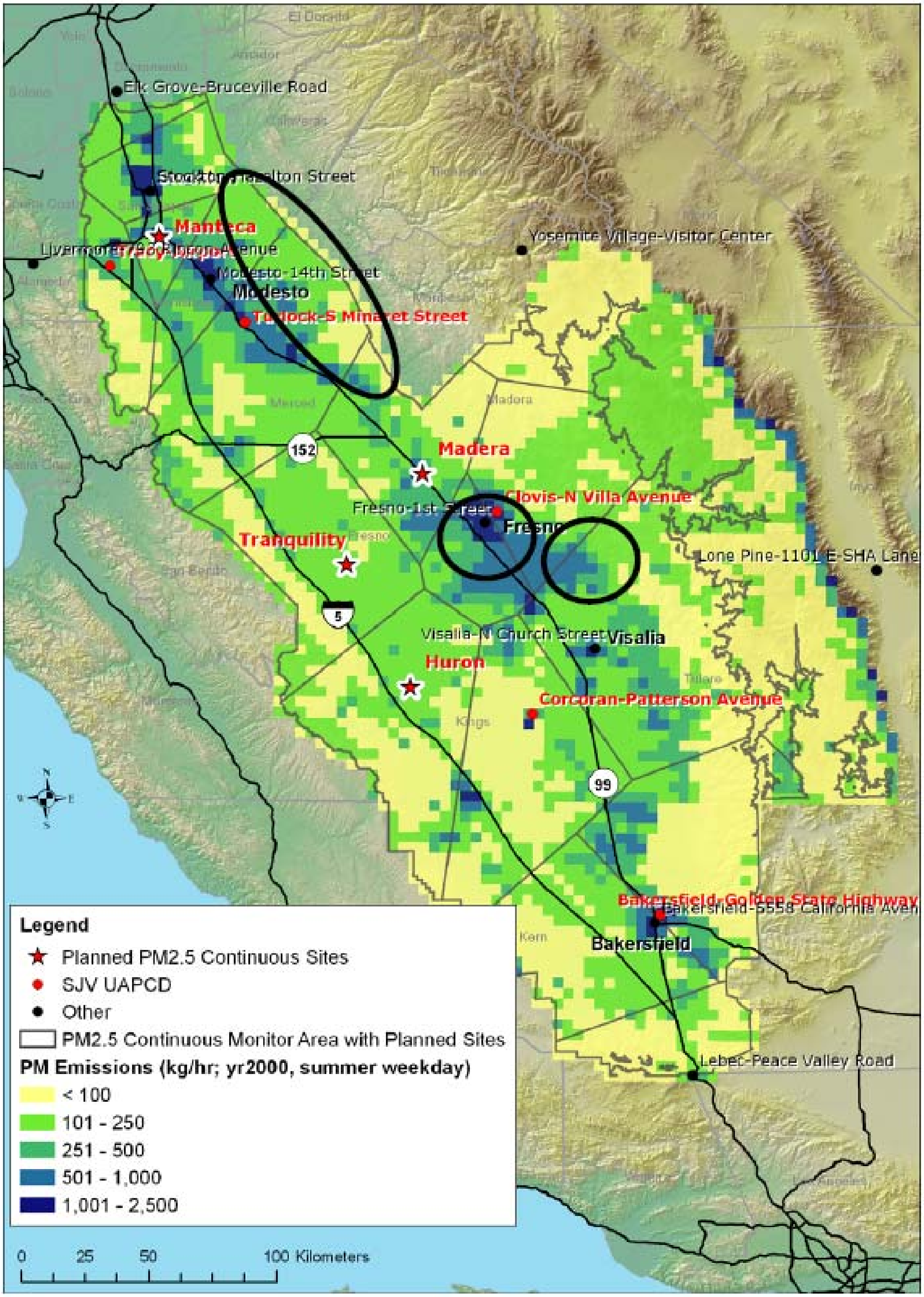


Figure 2-12. Area-served boundaries for the $PM_{2.5}$ 1-hr monitor network overlaid with the spatially resolved (2-km) gridded PM emissions inventory. Black circles indicate areas that are unmonitored and where PM emissions density is high.

PM$_{2.5}$ 24-hr network

Table 2-13 shows the area-served, population-served, population change, and emissions-served analysis results for the SJVUAPCD-operated PM$_{2.5}$ 24-hr monitoring sites. The results of the analysis indicate that Merced, Clovis, and Corcoran rank highest with the most area and emissions served.

Table 2-13. Summary of the area-, population-, population change, and emissions-served analyses for the PM$_{2.5}$ 24-hr monitoring network. Red dots represent the high-ranking sites, green dots represent the mid-ranking sites, and blue dots represent the low-ranking sites.

Site Name (showing all sites within the SJV)	**Area Served**	**Population Served**	**Population Change**	**PM Emissions Served**
Stockton-Hazelton Street	🟢	🔴	🔴	🟢
Modesto-14th Street	🟢	🔴	🔴	🔴
Merced-2334 M Street	🔴	🟢	🟢	🔴
Clovis-N Villa Avenue	🔴	🟢	🟢	🟢
Fresno-1st Street	🟢	🔴	🟢	🟢
Fresno-Hamilton and Winery	🟢	🟢	🟢	🟢
Visalia-N Church Street	🔴	🔴	🔴	🔴
Corcoran-Patterson Avenue	🔴	🟢	🟢	🔴
Bakersfield-GSH	🟢	🟢	🟢	🟢
Bakersfield-5558 California Ave	🟢	🟢	🔴	🟢
Bakersfield-410 E Planz Road	🟢	🟢	🟢	🟢

🔴 Highest ranking sites (e.g., largest area-/population-/etc.-served value): Top 25% of all sites within the analysis
🟢 Middle ranking sites: 25%-75% of all sites within the analysis
🔵 Lowest ranking sites (e.g., smallest PM emissions value): Bottom 25% of all sites within the analysis
Total PM$_{2.5}$ 24-hr monitoring sites included in this analysis = 16

Figure 2-13 shows the area-served boundaries for the PM$_{2.5}$ 24-hr network overlaid with population density. The results for the PM$_{2.5}$ 24-hr network are similar to those for the ozone and PM$_{2.5}$ 1-hr network in that the western side of the SJV appears to lack monitors. However, the two PM$_{2.5}$ 1-hr monitors that are planned for Tranquility and Huron should fill the gap in PM$_{2.5}$ monitoring within the SJV. Again, the areas northeast of Clovis and east of Corcoran are also potential areas for placing new monitors relative to population.

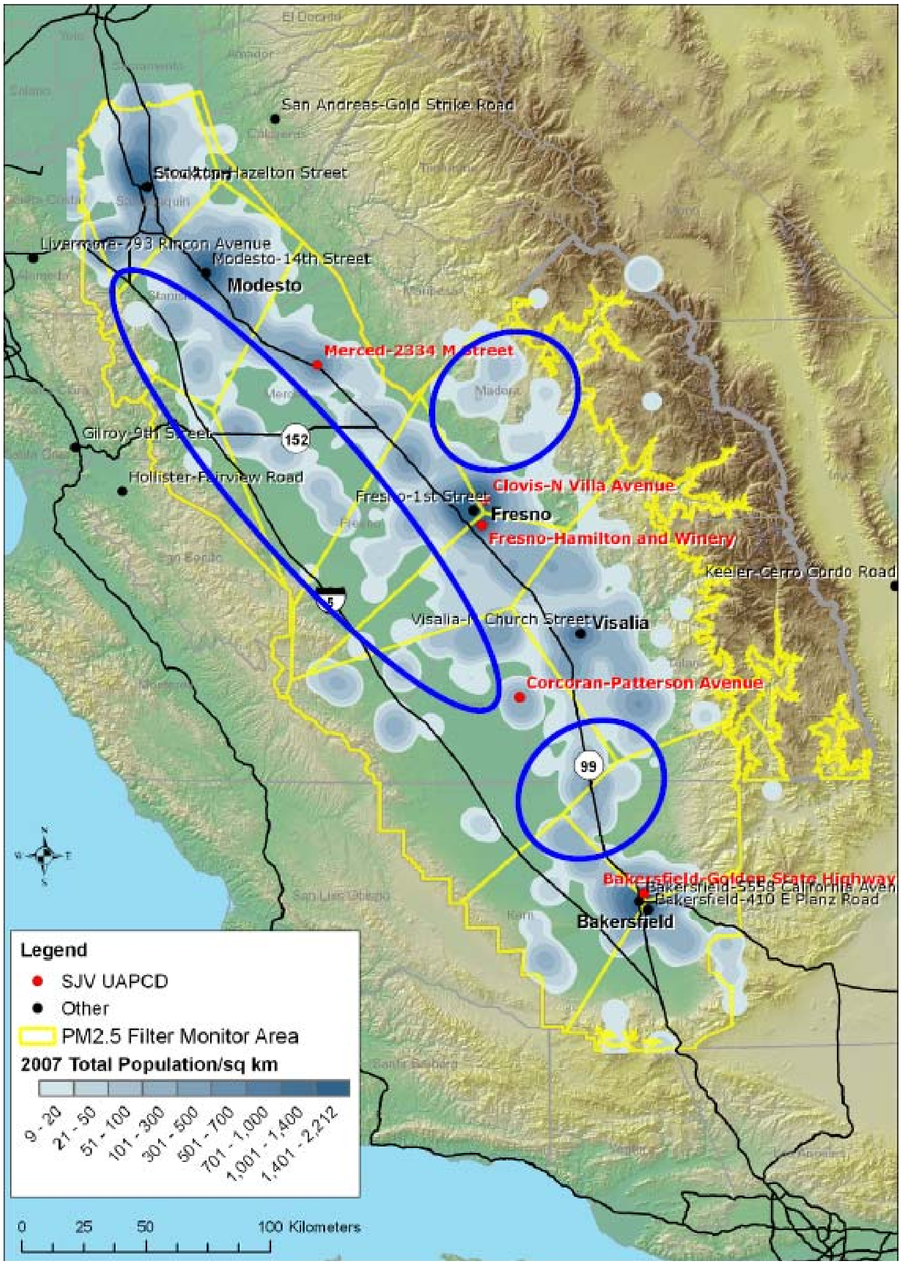


Figure 2-13. Area-served boundaries for the $PM_{2.5}$ 24-hr monitoring network overlaid with 2007 population density. Blue circles indicate areas that are unmonitored for 24-hr $PM_{2.5}$ but have substantial population.

Three monitors currently exist in Fresno, two of which measure both 1-hr and 24-hr $PM_{2.5}$ (Fresno First St. and Clovis). The third site, Fresno–Hamilton Winery, only measures 24-hr $PM_{2.5}$ but is an important monitoring site in southern Fresno. The SJVUAPCD might consider adding a continuous $PM_{2.5}$ site northeast of Clovis to help fill gaps in the continuous $PM_{2.5}$ network. Supplemental graphs and maps for all of the bottom-up analyses for the $PM_{2.5}$ 24-hr monitoring network can be found in Appendix B.

PM$_{10}$ 1-hr network

Table 2-14 shows the area-served, population-served, population change, and emissions-served results for the SJVUAPCD-operated PM$_{10}$ 1-hr monitoring sites. Unlike the previously discussed networks, the PM$_{10}$ 1-hr network is fairly sparse, with only five sites in the entire SJV (including the planned Madera site). The SJVUAPCD operates four of the five sites. Because the PM$_{10}$ 1-hr network is relatively sparse, the area-, population-, and emissions-served results indicate that the sites represent much larger areas than do sites for the more robust networks (i.e., ozone and PM$_{2.5}$). For example, because there are no sites in Stockton and Modesto, the area-served boundary for the Tracy site encompasses these areas, thus producing high values for population-served, population change, and emissions-served.

Table 2-14. Summary of the area-, population-, population change, and emissions-served analyses for the PM$_{10}$ 1-hr monitoring network. Red dots represent the high-ranking sites, green dots represent the mid-ranking sites, and blue dots represent the low-ranking sites.

Site Name (showing all sites within the SJV)	**Area Served**	**Population Served**	**Population Change**	**PM Emissions Served**
Tracy-Airport	🟢	🔴	🔴	🔴
Madera	🔴	🟢	🟢	🟢
Fresno-1st Street	🟢	🔴	🔴	🟢
Corcoran-Patterson Avenue	🔴	🟢	🟢	🔴
Bakersfield-GSH	🟢	🟢	🟢	🟢

🔴 Highest ranking sites (e.g., largest area-/population-/etc.-served value): Top 25% of all sites within the analysis
🟢 Middle ranking sites: 25%-75% of all sites within the analysis
🔵 Lowest ranking sites (e.g., smallest PM emissions value): Bottom 25% of all sites within the analysis
Total PM$_{10}$ 1-hr monitoring sites included in this analysis = 8

Figure 2-14 shows the area-served boundaries for the PM$_{10}$ 1-hr network overlaid with the 2007 population density. Areas that have substantial population but no monitoring sites are indicated with blue circles. A planned Madera site will help fill gaps in the network along the north-south corridor of the SJV. However, there are no PM$_{10}$ 1-hr sites in the eastern and western portions of the SJV. Potential improvements to the PM$_{10}$ 1-hr monitoring network might include adding PM$_{10}$ monitors at the planned PM$_{2.5}$ 1-hr monitor sites (i.e., Huron, Manteca, and Tranquility) and/or adding 1-hr PM$_{10}$ monitors at existing 24-hr PM$_{10}$ sites. Twenty-four-hour data are generally more reliable than continuous data; however, continuous data can be used in conjunction with 24-hr data to help explain the phenomena and conditions that lead to high PM episodes. Currently, the PM$_{10}$ 24-hr network consists of 15 sites (8 of which are operated by the SJVUAPCD) in areas that would fill gaps in the current PM$_{10}$ 1-hr monitoring network. Supplemental graphs and maps for the PM$_{10}$ 1-hr monitoring network assessment can be found in Appendix B.

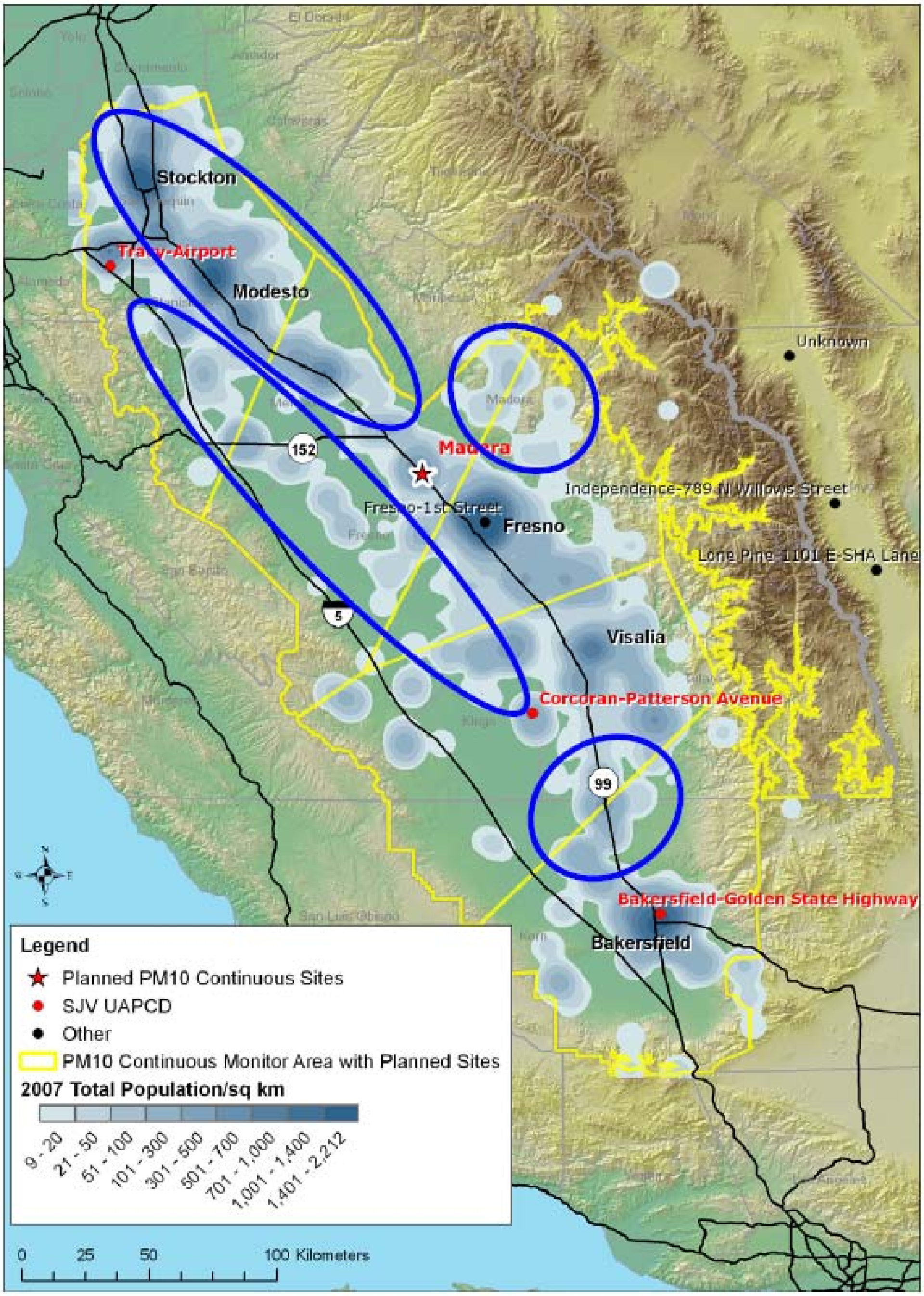


Figure 2-14. Area-served boundaries for the PM_{10} 1-hr monitoring network overlaid with 2007 population density. Blue circles indicate areas that are unmonitored for continuous PM_{10} but have substantial population.

<u>PM_{10} 24-hr Network</u>

Table 2-15 shows the area-, population-, population change, and emissions-served results for the SJVUAPCD-operated PM_{10} 24-hr monitoring sites. The results of this analysis indicate that the Stockton site is important for population coverage, while Turlock, Merced, and Fresno–Drummond are important sites for monitoring emissions.

Table 2-15. Summary of the area-, population-, population change, and emissions-served analyses for the PM_{10} 24-hr monitoring network. Red dots represent the high-ranking sites, green dots represent the mid-ranking sites, and blue dots represent the low-ranking sites.

Site Name **(showing all sites within the SJV)**	**Area Served**	**Population Served**	**Population Change**	**PM Emissions Served**
Stockton-Wagner-Holt School	🟢	🔴	🔴	🟢
Stockton-Hazelton Street	🟢	🔴	🔴	🟢
Modesto-14th Street	🟢	🔴	🔴	🔴
Turlock-S Minaret Street	🟢	🟢	🟢	🔴
Merced-2334 M Street	🔴	🟢	🟢	🔴
Clovis-N Villa Avenue	🔴	🔴	🔴	🟢
Fresno-1st Street	🟢	🔴	🔴	🔴
Fresno-Drummond Street	🟢	🟢	🟢	🔴
Visalia-N Church Street	🔴	🔴	🔴	🔴
Hanford-S Irwin Street	🟢	🟢	🟢	🟢
Santa Rosa Rancheria	🔴	🟢	🟢	🔴
Corcoran-Patterson Avenue	🔴	🟢	🟢	🟢
Oildale-3311 Manor Street	🔴	🟢	🟢	🟢
Bakersfield-GSH	🟢	🟢	🟢	🟢
Bakersfield-5558 California Ave	🔴	🔴	🔴	🟢

🔴 Highest ranking sites (e.g., largest area-/population-/etc.-served value): Top 25% of all sites within the analysis
🟢 Middle ranking sites: 25%-75% of all sites within the analysis
🔵 Lowest ranking sites (e.g., smallest PM emissions value): Bottom 25% of all sites within the analysis
Total PM_{10} 24-hr monitoring sites included in this analysis = 25

Figure 2-15 shows the area-served boundaries for the PM_{10} 24-hr network overlaid with 2007 population density. Fifteen PM_{10} 24-hr monitors are currently located in the SJV, eight of which are operated by the SJVUAPCD. The results of the PM_{10} 24-hr network are consistent with the results for the other pollutant networks. Specifically, the areas northeast of Clovis, the western region of the SJV, and the region between Corcoran and Bakersfield may warrant additional PM_{10} monitors.

Supplemental graphs and maps for all bottom-up analyses of the PM_{10} 24-hr monitoring network can be found in Appendix B.

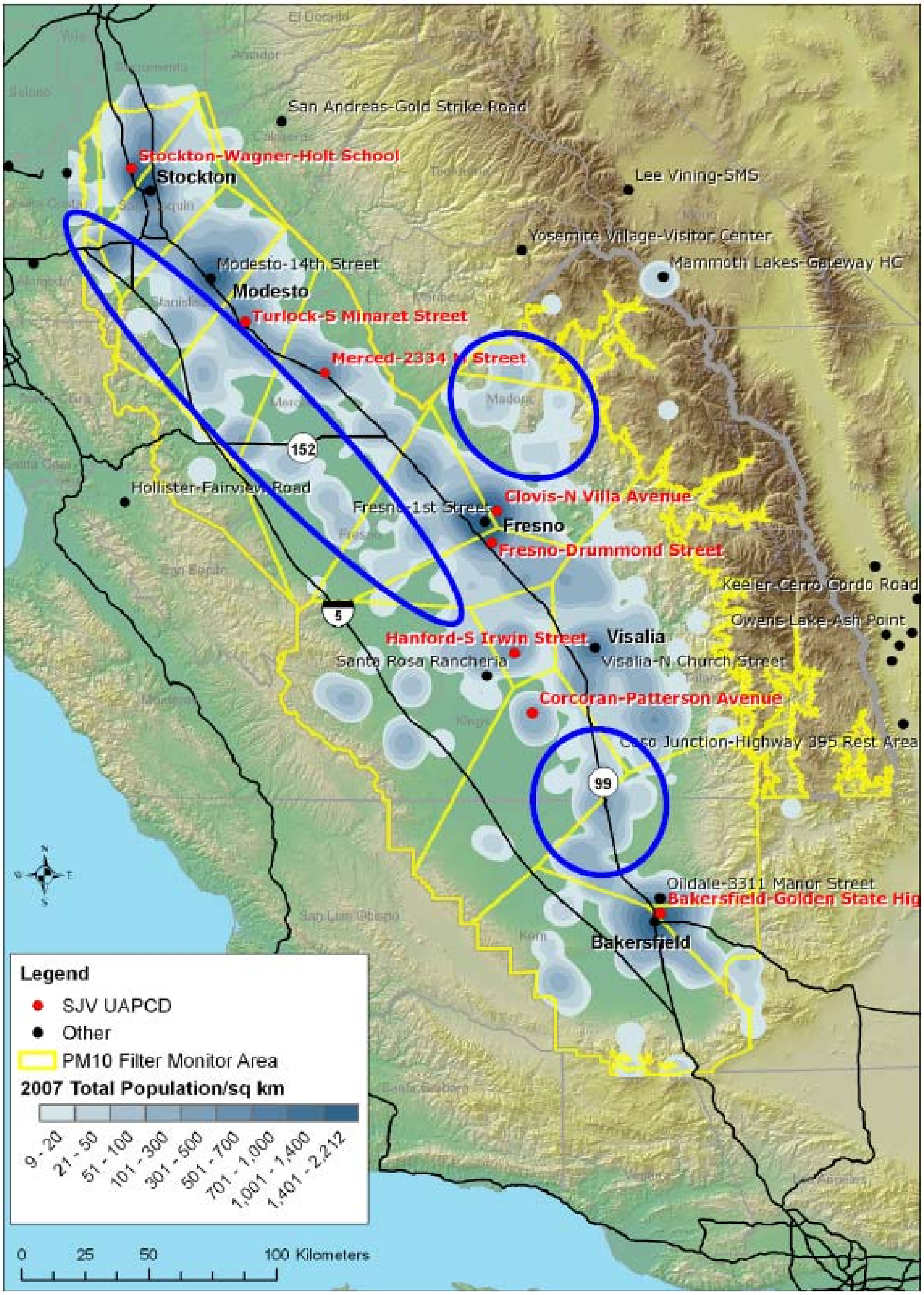


Figure 2-15. Area-served boundaries for the PM_{10} 24-hr monitoring network overlaid with 2007 population density in the SJV. Blue circles indicate areas that are unmonitored for 24-hr PM_{10} but have substantial population.

NO$_2$ network

Table 2-16 depicts the area-served, population-served, and population change results for the SJVUAPCD-operated NO_2 monitoring sites. The results of these analyses indicate that the Turlock site ranks highest among SJVUAPCD-operated sites. The Fresno sites, though representing small areas due to a cluster of monitors in the Fresno area, are important sites for population coverage and emissions.

Table 2-16. Summary of the area-served, population-served, and population change analyses for the NO_2 monitoring network. Red dots represent the high-ranking sites, green dots represent the mid-ranking sites, and blue dots represent the low-ranking sites.

Site Name (showing all sites within the SJV)	**Area Served**	**Population Served**	**Population Change**
Stockton-Hazelton Street	Green	Red	Red
Tracy-Airport	Green	Green	Green
Turlock-S Minaret Street	Red	Red	Red
Merced-S Coffee Avenue	Green	Green	Green
Madera-Pump Yard	Red	Green	Green
Clovis-N Villa Avenue	Green	Green	Red
Fresno-Sierra Skypark #2	Blue	Green	Green
Fresno-1st Street	Blue	Red	Green
Fresno-Drummond Street	Blue	Green	Green
Parlier	Green	Green	Green
Visalia-N Church Street	Red	Red	Red
Hanford-S Irwin Street	Red	Green	Green
Shafter-Walker Street	Red	Green	Green
Bakersfield-GSH	Green	Green	Green
Bakersfield-5558 California Ave	Green	Red	Red
Edison	Green	Blue	Blue
Arvin-Bear Mountain Blvd	Green	Blue	Blue

• Highest ranking sites (e.g., largest area-/population-/etc.-served value): Top 25% of all sites within the analysis
• Middle ranking sites: 25%-75% of all sites within the analysis
• Lowest ranking sites (e.g., smallest NO_x emissions value): Bottom 25% of all sites within the analysis
Total NO_2 monitoring sites included in this analysis = 20

Figure 2-16 shows the area-served boundaries for the NO_2 monitoring network overlaid with 2007 population density. Overall, the sites in the NO_2 network appear to meet their intended monitoring objectives. However, Figure 2-16 indicates a potential gap in the network along the western side of the SJV (see the blue circles on the map). Although the SJV does not exceed federal or state standards for NO_2, and it is likely that NO_2 levels will continue to decline as a result of NO_x controls, an NO_2 monitor at the planned Tranquility ozone site could help fill the gap along the western side of the SJV. Nevertheless, the western side of the SJV is too large to realistically capture data with only one NO_2 monitoring location. Supplemental graphs and maps for the bottom-up analyses of the NO_2 monitoring network can be found in Appendix B.

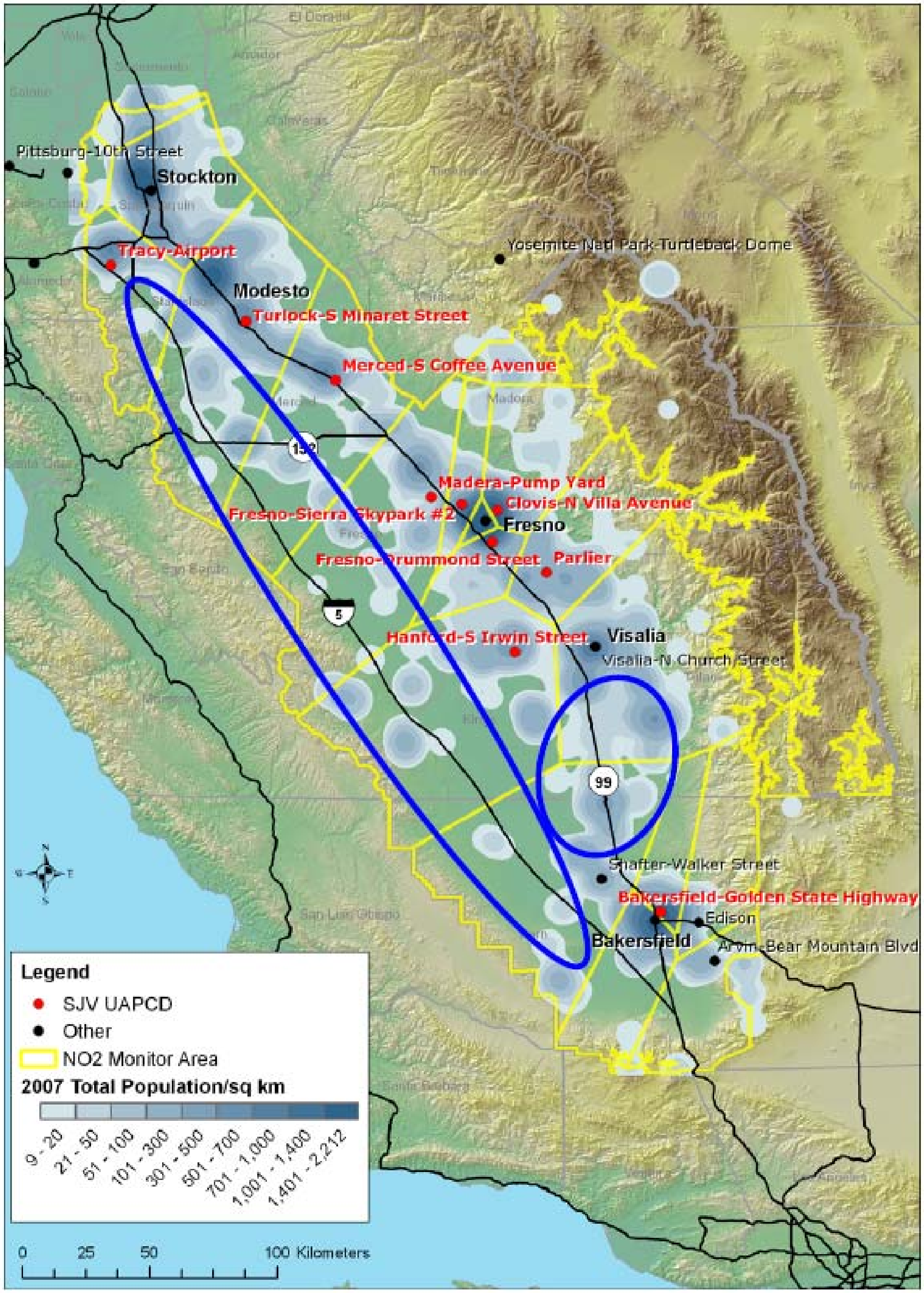


Figure 2-16. Area-served boundaries for the NO_2 monitoring network overlaid with 2007 population density in the SJV. Blue circles indicate areas that are unmonitored for NO_2 but have substantial population.

CO Network

Table 2-17 shows the results of the area-served, population-served, and population change analyses for the CO monitoring sites. The SJVUAPCD operates eight CO sites, three of which are located in and around Fresno. The Turlock, Fresno–Drummond, and Bakersfield–GSH sites rank highest based on the bottom-up analyses because they represent large areas and high population density.

Table 2-17. Summary of the area-served, population-served, and population change analyses for the CO monitoring network. Red dots represent the high-ranking sites, green dots represent the mid-ranking sites, and blue dots represent the low-ranking sites.

Site Name (showing all sites within the SJV)	**Area Served**	**Population Served**	**Population Change**
Stockton-Hazelton Street	● (green)	● (red)	● (red)
Modesto-14th Street	● (green)	● (green)	● (green)
Turlock-S Minaret Street	● (red)	● (green)	● (green)
Fresno-Sierra Skypark #2	● (green)	● (green)	● (green)
Clovis-N Villa Avenue	● (green)	● (green)	● (green)
Fresno-1st Street	● (blue)	● (green)	● (green)
Fresno-Drummond Street	● (red)	● (red)	● (red)
Bakersfield-GSH	● (red)	● (red)	● (red)

• Highest ranking sites (e.g., largest area-/population-/etc.-served value): Top 25% of all sites within the analysis
• Middle ranking sites: 25%-75% of all sites within the analysis
• Lowest ranking sites (e.g., smallest NO_x emissions value): Bottom 25% of all sites within the analysis
Total CO monitoring sites included in this analysis = 11

According to the site-by-site analyses and the SJV Network Plan, CO concentrations in the SJV are far below the NAAQS and the SJVUAPCD is not required to monitor for CO. However, the SJVUAPCD plans to add high-sensitivity CO instruments at the Clovis and Bakersfield–GSH sites. **Figure 2-17** shows the area-served boundaries for the CO network overlaid with the 2007 population density. Of the eight CO monitors in the SJV, four are located in the greater Fresno area (three of which are run by the SJVUAPCD), as shown in Figure 2-17. With the addition of a trace CO monitor at the Clovis site, the relocation of one or two of the other sites in Fresno could be beneficial, as there may be some redundancy in CO sites in the Fresno area. Figure 2-17 depicts areas of high population that may warrant a CO monitor (as shown by blue circles). Supplementary graphs and maps for the CO bottom-up analyses can be found in Appendix B.

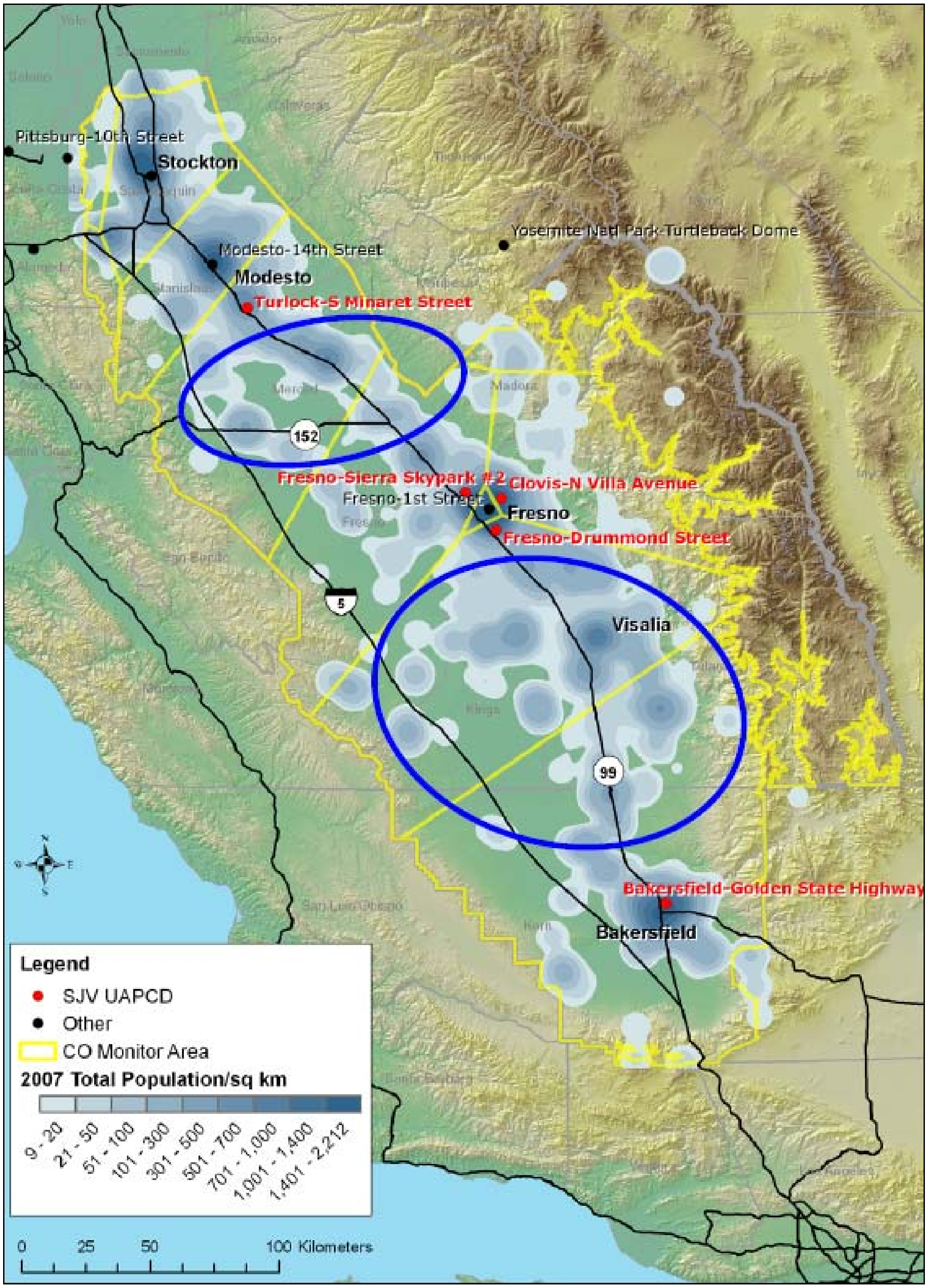


Figure 2-17. Area-served boundaries for the CO monitoring network overlaid with 2007 population density in the SJV. Blue circles indicate areas that are unmonitored for CO but have substantial population.

2.3 TECHNICAL APPROACH AND FINDINGS FOR THE PAMS NETWORK ASSESSMENT

The PAMS program collects ambient air measurements in areas classified as serious, severe, or extreme ozone nonattainment, as required by Section 182(c)(1) of the Clean Air Act. PAMS are used to collect data for a target list of VOCs, nitrogen oxides (NO_x, NO_y), ozone, and surface and upper-air meteorological measurements. In 2006, the EPA reduced minimum PAMS monitoring requirements to establish a network that meets the national objectives of the program while freeing up resources for states to tailor their networks to suit specific data needs. Overall, the changes significantly reduce the costs of the minimum PAMS monitoring requirements and allow states to re-invest these savings in region-specific PAMS monitoring activities.

In 2008, STI performed an assessment of the national PAMS network for the EPA. This assessment included performing the same site-by-site analyses described in Section 2.2 above as well as several other analyses to examine areas of high ozone concentrations relative to monitoring site types, locations, and objectives. The result of this work was a report that was delivered to EPA in September 2008 entitled *Network Assessment for the National Photochemical Assessment Monitoring Stations (PAMS) Program* (McCarthy et al., 2008).

The PAMS Network Assessment project was a collaboration of federal, regional, and state PAMS participants with the objectives of assessing how well the current PAMS network is meeting its monitoring objectives; determining which sites are most useful for meeting these objectives; identifying potentially redundant, ineffective, or unnecessary sites; and assessing other enhanced ozone monitoring activities that may prove useful. This section contains the key findings and results of the national PAMS network assessment for Region 9 and of the SJV PAMS network assessment. For a detailed discussion of the national PAMS network assessment and analysis methods, refer to the EPA draft report (McCarthy et al., 2008).

2.3.1 Overview of the PAMS Network

The PAMS network was established in the mid-1990s in ozone nonattainment areas to provide information on the effectiveness of control strategies, emissions tracking, trends, and exposure. State and local air pollution control agencies are responsible for operation of the PAMS sites. A PAMS site typically monitors 56 target hydrocarbons and 2 carbonyl compounds, ozone, NO_x and/or NO_y, and meteorological measurements. The conceptual PAMS network design was developed to include measurements collected at defined locations within an urban region to meet specific objectives based on a site's location relative to emissions and transport pathways in a given area. The site types and objectives are defined as follows:

- Type 1 – Upwind and background characterization site
- Type 2 – Maximum ozone precursor emissions impact sites
- Type 3 – Maximum ozone concentration sites
- Type 4 – Extreme downwind monitoring sites

EPA Region 9 consists of California, Nevada, Arizona, and Hawaii. PAMS areas include the South Coast (Los Angeles/Riverside), SJV, Sacramento, Phoenix, and San Diego. Region 9 has the most severe ozone areas and has the highest and most frequent number of ozone exceedances in the nation. Region 9 has approximately 21 active monitoring sites, six of which are operated by the SJVUAPCD. The SJVUAPCD sites are located in Madera, Clovis, Parlier, Shafter, Bakersfield–GSH, and Arvin.

Several analyses were performed as part of the national PAMS network assessment to address the objectives of the PAMS sites, including the number of parameters monitored, data completeness, percent above MDL, trend length, measured concentrations, attainment status, network density, and maximum ozone locations. As part of the SJV study, several additional analyses were performed, including area-served, population-served, and population change analyses.

Two of the main goals of the national PAMS network assessment were to (1) assess data quality and (2) determine how well the PAMS sites are currently serving their objectives. That is, are PAMS sites actually meeting Type 1, 2, 3, and 4 site objectives? One of the key analyses involved an examination of PAMS Type 3 (maximum ozone concentration) sites to determine if they are still capturing maximum ozone concentrations given changes in population and emissions patterns over time. For this analysis, all (or most) ozone sites were considered including both PAMS and non-PAMS ozone sites as well as sites located both inside and outside the SJV. Area-served analyses were not performed for the PAMS assessment because the PAMS network design is based primarily on siting monitors relative to urban centers to characterize upwind, maximum, and downwind pollutant concentrations and transport rather than maximum spatial coverage.

2.3.2 Key Findings and Discussion of the PAMS Network Assessment

The findings from the data completeness and percent above MDL analyses indicate that the quality of select VOC species measured at the PAMS SJVUAPCD-operated sites is generally poor. The MDLs throughout the region are high, and despite high observed concentrations, more than 50% of measurements (for some species) are reported below the MDL. Despite the MDL issue, all the sites in the SJV appear to be suitable for long-term trends analysis of ozone, total non-methane organic compounds (TNMOC), and some ozone precursors (i.e., benzene, toluene, etc.).

The SJV is classified as “serious” for ozone nonattainment. Based on the analysis of maximum concentrations, the SJV reported some of the highest ozone concentrations and precursor concentrations in the United States. **Figure 2-18** shows the average number of days per year in 2004–2006 when the 8-hr daily maximum ozone concentrations were greater than 75 ppb in Central California. **Figure 2-19** shows the average number of days per year that sites in the SJV and nearby nonattainment areas reported maximum ozone concentrations greater than 75 ppb. Note that both PAMS and non-PAMS ozone sites were included in this analysis to help identify if PAMS Type 3 sties are capturing areas of high (or maximum) ozone concentrations.

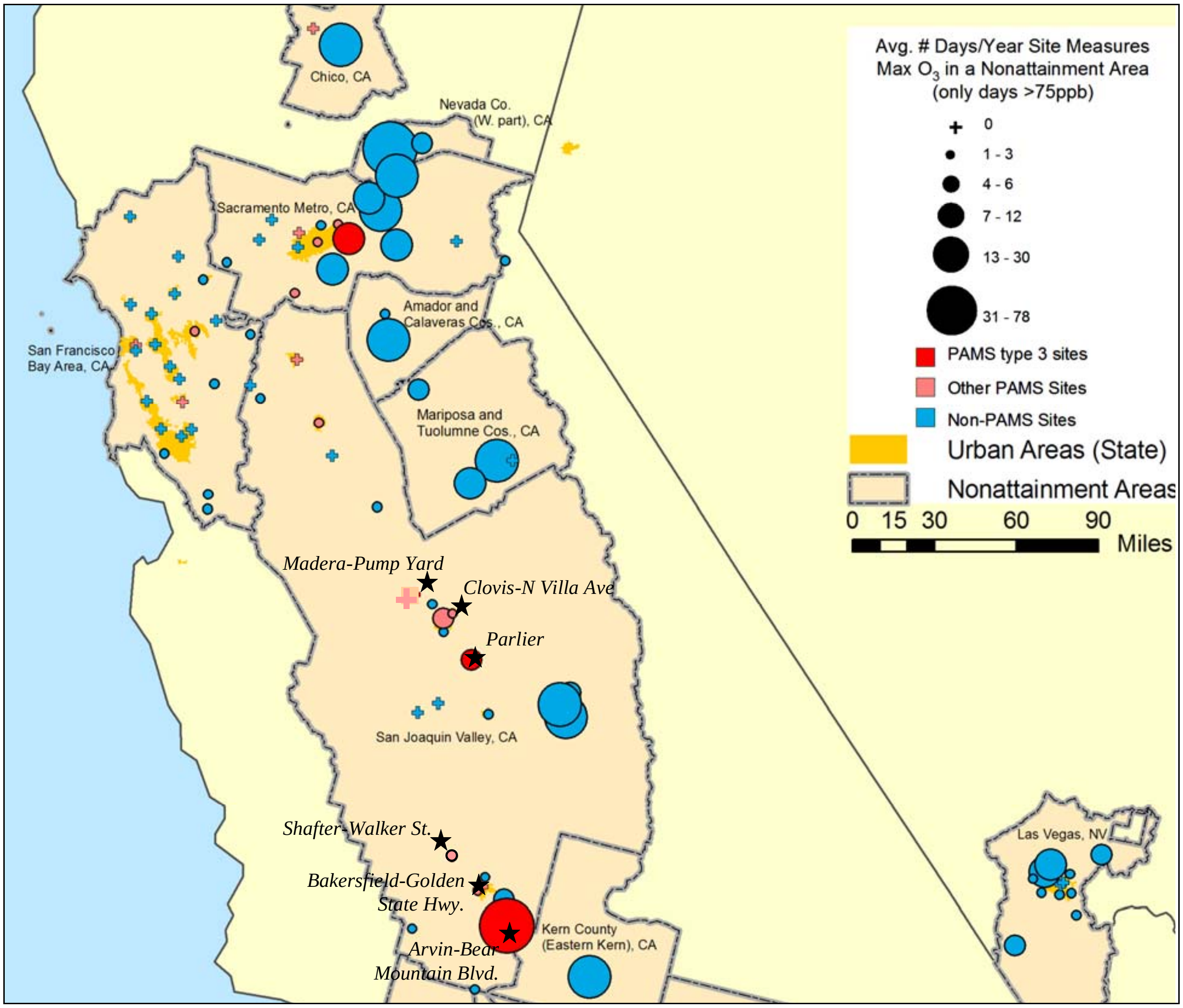


Figure 2-18. Average number of days per year when 8-hr daily maximum ozone concentrations were greater than 75 ppb from 2004 through 2006 in Central California. Note that this analysis included both PAMS and non-PAMS ozone sites both within and outside of the SJV. Stars indicate the PAMS sites operated by the SJVUAPCD.

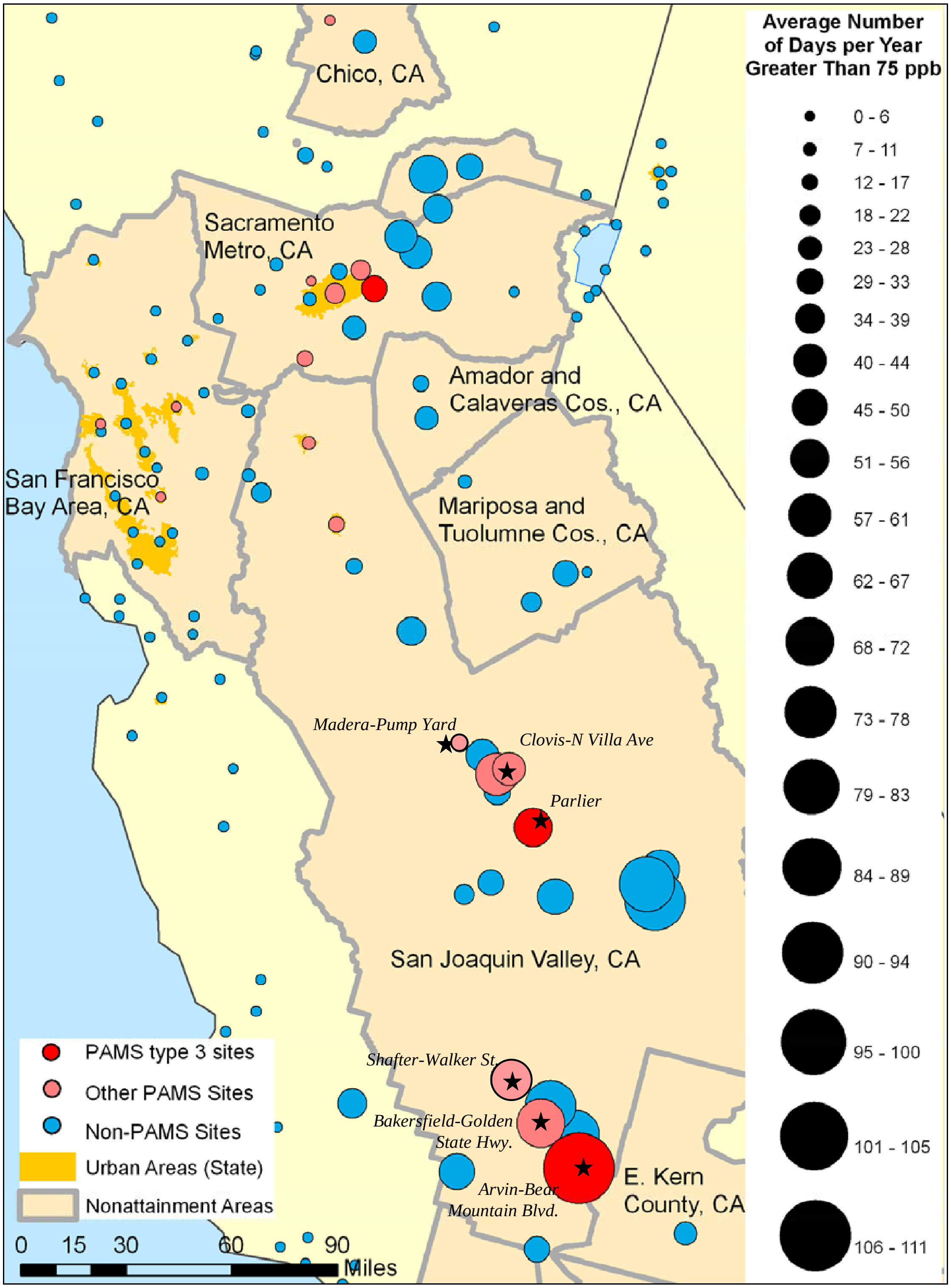


Figure 2-19. Average number of days a site reported 8-hr daily maximum ozone concentrations greater than 75 ppb in the SJV and nearby nonattainment areas. Note that the sites indicated with stars are operated by the SJVUAPCD.

One of the most notable findings from the PAMS network assessment is that Arvin and Parlier are designated as Type 3 sites, or sites that measure maximum ozone concentrations. The Arvin site appears to be accurately located to meet the Type 3 monitoring objectives; however, the Parlier site does not appear to be far enough downwind to capture the highest ozone concentrations. Due to changes in emissions patterns, the chemical composition of ozone precursors, and population growth, locations of maximum ozone concentrations have shifted over time and now generally occur along the foothill region on the eastern side of the SJV. These changes provide more evidence that the area northeast of Clovis may warrant an additional ozone monitor. The objectives of the PAMS site at Parlier should be reassessed and changed to reflect shifts in population, emissions patterns, and precursor chemistry because this site may no longer be serving its objectives; alternatively, the site could be relocated to the southeast of Fresno to better capture the maximum ozone concentrations along the foothill region. Site-specific observations are provided in **Table 2-18**.

Table 2-18. Site-specific observations for the PAMS sites operated by the SJVUAPCD.

PAMS Site Type	Current Site	Analysis Comments
1/2	CA – Madera	Improve data quality; site consistent with objectives.
	CA – Shafter	Improve data quality; site consistent with objectives.
2	CA – Bakersfield	Highest local concentrations; consistent with Type 2 site characteristics; improve data quality.
	CA – Clovis Villa	High VOC, somewhat low NO_x concentrations, low predicted emissions; evaluate if site best meets Type 2 characteristics.
3	CA – Arvin	Improve data quality; high ozone site, consistent with Type 3 objectives.
	CA – Parlier	Improve data quality; consider relocating site to the southeast of Fresno or changing the site designation to Type 2.

The PAMS network design was developed specifically to characterize upwind, fresh emissions, and downwind pollutant concentrations within a region for the purpose of understanding ozone precursor emissions, chemical transformation, ozone patterns, and transport. PAMS sites are not specifically sited to monitor population exposure. Therefore, the area- and population-served analysis results are useful for determining the extent of spatial coverage of each site and which PAMS sites might also be candidate sites for monitoring population exposure. **Table 2-19** shows the area, population, and population change results for the SJVUAPCD-operated PAMS sites. Based on the area- and population-served results, Clovis could be a candidate PAMS site for examining population exposure to ozone and ozone precursors.

Table 2-19. Summary of the area-served, population-served, and population change analyses for the SJVUAPCD PAMS monitoring network. Red dots represent the high-ranking sites, green dots represent the mid-ranking sites, and blue dots represent the low-ranking sites.

Site Name (showing SJVUAPCD-operated sites only)	**Area Served**	**Population Served**	**Population Change**
Madera–Pump Yard	● red	● green	● green
Clovis–N Villa Avenue	● green	● red	● green
Parlier	● green	● green	● green
Shafter–Walker Street	● green	● blue	● blue
Bakersfield–GSH	● green	● green	● red
Arvin–Bear Mountain Blvd	● blue	● blue	● blue

• Highest ranking sites (e.g., largest area-/population-/etc.-served value): Top 25% of all sites within the analysis
• Middle ranking sites: 25%-75% of all sites within the analysis
• Lowest ranking sites (e.g., smallest NO_x emissions value): Bottom 25% of all sites within the analysis
Total PAMS monitoring sites included in this analysis = 8

3. TECHNICAL APPROACH AND FINDINGS OF THE METEOROLOGICAL NETWORK ASSESSMENT

Accurate representation of the spatial and temporal characteristics of a region's meteorology is needed to understand the physical and chemical processes that influence air quality to help determine ways to mitigate future air quality impacts. The main meteorological conditions that influence air quality include: transport of pollutants by winds, recirculation of air by local wind patterns, horizontal dispersion of pollution by wind, variations in sunlight due to clouds and seasons, vertical mixing and dilution of pollution within the atmospheric boundary layer, temperature, and moisture. These conditions are typically measured by a network of surface meteorological stations, weather balloons, and remote sensing equipment such as radar wind profilers (RWPs) and sodars.

The SJVUAPCD has been monitoring meteorology for many years to support the ambient air monitoring programs. **Figure 3-1** shows a map of the (a) upper-air and (b) surface meteorological sites operated by the SJVUAPCD and sites operated by the National Oceanic and Atmospheric Administration (NOAA). While data from the meteorological network support a variety of air quality analysis applications, one of the primary uses of the meteorological data is to aid in the daily forecasting of weather conditions and air quality (San Joaquin Valley Air Pollution Control District, 2008).

The goals of the meteorological network assessment presented in this section were to determine the network's ability to represent the critical and important meteorological conditions in the SJV and to assess the network's ability to provide information to support weather and air quality forecasting and State Implementation Plan (SIP) development designed to reduce pollution in the SJV. In particular, analyses were performed to address the following questions:

- Does the surface monitoring network capture the spatial and temporal variability of winds, temperature, and humidity?
- Do the aloft measurements and data capture spatial and temporal characteristics of the aloft winds, temperature, and mixing heights in the region?
- Are there redundant sites?

The remainder of this section describes the technical approach and findings of the meteorological network assessment.

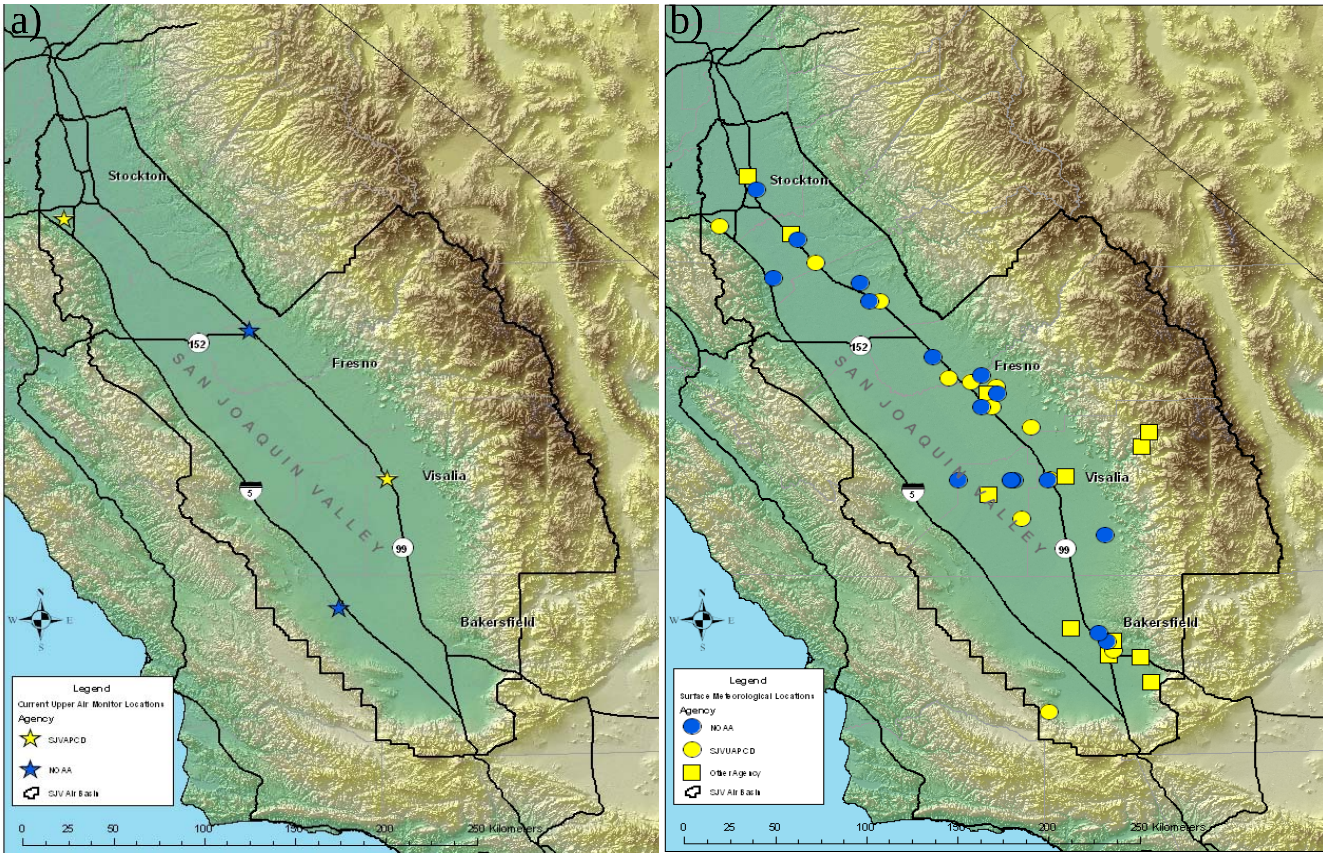


Figure 3-1. (a) Map of upper-air meteorological sites operated by the SJVUAPCD (yellow stars) and NOAA (blue stars) for the period 1998 through 2002; (b) map of surface meteorological sites operated by the SJVUAPCD (yellow circles), NOAA (blue circles), and other agencies (yellow squares) in the SJV.

3.1 SURFACE NETWORK ASSESSMENT

To evaluate the surface meteorological network, STI reviewed surface meteorological data collected in and within 20 miles of the SJV for the period 1998–2002. The data included wind speed, wind direction, temperature, relative humidity, and dew point temperature data. These data were obtained from the EPA's AQS and the NOAA's National Weather Service Meteorological Terminal Air Report (METAR) network. The AQS data were collected at sites operated by the CARB, SJVUAPCD, National Park Service (NPS), or jointly by CARB and SJVUAPCD.

STI used data from 1998–2002 because the SJVUAPCD's wind data collected during 2003–2008 were not valid. In addition, STI determined that the meteorological network for the 1998–2002 period contained no substantial differences from the current network; therefore, the results from the analysis of data from 1998–2002 provide a valid assessment of the current network. The METAR sites were considered in this evaluation because they provide reliable, quality controlled data on a permanent basis. The Remote Automated Weather Stations (RAWS) meteorological data network also operates many monitors in and around the SJV; however, many of these are run seasonally and the data are not subject to regular or consistent quality control. Therefore, this network was not considered in this evaluation and analysis.

Using these data, STI

- Determined data completeness and percent of valid data reports for temperature, relative humidity, dew point temperature, wind speed, and wind direction for each site. This was done to assess the overall quality of the data provided by the network.
- Created spatial wind rose plots to identify (1) important meteorological flow patterns and (2) regions that need monitors to capture the important meteorological phenomena in and around the SJV basin.
- Calculated site-to-site correlations for each meteorological variable (temperature, relative humidity, dew point temperature, and wind speed) to help determine if there were redundant sites. METAR sites were evaluated separately because these sites are not operated by the SJVUAPCD.

3.1.1 Data Completeness

Data completeness was calculated by dividing the number of samples reported by the total number of samples expected based on an hourly sampling frequency. In general, a robust data set will have at least 85% completeness. The percent of valid data samples was calculated by dividing the number of valid data records by the total number of data records. It is important to identify the percent of valid data samples because a data set might be very complete but have mostly invalid data. **Table 3-1** shows a summary of the results of the data completeness and percent valid analyses by parameter for all sites in the SJV air basin and sites from surrounding air basins, and shows the operator of each site.

Table 3-1. Data completeness and percent of valid data reports for each site in the SJV air basin and sites from surrounding air basins. Yellow highlighted cells indicate data completeness below an 85% target and orange highlighted cells indicate percent valid below 80%.

		Relative Humidity		Dew Point Temperature		Temperature		Wind Speed		Wind Direction	
Site Name	Site Operator	Data Completeness (%)	% Valid	Data Completeness (%)	% Valid	Data Completeness (%)	% Valid	Data Completeness (%)	% Valid	Data Completeness (%)	% Valid
Corcoran	SJVUAPCD	Not Reported		Not Reported		100	82	100	96	100	98
Bakersfield Golden State Highway	SJVUAPCD	98	96	Not Reported		98	96	80	72	80	72
Turlock S Minaret Street	SJVUAPCD	Not Reported		Not Reported		Not Reported		35	33	35	33
Madera Pump Yard	SJVUAPCD	Not Reported		Not Reported		100	99	95	94	95	94
Maricopa Stanislaus Street	SJVUAPCD	Not Reported		Not Reported		99	98	76	75	76	75
Clovis - N. Villa Ave	SJVUAPCD	100	89	Not Reported		100	99	35	35	35	35
Parlier	SJVUAPCD	100	98	Not Reported		100	99	40	39	40	39
Merced S. Coffee Ave	SJVUAPCD	Not Reported		Not Reported		100	100	40	40	40	40
Fresno Sierra Skypark	SJVUAPCD	Not Reported		Not Reported		100	100	100	100	100	99
Visalia Airport	SJVUAPCD	85	80	Not Reported		85	84	85	84	85	84
Sequoia NP Lower Kaweah	NPS	98	95	Not Reported		100	96	100	95	100	95
Sequoia and Kings Canyon Natl Park	NPS	23	21	Not Reported		23	21	23	23	23	23
Fresno 1st Street	CARB	91	90	Not Reported		97	95	96	96	95	95
Arvin Bear Mountain Blvd	CARB	95	94	Not Reported		90	90	100	100	90	90
Bakersfield 5558 California Ave	CARB	100	98	Not Reported		95	93	100	97	100	97
Edison	CARB	Not Reported		Not Reported		100	99	100	99	100	99
Oildale 3311 Manor Street	CARB	Not Reported		Not Reported		98	97	100	99	100	99
Stockton Hazelton Street San Joaquin	CARB	98	95	Not Reported		98	97	98	97	98	97
Modesto 14th Street	CARB	Not Reported		Not Reported		93	92	93	93	93	93
Visalia N Church Street	CARB	Not Reported		Not Reported		100	100	100	100	100	100
Shafter Walker Street	CARB	30	30	Not Reported		100	99	100	100	100	100
Pt. Piedras Blanco	NOAA	Not Reported		97	99	97	99	97	99	97	99
Napa	NOAA	Not Reported		95	95	95	95	95	98	95	98
Auburn Muni	NOAA	Not Reported		3	100	3	100	3	100	3	100
Bakersfield	NOAA	Not Reported		97	100	97	100	97	98	97	98
Bishop	NOAA	Not Reported		98	100	98	100	98	96	98	96
Concord	NOAA	Not Reported		87	99	87	100	87	98	87	98
Edwards Afb	NOAA	Not Reported		80	99	80	100	80	92	80	91
Fresno	NOAA	Not Reported		97	100	97	100	97	97	97	97
Hanford	NOAA	Not Reported		89	98	89	98	89	96	89	96
Hanford/San Joaq	NOAA	Not Reported		6	0	6	0	6	0	6	0
Hayward	NOAA	Not Reported		93	99	93	100	93	99	93	99
Inyokern	NOAA	Not Reported		29	4	29	99	29	89	29	88
Livermore	NOAA	Not Reported		96	97	96	97	96	98	96	98
Madera	NOAA	Not Reported		79	98	79	98	79	97	79	97
Mcclellan Afb	NOAA	Not Reported		55	99	55	99	55	99	55	99
Merced	NOAA	Not Reported		89	99	89	99	89	98	89	97
Mather Field	NOAA	Not Reported		43	98	43	99	43	99	43	99
Mojave	NOAA	Not Reported		30	3	30	99	30	96	30	95
Mammoth/June Lak	NOAA	Not Reported		30	95	30	99	30	98	30	98
Modesto	NOAA	Not Reported		94	99	94	99	94	98	94	98
Monterey	NOAA	Not Reported		97	99	97	99	97	98	97	98
China Lake (Naf)	NOAA	Not Reported		47	99	47	100	47	95	47	95
Lemoore Nas/Reev	NOAA	Not Reported		60	100	60	100	60	97	60	97
Moffett Nas/Mtn	NOAA	Not Reported		98	100	98	100	98	98	98	98
Oakland	NOAA	Not Reported		98	100	98	100	98	99	98	99
Palo Alto	NOAA	Not Reported		60	98	60	99	60	93	60	92
Paso Robles	NOAA	Not Reported		95	100	95	100	95	97	95	97
Porterville	NOAA	Not Reported		92	100	92	100	92	100	92	100
San Jose/Reid	NOAA	Not Reported		64	98	64	98	64	96	64	95
Sacramento	NOAA	Not Reported		98	100	98	100	98	98	98	97
San Luis Obispo	NOAA	Not Reported		97	100	97	100	97	98	97	98
Stockton	NOAA	Not Reported		97	100	97	100	97	98	97	98
San Francisco	NOAA	Not Reported		98	100	98	100	98	100	98	99
San Jose	NOAA	Not Reported		98	100	98	100	98	98	98	98
Sacramento/Metro	NOAA	Not Reported		98	100	98	100	98	98	98	98
Santa Maria	NOAA	Not Reported		98	100	98	100	98	98	98	98
Salinas	NOAA	Not Reported		98	100	98	100	98	99	98	99
San Carlos Airpo	NOAA	Not Reported		60	98	60	99	60	95	60	94
Sacramento/Wfo	NOAA	Not Reported		3	0	3	0	3	0	3	0
Travis Afb/Fairf	NOAA	Not Reported		95	100	95	100	95	96	95	95
Vacaville	NOAA	Not Reported		81	100	81	100	81	95	81	94
Visalia Muni	NOAA	Not Reported		82	100	82	100	82	100	82	100
Watsonville	NOAA	Not Reported		83	99	83	99	83	96	83	96

Table 3-1 shows that of the 64 total sites in the SJV, only 39 sites (14 AQS sites and 25 METAR sites) had 85% data completeness for temperature, wind speed, wind direction, and dew point temperature or relative humidity. Findings for the sites operated by SJVUAPCD, CARB, or NPS, shown in Table 3-1**,** are as follows:

- At all sites, parameters with high data completeness also had a high percentage of valid data.
- Temperature data completeness and percent of valid data were high for all but one site.
- Relative humidity data completeness and percent of valid data were high for 9 of 11 sites.
- Wind speed and direction data completeness and percent of valid data were high for 14 of 21 sites.

3.1.2 Wind Rose Analyses

A meteorological monitoring study recently performed for the SJV recommended that the monitoring network in the SJV should adequately resolve the following phenomena (Sweet et al., 2002):

- Sea breeze and marine air intrusion
- Marine fog and stratus
- Mixing depth/inversion strength
- Upslope/downslope flows
- Bifurcation of the delta flow
- Eddies and jets
- Flows over mountain passes
- Synoptic deformation, subsidence

The ability of the meteorological data network to represent the spatial and temporal variations of the sea breeze and marine air intrusion, upslope/downslope flows, bifurcation of the delta flow, and flows over mountain passes was evaluated using spatial plots of wind roses placed on a map of the SJV. Wind roses show the frequency of winds blowing from compass-based directions and provide a view of the distribution of wind speed and direction at a particular site. The seasons were selected to approximately capture periods that are more conducive to high $PM_{2.5}$ concentrations, i.e., November through March, and high ozone concentrations, i.e., April through October. Wind roses were created for the following four time periods:

1. warm-season day (6:00 a.m. through 5:59 p.m. April through October)
2. warm-season night (6:00 p.m. through 5:59 a.m. April through October)

3. cool-season day (6:00 a.m. through 5:59 p.m. November through March)
4. cool-season night (6:00 p.m. through 5:59 a.m. November through March)

Wind roses were created for surface meteorological sites that had at least 85% data completeness and 80% valid data.

In summary, analysis of the wind roses for the four time periods adequately capture some of the phenomena listed above, but not all. (Note, only figures of wind roses for the central valley that provide critical information about the flow regimes in the SJV are shown in this report.) Key observations include:

- The surface meteorological network adequately captures the sea breeze and marine air intrusion in most areas; however, adding a surface meteorological site in the delta would improve information about the strength and timing of the delta breeze.
- The surface meteorological network adequately captures the upslope/downslope flows along the east side of the SJV and around Bakersfield (**Figures 3-2a and 3-2b**), as shown as the oscillation between upslope flow during the day and downslope flow overnight. However, additional surface meteorological sites east of Visalia, Fresno, and Modesto at the base of the Sierra Nevada foothills would help to better capture this phenomenon. The network is not adequate along the west side of the SJV (**Figure 3-2b**). Adding two to three sites along the western SJV would help to better capture the upslope/downslope flows occurring on the western edge of the SJV, which would also help forecasters assess transport to and from coastal areas.
- The surface meteorological network adequately captures bifurcation of the delta flow (**Figure 3-3**) as shown by the predominant southerly winds in the extreme northern SJV and northerly winds near Modesto; however, adding a site in the delta near Discovery Bay would better capture the southern branch of the delta breeze.
- The surface meteorological network does not appear to adequately capture flows over mountain passes. Adding sites near the east end of the Pacheco Pass and at the north end of the Tehachapi and Tejon Passes would help better capture transport into and out of the SJV. It should be noted that the Kern County Air Pollution Control District recently added an air quality and meteorological site at the southeastern end of the SJV domain. These data could be used to fill in potential monitoring gaps in this area.

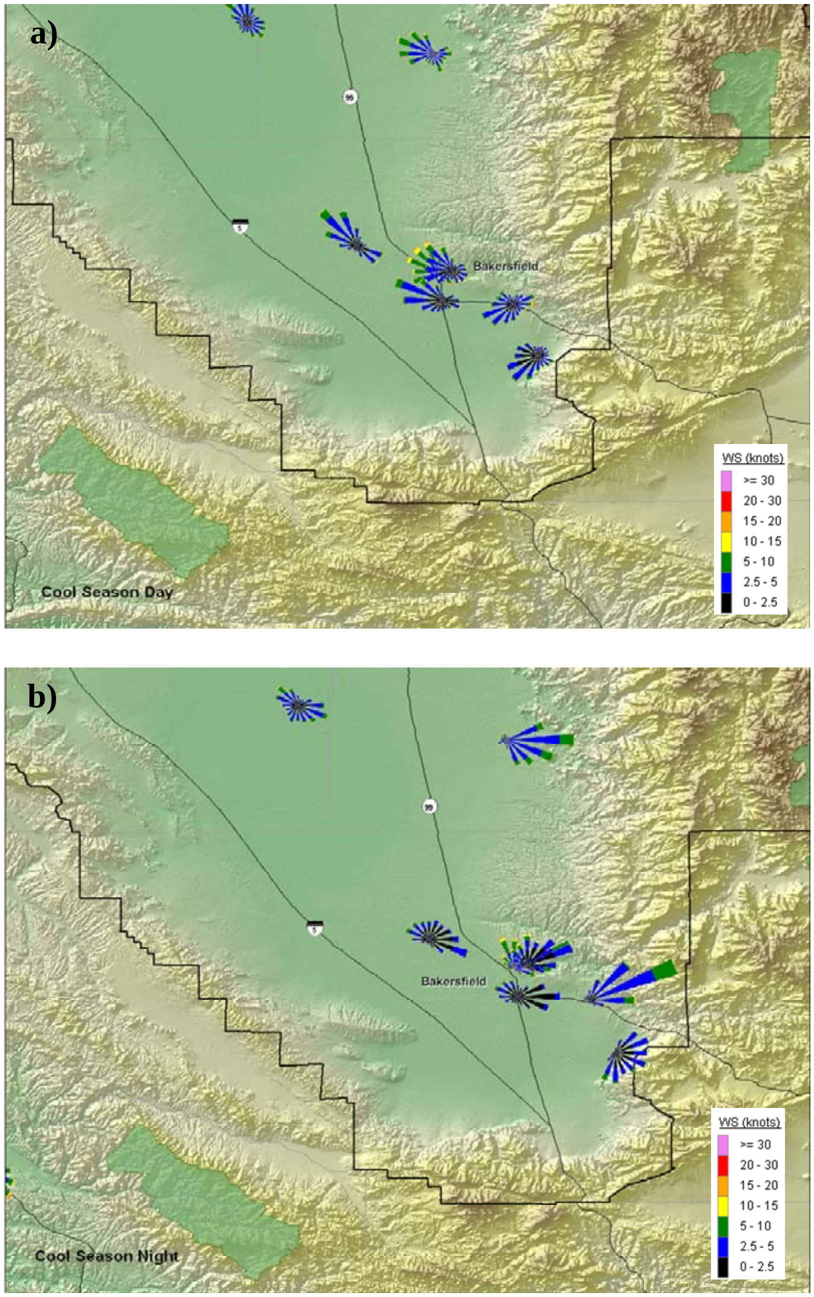


Figure 3-2. (a) Cool-season day and (b) cool-season night wind roses for SJVUAPCD- and NOAA-operated sites in the southern SJV near Bakersfield. Calm wind measurements are not included in these plots.

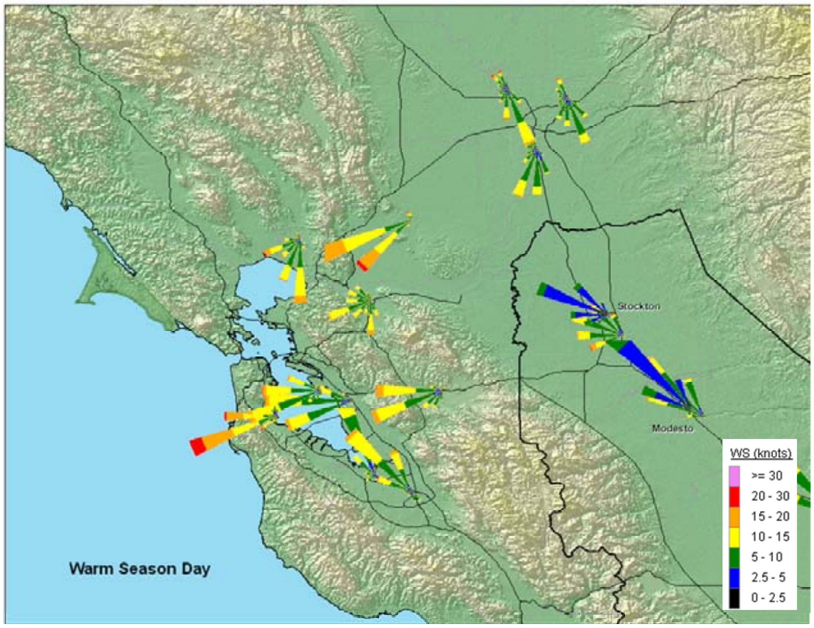


Figure 3-3. Warm-season day wind roses for sites operated by SJVUAPCD and NOAA for the northern SJV. Note the current network also includes a site at Tracy Airport (not shown). Calm wind measurements are not included in these plots.

3.1.3 Site-to-Site Correlation Analyses

To identify possible redundancies in the surface meteorological network, correlation analyses were performed for temperature, relative humidity, dew point temperature, and wind speed. High correlation between sites for all parameters could indicate redundancy in the monitoring network. The Pearson correlation coefficient (R) between site pairings indicates how well the data agree. The R value is a measure of the linear relationship between two variables and ranges from -1.0 to 1.0. An R value of 1.0 means that there is a positive linear relationship between two variables (i.e., when the measurement of interest at one site is high, it will also be high at the other site); which indicates that the two sites agree well and could possibly be redundant. It is highly unlikely that there will be a perfect correlation between two sites; however, if the data from two sites are plotted against one another a higher R value indicates that there is a stronger correlation between sites, which could indicate a potential site redundancy.

Correlations were computed using hourly data from 1998 through 2002 for the AQS and METAR surface sites with greater than 85% percent data completeness and greater than 80% valid data. In general, correlations for temperature are good with an average R value of 0.89, which is expected since temperatures within a geographically similar area should be relatively similar. The correlations are much lower for the Sequoia National Park Lower Kaweah site (average R value of 0.61); however, this is also expected since this site is located in the mountains and is in a different geographic area. The wind speed correlations were, on average, 0.42, with sites located near one another having slightly higher correlations, but none as high as 0.89. This indicates that while temperature measurements suggest potential site redundancies, wind correlations do not; thus, the AQS sites are not redundant. Similar to the AQS sites, wind speed correlations for the METAR sites were much lower than temperature correlations, averaging 0.47 for wind speed compared to 0.80 for temperature; indicating no site redundancies for the METAR sites. METAR sites were evaluated separately because these sites are not operated by the SJVUAPCD.

3.2 UPPER-AIR NETWORK ASSESSMENT

Many detailed analyses have investigated the upper-air data needs for the SJV. Rather than repeating this work, STI reviewed the results from these past studies and provided recommendations about the most effective ways to improve the upper-air network, as well as a prioritized list of additions or changes to the network. For this evaluation, we considered RWPs operated by SJVUAPCD and NOAA. SJVUAPCD operates two permanent RWP sites, one in Visalia and one in Tracy (yellow stars in Figure 3-1). NOAA operates two temporary sites, one in Lost Hills and one in Chowchilla (blue stars in Figure 3-1); both of the NOAA sites are planned to be decommissioned in 2010. Because RWPs are complex instruments, STI also reviewed recent RWP data from SJVUAPCD to determine whether the profilers are providing data of sufficient quality.

Two studies performed for the SJV identified several important upper-air meteorological phenomena that contribute to air quality in the SJV (Roberts et al., 1990; Sweet et al., 2002). The key meteorological phenomena in the SJV are described below along with a discussion of the ability of the current upper-air network to capture these phenomena.

- The **Fresno eddy** is an elongated cyclonic circulation between Delano and Fresno with an east-west center near, or slightly west of, Highway 99. The eddy circulation develops about midnight and reaches a maximum stage at 0900 PDT. The eddy transports carryover pollutants and fresh morning emissions northward to Visalia and Fresno. These pollutants are entrained to the surface in the late morning when the mixed layer grows. Thus, the Fresno eddy is important for evaluation of potential pollution re-circulation. The Visalia and Chowchilla RWPs are in good locations to capture the Fresno eddy. Extending the operation of the Chowchilla site is recommended.
- The **nocturnal jet** is a low-level nocturnal jet that forms regularly during summer nights in the SJV. The nocturnal jet is strongest along the west side of the SJV. The formation of the nocturnal jet and Fresno eddy are probably linked because the eddy never appeared unless the jet was present the previous night. The Tracy and Lost Hills RWPs are in good locations to capture the nocturnal jet; therefore, extending the operation of the Lost Hills site is recommended.
- **Marine intrusion**. Marine air regularly invades the SJV and may have a significant diluting effect on pollutants and/or pollution transport from the San Francisco Bay Area (SFBA). Pollutants may even be transported from the SJV

toward the coast under some circumstances. The current RWP network moderately captures the marine intrusion; however, continued operation of the Lost Hills site and the addition of sites near Pacheco Pass and Discovery Bay are recommended.

- **Mixing depths.** Information about mixing depth/inversion strength is important for determining potential pollution dilution due to vertical mixing. Mixing depths vary throughout the valley, and the upper-air network should be able to capture this variation. Adding an RWP site near Bakersfield to the current network (including the NOAA RWPs) would better capture the mixing depth variation throughout the valley. SJVUAPCD should also consider new remote sensing technology, such as ceilometers, for determining mixing heights. For example, software is currently being developed to automatically derive mixing heights from ceilometer data.

3.2.1 Data Quality

STI evaluated the current quality of the RWP data from the permanent site run by the SJVUAPCD at Tracy. STI did not evaluate the Visalia RWP due to an in-progress equipment upgrade. STI reviewed RWP data for April 14, 2009, through May 15, 2009. In particular, STI reviewed the moments, winds, and the Radio Acoustic Sounding System (RASS) virtual temperature data. The results of this analysis are presented below:

- The moments data were of good quality; however, STI recommends the addition of an automated boundary layer algorithm.
- The wind data had good height recovery with maximum height recoveries of approximately 3300 m above ground level (agl); however, there were some outliers.
- The RASS virtual temperature data height recovery was a little low. Therefore, STI recommends checking
    a. the true root mean square (RMS) voltage at the audio amplifier outputs. The reading should be above 19V and should not exceed 24V; and
    b. the audio levels of each RASS source. The audio levels typically range between 115 to 120 dB.

Additionally, regularly performing quality control on all RWP and RASS data by implementing real-time quality control algorithms would provide data of better quality and reduce outliers. These algorithms may remove some of the outliers, minimize time spent on quality control, and potentially result in better data recovery.

4. RECOMMENDATIONS AND DISCUSSION

This section contains a summary of the synthesized findings, recommendations, and discussion for the air monitoring and meteorological networks in the SJV. The recommendations in this section should be viewed in light of agency monitoring objectives, priorities, and resources. In addition, the recommendations provided in this section assume that the CARB will continue to operate existing sites in the SJV.

4.1 SUMMARY OF RECOMMENDATIONS FOR THE AIR MONITORING NETWORK

Criteria Pollutant Network

- Overall, the monitoring site coverage in the SJV is robust along the central north-to-south corridor. However, gaps appear along the western and eastern region for specific pollutants including ozone, $PM_{2.5}$, PM_{10}, and NO_2. Populated and unmonitored areas more than 50 km away from existing monitors are of concern. Unless the SJVUAPCD has special study data indicating low spatial variability in pollutant concentrations in the areas that lack monitors, then additional sites in these unmonitored regions should be considered. The SJVUAPCD should consider adding two additional criteria sites in the region west of Merced (Los Banos area) and in the region northeast of Clovis, where there appear to be gaps in the network.
- The area between Corcoran and Bakersfield may warrant an additional $PM_{2.5}$ 1-hr continuous monitoring site based on population density and PM emissions levels. Again, further investigation of the spatial variability in $PM_{2.5}$ concentrations observed in special studies should be performed (if available) in this area prior to installing a site to determine if the site would add value.
- Assuming that high-sensitivity CO instruments are going to replace existing CO instruments, further analyses should be performed using CO data from the Fresno sites to identify potentially redundant CO monitors.

PAMS Network

- One SJVUAPCD-operated PAMS site in the SJV, Parlier, is designated as a Type 3 maximum ozone concentration site; however, this site does not appear to be appropriately located to monitor maximum ozone concentrations. The SJVUAPCD should consider either (1) changing the site-type designation or (2) relocating the site to better reflect the site objectives.
- California Alternate Plan sites do not measure TNMOC and only measure NO_x concentrations, leaving substantial holes in the SJV monitoring network.
- Lower MDLs for VOCs are achievable and may make the monitoring data more useful for analysis efforts.

- Additional or repurposed monitors in the Sierra Nevada Foothills may be appropriate to capture peak ozone in the SJV.

4.2 SUMMARY OF RECOMMENDATIONS FOR THE METEOROLOGICAL MONITORING NETWORK

General Recommendations

- A general network recommendation is that all air quality monitors that collect temporally resolved data (i.e., hourly) should have collocated meteorological instruments to measure temperature, winds, relative humidity, and solar radiation. The SJVUAPCD has already implemented this recommendation.
- Not all meteorological sites need air quality measurements; however, meteorological sites located in transport corridors should measure ozone, NO_x, and $PM_{2.5}$ (preferably collected on an hourly basis).

Surface Meteorological Network

- Adding a surface meteorological site in the delta near Discovery Bay would improve information regarding the strength and timing of the southern branch of the delta breeze. This information could be used to help assess transport from the San Francisco Bay Area into the SJV.
- Adding surface meteorological sites east of Visalia, Fresno, and Modesto at the base of the Sierra Nevada foothills would improve information regarding the oscillation between upslope flow during the day and downslope flow overnight. This information can be used to help assess local-scale pollutant recirculation. A recommendation from the air monitoring network assessment is to add a criteria pollutant site to the area northeast of Clovis. Deploying a criteria pollutant monitoring site with collocated meteorological measurements northeast of Clovis would serve both the air and meteorological networks.
- Adding two to three sites along the western SJV would help to better capture the upslope/downslope flows in and out of the Coast Range and the flows to and from coastal areas. General locations to consider include the east end of Pacheco Pass between Tranquility and Tracy and west of Interstate 5, Kettleman City, Lost Hills, and/or Coalinga. A recommendation from the air monitoring network assessment is to add a criteria pollutant site to the area west of Merced (Los Banos area). Deploying a criteria monitoring site with collocated meteorological measurements at the east end of the Pacheco Pass would serve both the air quality and meteorological networks.
- Adding sites near the east end of the Pacheco Pass and at the north and south ends of the Tehachapi and Tejon Passes would provide information to better capture transport in and out of the SJV in these areas. Any added sites should include ozone and $PM_{2.5}$ measurements.
- Correlation analyses indicated that there are no redundant meteorological sites.

Upper-air Meteorological Network (General)

- The RWP at Chowchilla should continue operation to provide data to capture the depth, timing, and strength of the Fresno eddy.
- The RWP at the Lost Hills site should continue operation to capture the depth, timing, and strength of the nocturnal jet. The nocturnal jet strongly influences transport of pollutants from the SFBA and within the SJV.
- The current RWP at Tracy captures the marine intrusion along the Altamont Pass; however, continued operation of the Lost Hills site and adding sites near Pacheco Pass and Discovery Bay would capture the spatial variations of the marine intrusion through key corridors. The information would help determine (1) transport to and from coastal areas and (2) the timing of conditions that tend to move pollution out of the SJV.
- Adding a RWP site near Bakersfield would be useful to provide information regarding the aloft winds, stability, and mixing depth in the southern end of the SJV. A site near Bakersfield combined with the current RWP network (including Lost Hills and Chowchilla) would help capture the temporal and spatial variations of mixing depth throughout the valley.

Upper-air Meteorological Network (Data Quality)

The following recommendations will help improve data quality from the upper-air network:

- Add automated mixing height detection algorithm to all RWP instruments.
- The RASS virtual temperature data height recovery was a little low. Therefore, STI recommends checking (1) the true RMS voltage at the audio amplifier outputs (the reading should be above 19V and should not exceed 24V) and (2) the audio levels of each RASS source. The audio levels typically range between 115 to 120 decibels.
- Perform quality control on all RWP and RASS data on a regular basis by implementing real-time quality control algorithms.

4.3 DISCUSSION

This section provides a discussion of the questions (Section 1) that SJVUAPCD sought to address with the results of this network assessment.

Which sites provide the most value in terms of the number of pollutants measured, the length of data record, and data quality?

The Clovis, Bakersfield–GSH, Tracy, Turlock, Fresno–Sierra Skypark #2, and Fresno–Drummond sites provide the most value in terms of the number of criteria pollutants measured. These sites all provide good criteria pollutant data quality. The PAMS sites—Madera, Clovis, Parlier, Shafter, Bakersfield–GSH, and Arvin—also provide value in terms of the number of parameters measured; however, the PAMS VOC data quality for some species at these sites needs improvement. While all PAMS data collection efforts may be meeting minimum requirements for VOC measurements and reporting, these minima are inadequate, resulting in a large amount of data reported below the MDL. It has been recommended to EPA that the national-scale requirements for MDL values, which are achievable, should be strengthened to reflect the lower precursor concentrations routinely observed (McCarthy et al., 2008). Lower MDLs would make the VOC data more useful for air quality analysis efforts.

The SJVUAPCD network has been in operation for many years and as a result has a generally long data record for performing trends analyses. The following sites are specifically valuable for assessing trends in ozone, ozone precursors, NO_2, and CO: Turlock, Merced, Madera, Fresno–Sierra Skypark, Clovis, Fresno–Drummond, Parlier, Shafter, Bakersfield–GSH, and Arvin. The following sites are specifically valuable for assessing trends in 24-hour PM_{10} concentrations: Stockton, Turlock, Merced, Clovis, Fresno–Drummond, Corcoran, and Bakersfield–GSH. The continuous PM network has not yet collected enough data to assess trends in hourly PM concentrations.

Are sites appropriately located to determine the highest pollutant concentrations expected to occur in the area covered by the network?

Yes, for primary pollutants such as VOCs, NO_x, PM_{10}, and CO that are directly emitted by sources along the central corridor of the SJV. However, for secondary pollutants—ozone and $PM_{2.5}$—there are likely gaps in the network along the downwind eastern side of the SJV and up into the Sierra Nevada foothills. Results of the national PAMS network assessment indicate that ozone concentrations often exceed the NAAQS at sites located in the foothill region. It is likely that the same meteorological phenomena and flow patterns that contribute to high ozone concentrations might also contribute to high $PM_{2.5}$ concentrations. Past studies should be reviewed and further data analysis should be performed to identify areas where maximum ozone and $PM_{2.5}$ concentrations are likely to occur.

The results of the national PAMS network assessment indicated that California has some of the highest concentrations of ozone precursor emissions and that this is particularly true in the SJV. The existing PAMS network is fairly robust for monitoring fresh emissions along the central corridor of the SJV. However, there appears to be an area of high emissions that is currently unmonitored west of Bakersfield.

Are sites appropriately located to measure typical pollutant concentrations in areas of high population density?

Yes, the existing network and planned modifications to the network adequately measure typical pollutant concentrations in the areas where population density is highest. The areas with the highest population densities are located along the central corridor of the SJV, and monitor coverage along this corridor is good. Two areas have moderate population densities and no monitors, and possibly high ozone and/or PM concentrations: (1) west of Merced (Pacheco Pass area) and (2) northeast of Clovis (Sierra Nevada Foothills).

Are sites appropriately located to determine the impact of significant sources or source categories on air quality?

In general, the existing and planned criteria pollutant monitoring network is adequate for determining the impact of broad-scale emissions sources (i.e., mobile sources) along the central corridor of the SJV, where most of the emissions occur. However, to capture the impacts of source-specific emissions, improvements in the monitoring network are needed. Specifically, additional instruments with time-resolved, speciated measurements could be strategically placed to measure the impacts of specific source categories. Additionally, special studies could be conducted to better understand emissions source activity and contributions. For example, time-resolved emissions activity data could be collected and/or special measurements could be made to further understand source contributions such as the relative contributions of on-road versus non-road emissions.

There appears to be a general gap in the $PM_{2.5}$ network along the central corridor between Corcoran and Bakersfield where PM emissions are relatively high. The PAMS network was established to measure ozone and ozone precursor emissions. There are high ozone precursor emissions in the northern end of the SJV and in the region to the west of Bakersfield. If the SJVUAPCD is considering relocating any PAMS sites, these are candidate areas for potential Type 2 site locations.

Are sites appropriately located to determine general background concentration levels?

There is substantial emissions activity within the SJV, particularly in the central SJV corridor along Highway 99 and Interstate 5. As a result, more background pollutant concentrations would be observed as one moved away from the central corridor to the east and west. There are currently general monitoring gaps along the eastern and western corridors of the SJV, specifically for $PM_{2.5}$ and PM_{10}. Two PM sites located east of the SJV in the Sierra Nevada mountain range could provide data to help characterize background concentrations of PM; however, no sites are located west of the central SJV corridor. Many sites along or outside the SJV study boundary could provide data that may be useful for determining general background ozone concentration levels.

Are sites appropriately located to determine the extent of regional pollutant transport among populated areas?

Existing sites are appropriately located to help determine the extent of regional pollutant transport. The addition of surface meteorological and collocated air quality sites near Discovery Bay, the east end of the Pacheco Pass, and the north end of the Tehachapi and Tejon Passes would provide information to help assess transport from the San Francisco Bay Area and to better characterize transport into and out of the SJV.

Are sites appropriately located to measure air pollution impacts on visibility, vegetation damage, or other welfare-based impacts and to support secondary standards?

In general, the objectives of the SJVUAPCD air monitoring network are geared toward monitoring high pollutant concentrations in populated areas, and most of the densely populated urban areas along the SJV central corridor have well equipped monitoring sites. As a result, the network is reasonably adequate for measuring welfare-based health impacts.

Visibility can be characterized by utilizing data currently collected in the network, but could also be better understood with additions to the network. PM is the main driver of visibility degradation, so using PM data, the visibility degradation could be estimated for each site currently in the network. Nephelometers or visibility cameras are also available, and could be deployed at multiple sites to obtain time resolved (i.e., hourly) visibility degradation information. Different particle types have different impacts on visibility, e.g., sulfate produces more degradation than organic carbon. Additional sites that measure speciated $PM_{2.5}$ data could be used to better understand the causes of visibility degradation.

The existing network has marginal value for measuring air pollution impacts on agriculture and natural vegetation. Some existing sites in the SJV, specifically those located in more rural areas, may be useful for measuring air pollution impacts on agricultural and natural vegetation. The addition of sites in the eastern and western regions of the SJV as recommended above could also help measure air pollution impacts on vegetation.

Are there potentially redundant sites in the network?

With the exception of the potentially redundant CO sites in the Fresno area, there do not appear to be any redundant sites in the air and meteorological network.

Are there new technologies that may add value to the air monitoring network?

In recent years, several types of monitoring equipment (including continuous PM2.5 instruments, CO2 monitors, and Aethalometers™) have become less expensive and easier to deploy and operate. The SJVUAPCD currently has plans to deploy additional continuous FEM PM2.5 instruments in the near future. The addition of CO2 monitors could be useful for understanding greenhouse gas (GHG) impacts in the SJV. The addition of Aethalometers™ to densely populated, urban areas could be useful for examining health impacts of black carbon.

Does the surface meteorological monitoring network capture the spatial and temporal variability of winds, temperature, and humidity? Are there gaps in the meteorological network? Are new sites or parameters needed to capture the spatial and temporal characteristics of meteorology to support air quality applications?

In general, the surface meteorological network adequately captures the spatial and temporal variability of winds, temperature, and humidity throughout the SJV. The addition of surface meteorological sites in the following locations would help augment the surface network: (1) near Discovery Bay, (2) along the base of the foothills on the eastern and western sides of the SJV, (3) near the east end of the Pacheco Pass, and (4) at the north end of the Tehachapi and Tejon Passes.

Do the aloft measurements and data capture spatial and temporal characteristics of the aloft winds, temperature, and mixing heights in the region?

The existing RWPs, including the two operated by NOAA at Lost Hills and Chowchilla, do an adequate job of capturing spatial and temporal characteristics of the aloft winds, temperature, and mixing heights in most of the SJV. However, the southern SJV lacks aloft meteorological information. Adding an RWP near Bakersfield would address this issue.

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APPENDIX A

SUMMARY OF SJVUAPCD-OPERATED AIR QUALITY SITES

Table A-1. A summary of the air quality monitoring sites included in the network assessment. Sites denoted with an asterisk (*) have collocated meteorological monitors.

Page 1 of 2

Site Type	Name	Parameters Measured	Sample Frequency	Site Objective
PAMS	Arvin – Bear Mountain Blvd (06-029-5001)*	OZONE NO NO_2 NO_x PAMS VOCs	1-hr/Continuous n/a 1-hr/Continuous n/a Canister 4/3/3	Rep. Conc. Empty Rep. Conc. Empty
PAMS/ SLAMS	Bakersfield–GSH (06-029-0010)*	OZONE NO_2 $PM_{2.5}$ PM_{10} CO [a] PAMS VOCs	1-hr/Continuous 1-hr/Continuous 1-hr & 24/X[b] 1-hr & 24/6 1-hr/Continuous Canister 4/3/3	Rep. Conc. High Conc. Rep. Conc. High Conc. Rep. Conc.
PAMS/ NAMS/ SLAMS	Clovis–N. Villa Ave (06-019-5001)*	OZONE NO_2 $PM_{2.5}$ PM_{10} CO[a] PAMS VOCs	1-hr/Continuous 1-hr/Continuous 1-hr & 24/X[b] 24/6 1-hr/Continuous Canister 4/3/3	High Conc. High Conc. Rep. Conc. Rep. Conc. Rep. Conc.
SLAMS	Corcoran (06-031-0004)*	OZONE[c] $PM_{2.5}$ PM_{10}	1-hr/Continuous 1-hr & 24/X[b] 1-hr & 24/3	High Conc. Rep. Conc. High Conc.
SLAMS/ NAMS	Fresno–Drummond Street (06-019-0007)*	OZONE NO_2 PM_{10} CO	1-hr/Continuous 1-hr/Continuous 24/6 1-hr/Continuous	High Conc. High Conc. Rep. Conc. Rep. Conc.
SLAMS	Fresno–Sierra Skypark (06-019-0242)*	OZONE NO_2 CO	1-hr/Continuous 1-hr/Continuous 1-hr/Continuous	Rep. Conc. Rep. Conc. Rep. Conc.
SLAMS	Fresno–Hamilton/Winery (06-029-5025)	$PM_{2.5}$	24/X[b]	Rep. Conc.
Special purpose	Huron (06-019-0000)	$PM_{2.5}$	1-hr/Continuous	Rep. Conc.

Table A-1 (continued). A summary of the air quality monitoring sites included in the network assessment. Sites denoted with an asterisk (*) have collocated meteorological monitors.

Site Type	Name	Parameters Measured	Sample Frequency	Site Objective
SLAMS	Hanford – S. Irwin Street (06-031-1004)	OZONE PM_{10}	1-hr/Continuous 24/6	 Rep. Conc.
	Lebec (06-037-9034)	OZONE $PM_{2.5}$	1-hr/Continuous 1-hr/Continuous	
PAMS/ SLAMS	Madera – Pump Yard (06-039-0004)*	OZONE NO_2 PAMS VOC	1-hr/Continuous 1-hr/Continuous Canister 4/3/3	Rep. Conc. Rep. Conc.
SLAMS	Maricopa – Stanislaus Street (06-029-0008)*	OZONE	1-hr/Continuous	High Conc.
SLAMS	Merced – 2334 M Street (06-047-2510)	$PM_{2.5}$ PM_{10}	24/X[b] 24/6	Rep. Conc. Rep. Conc.
SLAMS	Merced – S. Coffee Ave (06-047-0003)*	OZONE NO_2	1-hr/Continuous 1-hr/Continuous	High Conc. Rep. Conc.
PAMS/ SLAMS	Parlier (06-019-4001)*	OZONE NO_2 $PM_{2.5}$	1-hr/Continuous 1-hr/Continuous 1-hr/Continuous	High Conc. Rep. Conc.
NAMS	Stockton – Wagner/Holt (06-077-1002)	PM_{10}	24/6	Rep. Conc.
SLAMS	Tracy Airport (06-077-3005)*	OZONE PM_{10} $PM_{2.5}$ NO_2	1-hr/Continuous 1-hr/Continuous 1-hr/Continuous 1-hr/Continuous	Rep. Conc. Rep. Conc. Rep. Conc. Rep. Conc.
SLAMS	Turlock – S. Minaret Street (06-099-0006)*	OZONE NO_2 $PM_{2.5}$ PM_{10} CO	1-hr/Continuous 1-hr/Continuous 1-hr/Continuous 24/6 1-hr/Continuous	Rep. Conc. Rep. Conc. Rep. Conc. Rep. Conc. Rep. Conc.

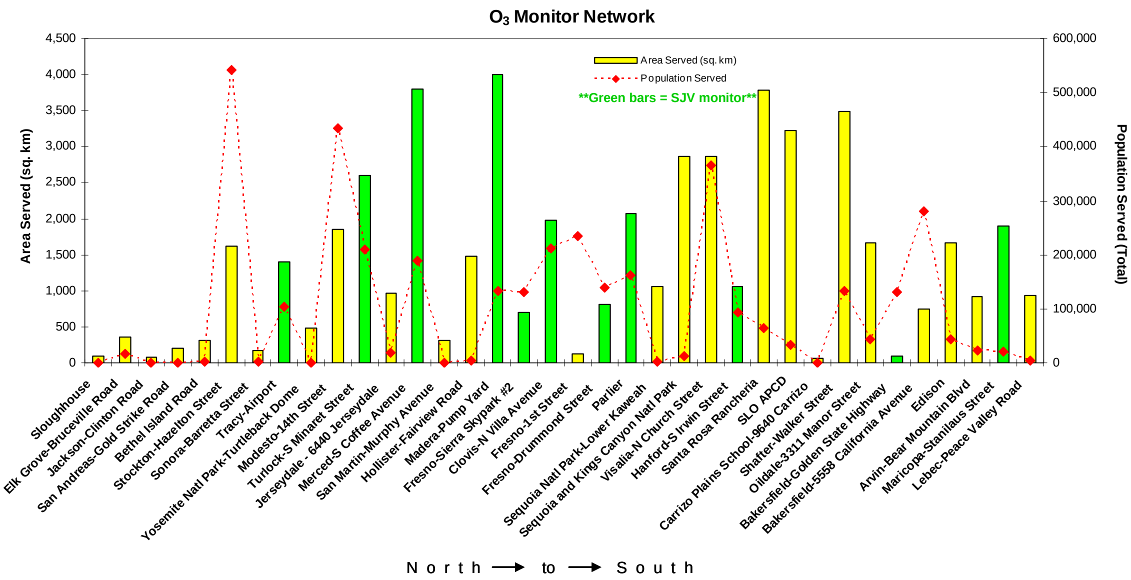
[a] Bakersfield–Golden State Highway is in planning stages of getting a trace level CO monitor; the Clovis site has a trace level CO analyzer.
[b] X sampling frequency for April-September is every six days and increases to sampling every three days for the months of October-March.
[c] The SJVUAPCD will be adding a temporary ozone monitor at Corcoran-Patterson for the 2008 ozone season.
Canister 4/3/3 = 4 hour sample, collected 3 times per day, every 3 days.

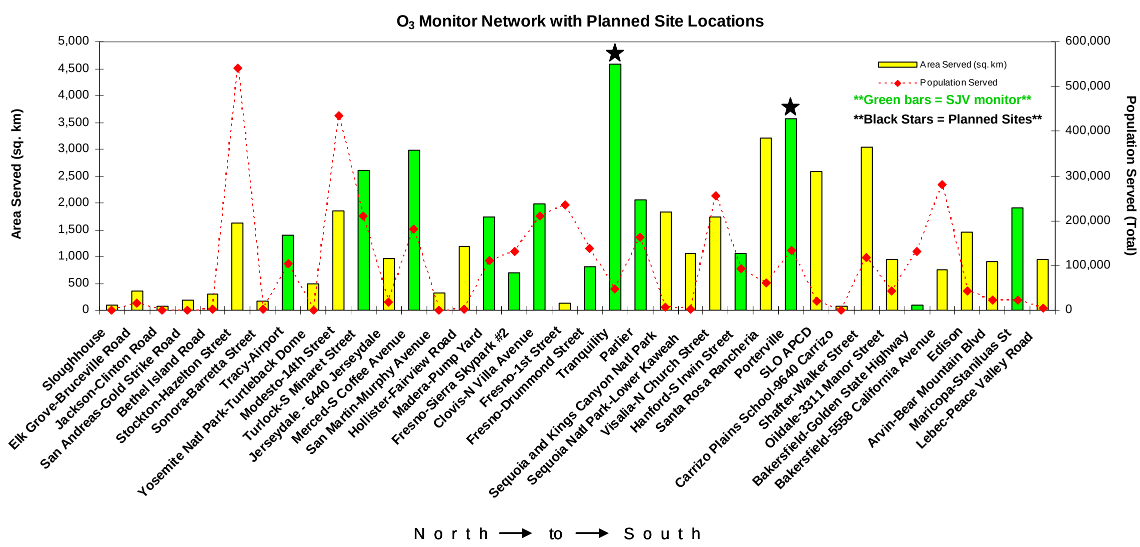
APPENDIX B

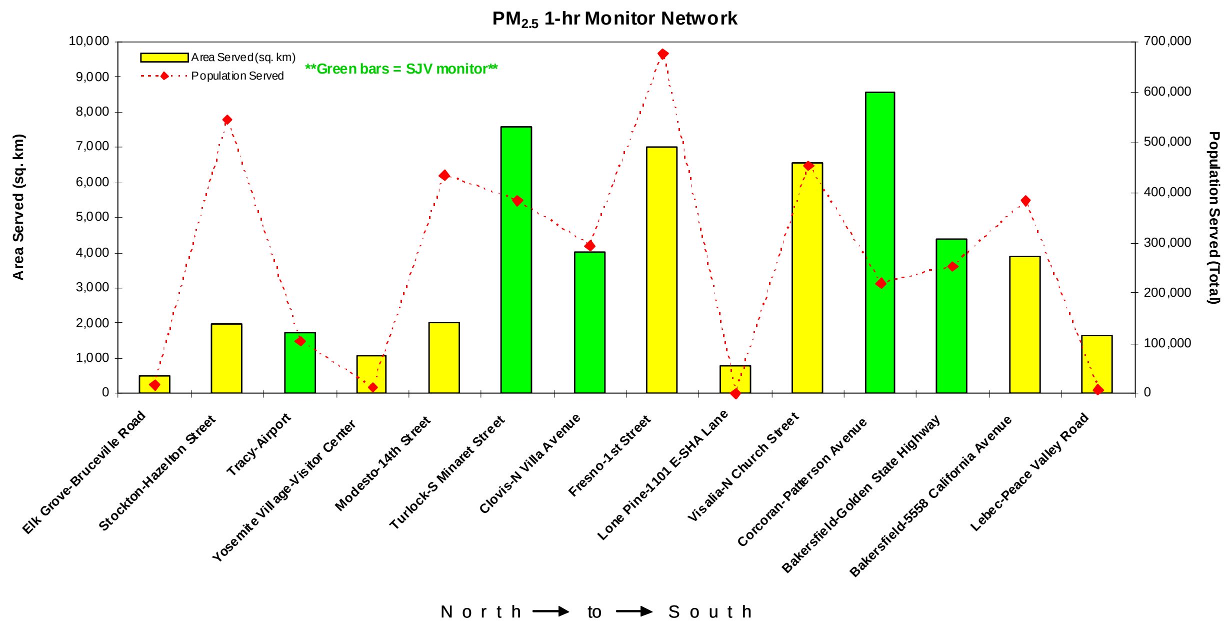
BOTTOM-UP ANALYSES

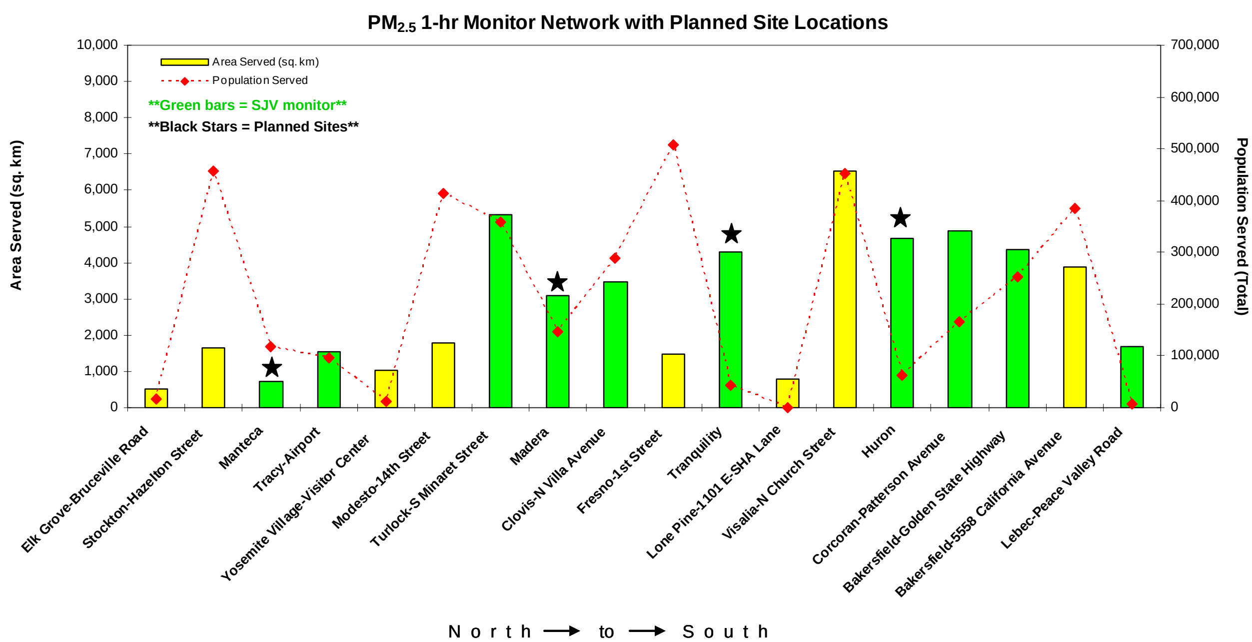
Appendix B contains graphs and maps for the bottom-up analyses described in Section 2. The appendix begins with area- and population-served graphs for each pollutant network, followed by population-change graphs and emissions-served graphs. The graphs depict current networks and planned/current networks wherever possible. The map section begins with the population-served ranking maps for each network, followed by population-change ranking maps, census block-group level population change overlaid on the area-served boundaries, and finally, spatially resolved emissions overlaid on the area-served boundaries.

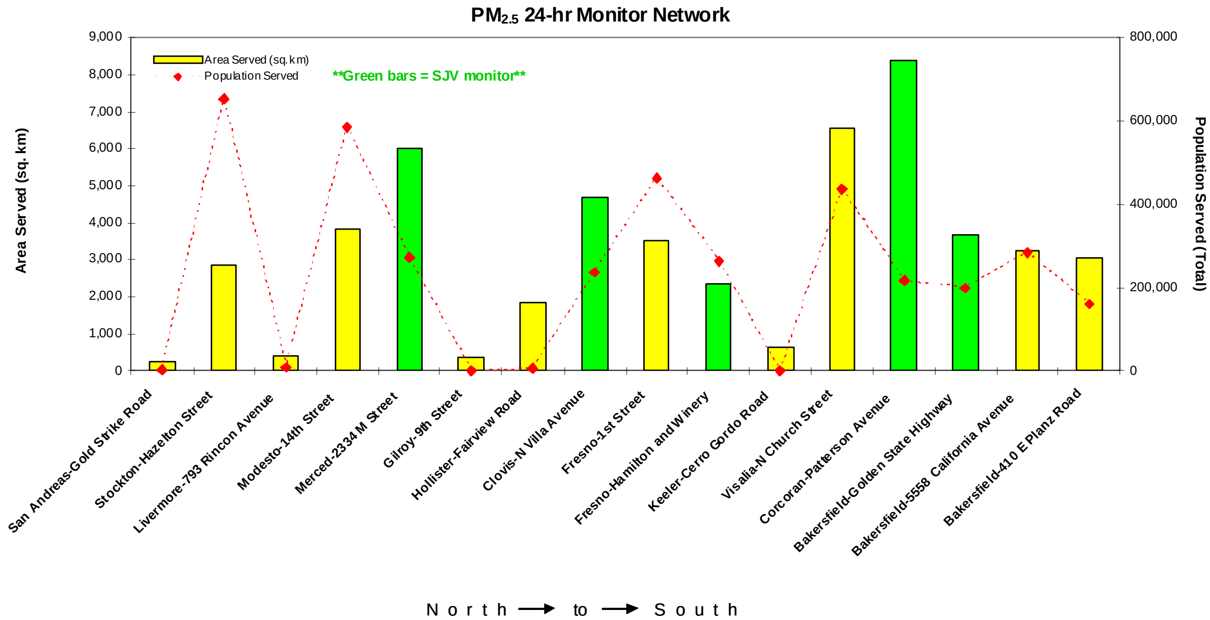
AREA AND POPULATION SERVED GRAPHS

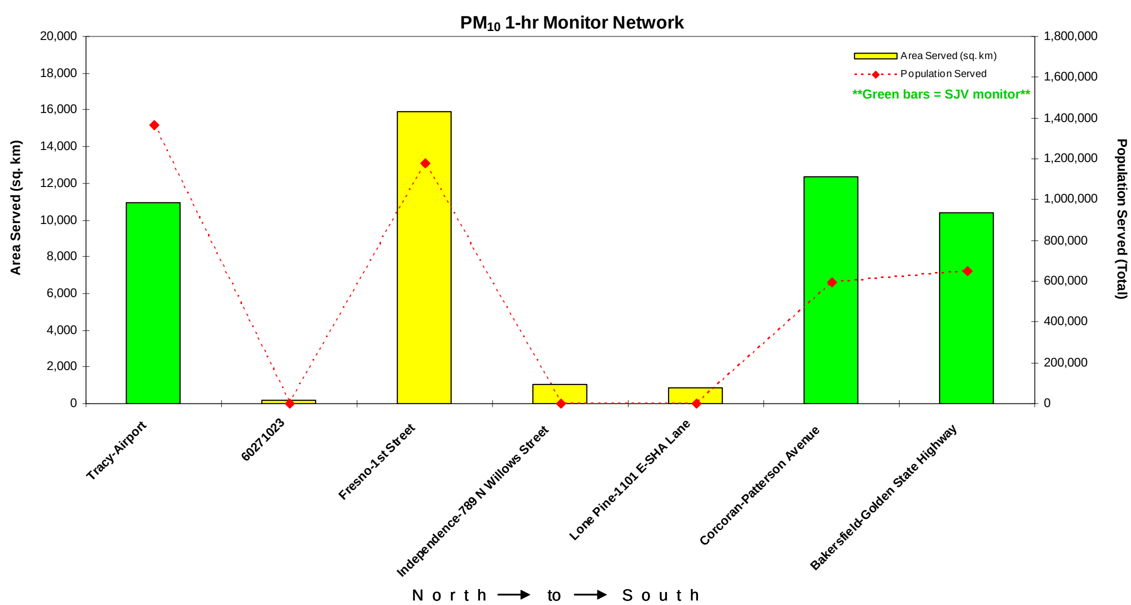


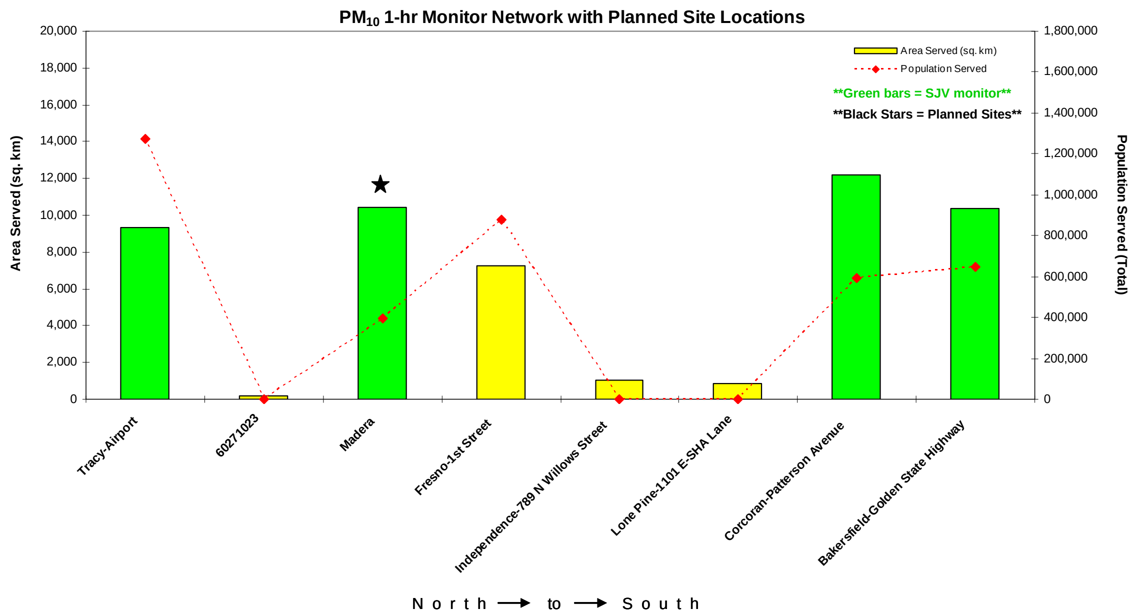


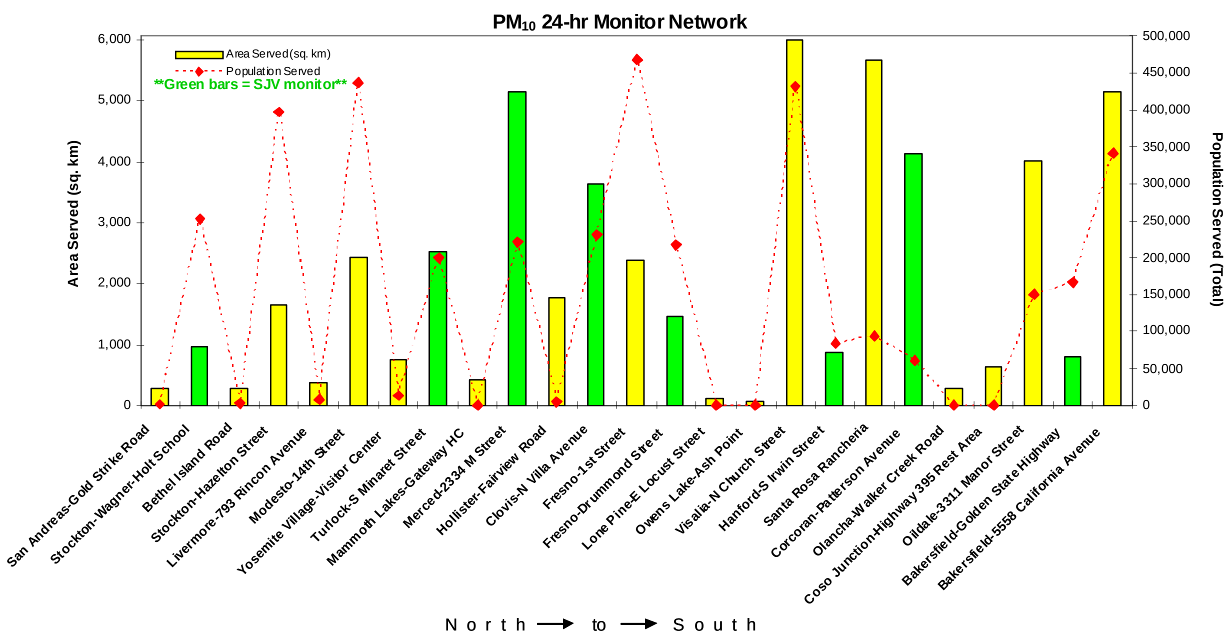

PM2.5 1-hr Monitor Network
Area Served (sq. km)
Population Served
Green bars = SJV monitor
Area Served (sq. km)
Population Served (Total)
Elk Grove-Bruceville Road
Stockton-Hazelton Street
Tracy-Airport
Yosemite Village-Visitor Center
Modesto-14th Street
Turlock-S Minaret Street
Clovis-N Villa Avenue
Fresno-1st Street
Lone Pine-1101 E-SHA Lane
Visalia-N Church Street
Corcoran-Patterson Avenue
Bakersfield-Golden State Highway
Bakersfield-5558 California Avenue
Lebec-Peace Valley Road
North to South

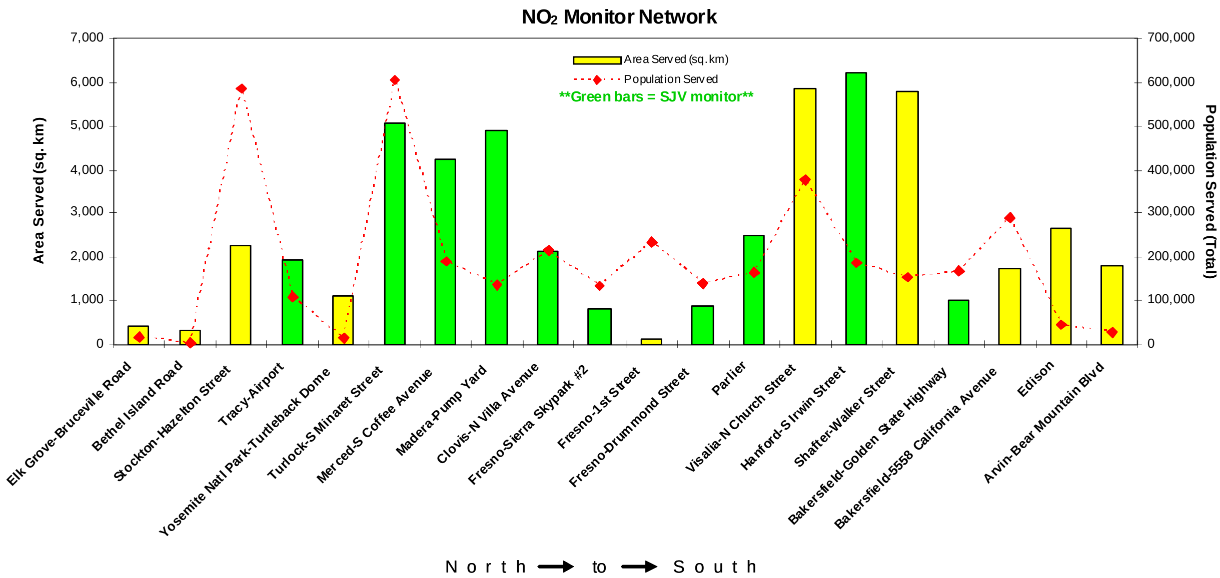

PM2.5 1-hr Monitor Network with Planned Site Locations
Area Served (sq. km)
Population Served
Green bars = SJV monitor
Black Stars = Planned Sites
Area Served (sq. km)
Population Served (Total)
Elk Grove-Bruceville Road
Stockton-Hazelton Street
Manteca
Tracy-Airport
Yosemite Village-Visitor Center
Modesto-14th Street
Turlock-S Minaret Street
Madera
Clovis-N Villa Avenue
Fresno-1st Street
Tranquility
Lone Pine-1101 E-SHA Lane
Visalia-N Church Street
Huron
Corcoran-Patterson Avenue
Bakersfield-Golden State Highway
Bakersfield-5558 California Avenue
Lebec-Peace Valley Road
North to South

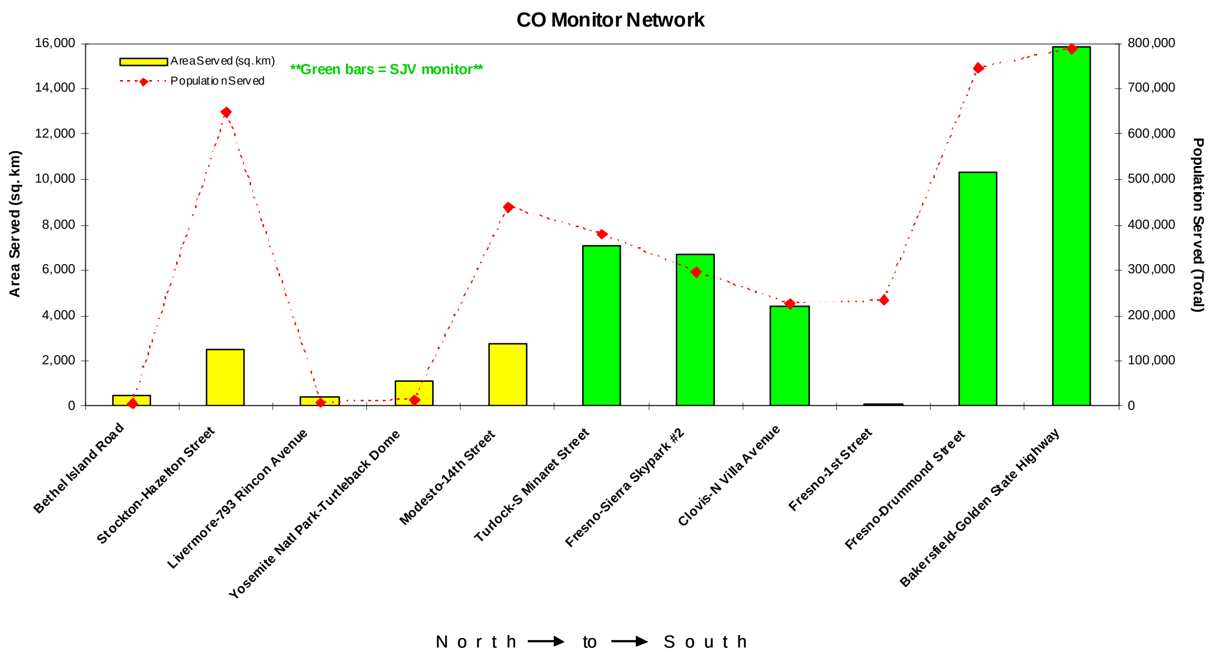

PM2.5 24-hr Monitor Network
Area Served (sq. km)
Population Served
Green bars = SJV monitor
Area Served (sq. km)
Population Served (Total)
San Andreas-Gold Strike Road
Stockton-Hazelton Street
Livermore-793 Rincon Avenue
Modesto-14th Street
Merced-2334 M Street
Gilroy-9th Street
Hollister-Fairview Road
Clovis-N Villa Avenue
Fresno-1st Street
Fresno-Hamilton and Winery
Keeler-Cerro Gordo Road
Visalia-N Church Street
Corcoran-Patterson Avenue
Bakersfield-Golden State Highway
Bakersfield-5558 California Avenue
Bakersfield-410 E Planz Road
North → to → South

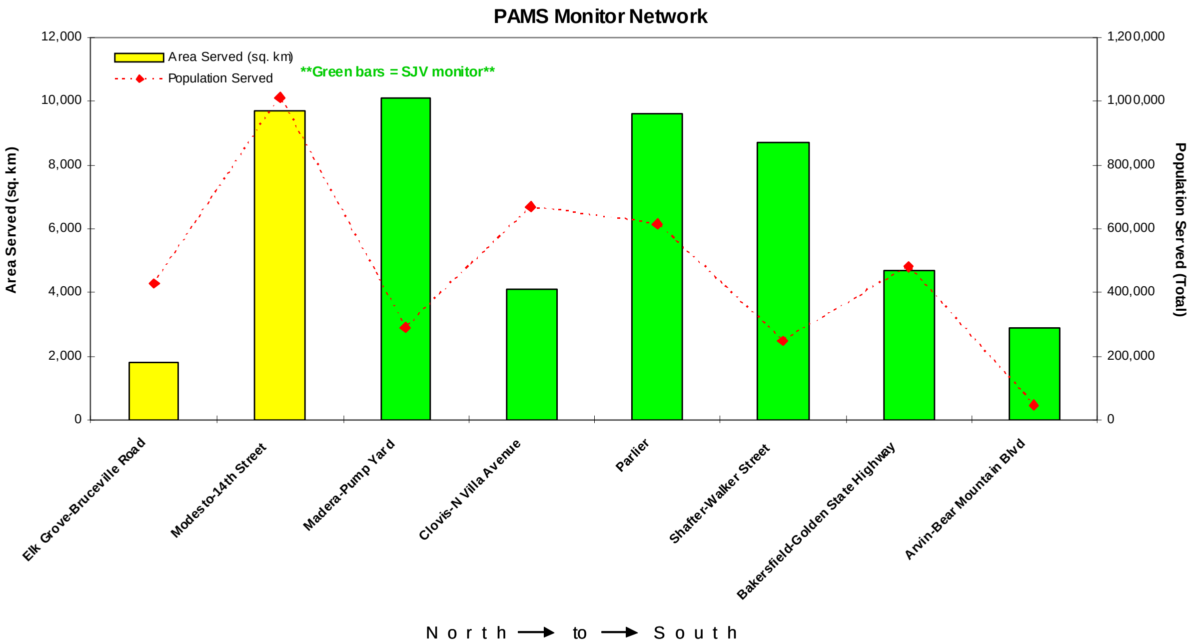

PM10 1-hr Monitor Network
Area Served (sq. km)
Population Served
Green bars = SJV monitor
Area Served (sq. km)
Population Served (Total)
Tracy-Airport
60271023
Fresno-1st Street
Independence-789 N Willows Street
Lone Pine-1101 E-SHA Lane
Corcoran-Patterson Avenue
Bakersfield-Golden State Highway
North → to → South


PM10 1-hr Monitor Network with Planned Site Locations
Area Served (sq. km)
Population Served
Green bars = SJV monitor
Black Stars = Planned Sites
Area Served (sq. km)
Population Served (Total)
Tracy-Airport
60271023
Madera
Fresno-1st Street
Independence-789 N Willows Street
Lone Pine-1101 E-SHA Lane
Corcoran-Patterson Avenue
Bakersfield-Golden State Highway
North to South

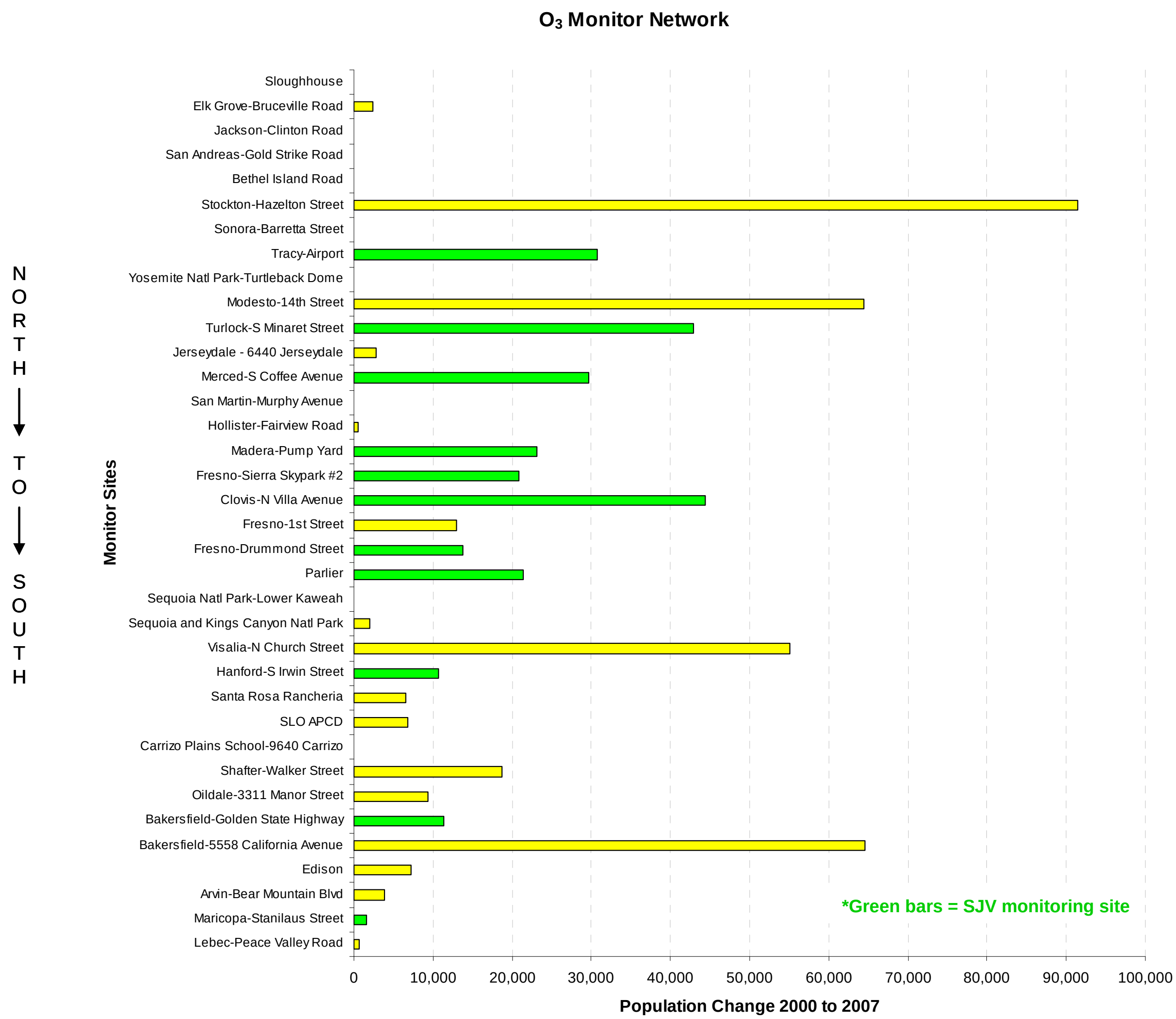

PM10 24-hr Monitor Network
Area Served (sq. km)
Population Served
Green bars = SJV monitor
Area Served (sq. km)
Population Served (Total)
San Andreas-Gold Strike Road
Stockton-Wagner-Holt School
Bethel Island Road
Stockton-Hazelton Street
Livermore-793 Rincon Avenue
Modesto-14th Street
Yosemite Village-Visitor Center
Turlock-S Minaret Street
Mammoth Lakes-Gateway HC
Merced-2334 M Street
Hollister-Fairview Road
Clovis-N Villa Avenue
Fresno-1st Street
Fresno-Drummond Street
Lone Pine-E Locust Street
Owens Lake-Ash Point
Visalia-N Church Street
Hanford-S Irwin Street
Santa Rosa Rancheria
Corcoran-Patterson Avenue
Olancha-Walker Creek Road
Coso Junction-Highway 395 Rest Area
Oildale-3311 Manor Street
Bakersfield-Golden State Highway
Bakersfield-5558 California Avenue
North to South

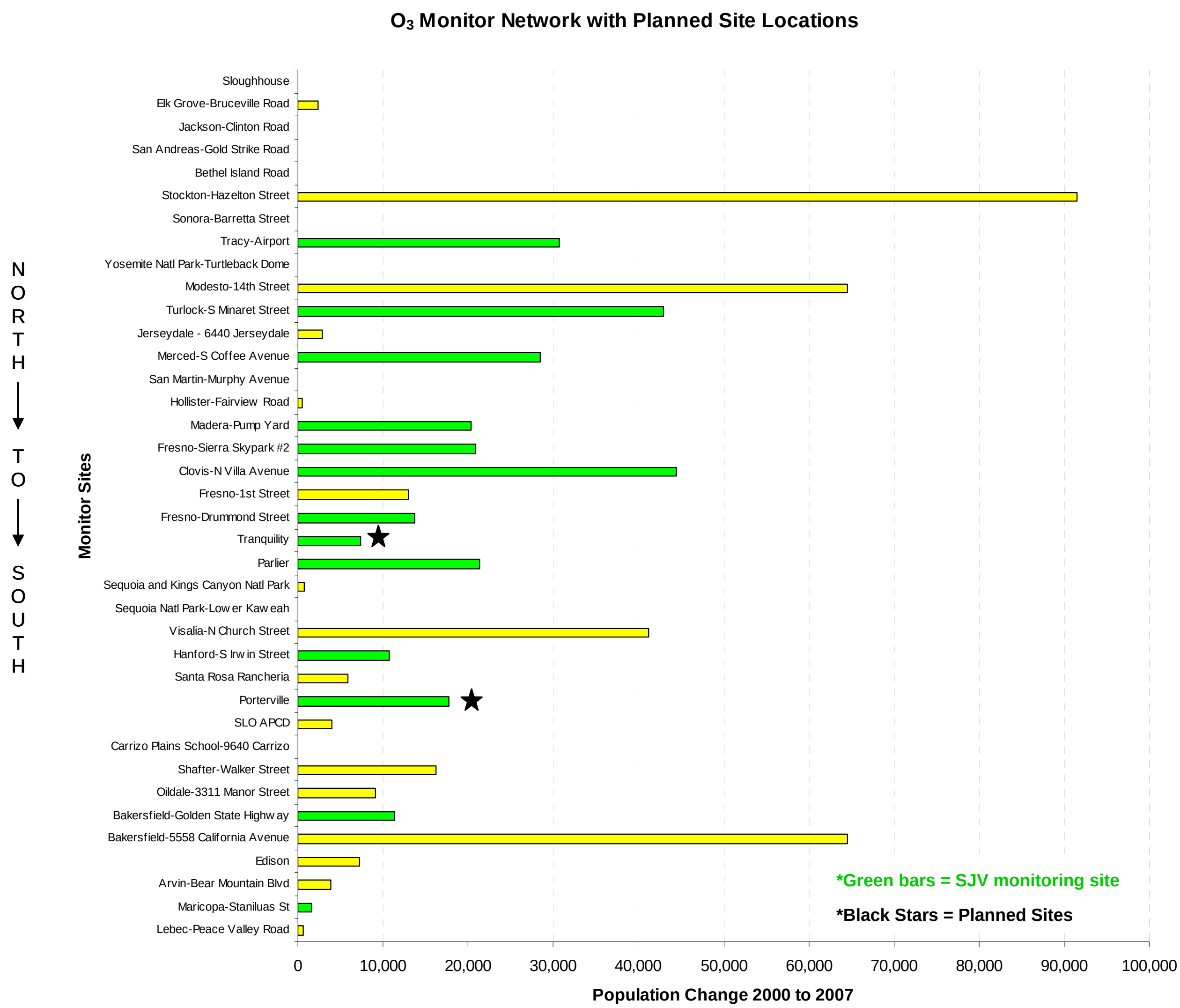

NO2 Monitor Network
Area Served (sq. km)
Population Served
Green bars = SJV monitor
Area Served (sq. km)
Population Served (Total)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Elk Grove-Bruceville Road
Bethel Island Road
Stockton-Hazelton Street
Tracy-Airport
Yosemite Natl Park-Turtleback Dome
Turlock-S Minaret Street
Merced-S Coffee Avenue
Madera-Pump Yard
Clovis-N Villa Avenue
Fresno-Sierra Skypark #2
Fresno-1st Street
Fresno-Drummond Street
Parlier
Visalia-N Church Street
Hanford-S Irwin Street
Shafter-Walker Street
Bakersfield-Golden State Highway
Bakersfield-5558 California Avenue
Edison
Arvin-Bear Mountain Blvd
North to South

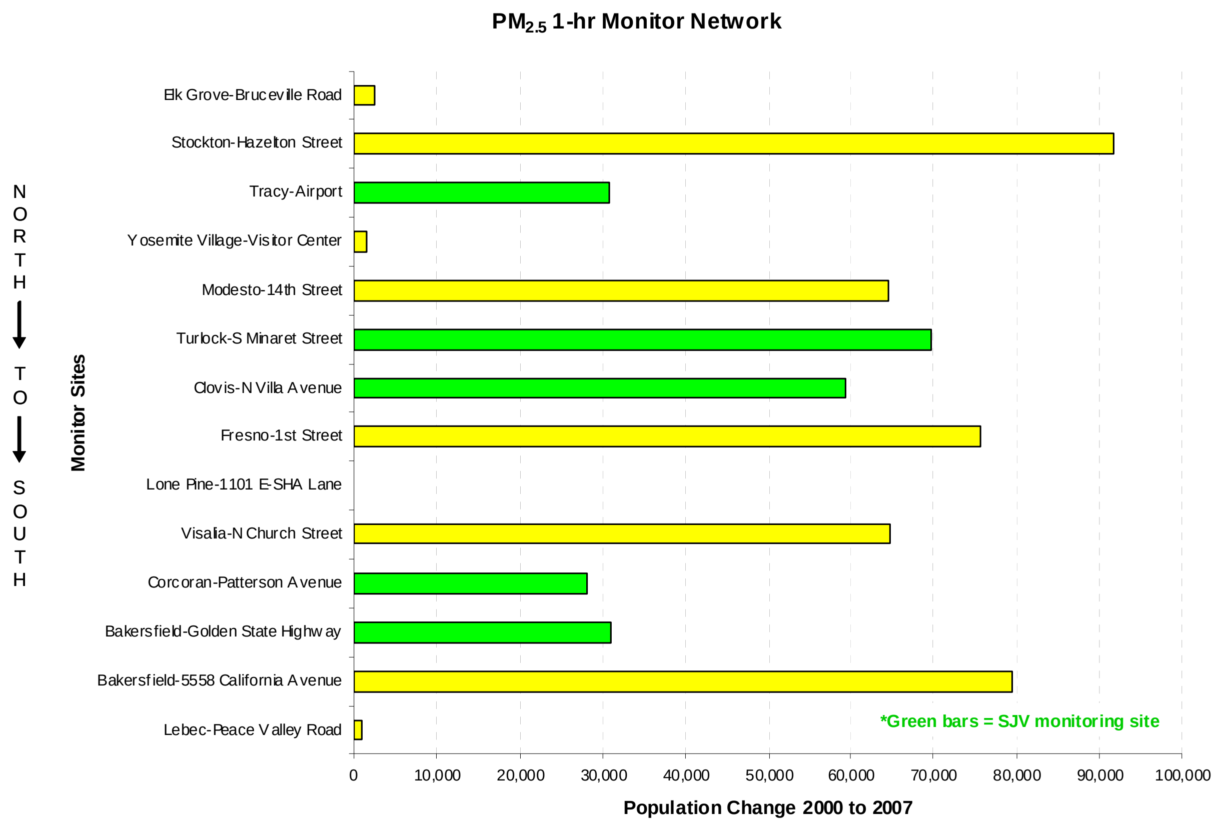

CO Monitor Network
Area Served (sq. km)
Population Served
Green bars = SJV monitor
Area Served (sq. km)
Population Served (Total)
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Bethel Island Road
Stockton-Hazelton Street
Livermore-793 Rincon Avenue
Yosemite Natl Park-Turtleback Dome
Modesto-14th Street
Turlock-S Minaret Street
Fresno-Sierra Skypark #2
Clovis-N Villa Avenue
Fresno-1st Street
Fresno-Drummond Street
Bakersfield-Golden State Highway
North to South


PAMS Monitor Network
Area Served (sq. km)
Population Served
Green bars = SJV monitor
Area Served (sq. km)
Population Served (Total)
12,000
10,000
8,000
6,000
4,000
2,000
0
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Elk Grove-Bruceville Road
Modesto-14th Street
Madera-Pump Yard
Clovis-N Villa Avenue
Parlier
Shafter-Walker Street
Bakersfield-Golden State Highway
Arvin-Bear Mountain Blvd
North → to → South

POPULATION CHANGE CHARTS




O3 Monitor Network with Planned Site Locations
N O R T H
T O
S O U T H
Monitor Sites
Sloughhouse
Elk Grove-Bruceville Road
Jackson-Clinton Road
San Andreas-Gold Strike Road
Bethel Island Road
Stockton-Hazelton Street
Sonora-Barretta Street
Tracy-Airport
Yosemite Natl Park-Turtleback Dome
Modesto-14th Street
Turlock-S Minaret Street
Jerseydale - 6440 Jerseydale
Merced-S Coffee Avenue
San Martin-Murphy Avenue
Hollister-Fairview Road
Madera-Pump Yard
Fresno-Sierra Skypark #2
Clovis-N Villa Avenue
Fresno-1st Street
Fresno-Drummond Street
Tranquility
Parlier
Sequoia and Kings Canyon Natl Park
Sequoia Natl Park-Lower Kaweah
Visalia-N Church Street
Hanford-S Irwin Street
Santa Rosa Rancheria
Porterville
SLO APCD
Carrizo Plains School-9640 Carrizo
Shafter-Walker Street
Oildale-3311 Manor Street
Bakersfield-Golden State Highway
Bakersfield-5558 California Avenue
Edison
Arvin-Bear Mountain Blvd
Maricopa-Staniluas St
Lebec-Peace Valley Road
*Green bars = SJV monitoring site
*Black Stars = Planned Sites
0
10,000
20,000
30,000
40,000
50,000
60,000
70,000
80,000
90,000
100,000
Population Change 2000 to 2007


PM2.5 1-hr Monitor Network
N O R T H
T O
S O U T H
Monitor Sites
Elk Grove-Bruceville Road
Stockton-Hazelton Street
Tracy-Airport
Yosemite Village-Visitor Center
Modesto-14th Street
Turlock-S Minaret Street
Clovis-N Villa Avenue
Fresno-1st Street
Lone Pine-1101 E-SHA Lane
Visalia-N Church Street
Corcoran-Patterson Avenue
Bakersfield-Golden State Highway
Bakersfield-5558 California Avenue
Lebec-Peace Valley Road
*Green bars = SJV monitoring site
0
10,000
20,000
30,000
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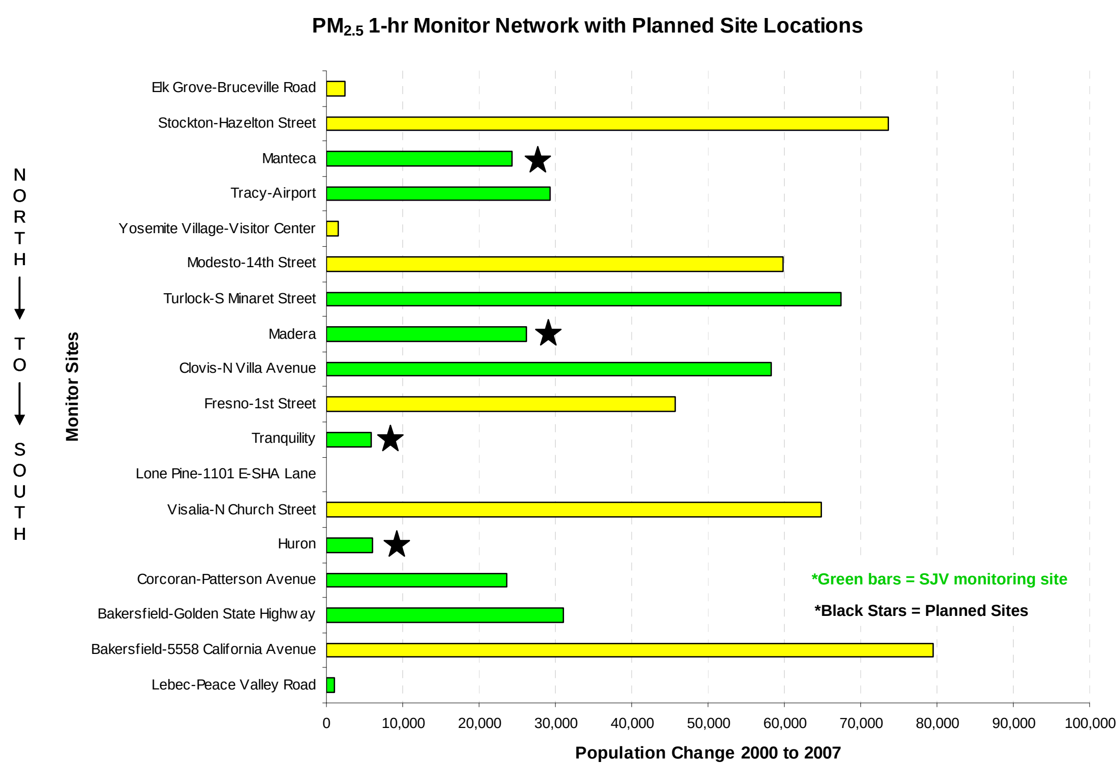
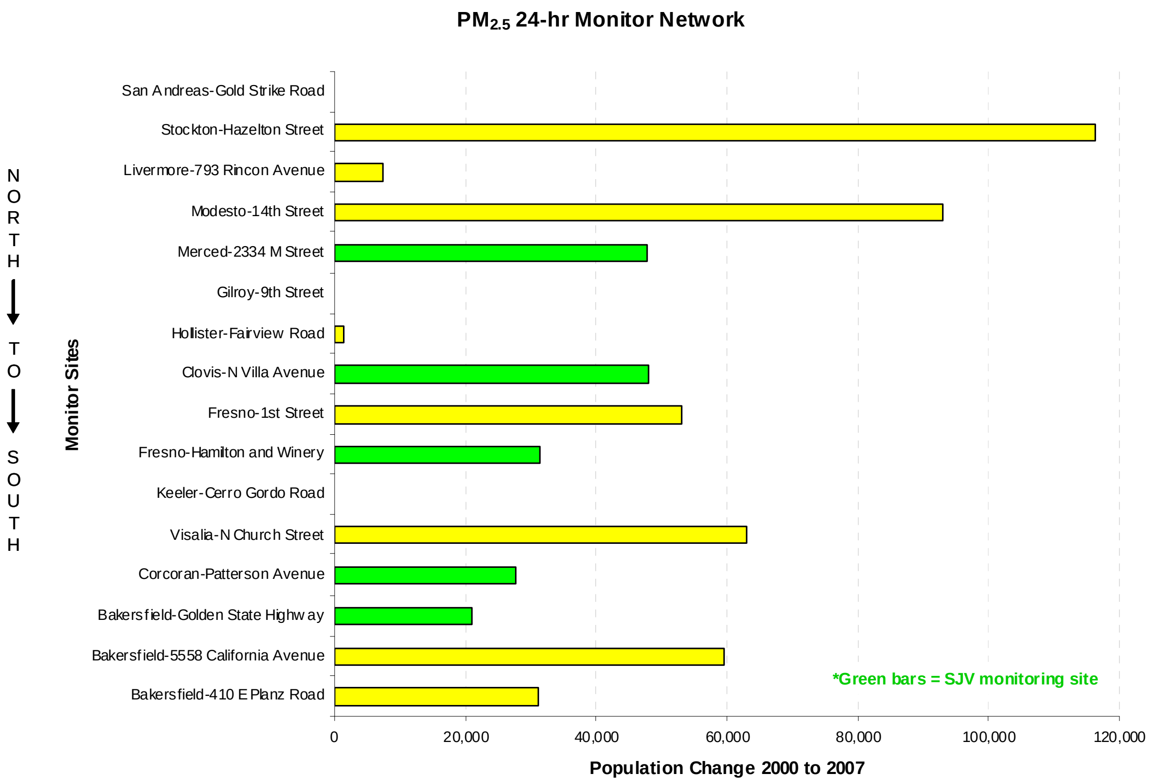
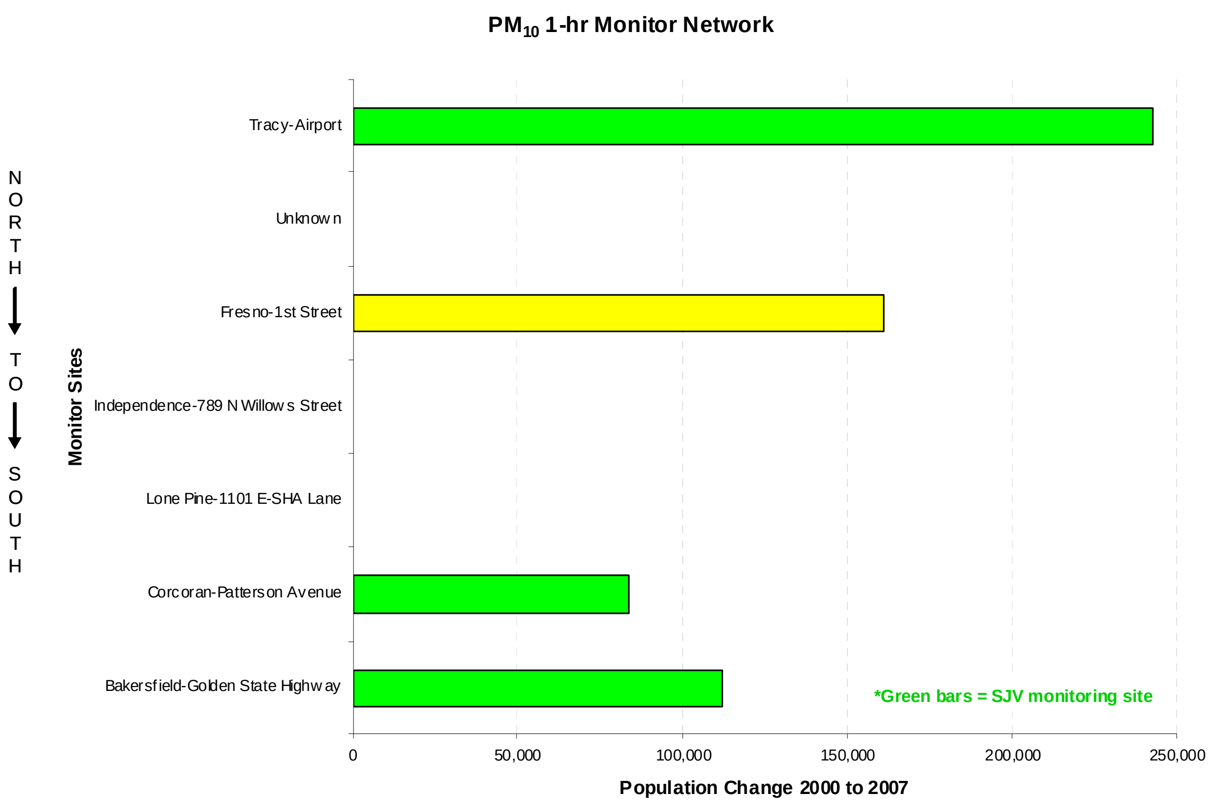
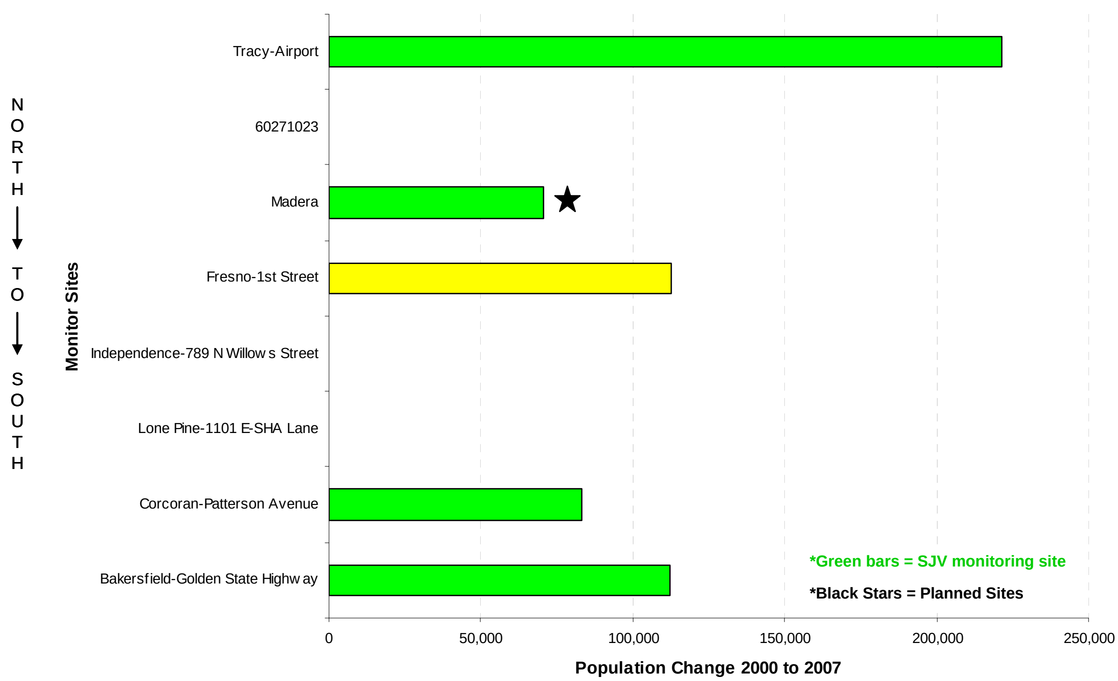
50,000
60,000
70,000
80,000
90,000
100,000
Population Change 2000 to 2007

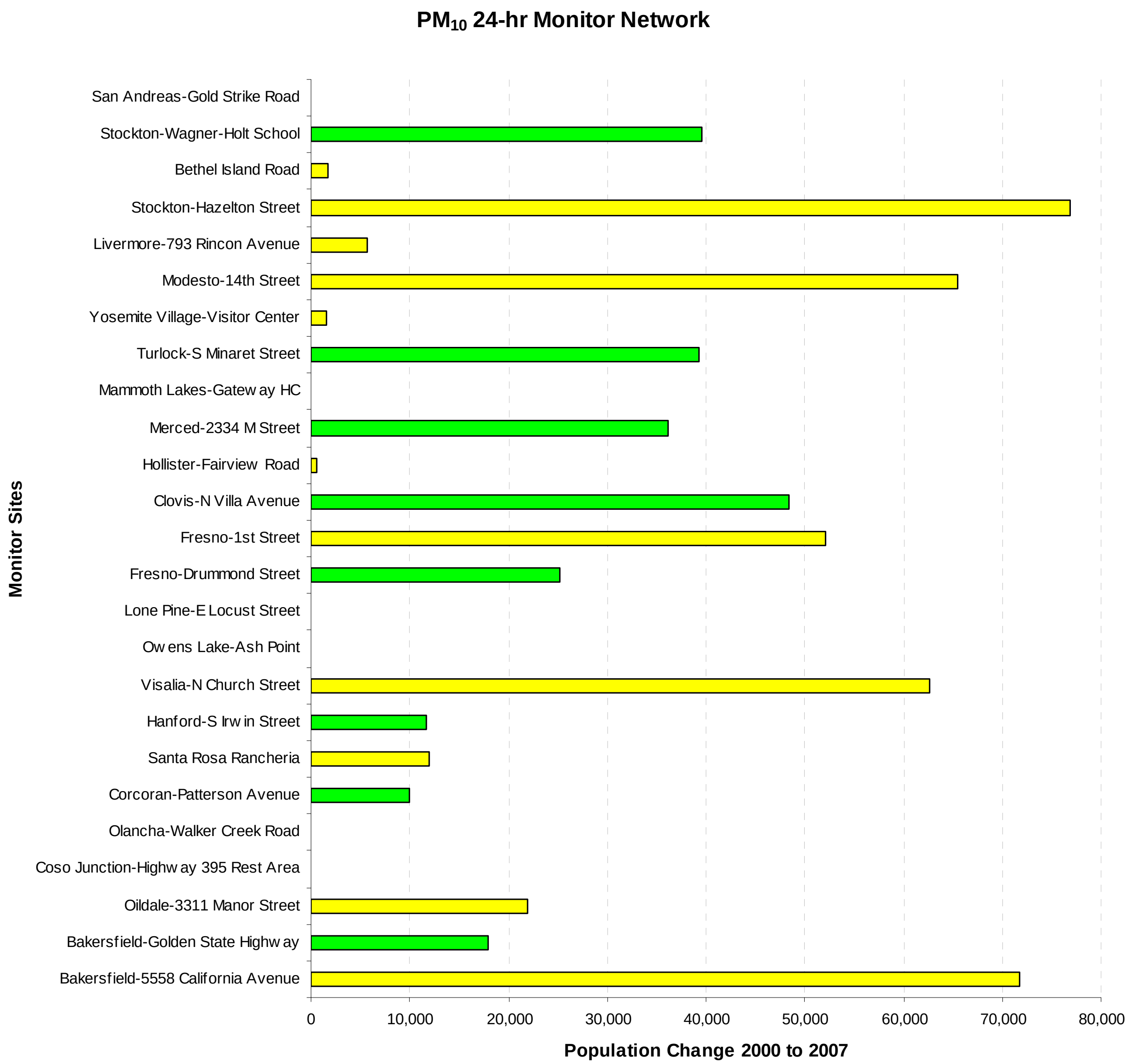

PM2.5 1-hr Monitor Network with Planned Site Locations
N O R T H
T O
S O U T H
Monitor Sites
Elk Grove-Bruceville Road
Stockton-Hazelton Street
Manteca
Tracy-Airport
Yosemite Village-Visitor Center
Modesto-14th Street
Turlock-S Minaret Street
Madera
Clovis-N Villa Avenue
Fresno-1st Street
Tranquility
Lone Pine-1101 E-SHA Lane
Visalia-N Church Street
Huron
Corcoran-Patterson Avenue
Bakersfield-Golden State Highway
Bakersfield-5558 California Avenue
Lebec-Peace Valley Road
*Green bars = SJV monitoring site
*Black Stars = Planned Sites
0
10,000
20,000
30,000
40,000
50,000
60,000
70,000
80,000
90,000
100,000
Population Change 2000 to 2007


PM2.5 24-hr Monitor Network
N O R T H
T O
S O U T H
Monitor Sites
San Andreas-Gold Strike Road
Stockton-Hazelton Street
Livermore-793 Rincon Avenue
Modesto-14th Street
Merced-2334 M Street
Gilroy-9th Street
Hollister-Fairview Road
Clovis-N Villa Avenue
Fresno-1st Street
Fresno-Hamilton and Winery
Keeler-Cerro Gordo Road
Visalia-N Church Street
Corcoran-Patterson Avenue
Bakersfield-Golden State Highway
Bakersfield-5558 California Avenue
Bakersfield-410 E Planz Road
*Green bars = SJV monitoring site
0
20,000
40,000
60,000
80,000
100,000
120,000
Population Change 2000 to 2007

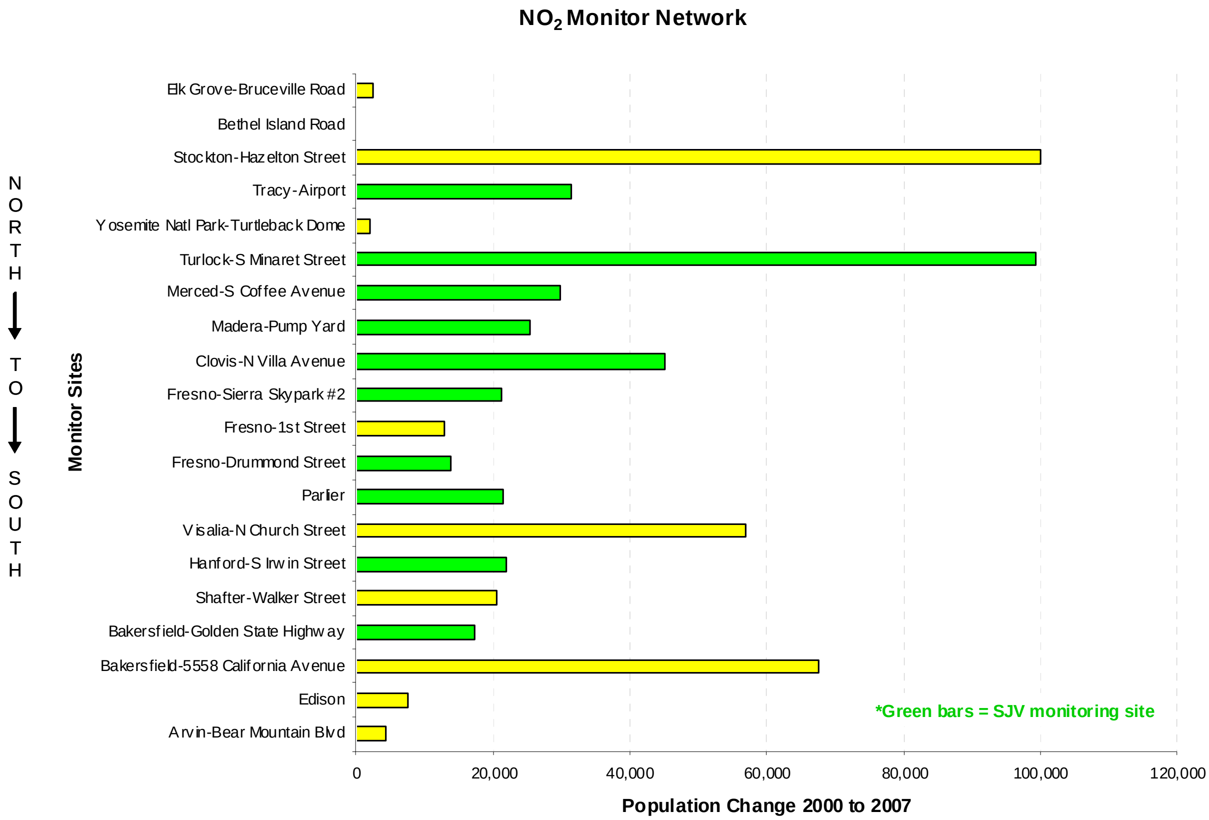

PM10 1-hr Monitor Network
N O R T H
T O
S O U T H
Monitor Sites
Tracy-Airport
Unknown
Fresno-1st Street
Independence-789 N Willows Street
Lone Pine-1101 E-SHA Lane
Corcoran-Patterson Avenue
Bakersfield-Golden State Highway
*Green bars = SJV monitoring site
0
50,000
100,000
150,000
200,000
250,000
Population Change 2000 to 2007

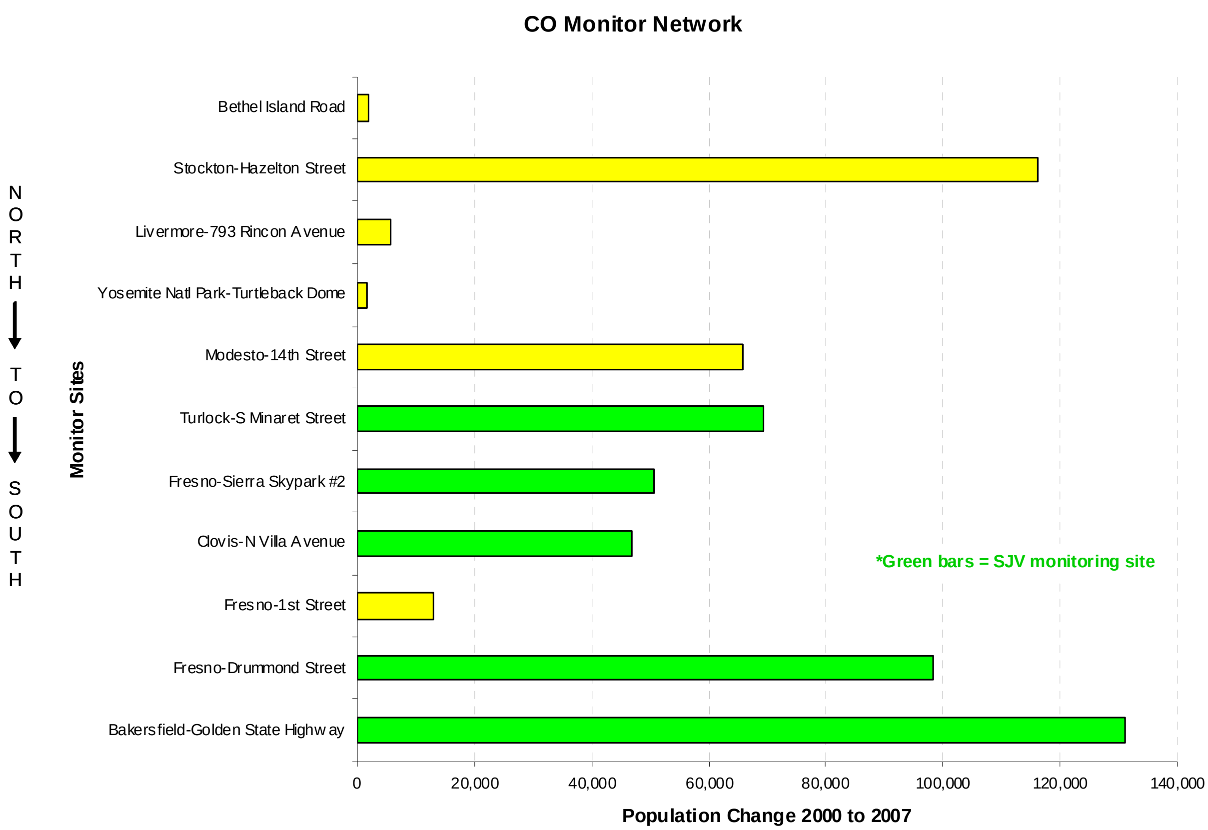
PM_{10} 1-hr Monitor Network with Planned Site Locations

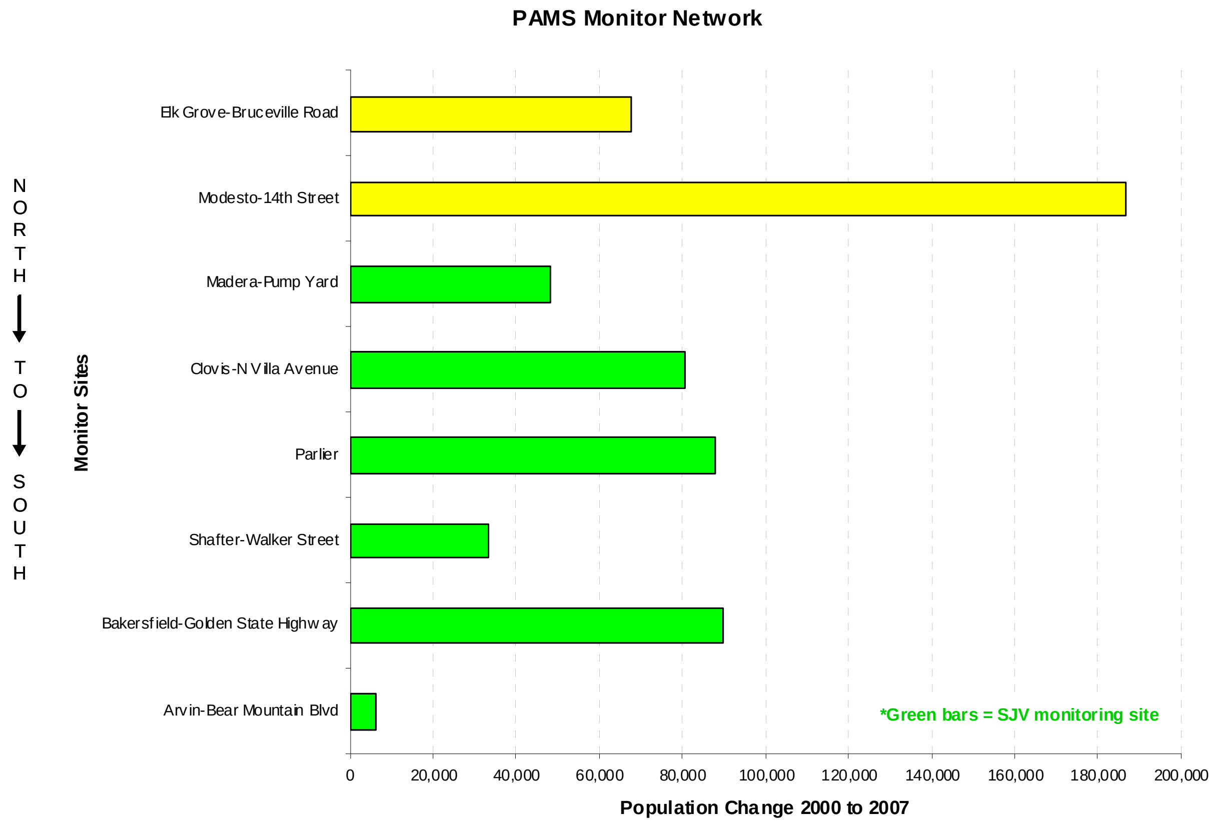




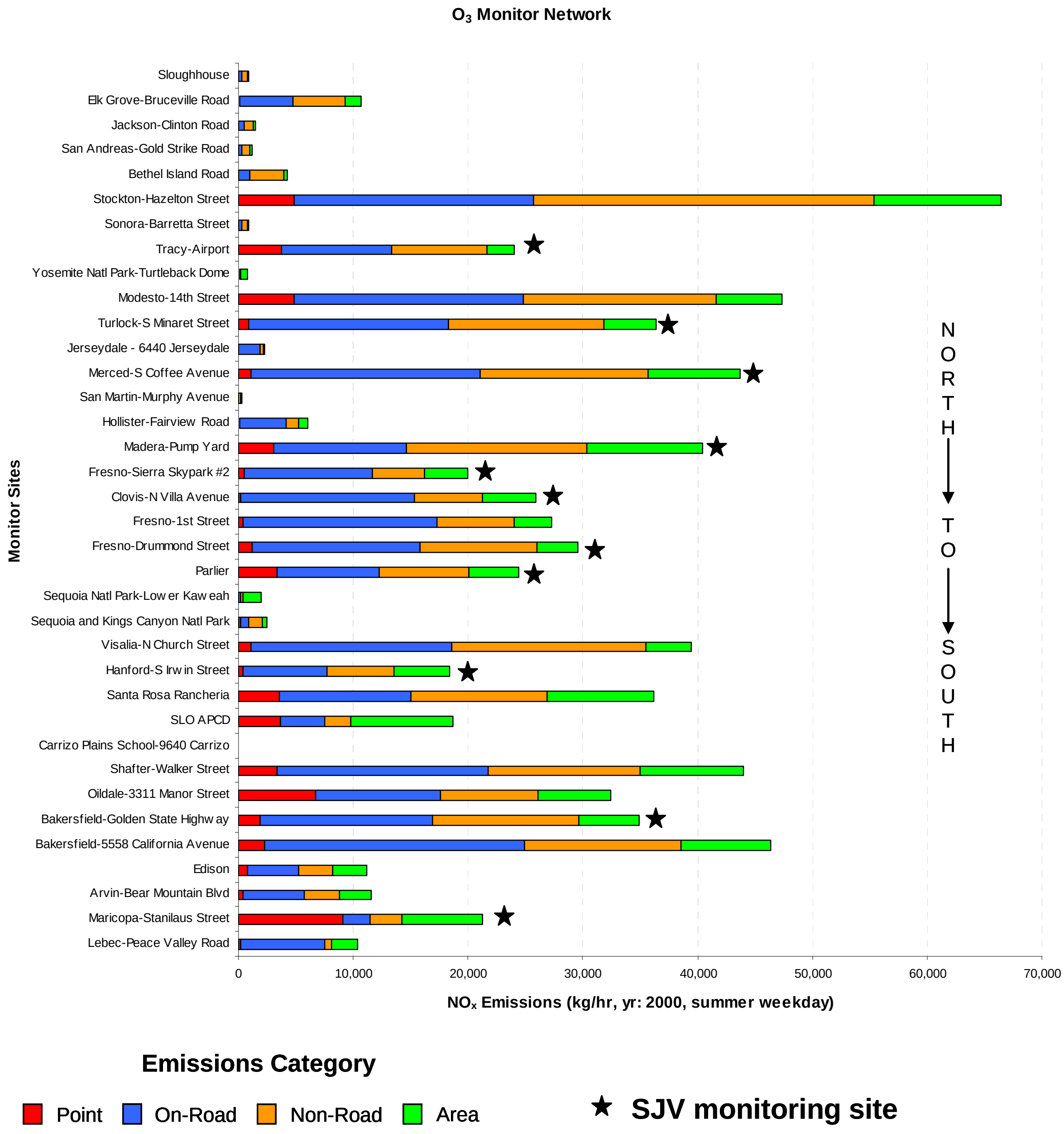
PM10 24-hr Monitor Network
Monitor Sites
San Andreas-Gold Strike Road
Stockton-Wagner-Holt School
Bethel Island Road
Stockton-Hazelton Street
Livermore-793 Rincon Avenue
Modesto-14th Street
Yosemite Village-Visitor Center
Turlock-S Minaret Street
Mammoth Lakes-Gatew ay HC
Merced-2334 M Street
Hollister-Fairview Road
Clovis-N Villa Avenue
Fresno-1st Street
Fresno-Drummond Street
Lone Pine-E Locust Street
Ow ens Lake-Ash Point
Visalia-N Church Street
Hanford-S Irw in Street
Santa Rosa Rancheria
Corcoran-Patterson Avenue
Olancha-Walker Creek Road
Coso Junction-Highw ay 395 Rest Area
Oildale-3311 Manor Street
Bakersfield-Golden State Highw ay
Bakersfield-5558 California Avenue
0
10,000
20,000
30,000
40,000
50,000
60,000
70,000
80,000
Population Change 2000 to 2007

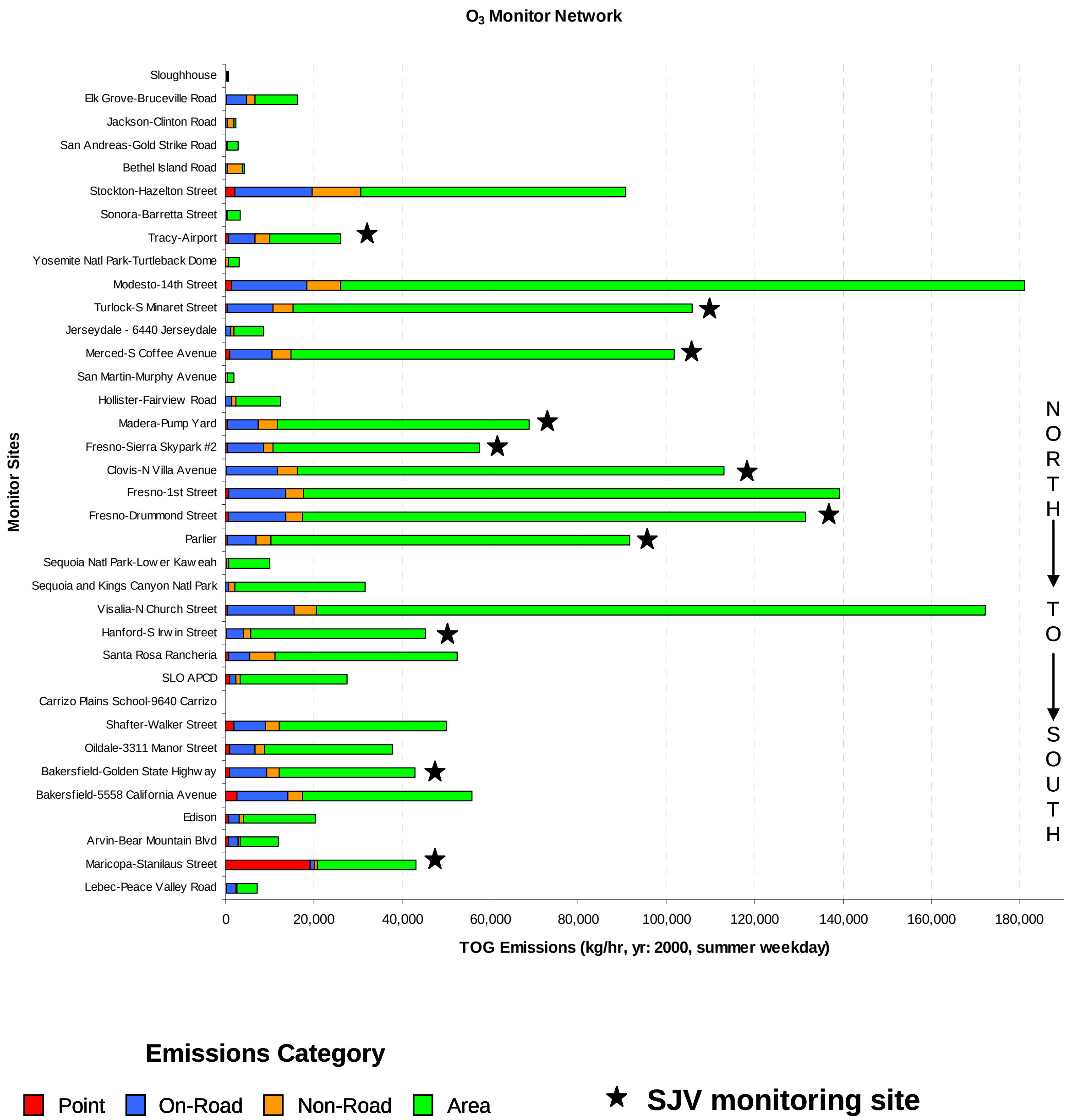

NO₂ Monitor Network
Elk Grove-Bruceville Road
Bethel Island Road
Stockton-Hazelton Street
Tracy-Airport
Yosemite Natl Park-Turtleback Dome
Turlock-S Minaret Street
Merced-S Coffee Avenue
Madera-Pump Yard
Clovis-N Villa Avenue
Fresno-Sierra Skypark #2
Fresno-1st Street
Fresno-Drummond Street
Parlier
Visalia-N Church Street
Hanford-S Irwin Street
Shafter-Walker Street
Bakersfield-Golden State Highway
Bakersfield-5558 California Avenue
Edison
Arvin-Bear Mountain Blvd
NORTH TO SOUTH
Monitor Sites
0
20,000
40,000
60,000
80,000
100,000
120,000
Population Change 2000 to 2007
*Green bars = SJV monitoring site


CO Monitor Network
Bethel Island Road
Stockton-Hazelton Street
Livermore-793 Rincon Avenue
Yosemite Natl Park-Turtleback Dome
Modesto-14th Street
Turlock-S Minaret Street
Fresno-Sierra Skypark #2
Clovis-N Villa Avenue
Fresno-1st Street
Fresno-Drummond Street
Bakersfield-Golden State Highway
NORTH TO SOUTH
Monitor Sites
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
Population Change 2000 to 2007
*Green bars = SJV monitoring site

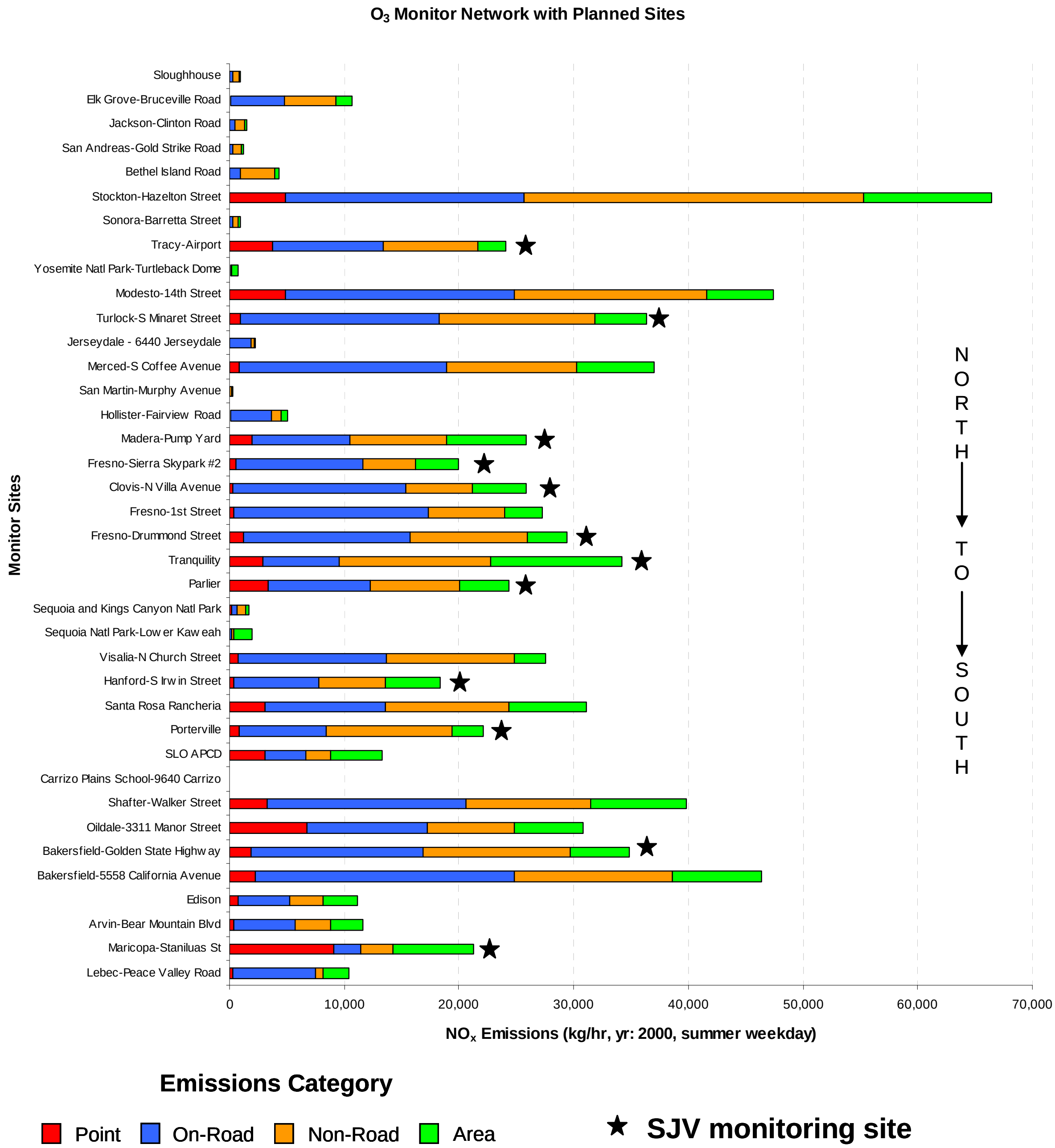

PAMS Monitor Network
NORTH
TO
SOUTH
Monitor Sites
Elk Grove-Bruceville Road
Modesto-14th Street
Madera-Pump Yard
Clovis-N Villa Avenue
Parlier
Shafter-Walker Street
Bakersfield-Golden State Highway
Arvin-Bear Mountain Blvd
*Green bars = SJV monitoring site
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
160,000
180,000
200,000
Population Change 2000 to 2007

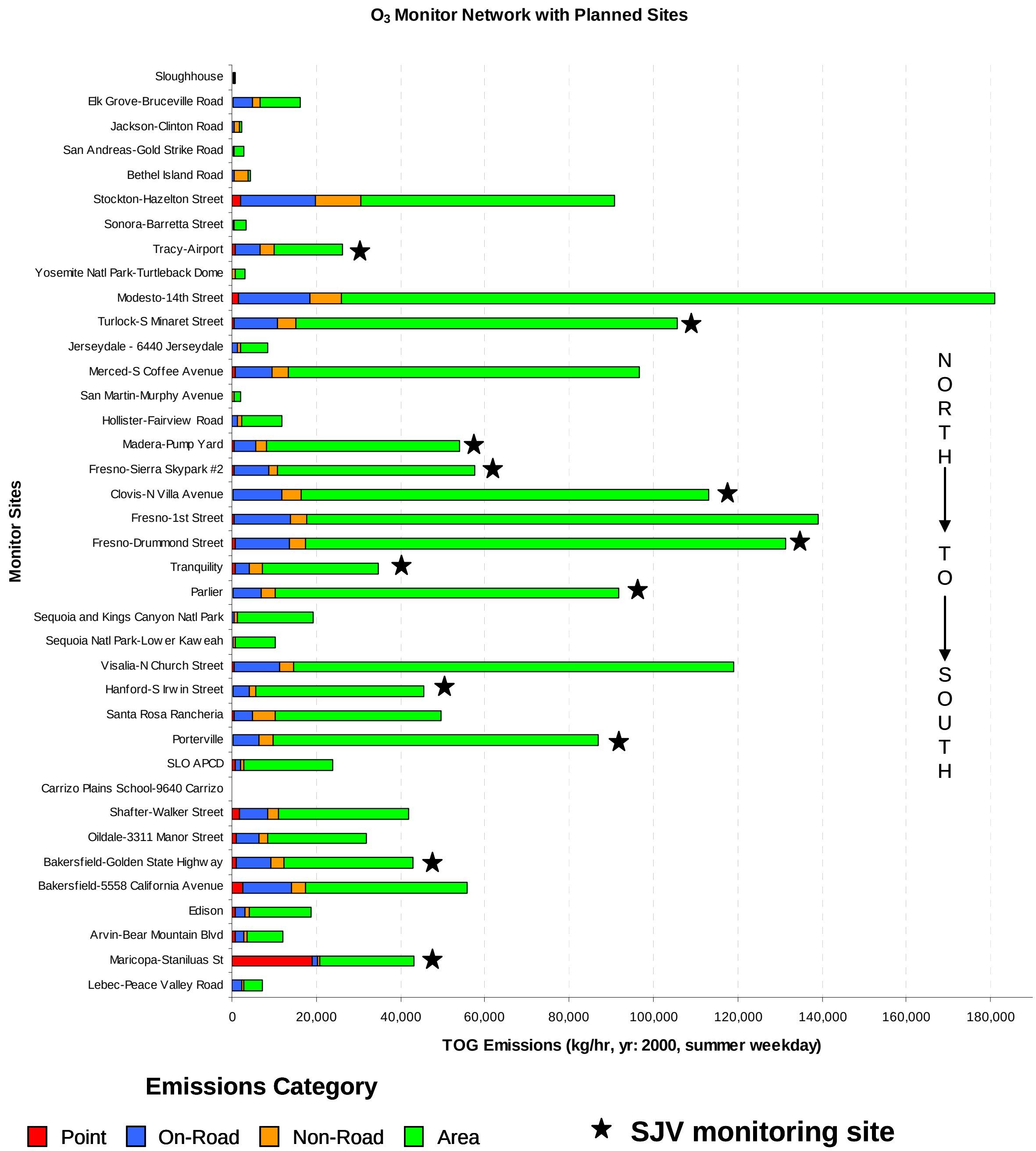
EMISSIONS SERVED CHARTS

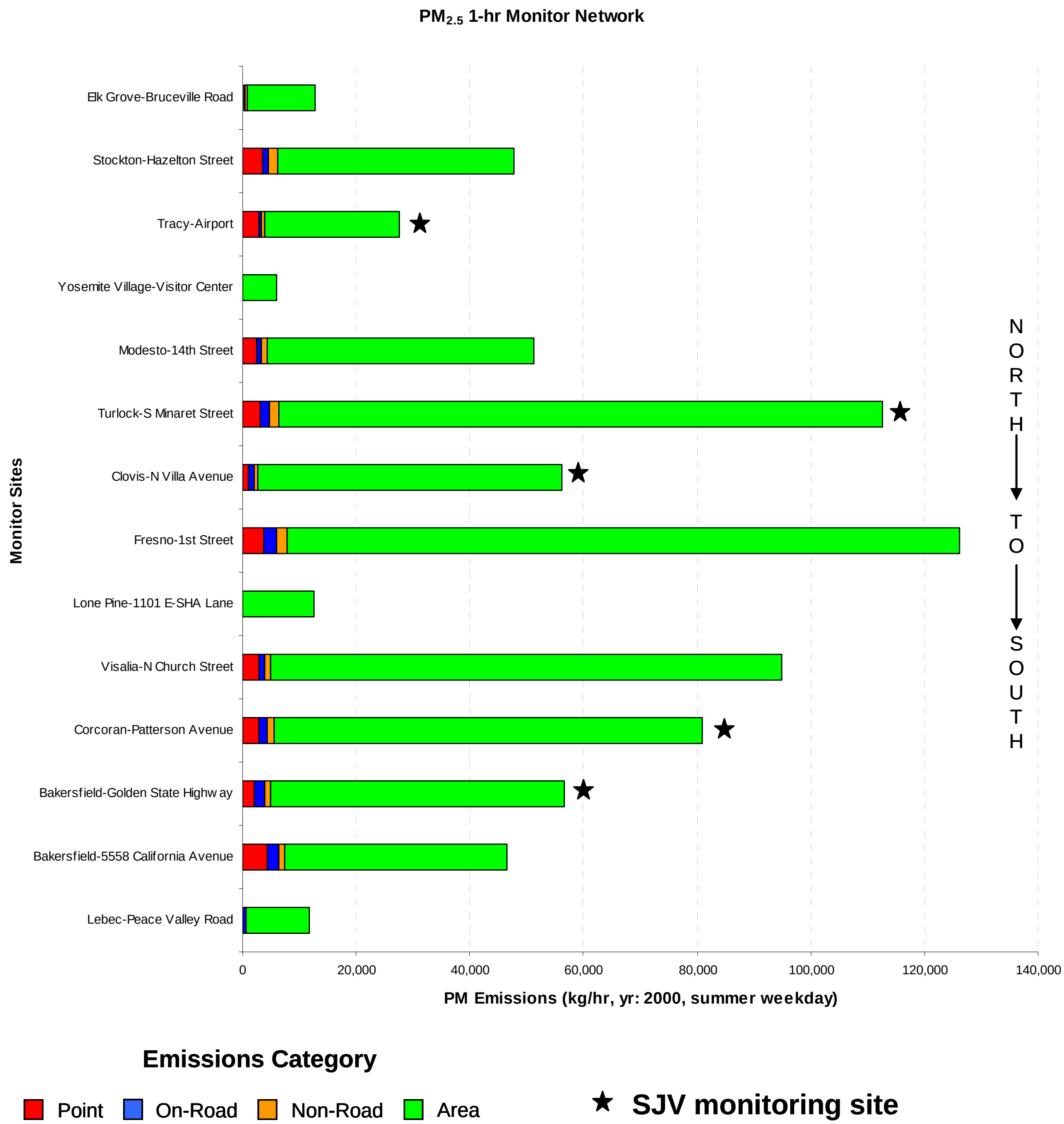


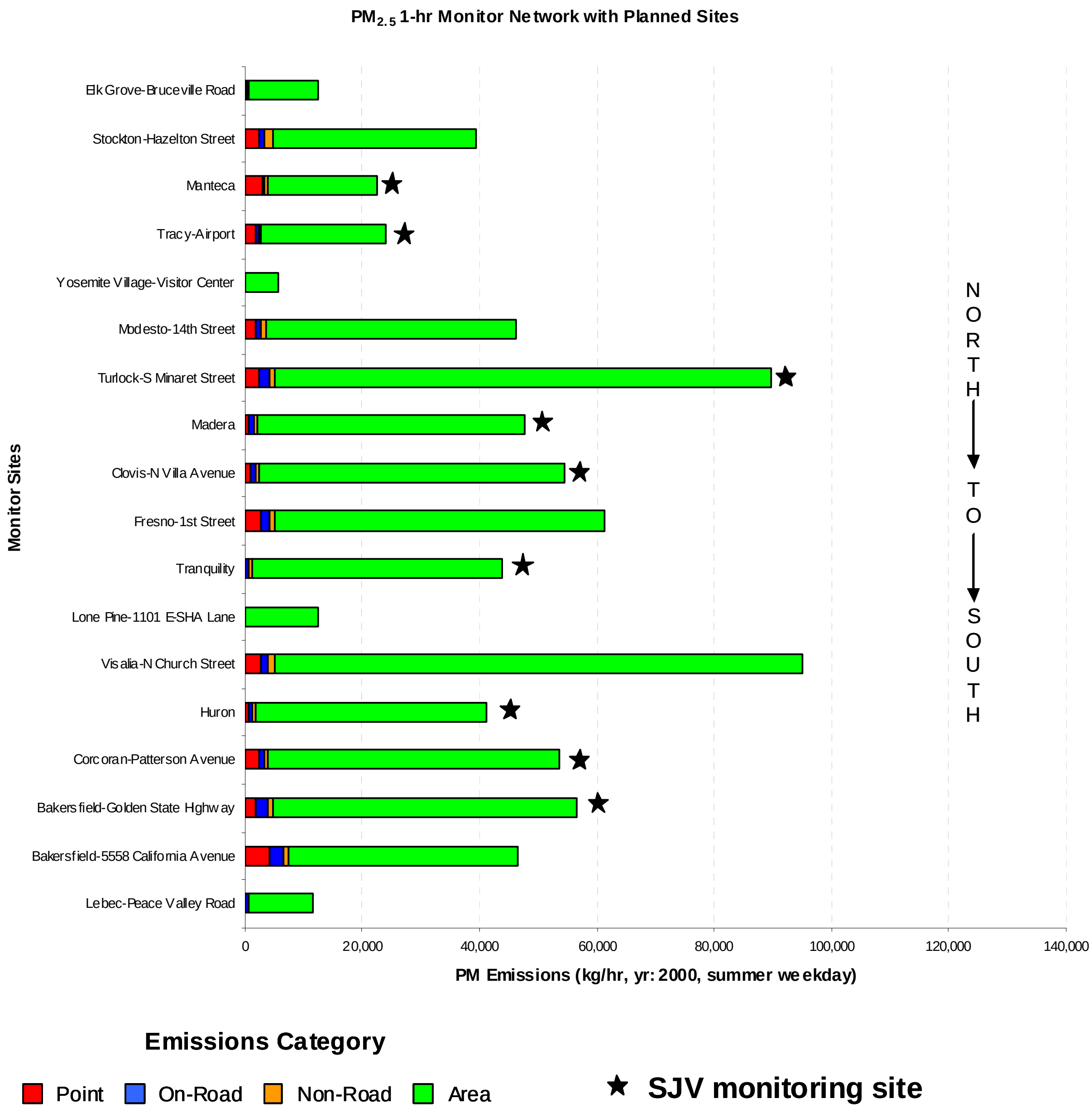


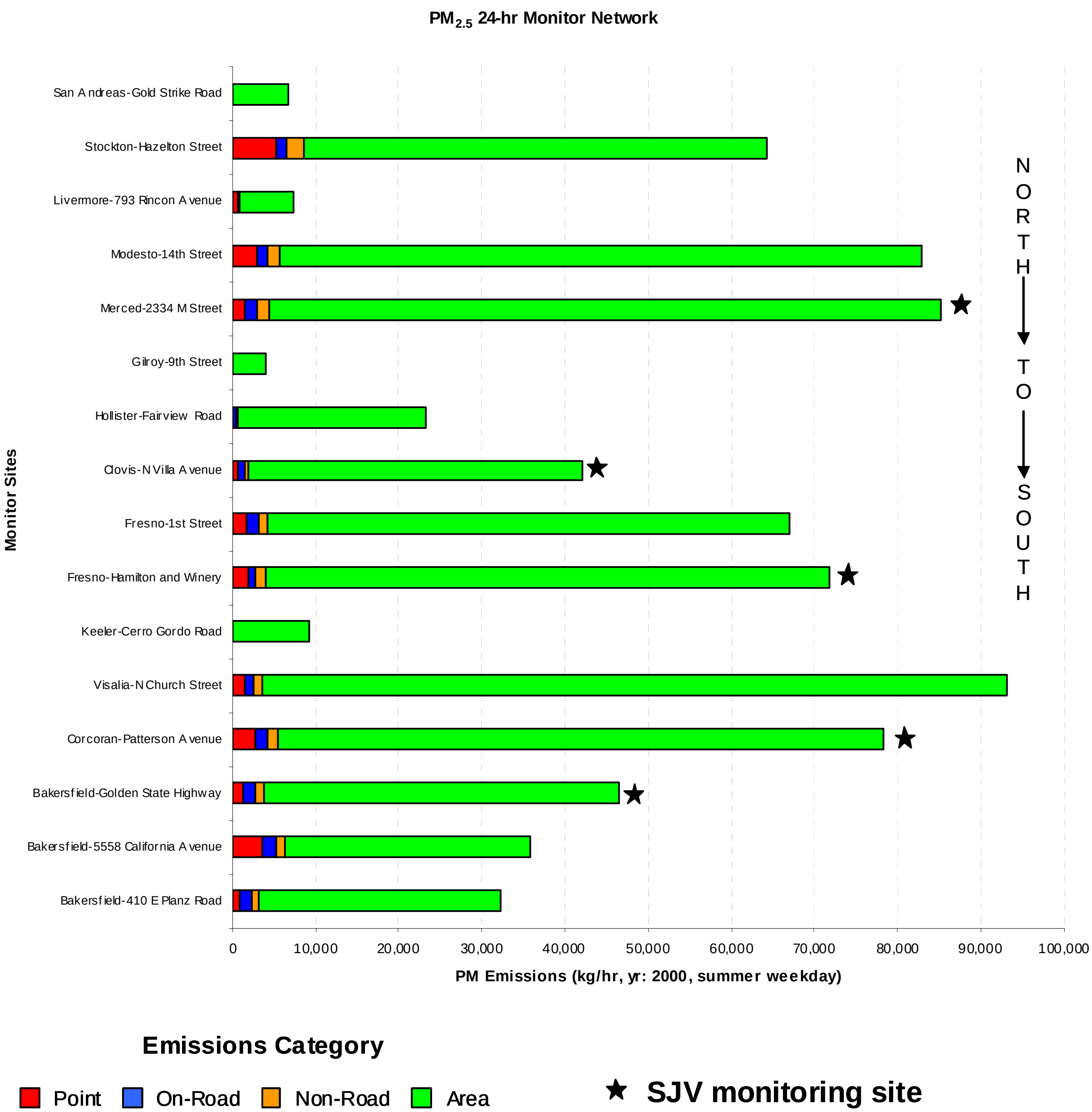
O_3 Monitor Network
Monitor Sites
Sloughhouse
Elk Grove-Bruceville Road
Jackson-Clinton Road
San Andreas-Gold Strike Road
Bethel Island Road
Stockton-Hazelton Street
Sonora-Barretta Street
Tracy-Airport
Yosemite Natl Park-Turtleback Dome
Modesto-14th Street
Turlock-S Minaret Street
Jerseydale - 6440 Jerseydale
Merced-S Coffee Avenue
San Martin-Murphy Avenue
Hollister-Fairview Road
Madera-Pump Yard
Fresno-Sierra Skypark #2
Clovis-N Villa Avenue
Fresno-1st Street
Fresno-Drummond Street
Parlier
Sequoia Natl Park-Lower Kaweah
Sequoia and Kings Canyon Natl Park
Visalia-N Church Street
Hanford-S Irwin Street
Santa Rosa Rancheria
SLO APCD
Carrizo Plains School-9640 Carrizo
Shafter-Walker Street
Oildale-3311 Manor Street
Bakersfield-Golden State Highway
Bakersfield-5558 California Avenue
Edison
Arvin-Bear Mountain Blvd
Maricopa-Stanilaus Street
Lebec-Peace Valley Road
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
160,000
180,000
TOG Emissions (kg/hr, yr: 2000, summer weekday)
NORTH TO SOUTH
Emissions Category
Point
On-Road
Non-Road
Area
SJV monitoring site

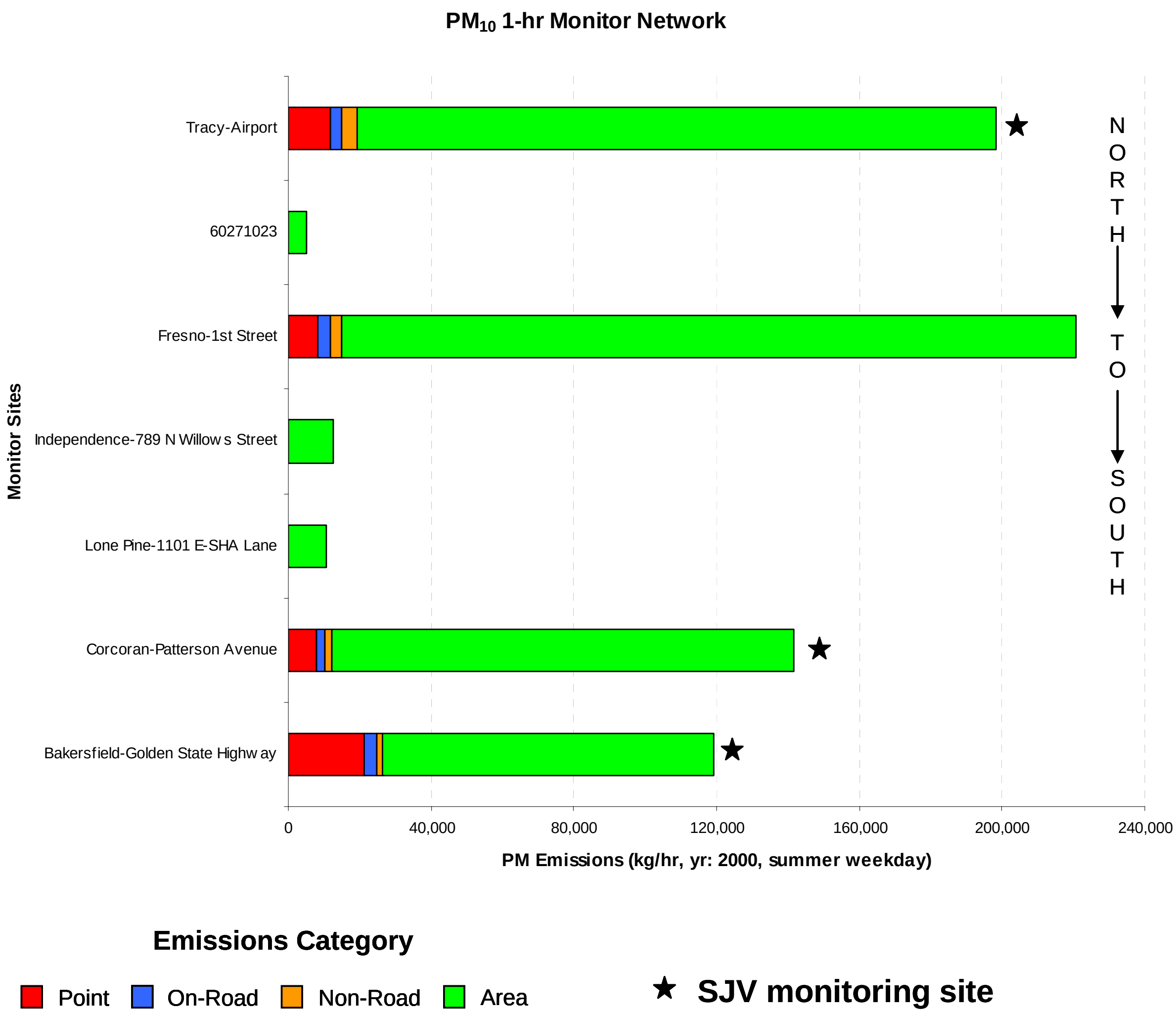

O3 Monitor Network with Planned Sites
Sloughhouse
Elk Grove-Bruceville Road
Jackson-Clinton Road
San Andreas-Gold Strike Road
Bethel Island Road
Stockton-Hazelton Street
Sonora-Barretta Street
Tracy-Airport
Yosemite Natl Park-Turtleback Dome
Modesto-14th Street
Turlock-S Minaret Street
Jerseydale - 6440 Jerseydale
Merced-S Coffee Avenue
San Martin-Murphy Avenue
Hollister-Fairview Road
Madera-Pump Yard
Fresno-Sierra Skypark #2
Clovis-N Villa Avenue
Fresno-1st Street
Fresno-Drummond Street
Tranquility
Parlier
Sequoia and Kings Canyon Natl Park
Sequoia Natl Park-Lower Kaweah
Visalia-N Church Street
Hanford-S Irwin Street
Santa Rosa Rancheria
Porterville
SLO APCD
Carrizo Plains School-9640 Carrizo
Shafter-Walker Street
Oildale-3311 Manor Street
Bakersfield-Golden State Highway
Bakersfield-5558 California Avenue
Edison
Arvin-Bear Mountain Blvd
Maricopa-Staniluas St
Lebec-Peace Valley Road
Monitor Sites
0
10,000
20,000
30,000
40,000
50,000
60,000
70,000
NOx Emissions (kg/hr, yr: 2000, summer weekday)
NORTH TO SOUTH
Emissions Category
Point
On-Road
Non-Road
Area
SJV monitoring site

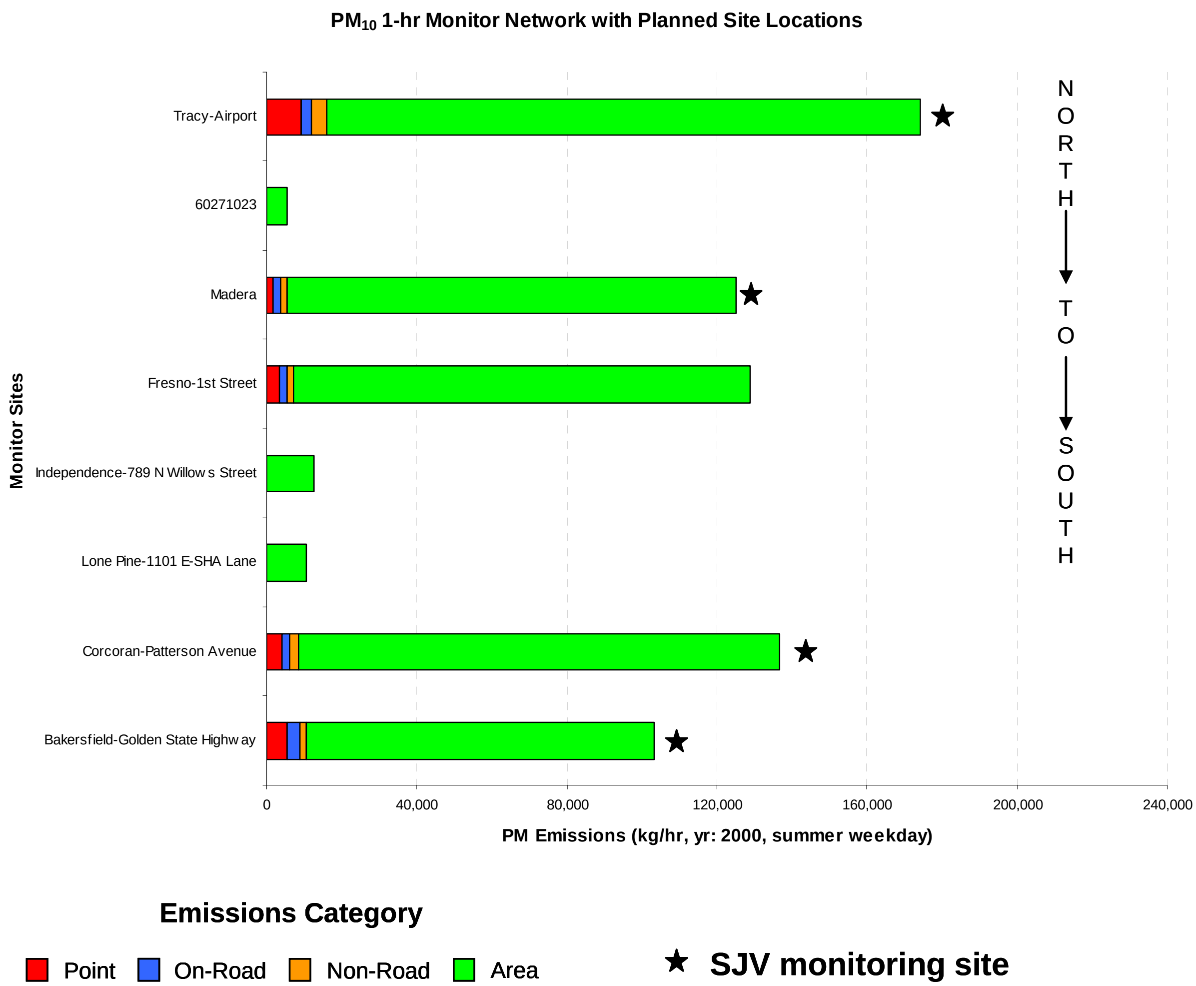

O3 Monitor Network with Planned Sites
Monitor Sites
Sloughhouse
Elk Grove-Bruceville Road
Jackson-Clinton Road
San Andreas-Gold Strike Road
Bethel Island Road
Stockton-Hazelton Street
Sonora-Barretta Street
Tracy-Airport
Yosemite Natl Park-Turtleback Dome
Modesto-14th Street
Turlock-S Minaret Street
Jerseydale - 6440 Jerseydale
Merced-S Coffee Avenue
San Martin-Murphy Avenue
Hollister-Fairview Road
Madera-Pump Yard
Fresno-Sierra Skypark #2
Clovis-N Villa Avenue
Fresno-1st Street
Fresno-Drummond Street
Tranquility
Parlier
Sequoia and Kings Canyon Natl Park
Sequoia Natl Park-Lower Kaweah
Visalia-N Church Street
Hanford-S Irwin Street
Santa Rosa Rancheria
Porterville
SLO APCD
Carrizo Plains School-9640 Carrizo
Shafter-Walker Street
Oildale-3311 Manor Street
Bakersfield-Golden State Highway
Bakersfield-5558 California Avenue
Edison
Arvin-Bear Mountain Blvd
Maricopa-Staniluas St
Lebec-Peace Valley Road
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
160,000
180,000
TOG Emissions (kg/hr, yr: 2000, summer weekday)
NORTH TO SOUTH
Emissions Category
Point
On-Road
Non-Road
Area
SJV monitoring site


PM2.5 1-hr Monitor Network
Elk Grove-Bruceville Road
Stockton-Hazelton Street
Tracy-Airport
Yosemite Village-Visitor Center
Modesto-14th Street
Turlock-S Minaret Street
Clovis-N Villa Avenue
Fresno-1st Street
Lone Pine-1101 E-SHA Lane
Visalia-N Church Street
Corcoran-Patterson Avenue
Bakersfield-Golden State Highway
Bakersfield-5558 California Avenue
Lebec-Peace Valley Road
Monitor Sites
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
PM Emissions (kg/hr, yr: 2000, summer weekday)
NORTH
TO
SOUTH
Emissions Category
Point
On-Road
Non-Road
Area
SJV monitoring site


PM2.5 1-hr Monitor Network with Planned Sites
Monitor Sites
Elk Grove-Bruceville Road
Stockton-Hazelton Street
Manteca
Tracy-Airport
Yosemite Village-Visitor Center
Modesto-14th Street
Turlock-S Minaret Street
Madera
Clovis-N Villa Avenue
Fresno-1st Street
Tranquility
Lone Pine-1101 E-SHA Lane
Visalia-N Church Street
Huron
Corcoran-Patterson Avenue
Bakersfield-Golden State Hghway
Bakersfield-5558 California Avenue
Lebec-Peace Valley Road
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
PM Emissions (kg/hr, yr: 2000, summer weekday)
NORTH TO SOUTH
Emissions Category
Point
On-Road
Non-Road
Area
SJV monitoring site

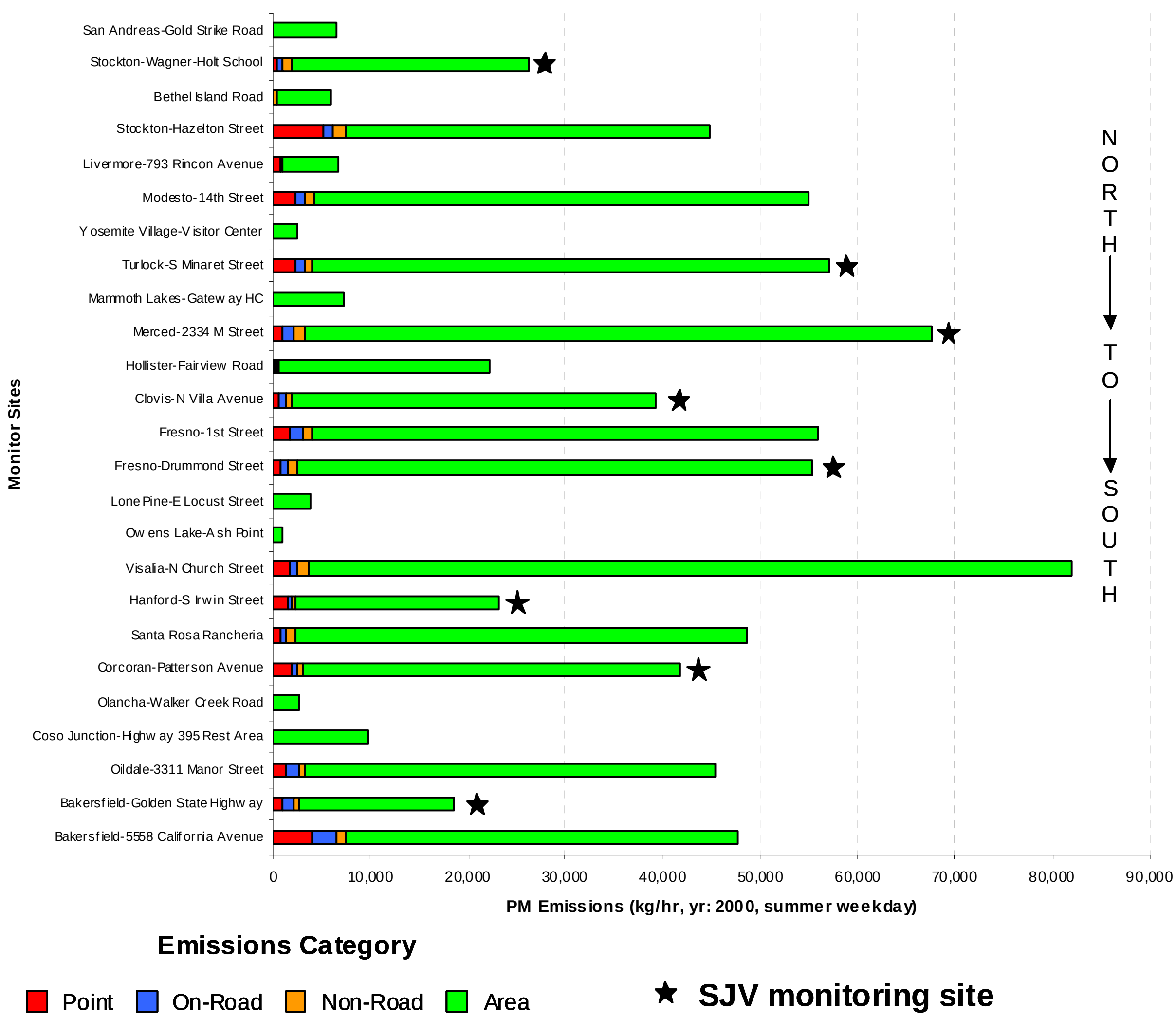

PM2.5 24-hr Monitor Network
Monitor Sites
San Andreas-Gold Strike Road
Stockton-Hazelton Street
Livermore-793 Rincon Avenue
Modesto-14th Street
Merced-2334 M Street
Gilroy-9th Street
Hollister-Fairview Road
Clovis-N Villa Avenue
Fresno-1st Street
Fresno-Hamilton and Winery
Keeler-Cerro Gordo Road
Visalia-N Church Street
Corcoran-Patterson Avenue
Bakersfield-Golden State Highway
Bakersfield-5558 California Avenue
Bakersfield-410 E Planz Road
NORTH TO SOUTH
0
10,000
20,000
30,000
40,000
50,000
60,000
70,000
80,000
90,000
100,000
PM Emissions (kg/hr, yr: 2000, summer weekday)
Emissions Category
Point
On-Road
Non-Road
Area
SJV monitoring site


PM10 1-hr Monitor Network
Monitor Sites
Tracy-Airport
60271023
Fresno-1st Street
Independence-789 N Willows Street
Lone Pine-1101 E-SHA Lane
Corcoran-Patterson Avenue
Bakersfield-Golden State Highway
0
40,000
80,000
120,000
160,000
200,000
240,000
PM Emissions (kg/hr, yr: 2000, summer weekday)
NORTH TO SOUTH
Emissions Category
Point
On-Road
Non-Road
Area
SJV monitoring site

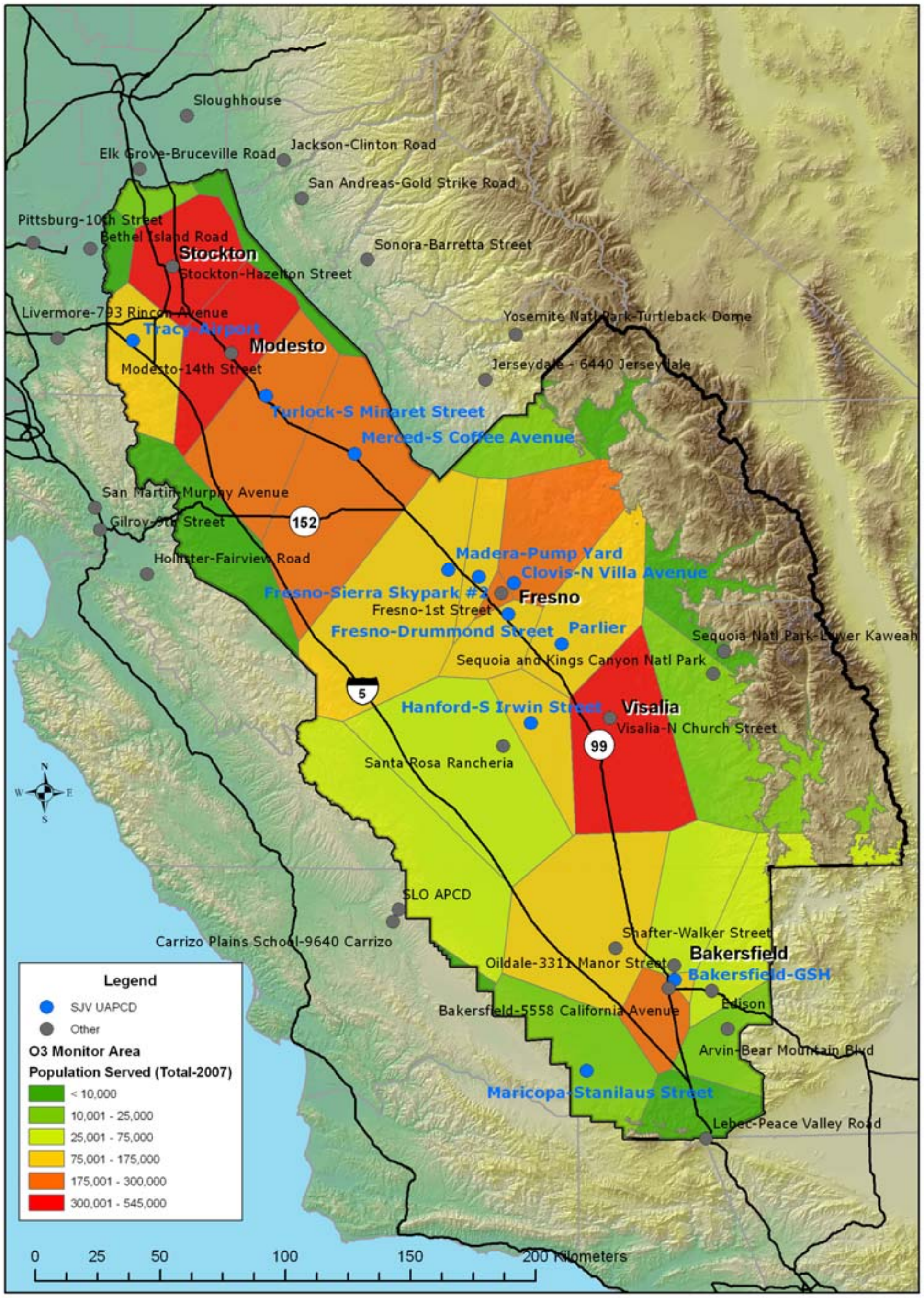


PM10 1-hr Monitor Network with Planned Site Locations
Monitor Sites
Tracy-Airport
60271023
Madera
Fresno-1st Street
Independence-789 N Willows Street
Lone Pine-1101 E-SHA Lane
Corcoran-Patterson Avenue
Bakersfield-Golden State Highway
0
40,000
80,000
120,000
160,000
200,000
240,000
PM Emissions (kg/hr, yr: 2000, summer weekday)
NORTH TO SOUTH
Emissions Category
Point
On-Road
Non-Road
Area
SJV monitoring site

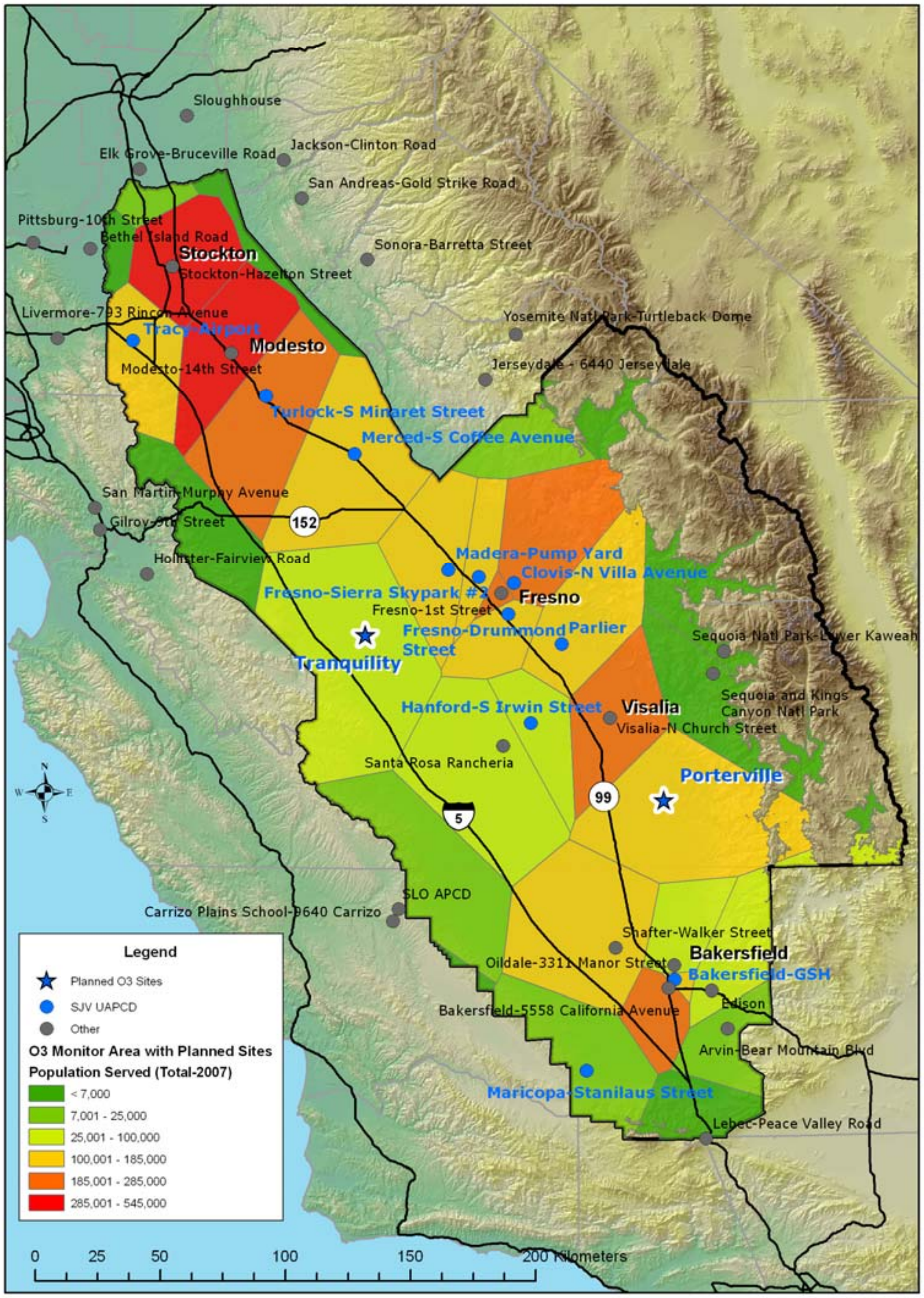
PM$_{10}$ 24-hr Monitor Network



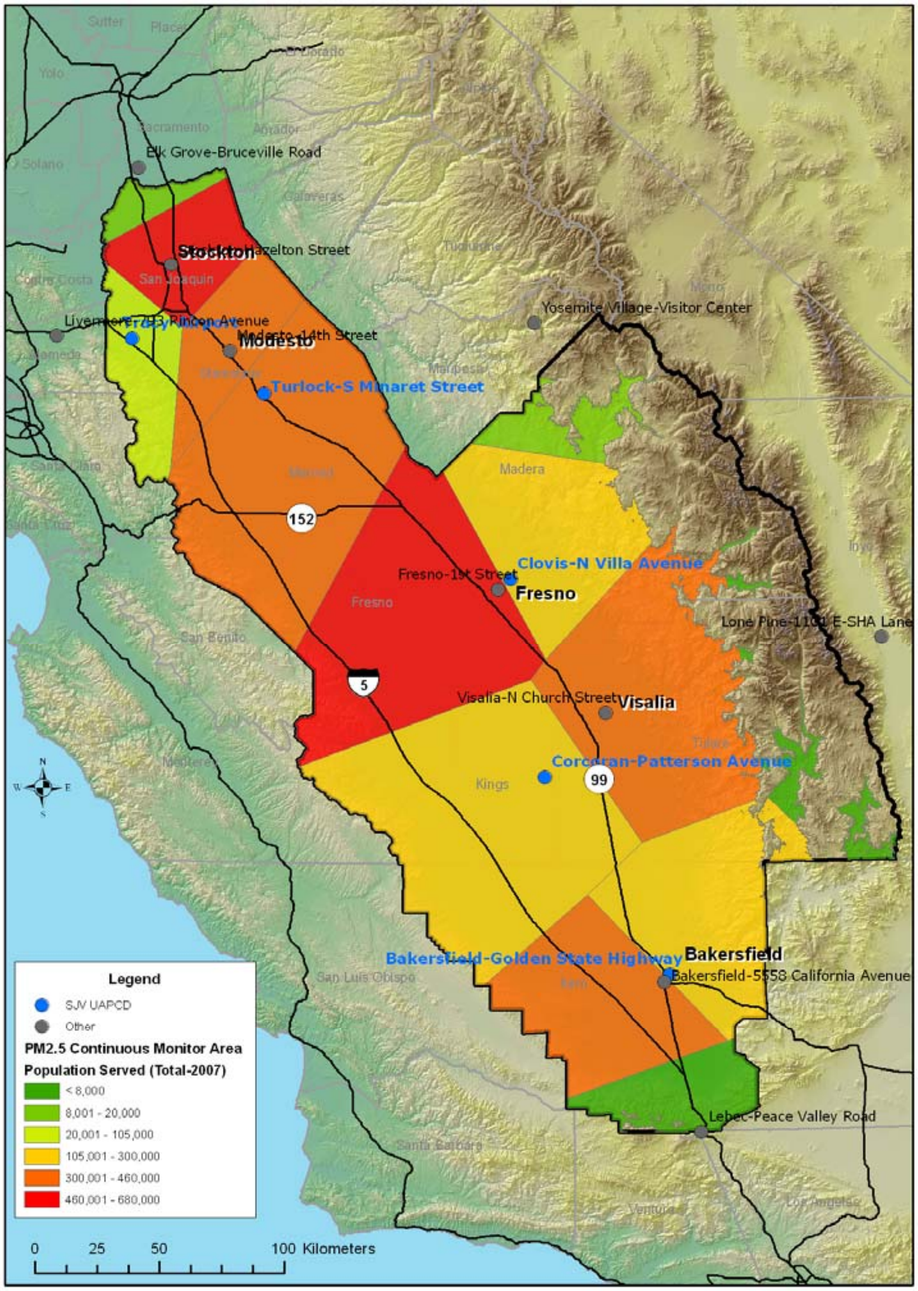
POPULATION SERVED MAPS



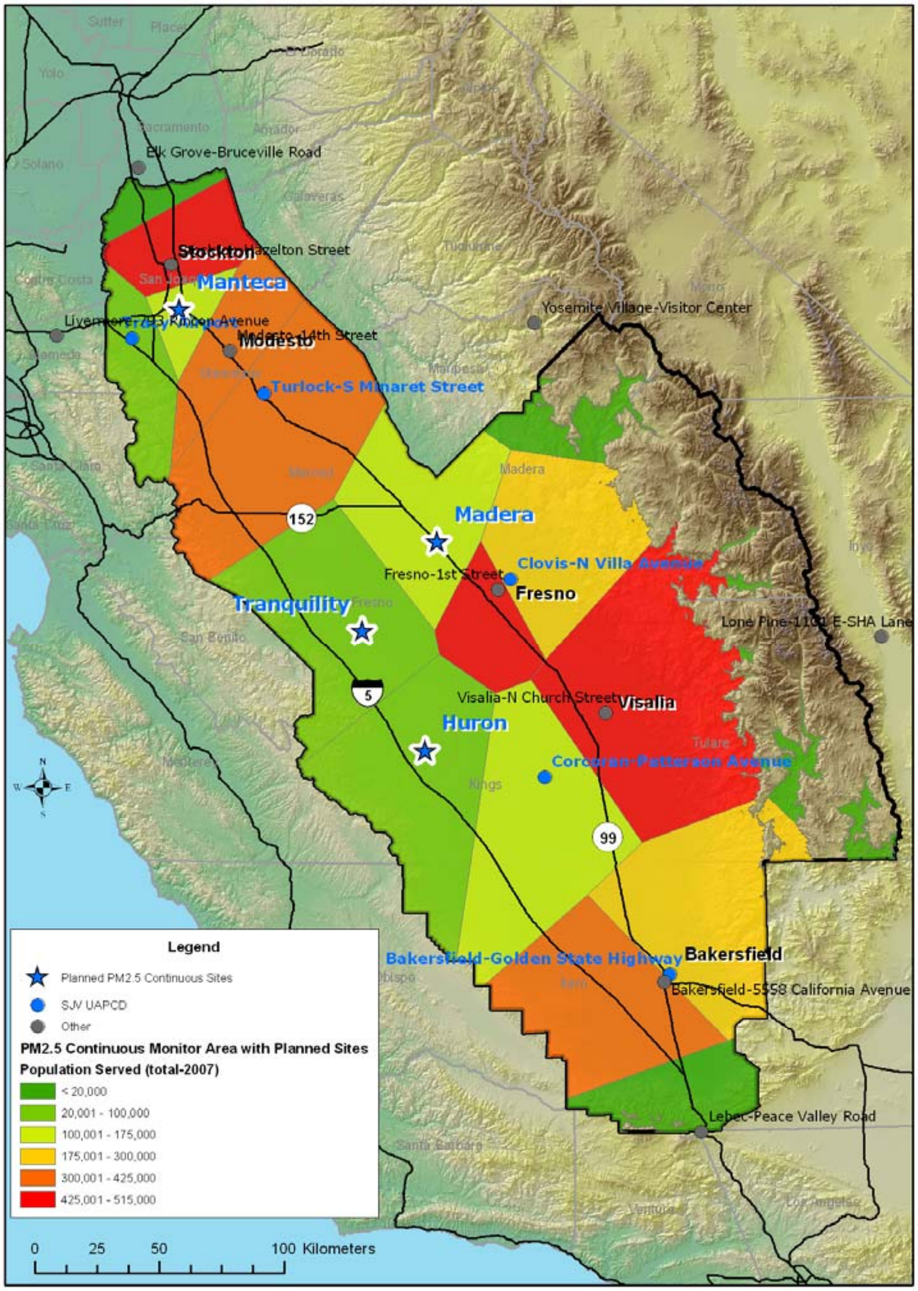
Population served for O_3 monitor areas



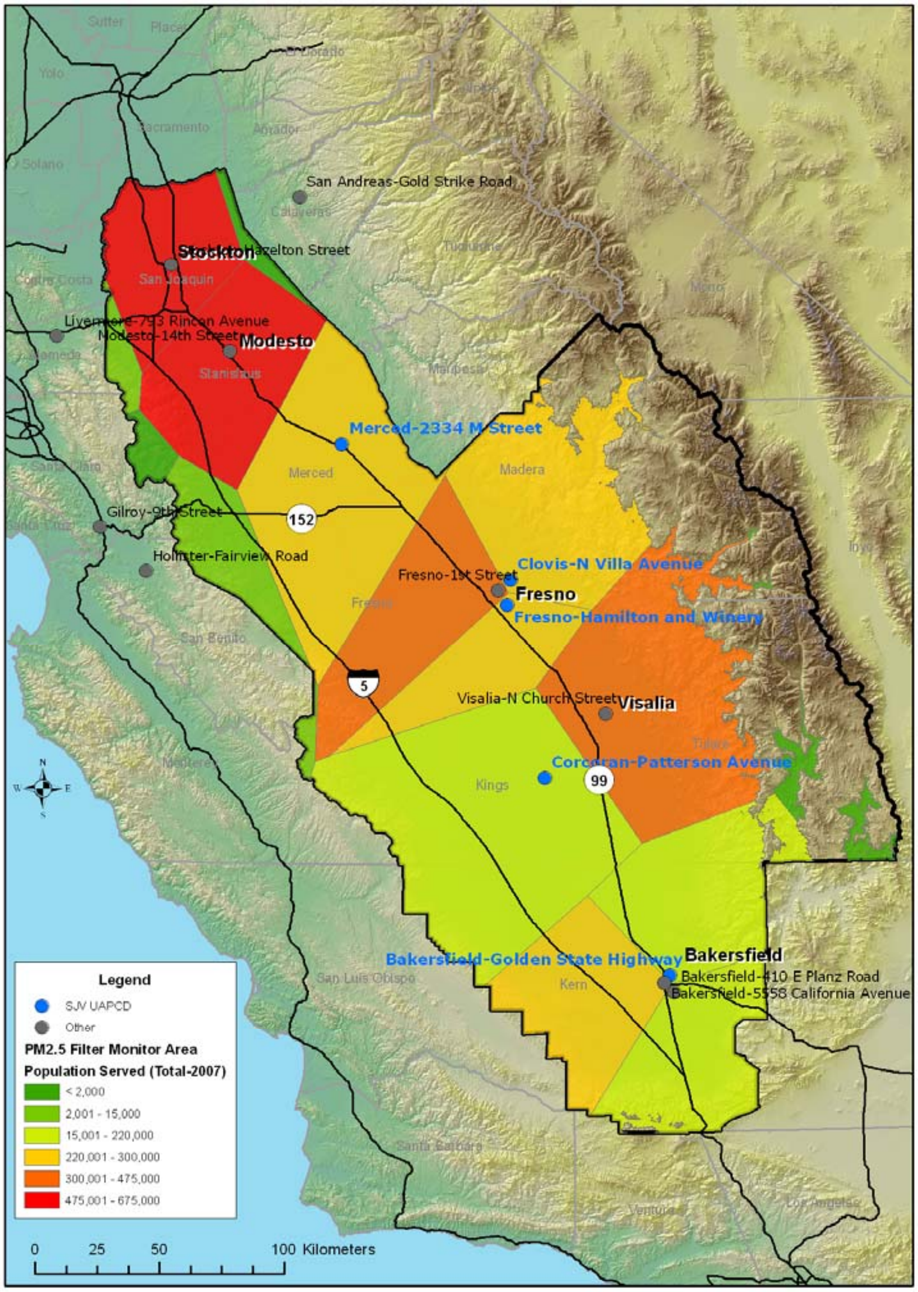
Population served for O_3 monitor areas, including planned site locations



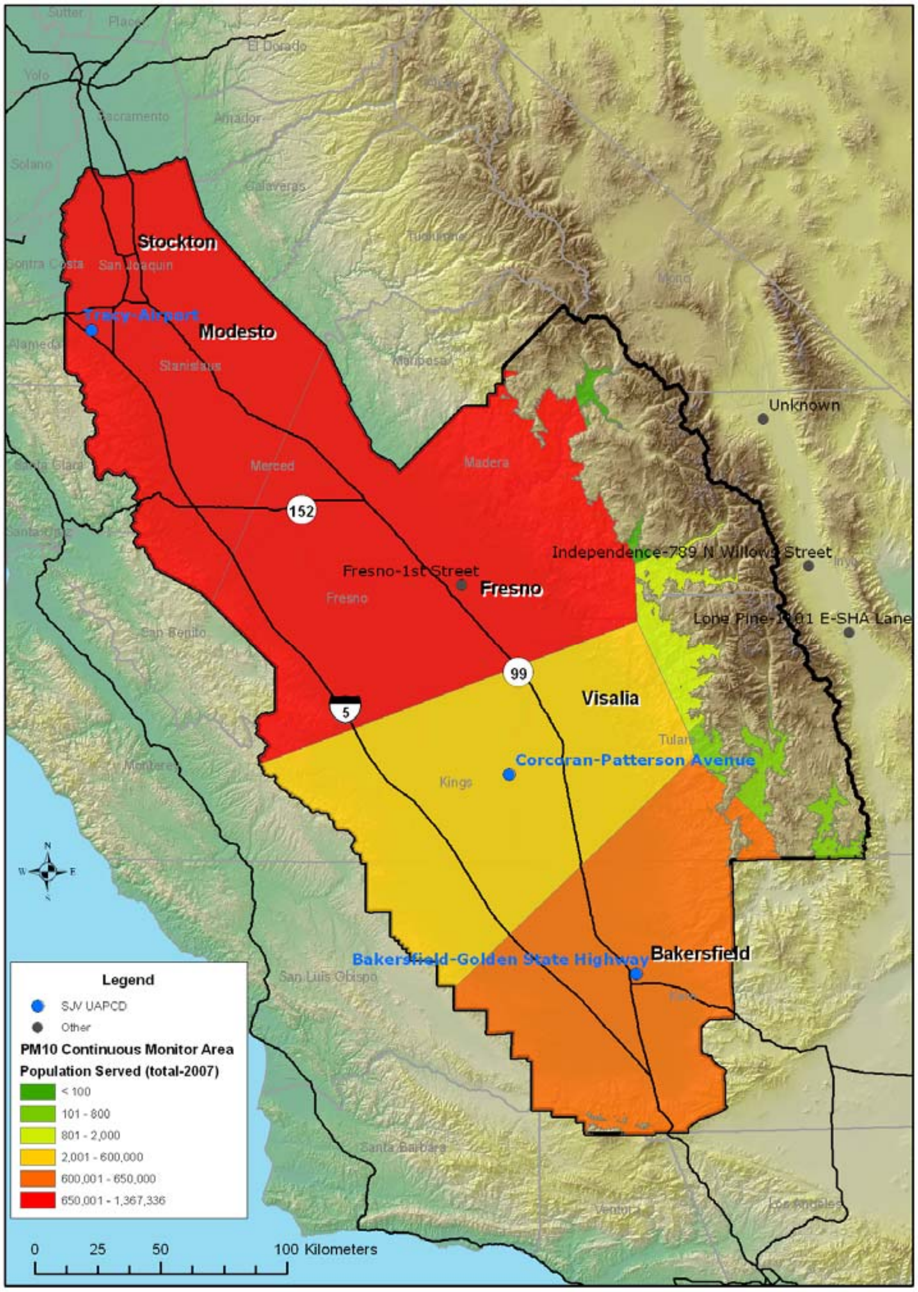
Population served for $PM_{2.5}$-1hr monitor areas



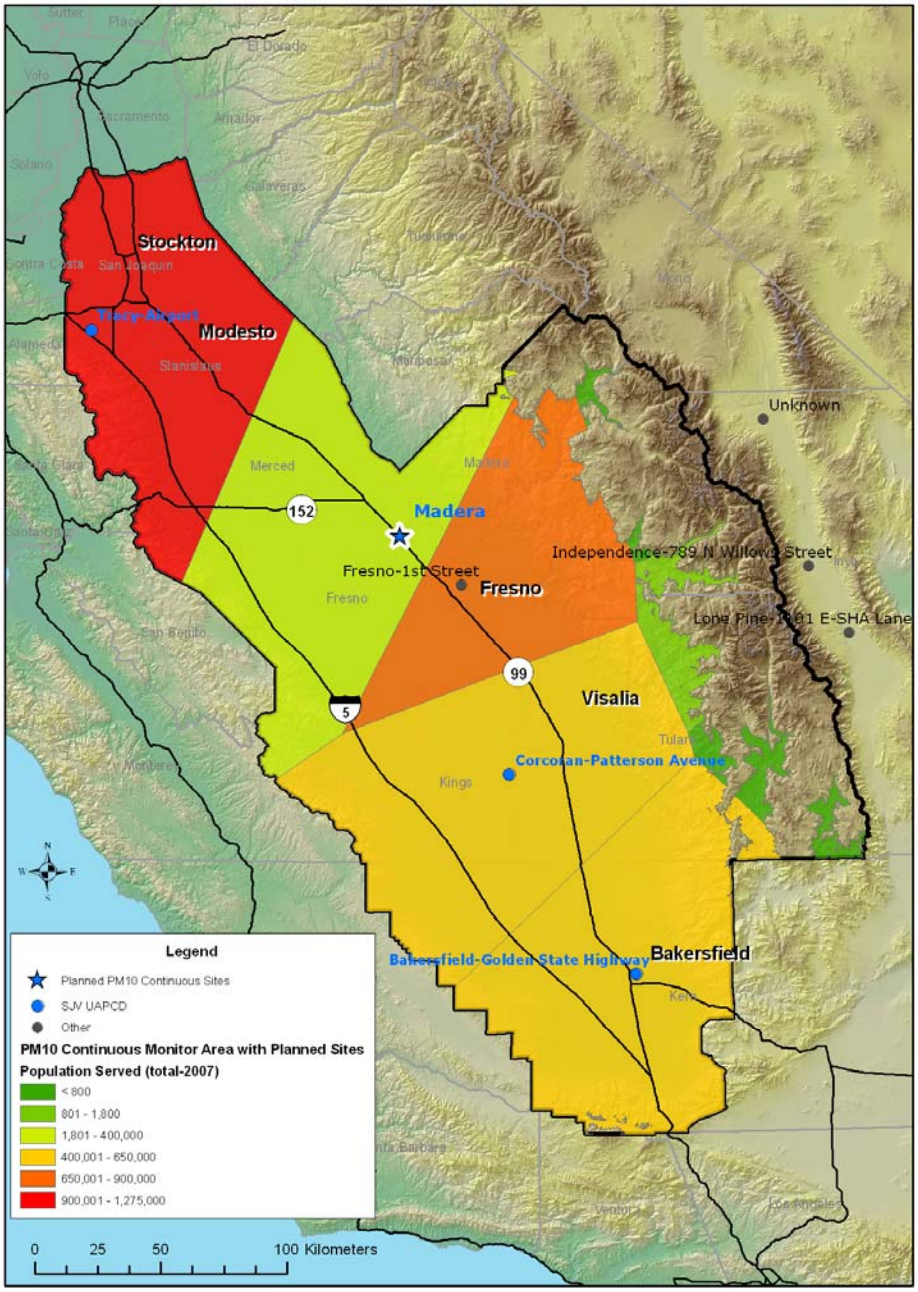
Population served for $PM_{2.5}$-1hr monitor areas, including planned site locations



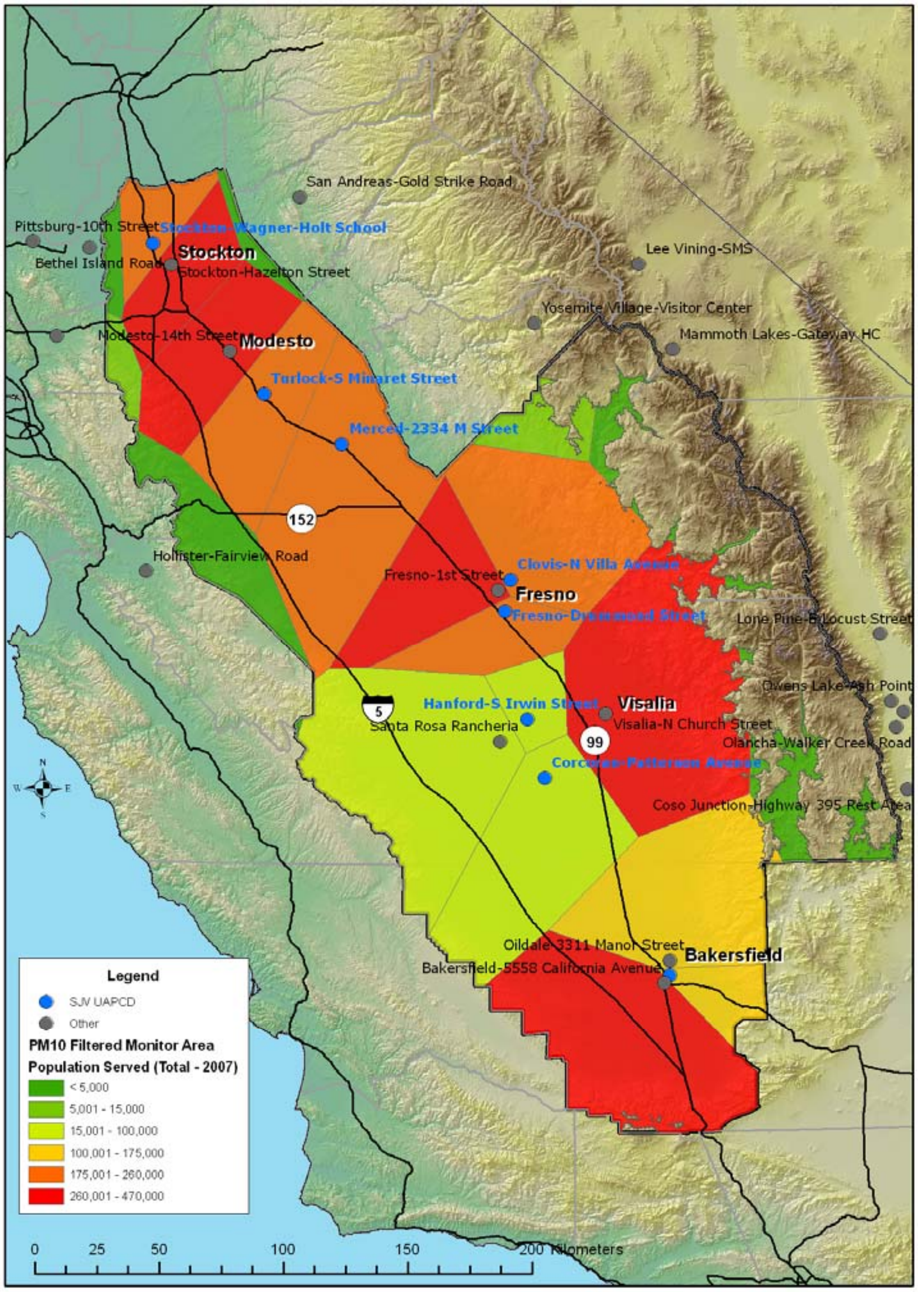
Population served for $PM_{2.5}$-24hr monitor areas



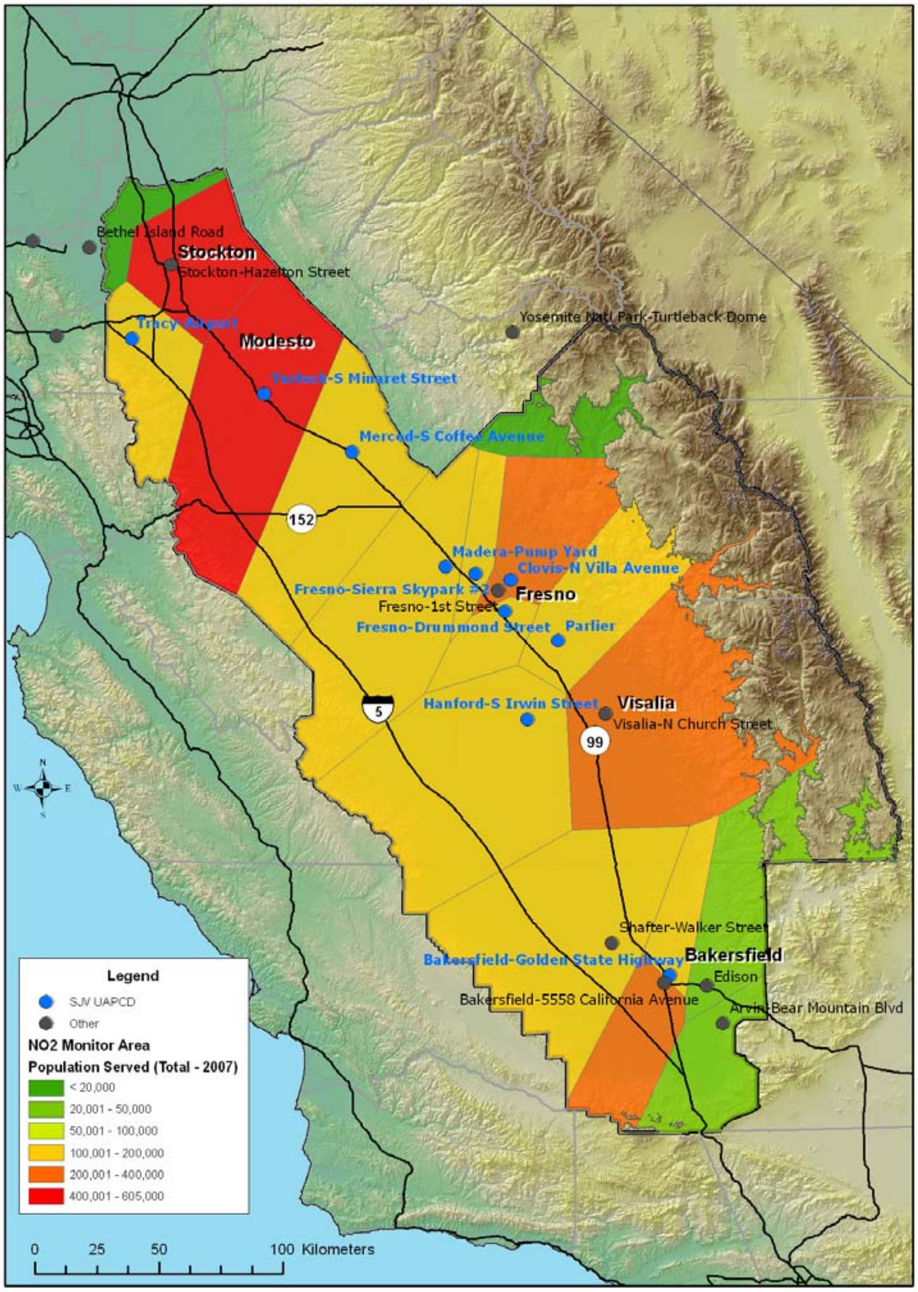
Population served for PM_{10}-1hr monitor areas



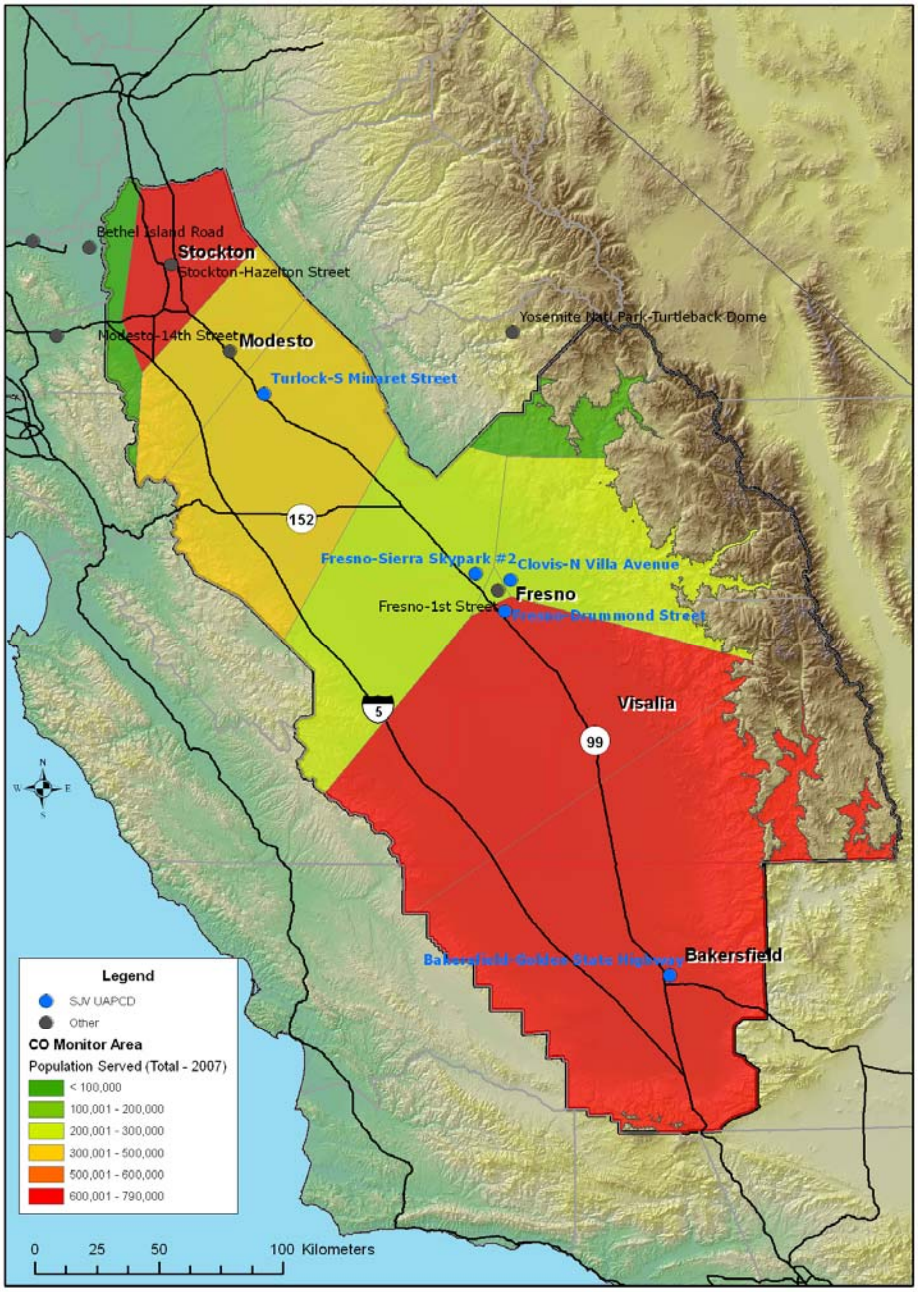
Population served for PM_{10}-1hr monitor areas, including planned site locations



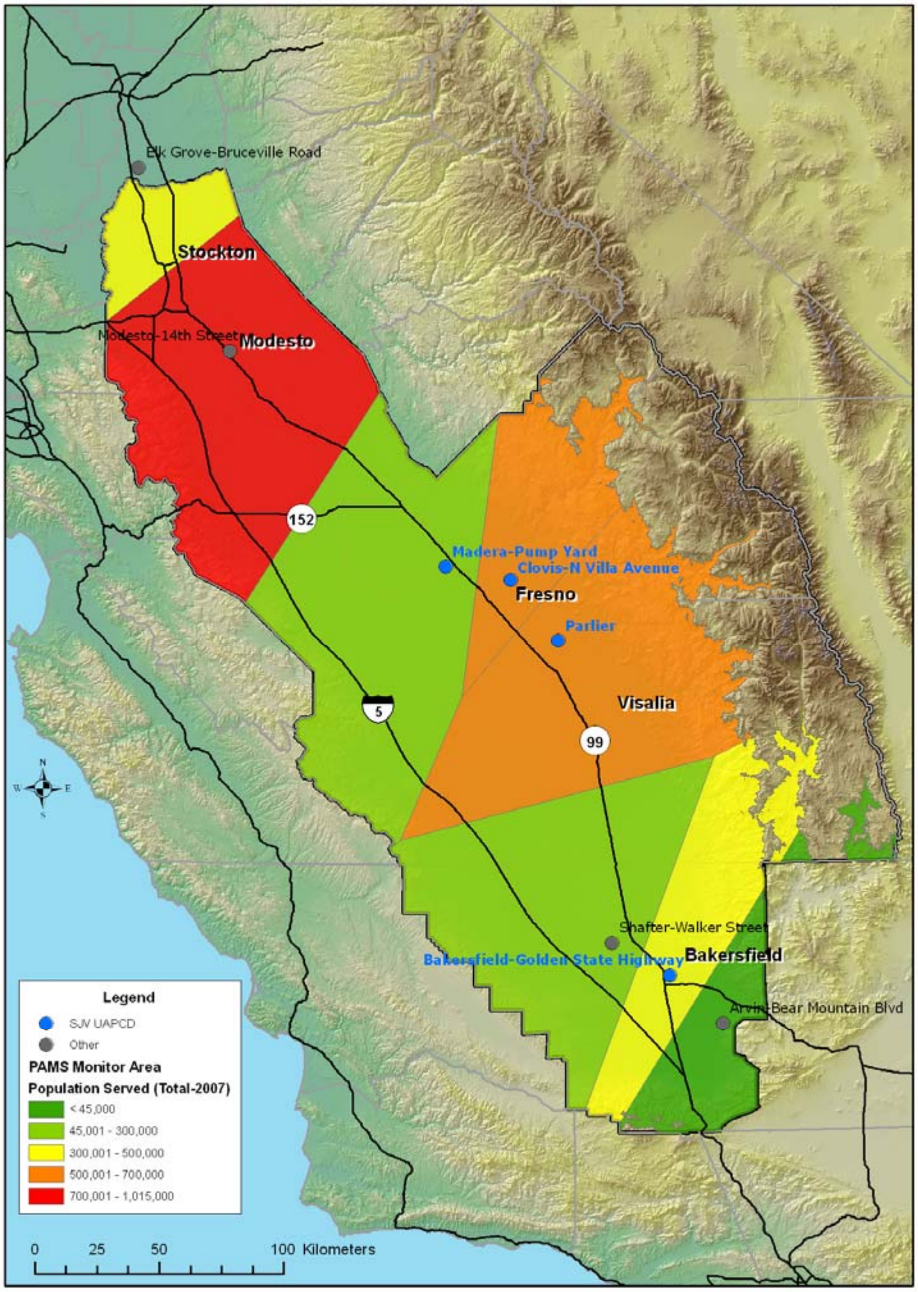
Population served for PM_{10}-24hr monitor areas



Population served for NO_2 monitor areas

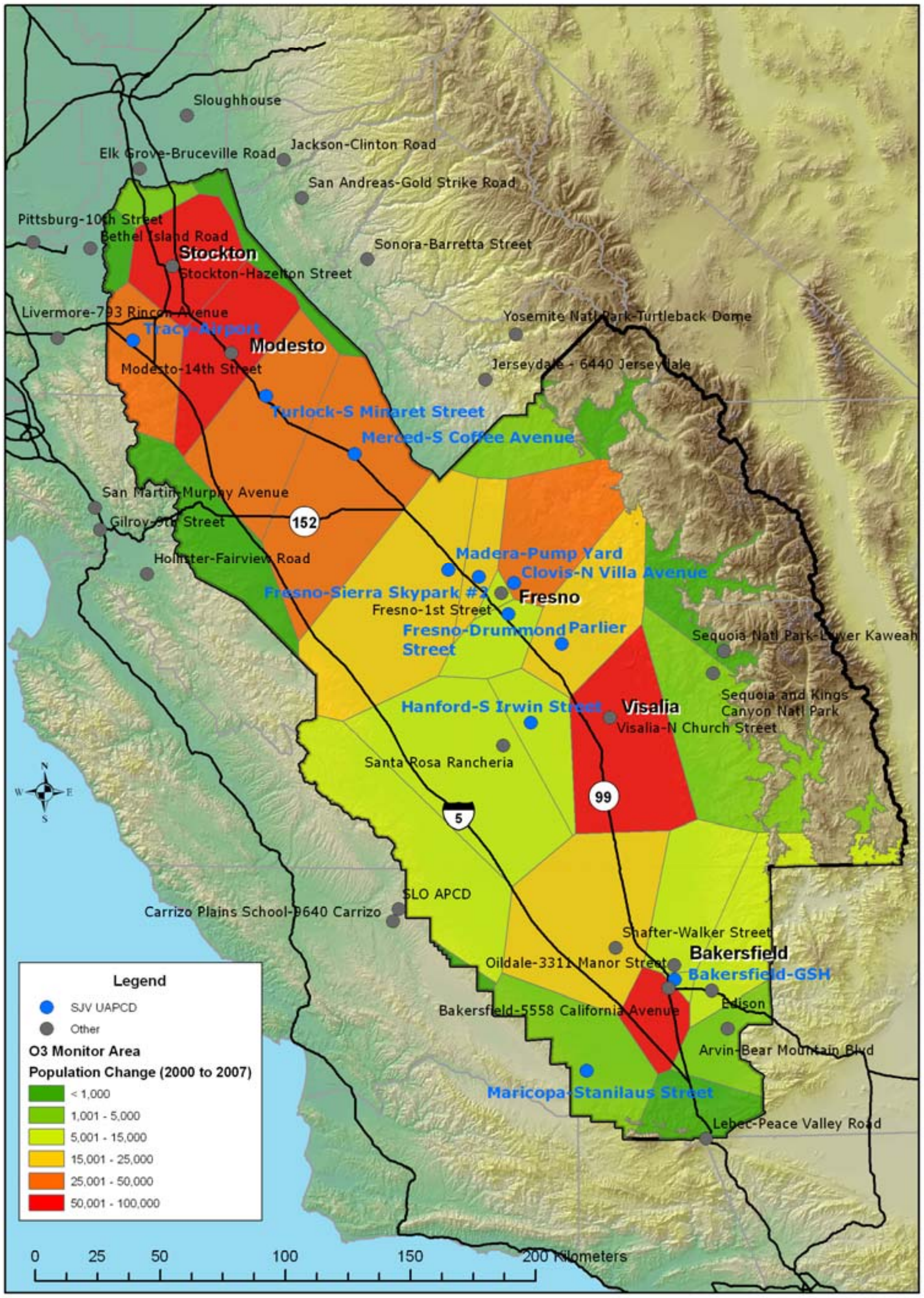


Population served for CO monitor areas

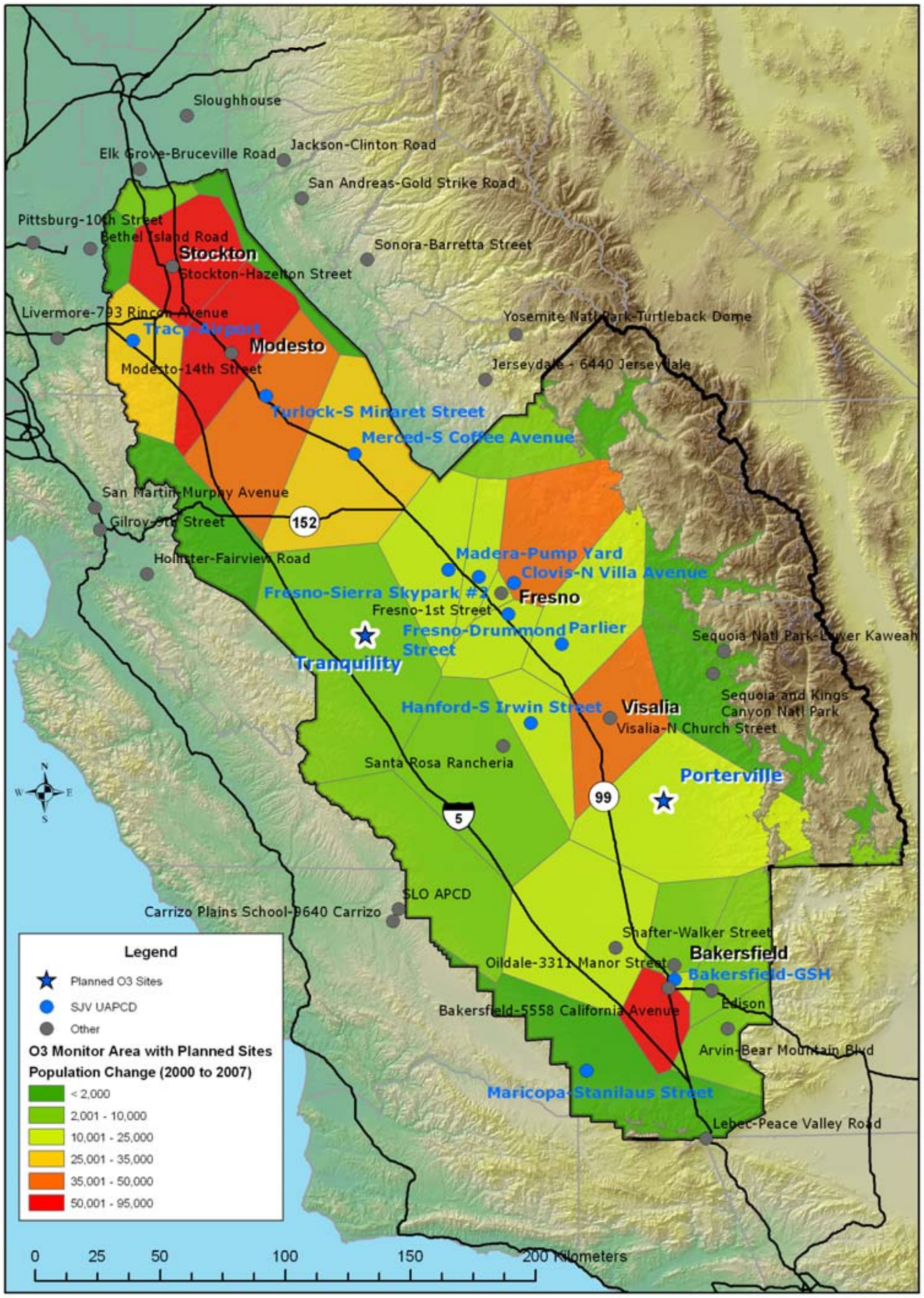


Population served for PAMS monitor areas

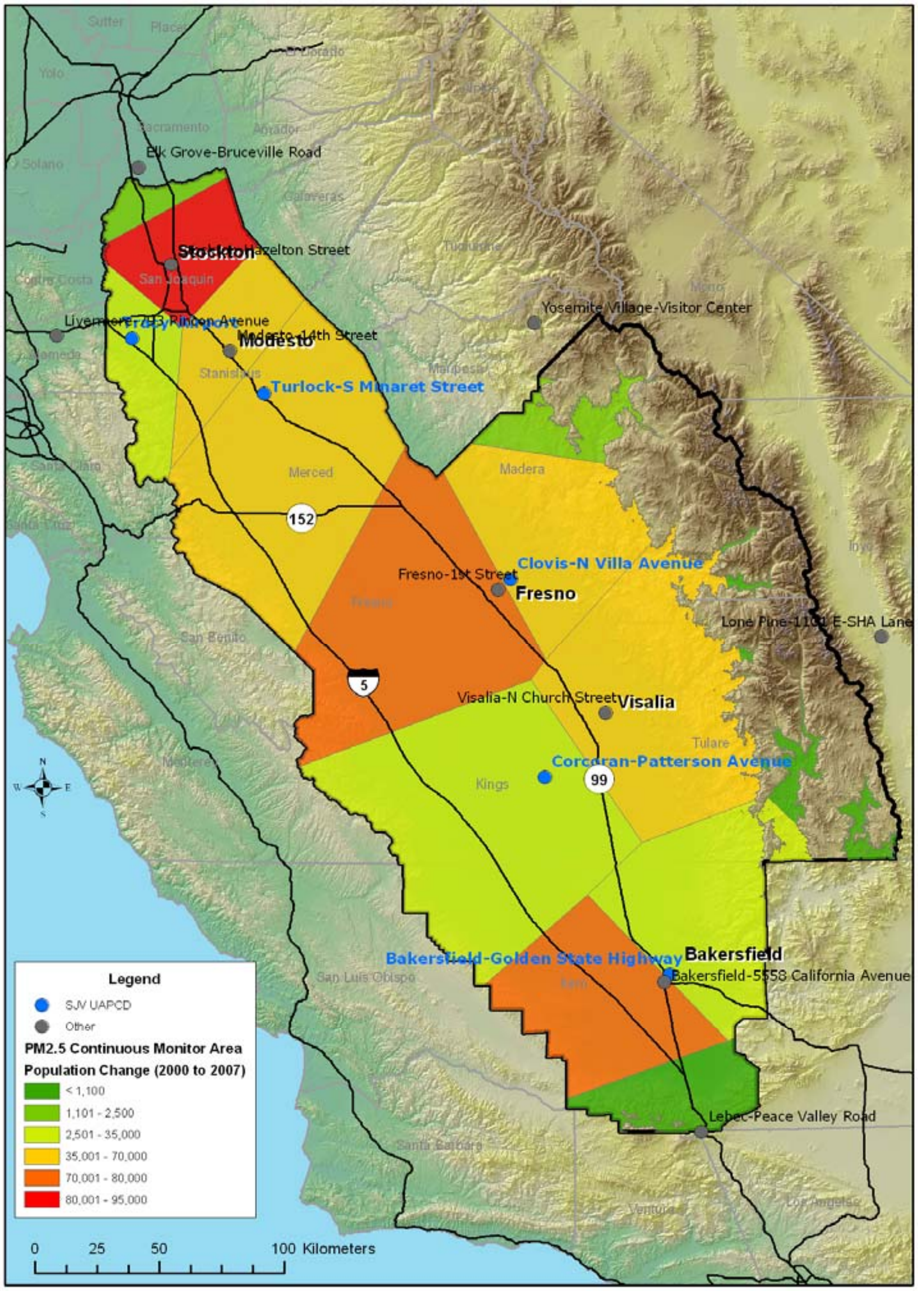
POPULATION CHANGE MAPS



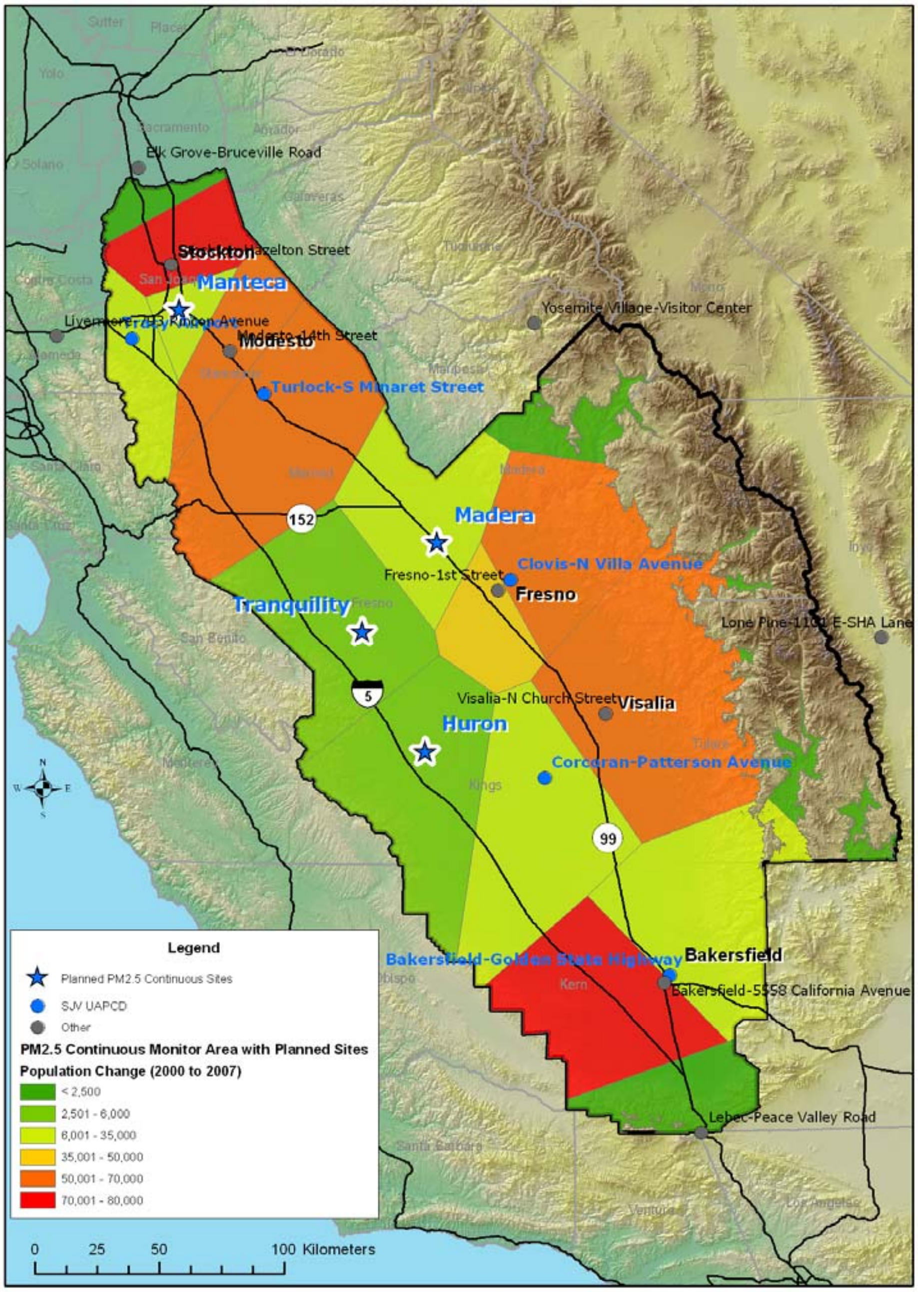
Population change served for O_3 monitor areas



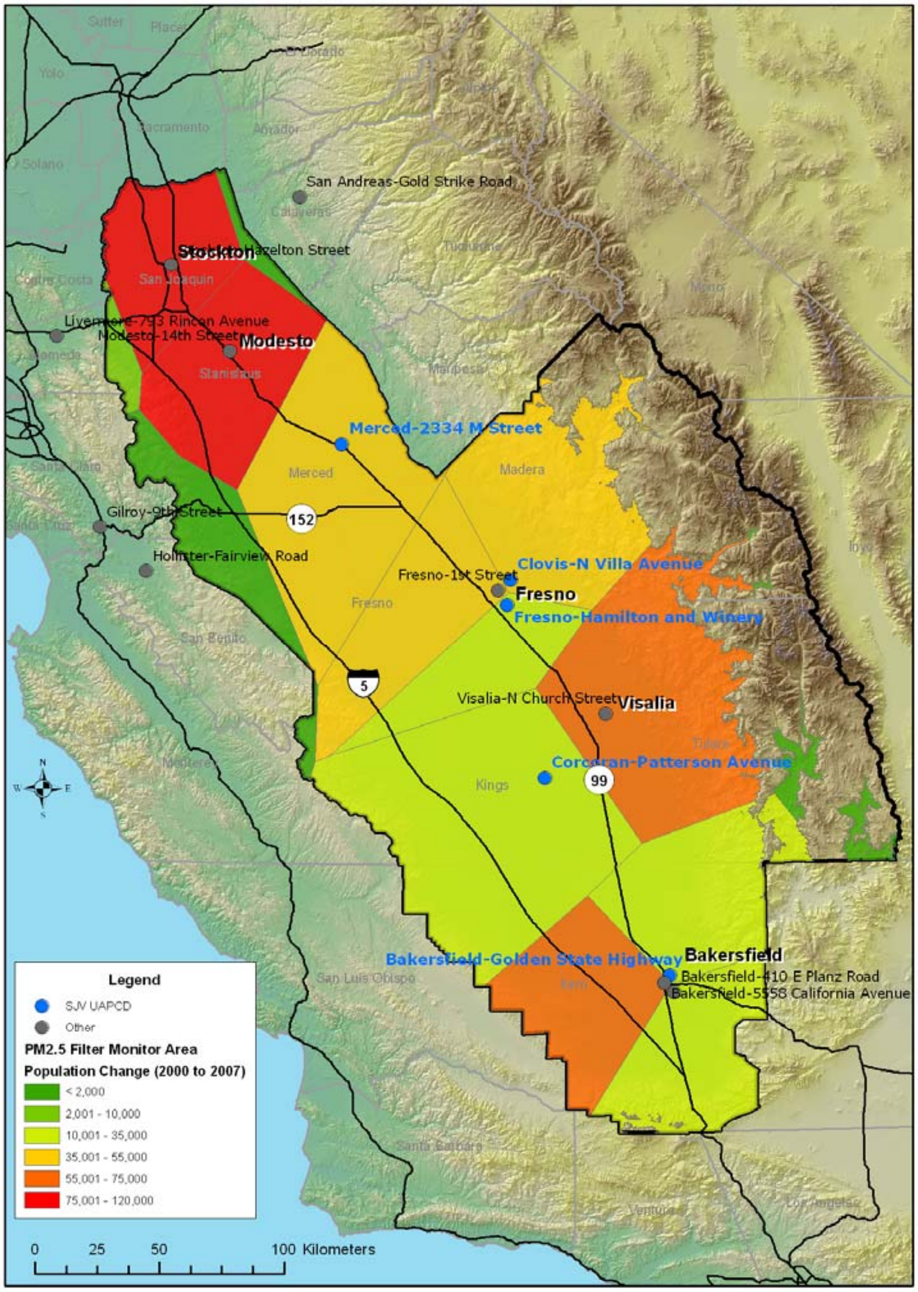
Population change served for O_3 monitor areas, including planned site locations



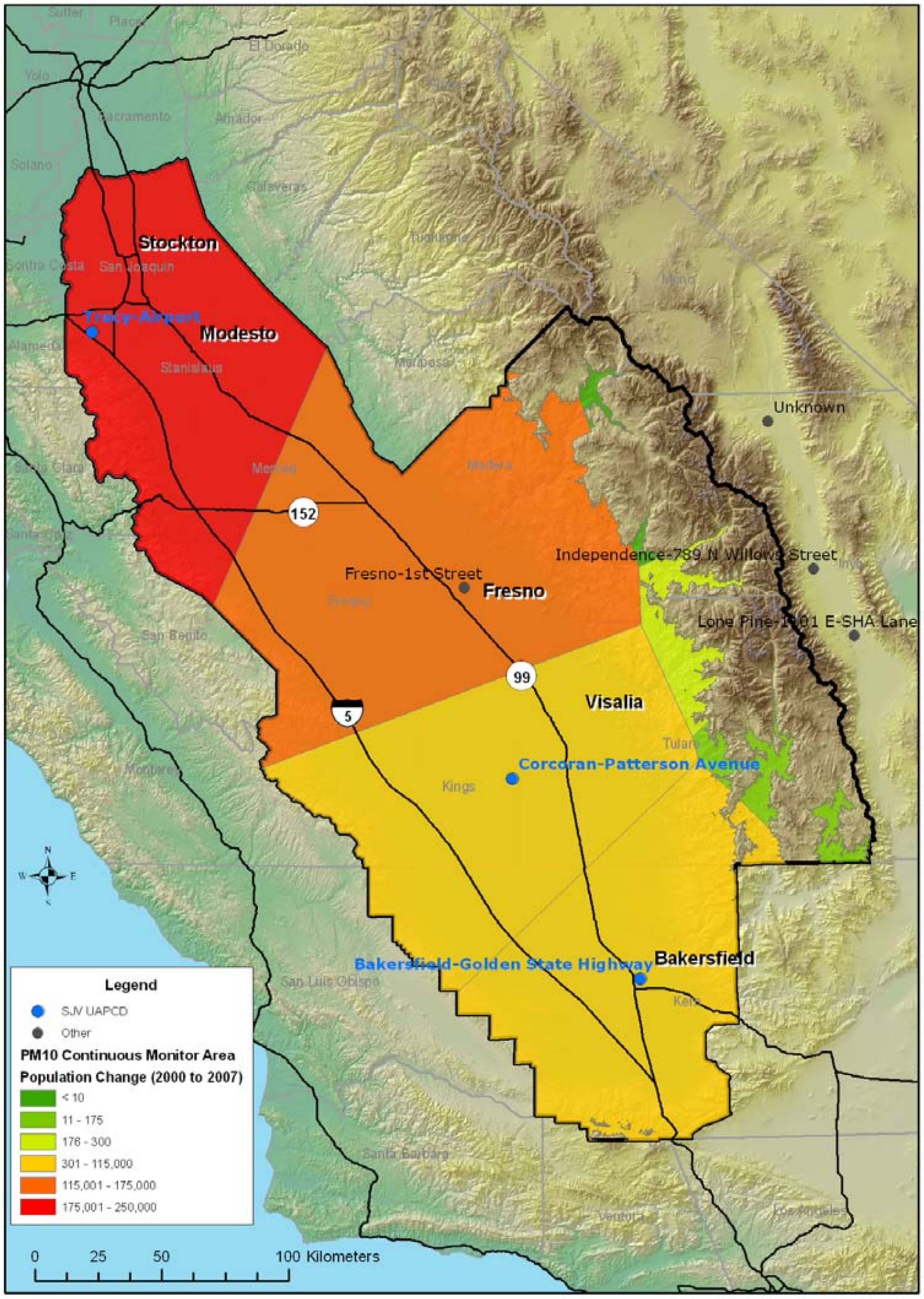
Population change served for $PM_{2.5}$-1hr monitor areas



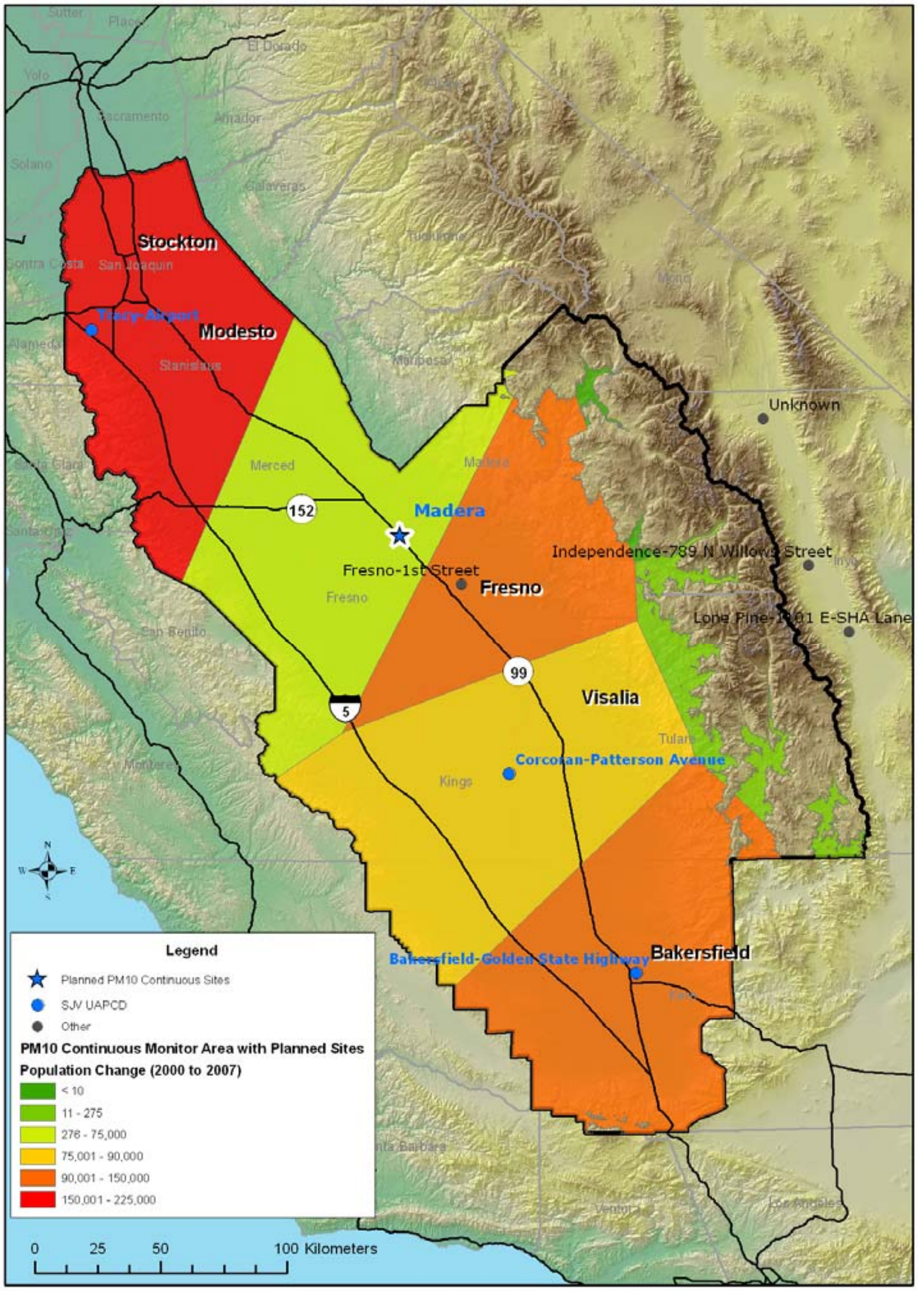
Population change served for $PM_{2.5}$-1hr monitor areas, including planned site locations



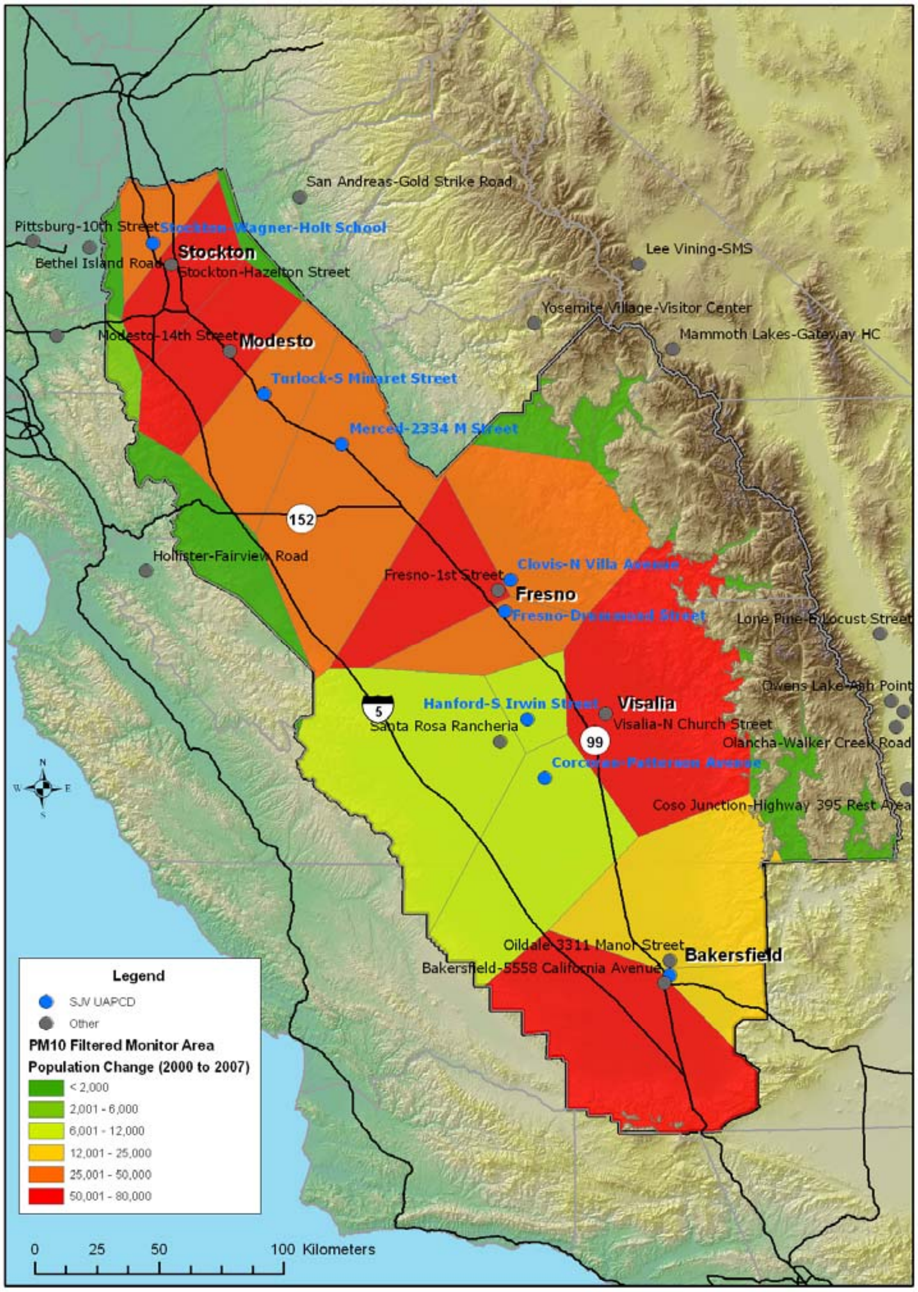
Population change served for $PM_{2.5}$-24hr monitor areas



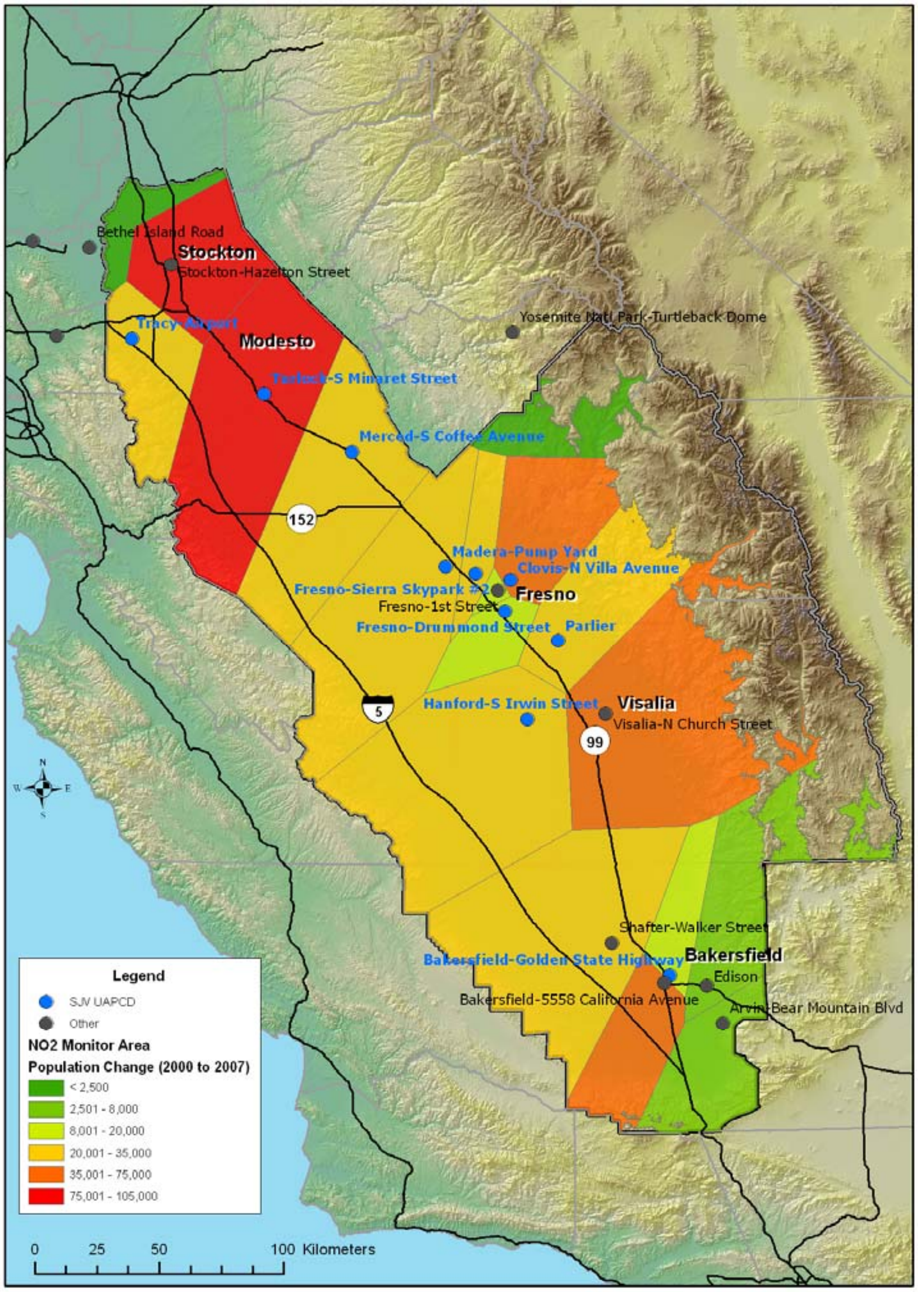
Population change served for PM_{10}-1hr monitor areas



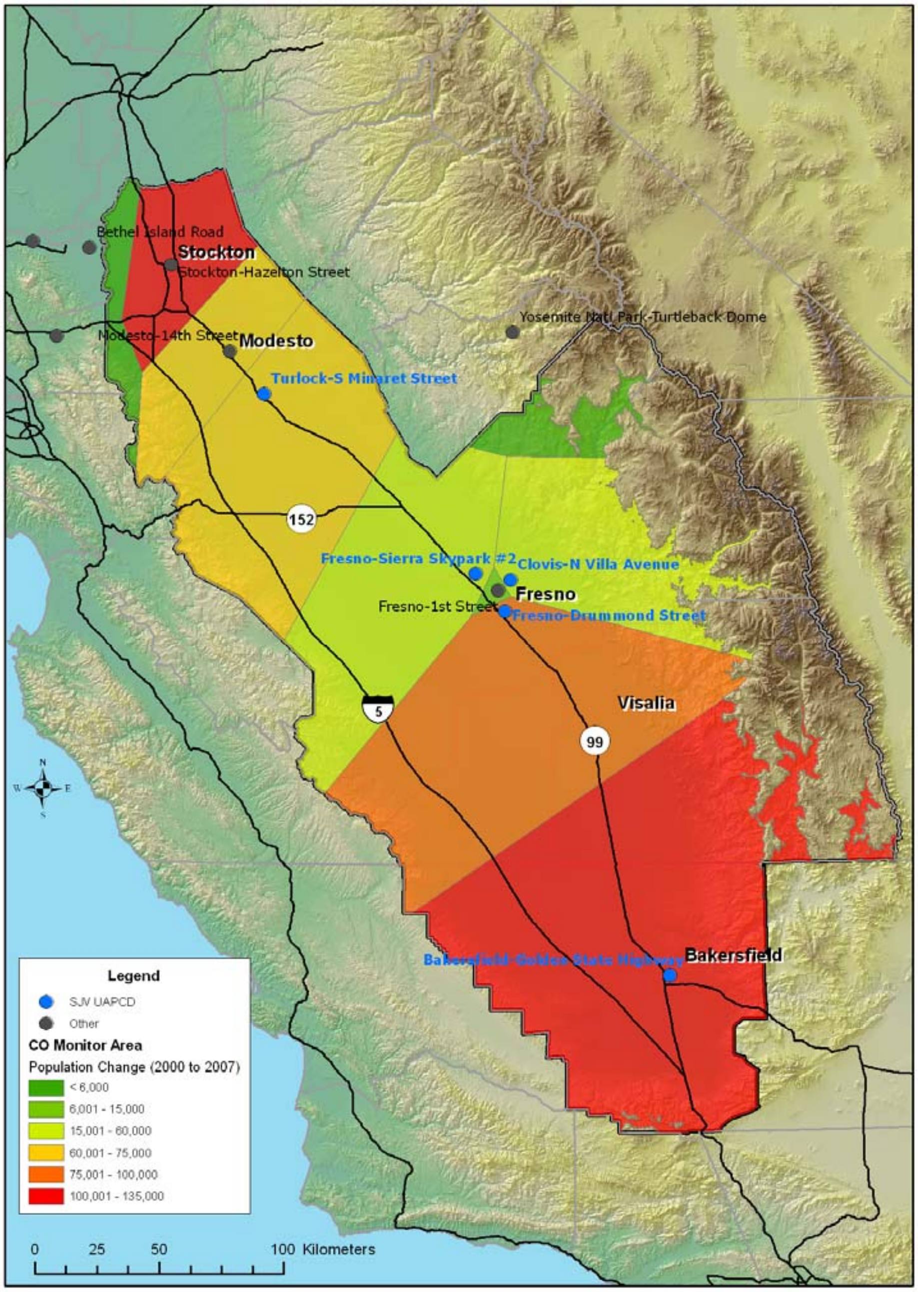
Population change served for PM10-1hr monitor areas, including planned site locations



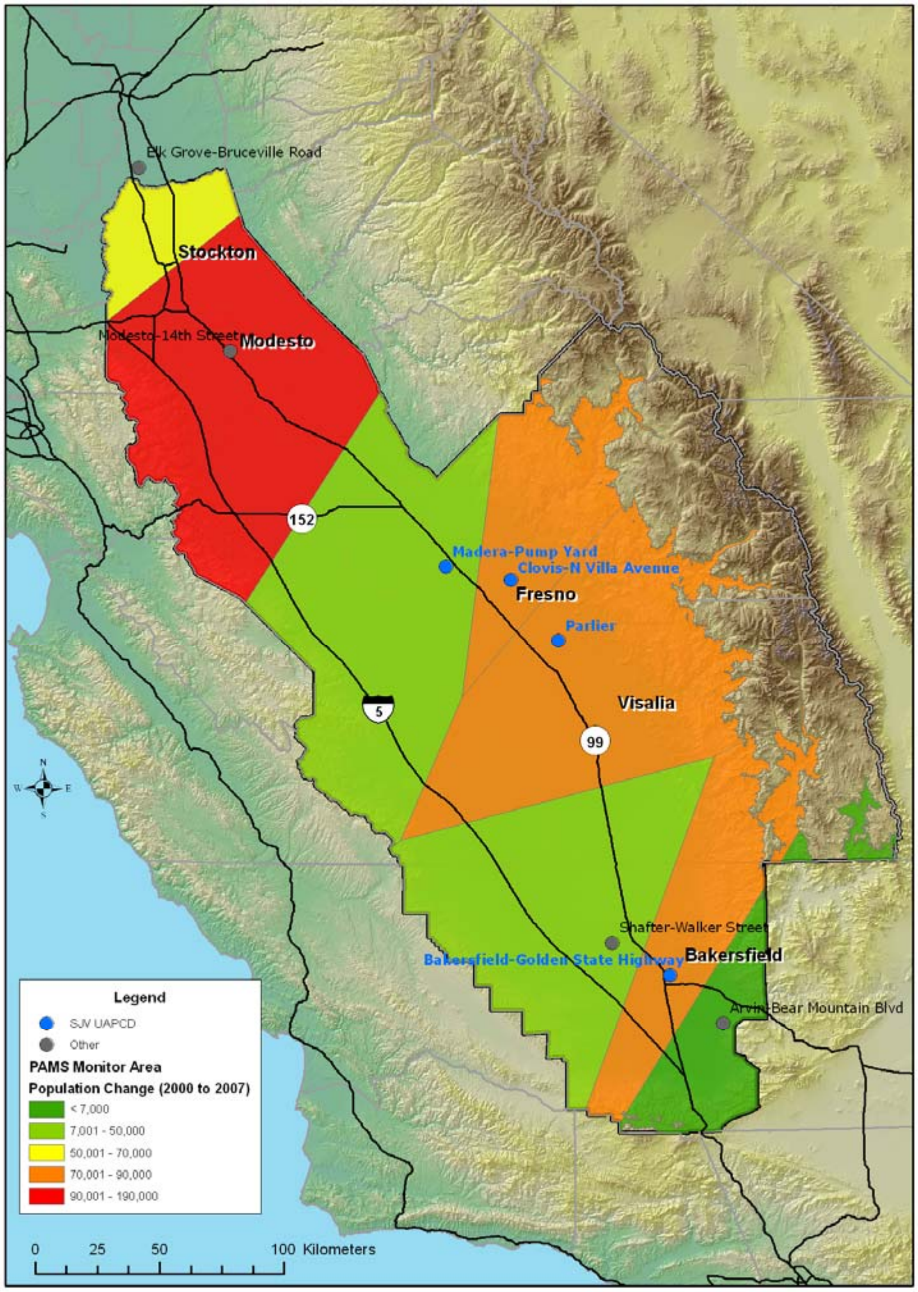
Population change served for PM_{10}-24hr monitor areas



Population change served for NO_2 monitor areas

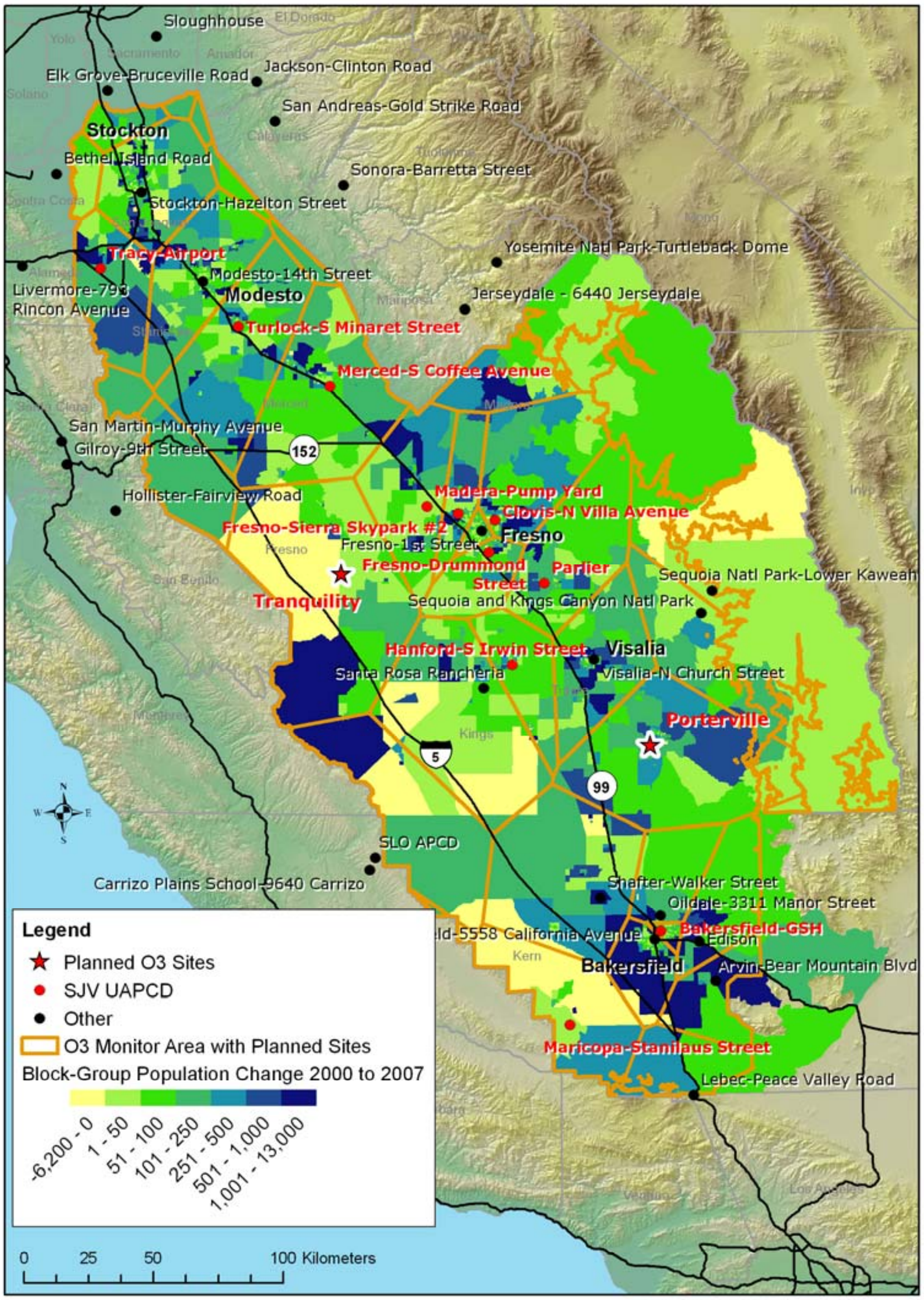


Population change served for CO monitor areas

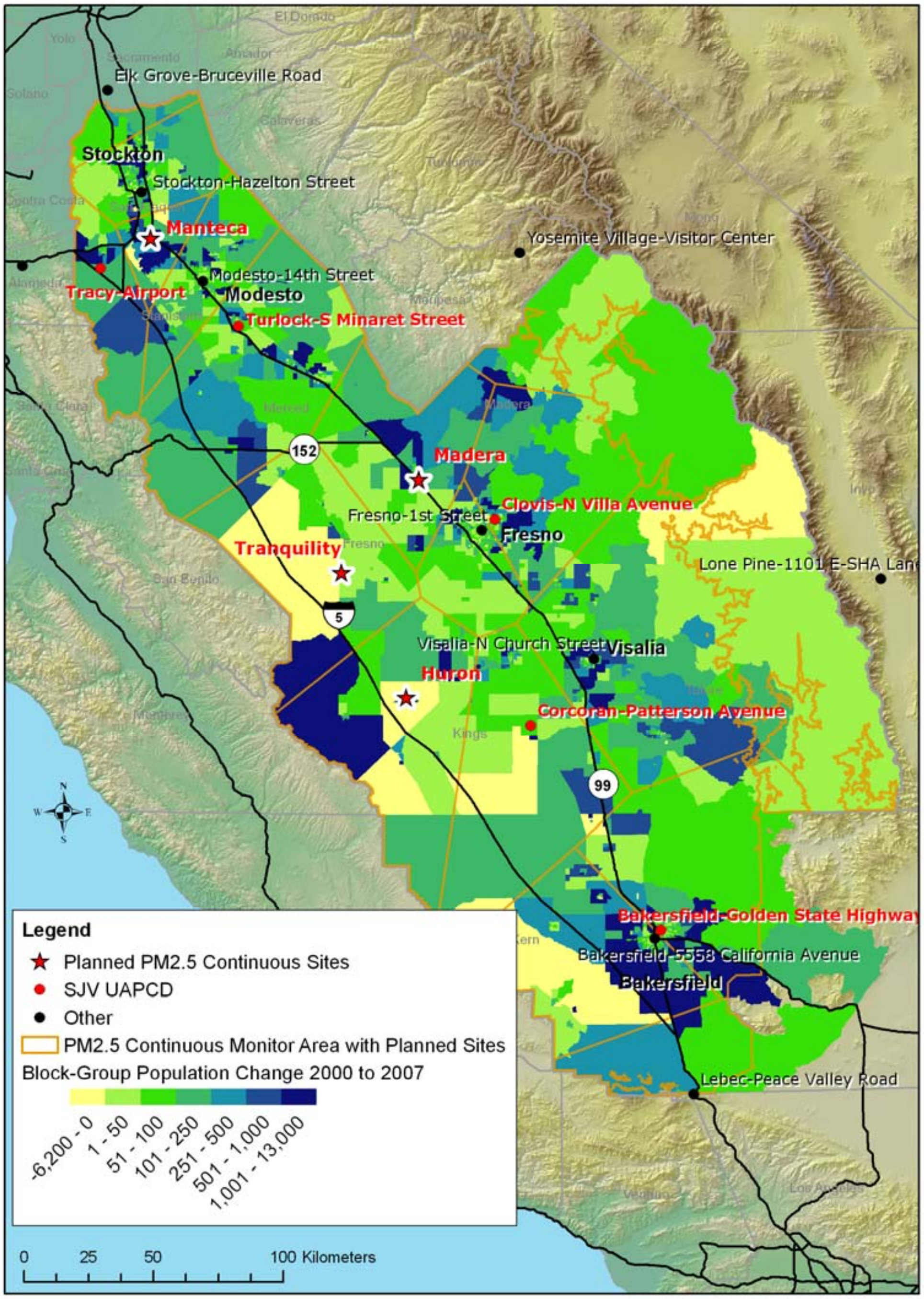


Population change served for PAMS monitor areas

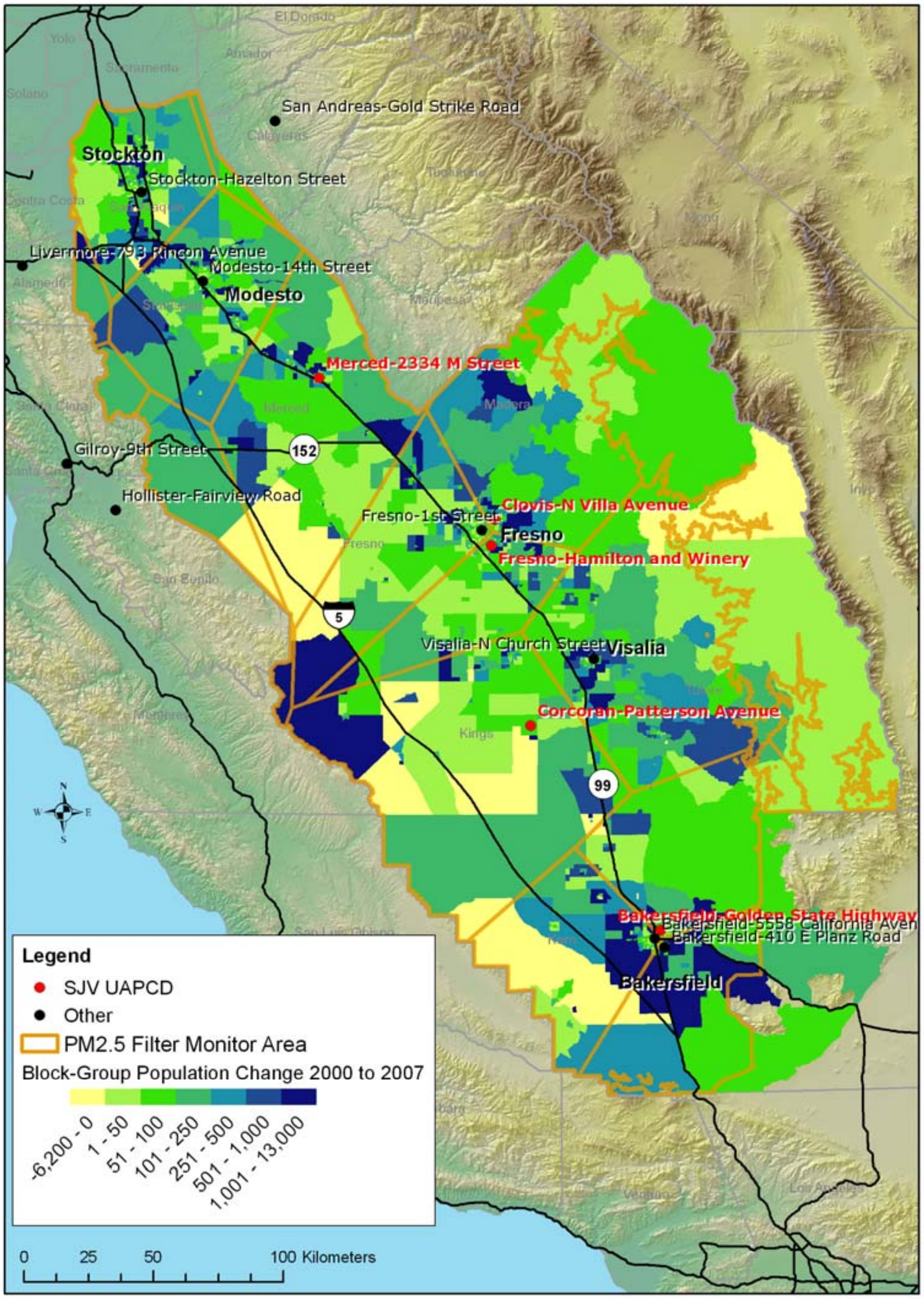
BLOCK-GROUP POPULATION CHANGE MAPS



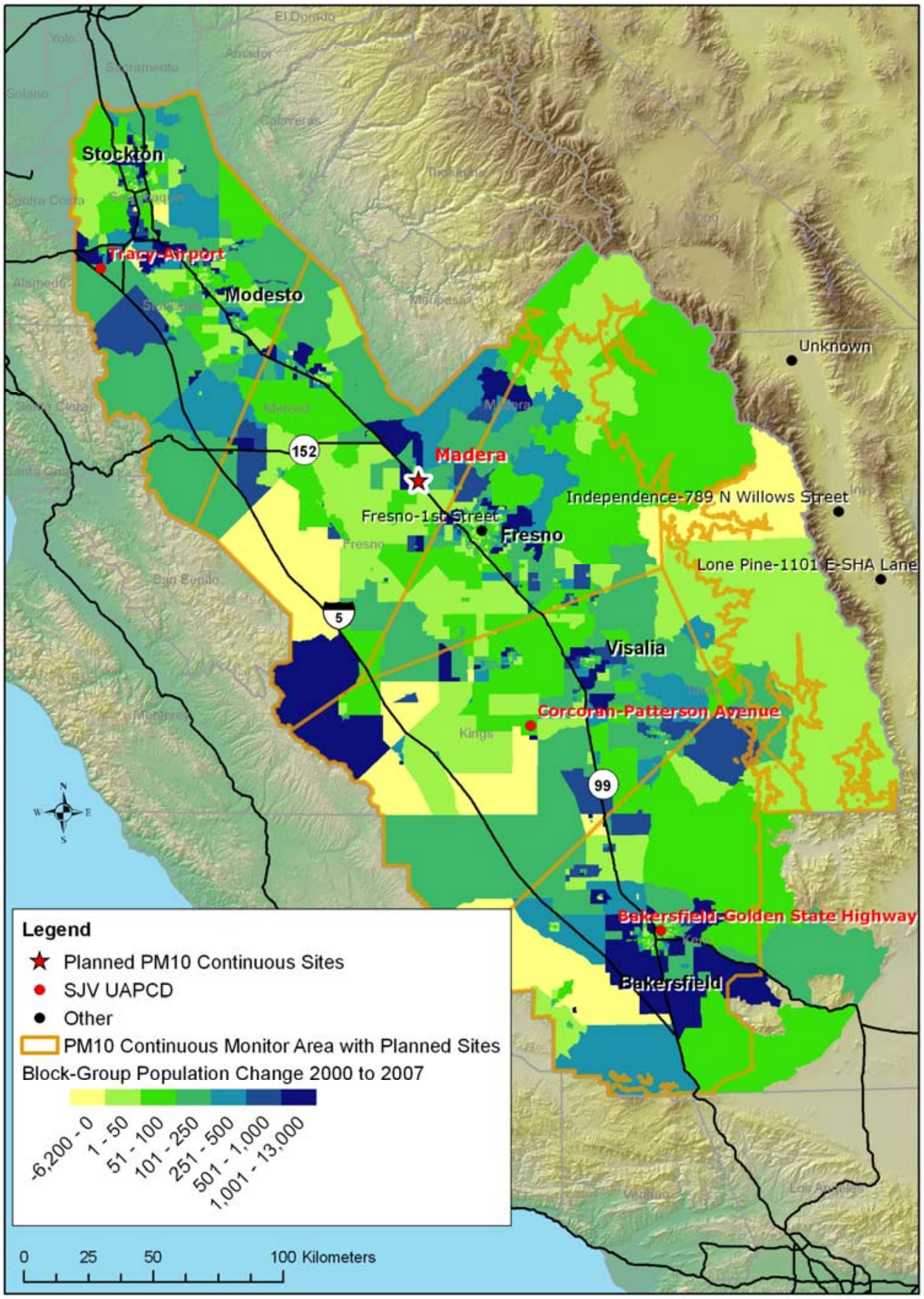
Block-group population change for O_3 monitor areas, including planned site locations



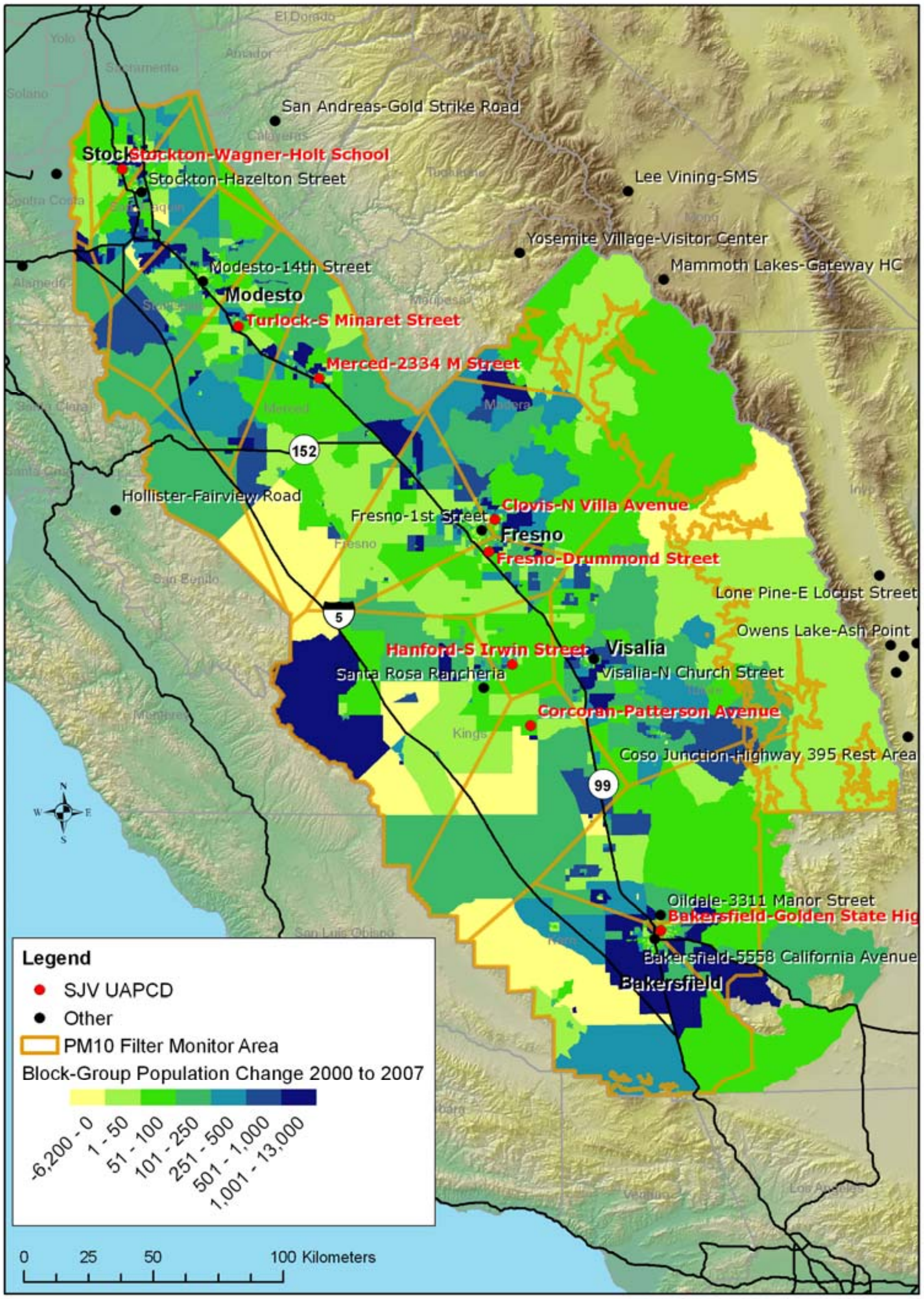
Block-group population change for $PM_{2.5}$-1hr monitor areas, including planned site locations



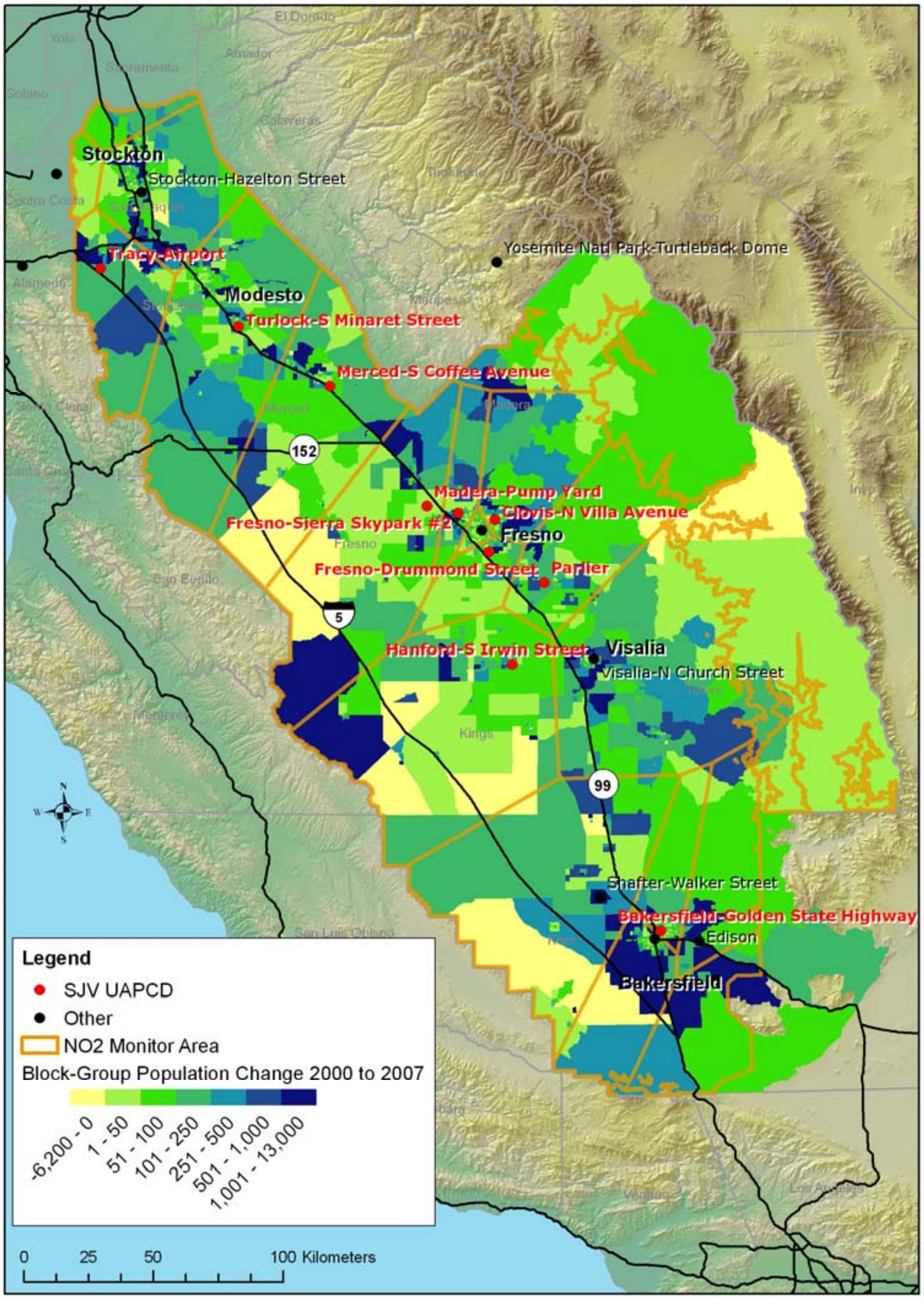
Block-group population change for $PM_{2.5}$-24hr monitor areas



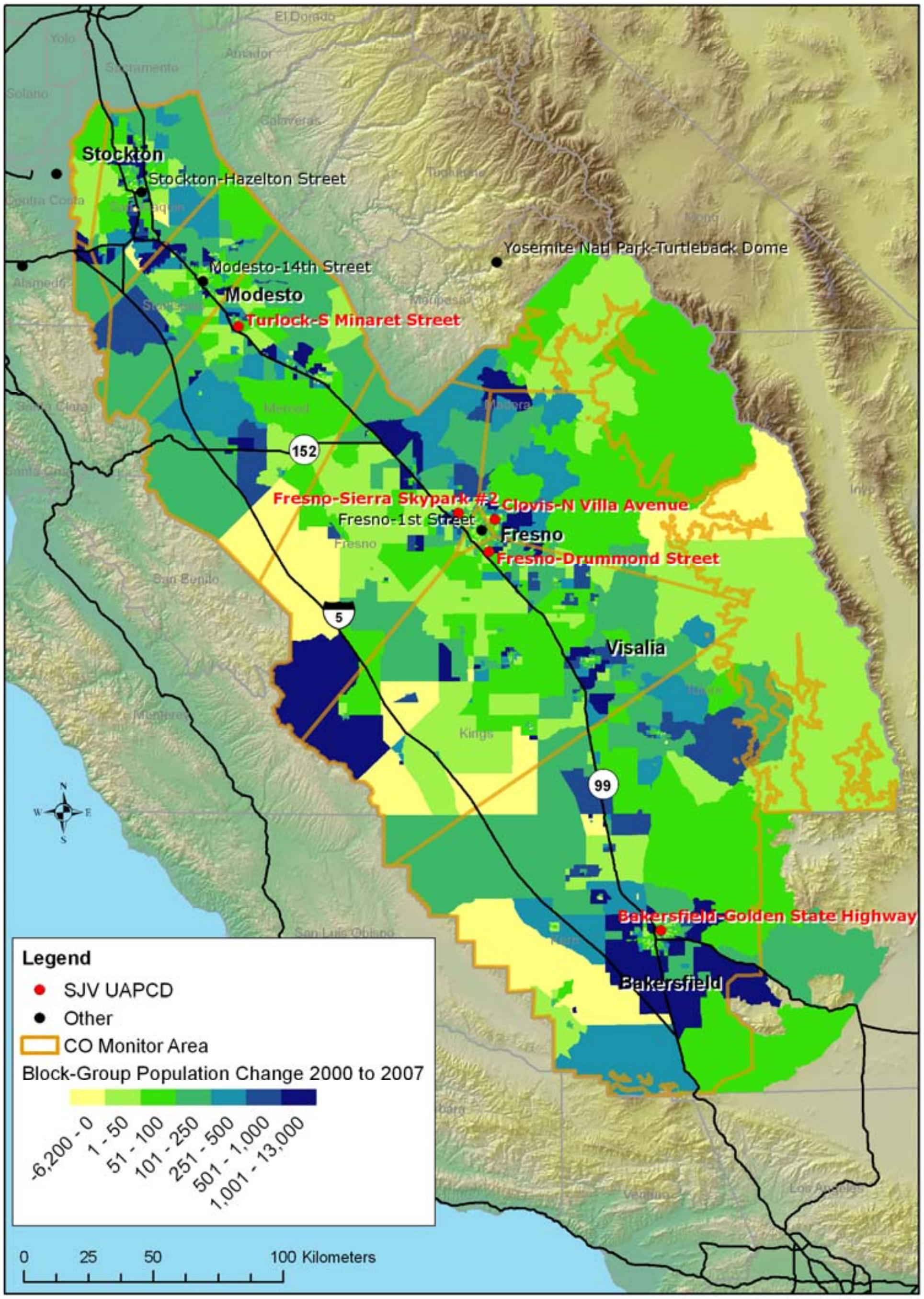
Block-group population change for PM_{10}-1hr monitor areas, including planned site locations



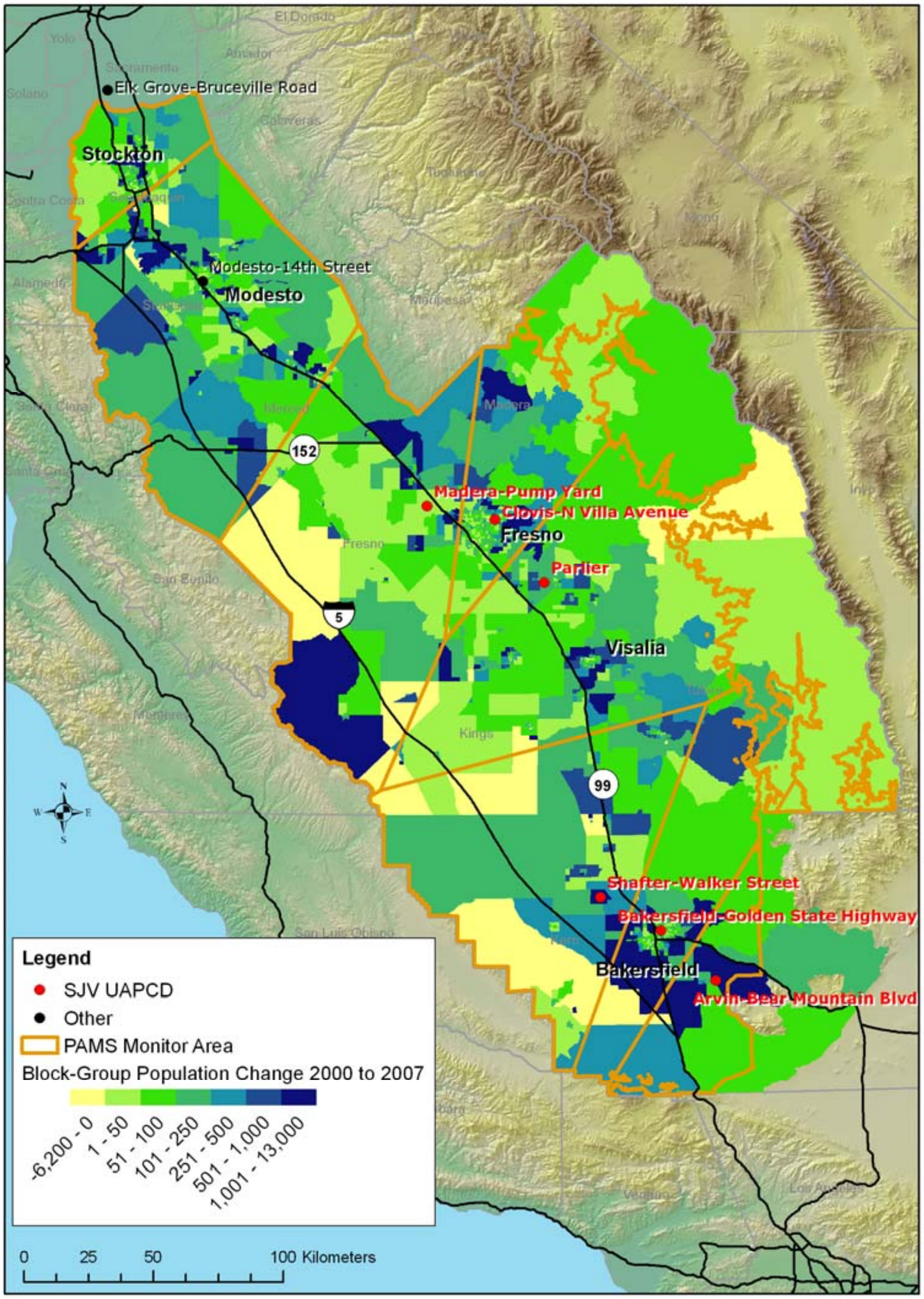
Block-group population change for PM_{10}-24hr monitor areas



Block-group population change for NO_2 monitor areas

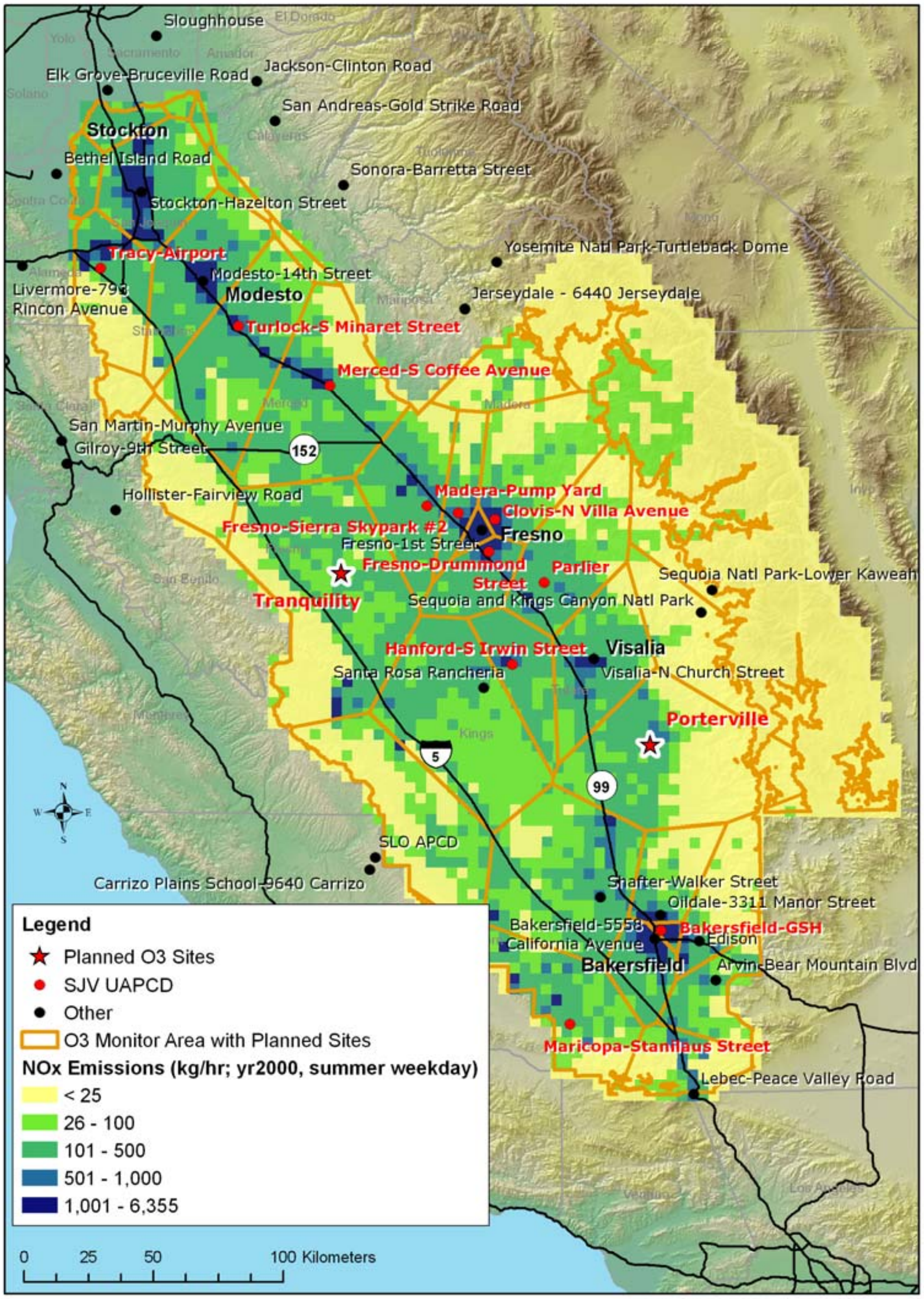


Block-group population change for CO monitor areas

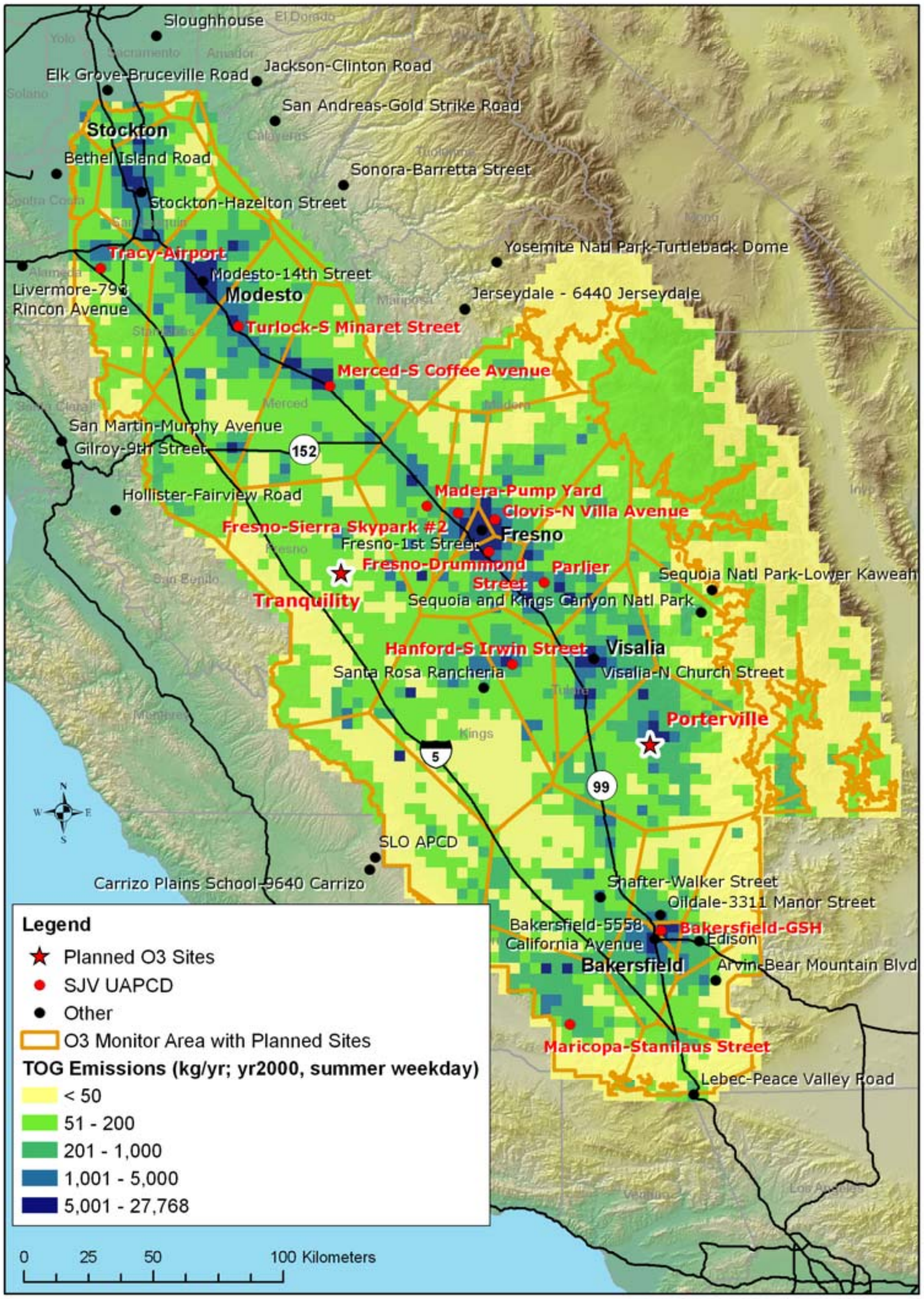


Block-group population change for PAMS monitor areas

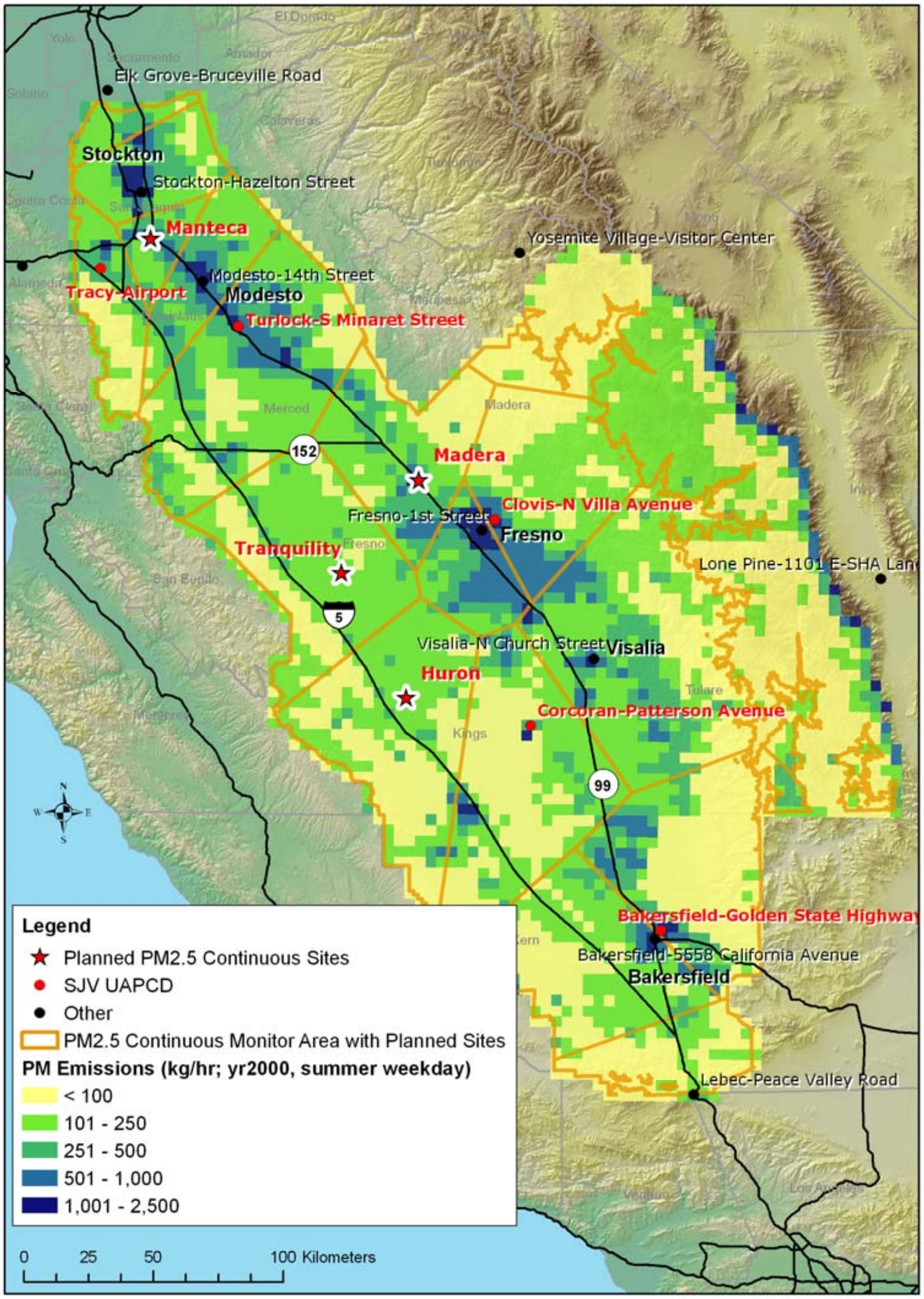
SPATIALLY RESOLVED EMISSIONS MAPS



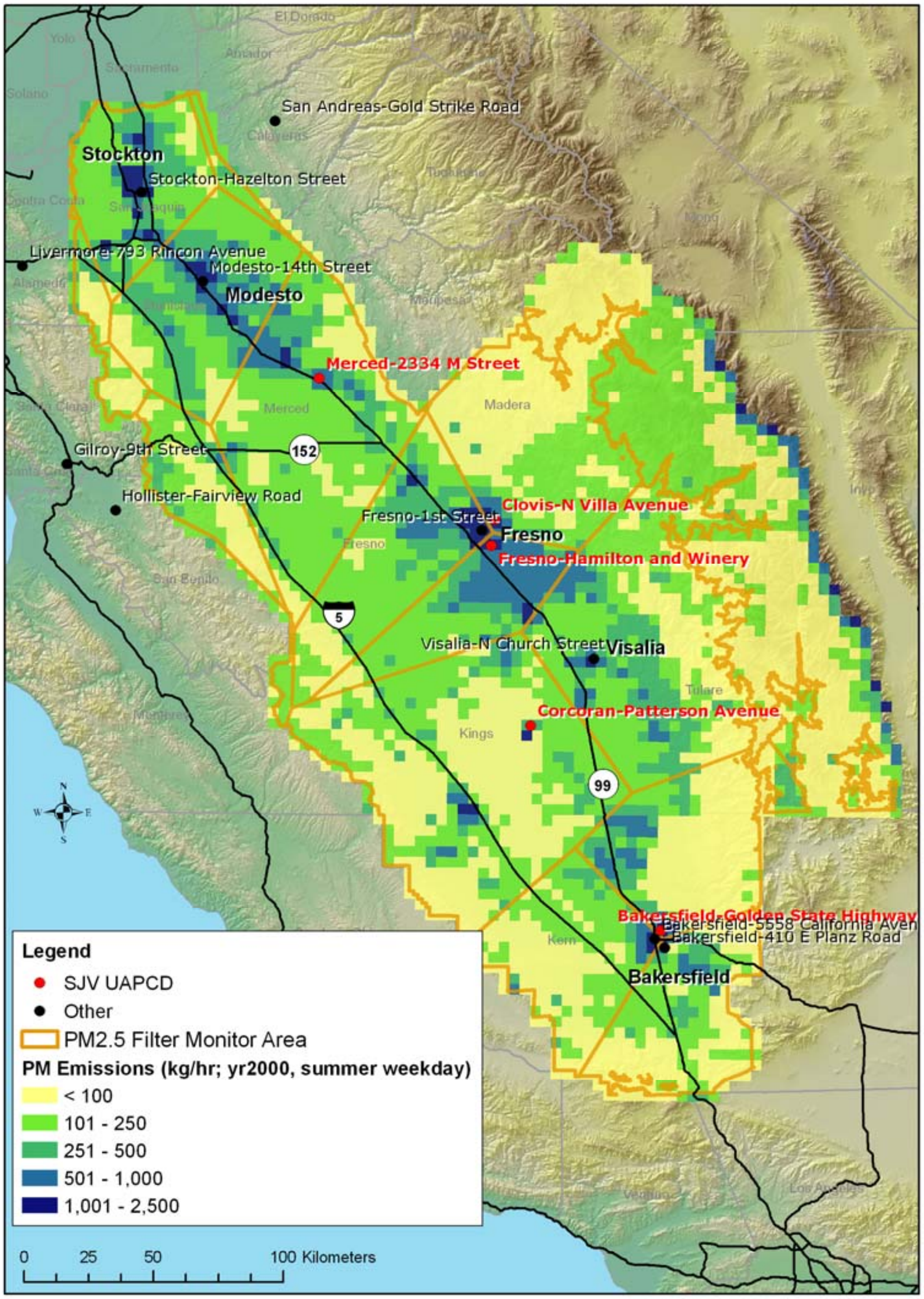
Spatially resolved NO_x emissions served for O_3 monitor areas, including planned site locations



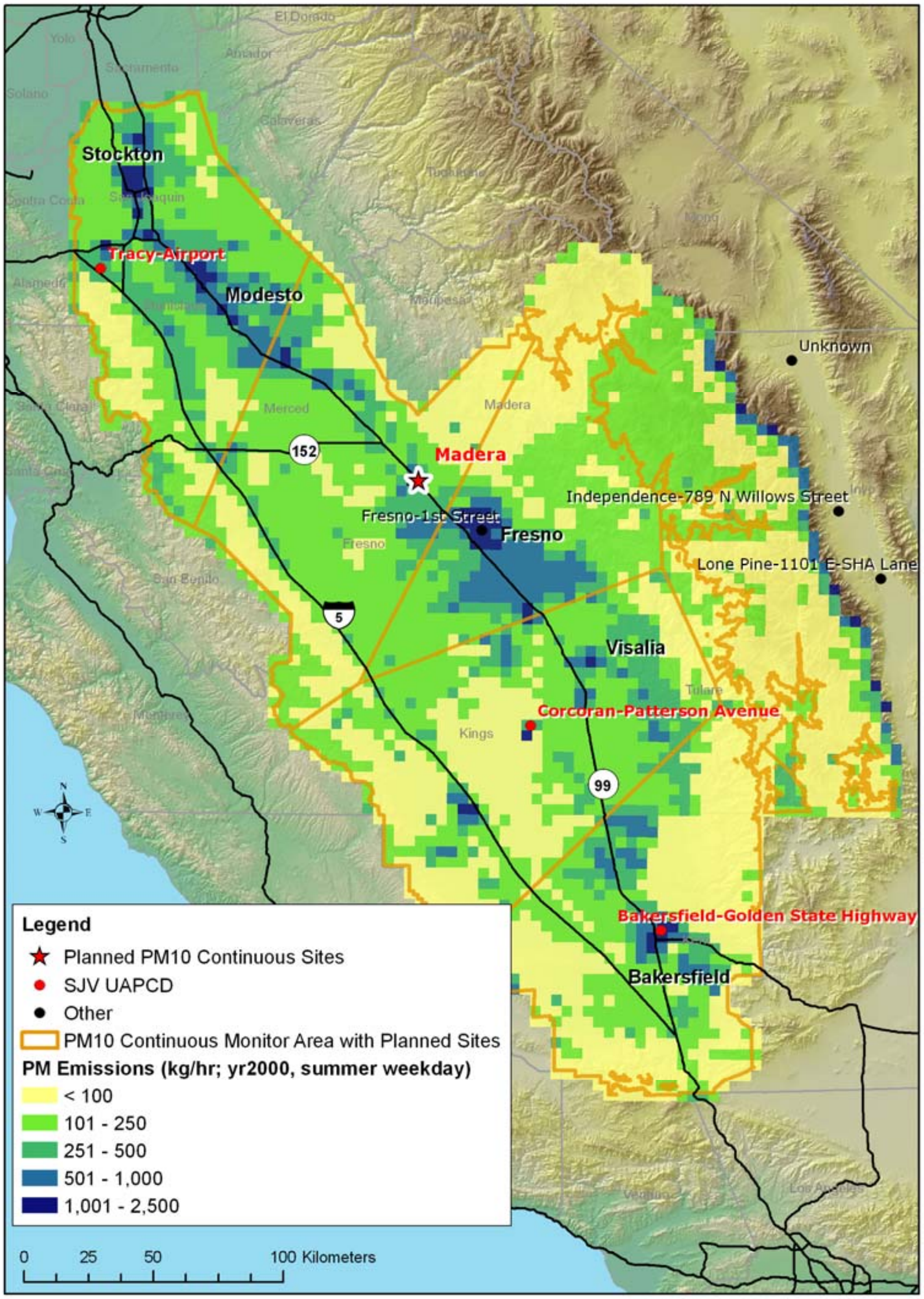
Spatially resolved TOG emissions served for O_3 monitor areas, including planned site locations



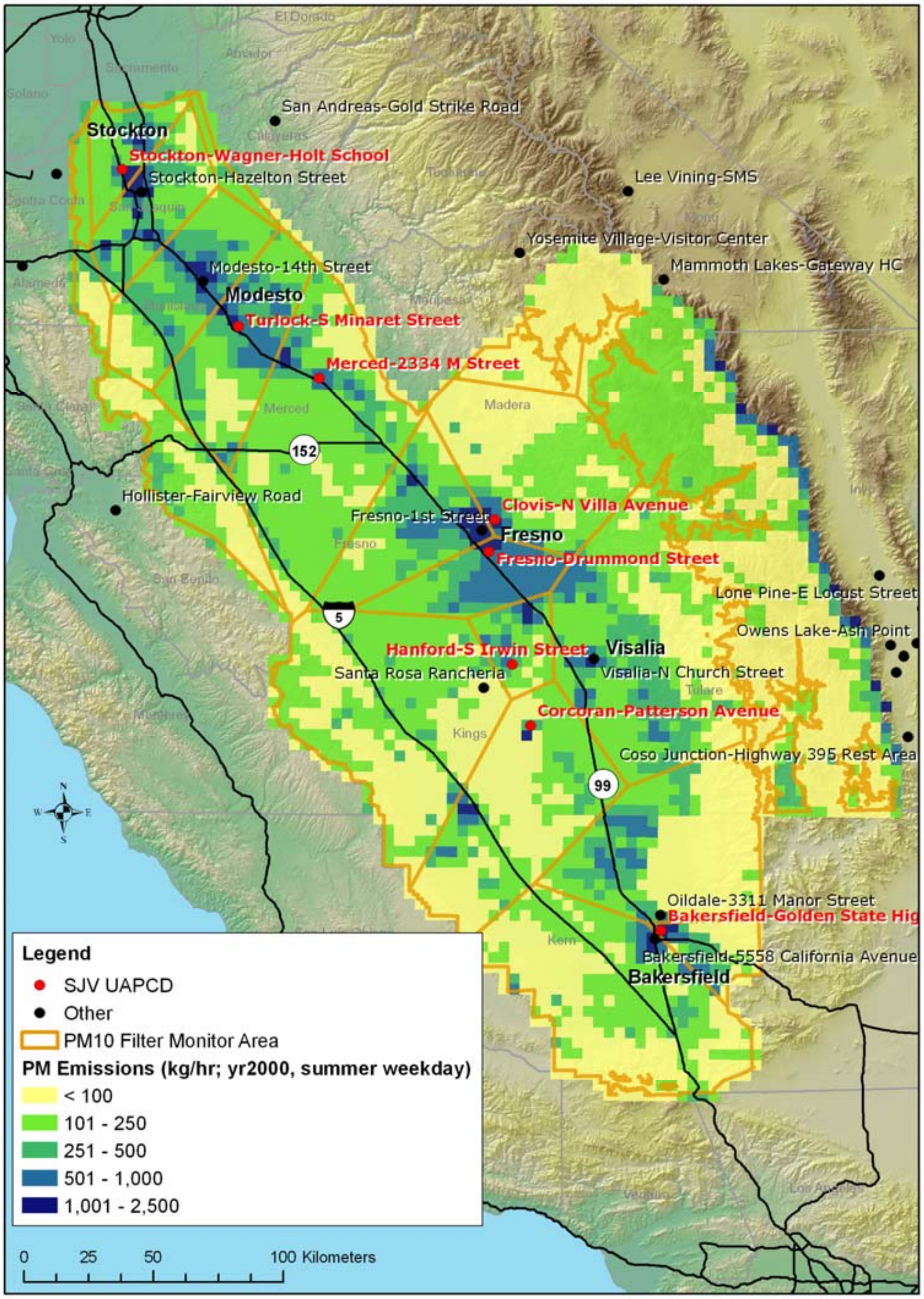
Spatially resolved PM emissions served for $PM_{2.5}$-1hr monitor areas, including planned site locations



Spatially resolved PM emissions served for $PM_{2.5}$-24hr monitor areas



Spatially resolved PM emissions served for PM_{10}-1hr monitor areas, including planned site locations



Spatially resolved PM emissions served for PM_{10}-24hr monitor areas

AIR POLLUTION
CONTROL DISTRICT
COUNTY OF SAN LUIS OBISPO

2010
Ambient Air Monitoring Network Assessment

Monitoring and Compliance Division
May 27 2010

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GLOSSARY AND LIST OF ACRONYMS:

Air Basin	An area with geographical or climatic conditions that result in a relatively physically homogeneous air mass.
APCD	Air Pollution Control District
ARB	California Air Resources Board
BAM	Beta Attenuation Monitor for particulate sampling
District	San Luis Obispo County Air Pollution Control District
EPA	U.S. Environmental Protection Agency
FRM	Federal Reference Method particulate sampler
NAAMS	National Ambient Air Monitoring Strategy
NAAQS	National Ambient Air Quality Standard
NO2	Nitrogen Dioxide
NOX	Oxides of nitrogen
O3	Ozone
ODSVRA	Oceano Dunes State Vehicular Recreation Area
Partisol	Federal reference method sampler for PM2.5.
PM10	Particulate matter 10 microns or less in aerodynamic circumference
PM2.5	Particulate matter 2.5 microns or less in aerodynamic circumference
SLAMS	State and Local Air Monitoring Stations
SLOAPCD	San Luis Obispo County Air Pollution Control District
SO2	Sulfur dioxide
TEOM	Tapered Element Oscillating Microbalance particulate sampler

1.0 INTRODUCTION

The San Luis Obispo County Air Pollution Control District (SLOAPCD) 2010 Ambient Air Monitoring Network Assessment is an examination and assessment of the technical aspects of SLOAPCD's network of air pollution monitoring stations.

The EPA finalized an amendment to the ambient air monitoring regulations on October 17, 2006. As part of this amendment, the EPA added the following requirement for state and local monitoring agencies to conduct a network assessment once every five years [40 CFR 58.10(e)]. The purpose is to determine, at a minimum, if the network meets the monitoring objectives defined in 40 CFR 58.10 appendix D, if new sites are needed, if existing sites may be discontinued, and whether new technologies are appropriate for incorporation into the ambient air monitoring network.

This requirement is and outcome of implementation of the National Ambient Air Monitoring Strategy (NAAMS). The purpose of the NAAMS is to optimize U. S. air monitoring networks to achieve, with limited resources, the best possible scientific value and protection of public and environmental health and welfare.

2.0 SAN LUIS OBISPO COUNTY REGIONAL DESCRIPTION

2.1 Geography

San Luis Obispo County constitutes a land area of approximately 3,316 square miles with varied vegetation, topography and climate which creates a diversity of environmental conditions greater than its size would suggest. The county is bordered by Monterey County to the north, Santa Barbara County to the south, and Kern County to the east, with the Pacific Ocean as the western border. From a geographical and meteorological standpoint, the county can be divided into three general regions: the Coastal Plateau, the Upper Salinas River Valley, and the East County Plain. Air quality in each of these regions is characteristically different, although the physical features which divide them provide only limited barriers to transport of pollutants between regions.

The coastal plateau is about five to ten miles wide and varies in elevation from sea level to about 500 feet. It is bounded on the northeast by the Santa Lucia Mountain Range, which extends almost the entire length of the county. Rising sharply to about 3,000 feet at its northern boundary, the Santa Lucia Range gradually winds southward away from the coast, finally merging into a mass of rugged features on the north side of Cuyama Canyon.

The Upper Salinas River Valley historically has experienced the highest ozone levels in the county. Transport of ozone precursors from the coastal plateau and from the San Joaquin Valley may contribute to this condition. This area of plains and low rolling hills is bounded on the west by the Santa Lucia Range and to the east by the Cholame Hills, a northern extension of the Temblor Range. Southward, the La Panza Range gradually rises east of Santa Margarita and runs roughly parallel to the coast, merging with the Caliente Range near the southern border of the county. Caliente Mountain, the highest peak in the county at 5,104 feet, is found in this range.

The East County Plain is a large region by land area, but only one percent of the county population resides there. Dryland farming and unpaved roads in this region contribute to county totals for particulate emissions, but, due to the prevailing winds, these emissions rarely affect other regions of the county.

A significant portion of this area is a landlocked drainage basin called the Carrizo Plain, which lies between the La Panza and Caliente Ranges on the west and the Temblor Range to the east. These mountains join together to close the basin at the southeastern tip of the county. The Diablo Range occupies the extreme northeastern portion of this region and, like the Temblors, lies adjacent to the San Joaquin Valley.

2.2 Climate and Weather

The climate of the county can be generally characterized as Mediterranean, with warm, dry summers and cooler, relatively damp winters. Along the coast, mild temperatures are the rule throughout the year due to the moderating influence of the Pacific Ocean. This effect is diminished inland in proportion to distance from the ocean or by major intervening terrain features, such as the coastal mountain ranges. As a result, inland areas are characterized by a considerably wider range of temperature conditions. Maximum summer temperatures average about 70 degrees Fahrenheit near the coast, while inland valleys are often in the high 90s. Minimum winter temperatures average from the low 30s along the coast to the low 20s inland.

Regional meteorology is largely dominated by a persistent high pressure area which commonly resides over the eastern Pacific Ocean. Seasonal variations in the strength and position of this pressure cell cause seasonal changes in the weather patterns of the area. The Pacific High remains generally fixed several hundred miles offshore from May through September, enhancing onshore winds and opposing offshore winds. During spring and early summer, as the onshore breezes pass over the cool water of the ocean, fog and low clouds often form in the marine air layer along the coast. Surface heating in the interior valleys dissipates the marine layer as it moves inland.

From November through April the Pacific High tends to migrate southward, allowing northern storms to move across the county. About 90% of the total annual rainfall is received during this period. Winter conditions are usually mild, with intermittent periods of precipitation followed by mostly clear days. Rainfall amounts can vary considerably among different regions in the county. In the Coastal Plain, annual rainfall averages 16 to 28 inches, while the Upper Salinas River Valley generally receives about 12 to 20 inches of rain. The Carrizo Plain is the driest area of the county with less than 12 inches of rain in a typical year.

Airflow around the county plays an important role in the movement and dispersion of pollutants. The speed and direction of local winds are controlled by the location and strength of the Pacific High pressure system and other global patterns, by topographical features, and by circulation patterns resulting from temperature differences between the land and sea. In spring and summer months, when the Pacific High attains its greatest strength, onshore winds from the northwest generally prevail during the day. At night, as the sea breeze dies, weak drainage winds flow down the coastal mountains and valleys to form a light, easterly land breeze.

In the Fall, onshore surface winds decline and the marine layer grows shallow, allowing an occasional reversal to a weak offshore flow. This, along with the diurnal alternation of land-sea breeze circulation, can sometimes produce a "sloshing" effect. Under these conditions, pollutants may accumulate over the ocean for a period of one or more days and are subsequently carried back onshore with the return of the sea breeze. Strong inversions can form at this time, "trapping" pollutants near the surface.

This effect is intensified when the Pacific High weakens or moves inland to the east. This may produce a "Santa Ana" condition in which air, often pollutant-laden, is transported into the county from the east and southeast. This can occur over a period of several days until the high pressure system returns to its normal location, breaking the pattern. The breakup of a Santa Ana condition may result in relatively stagnant conditions and a buildup of pollutants offshore. Occasionally, the onset of the typical daytime sea breeze can bring these pollutants back onshore, where they combine with local emissions to cause high pollutant concentrations along the coast.

2.3 Land Use, Population and Economics

The predominant land use in San Luis Obispo County is agriculture, with the production and processing of vegetable crops, wine grapes, dryland grains and livestock as the major components. The southern and coastal areas of the county are primarily devoted to the production of row crops (strawberries, lettuce, broccoli, peas and other vegetables) and vegetable transplants, although cattle ranching prevails along the north coast. Vineyards, grain production, livestock grazing, and show and thoroughbred horse ranching are the dominant land uses in the Upper Salinas River Valley; the East County Plain supports some cattle ranches and dryland grain farms. Much of the county's agricultural land is property committed to agricultural use for periods of up to 20 years under the Williamson Act. In 2008, agricultural acreage totaled approximately 1,144,299 acres, with a gross crop value of $606,745,000. Production in the animal industry was valued at $53,848,000 for the same period. The largest change in agricultural uses in recent years has been a substantial increase in vineyard plantings for wine grapes. In 1998 there were 11,897 bearing acres; this increased to 36,662 bearing acres in 2008.

The county's urban areas exist as separate and uniquely distinct clusters of development. San Miguel, Templeton, Atascadero, Cambria, Cayucos, Los Osos, Oceano and Nipomo are primarily residential communities; of these Atascadero is the only incorporated city. In contrast, San Luis Obispo, Morro Bay, the Five Cities area and Paso Robles have a much broader mix of commercial and residential uses. Residential development has been limited in some areas of the county as a result of moratoriums, growth management issues, and resource constraints. The 2009 estimated population of the county was 266,971. The two largest cities in the county are San Luis Obispo at 42,963 (2006 est.) and Atascadero at 27,343 (2006 est.)

The City of San Luis Obispo is the county seat and commercial center of the region. Commercial and industrial development has been growing steadily in the northern areas of the county, particularly in Atascadero and Paso Robles.

3. OVERVIEW OF NETWORK OPERATION

3.1 Air Monitoring Network Design - Monitoring Objectives and Spatial Scales

Federal regulations require that a SLAMS network be designed to meet a minimum of six basic ambient air monitoring objectives:

1. To determine the highest concentration expected to occur in the area covered by the network;
2. To determine representative concentrations in areas of high population density;
3. To determine the impact on ambient pollution levels of significant sources or source categories;
4. To determine general background concentration levels;
5. To determine the extent of regional pollutant transport among populated areas, and in support of secondary standards.
6. To determine the welfare-related impacts in more rural and remote areas (such as visibility impairment and effects on vegetation).

The goal in designing a SLAMS network is to establish monitoring stations that will provide data to meet these monitoring objectives. The physical siting of the air monitoring station must achieve a spatial scale of representativeness that is consistent with the monitoring objective. The spatial scale results from the physical location of the site with respect to the pollutant sources and categories. It estimates the size of the area surrounding the monitoring site that experiences uniform pollutant concentrations. The categories of spatial scale are:

- Microscale - An area of uniform pollutant concentrations ranging from several meters up to 100 meters.
- Middle Scale – uniform pollutant concentrations in an area of about 110 meters to 0.5 kilometer.
- Neighborhood Scale – an area with dimensions in the 0.5 to 4 kilometer range.
- Urban Scale – Citywide pollutant conditions with dimensions of from 4 to 50 kilometers.
- Regional Scale – An entire rural area of the same general geography (this area ranges from tens to hundreds of kilometers).

Table 1: Relationship Among Monitoring Objectives and Scale of Representativeness.

Monitoring Objective	Appropriate Spatial Scale
Highest concentration	Micro, middle, neighborhood (sometimes urban)
Population	Neighborhood, urban
Source impact	Micro, middle, neighborhood
General/Background	Neighborhood, urban, regional
Regional transport	Urban, regional
Welfare-related impacts	Urban, regional

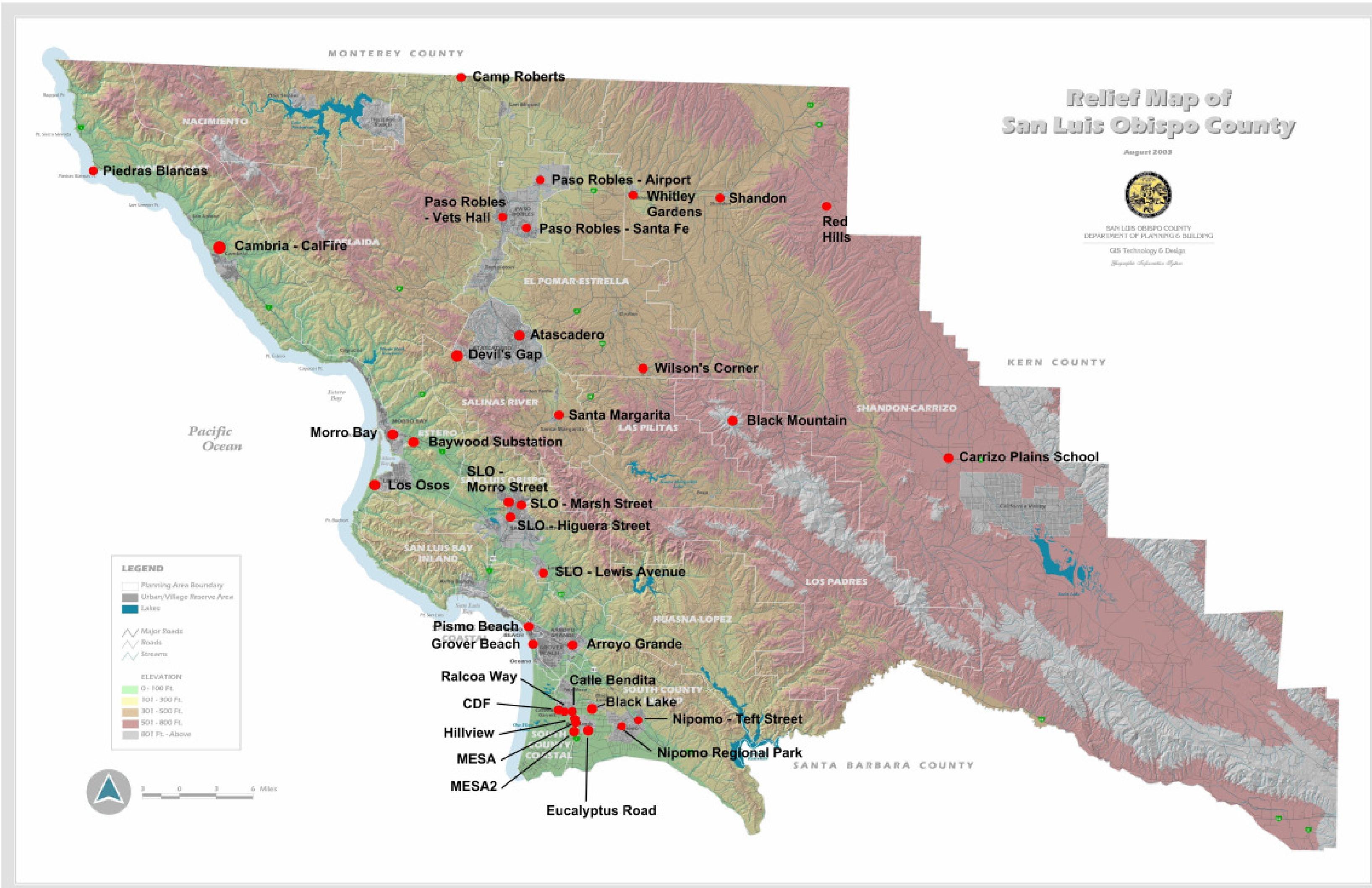

Figure 1: Historical Ambient Air Monitoring Locations in San Luis Obispo County

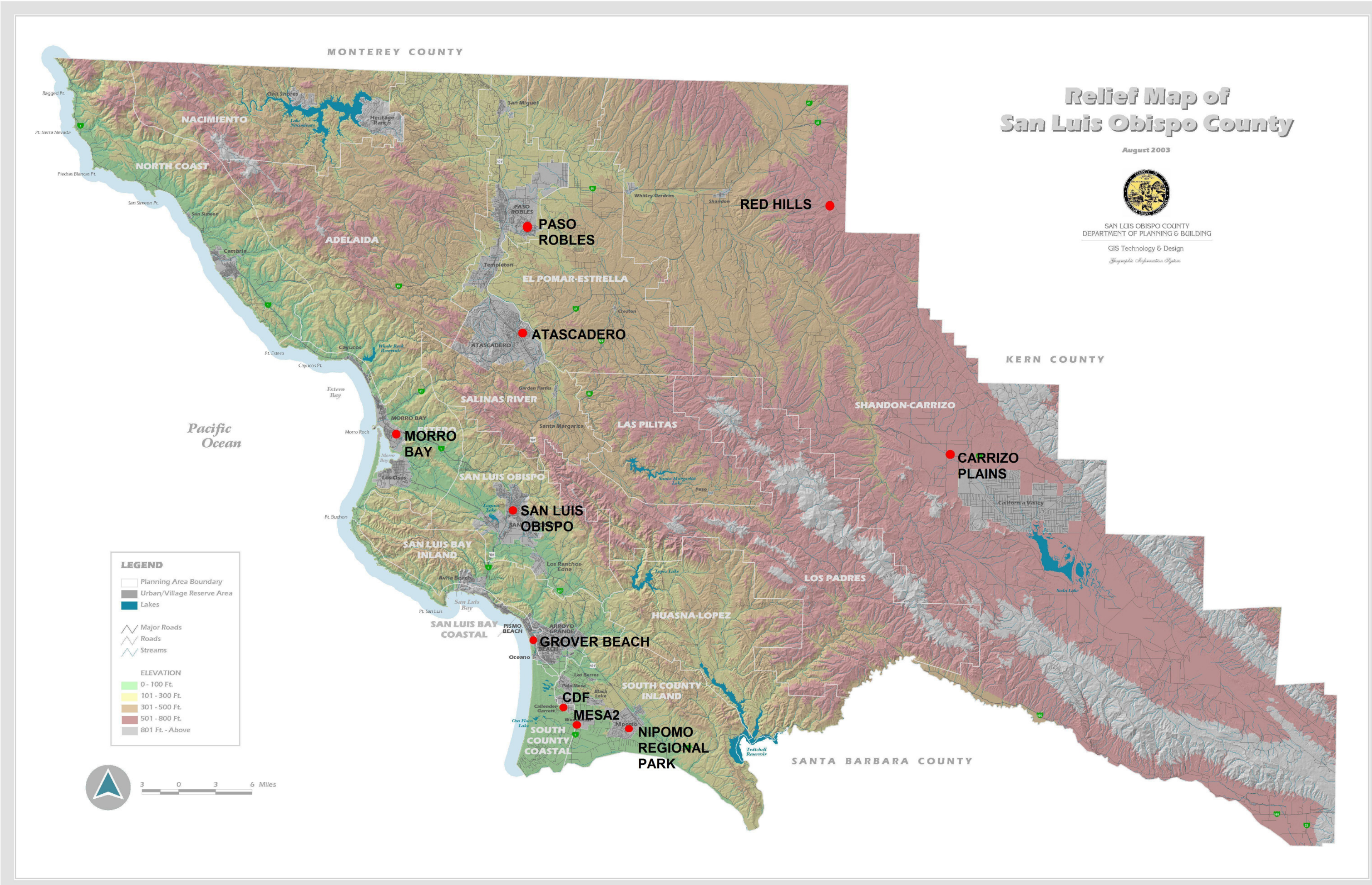

Figure 2: Ambient Air Monitoring Stations Operating in San Luis Obispo County in 2009/2010

3.2 Ambient Air Monitoring Network in San Luis Obispo County

Figure 1 shows a map of all historical ambient air monitoring locations dating back to 1976. Some of these sites were operated for a year or less in the first few years in which monitoring was conducted in the county to gauge the need for air quality surveillance at that location. Other sites were part of various studies the District has been involved in over the years such as the Central Coast Ozone Study, The San Joaquin Valley Air Quality Study/AUSPEX, the San Luis Obispo County Regional Ozone Study and a number of smaller short-term monitoring efforts. Lastly, the map includes monitoring stations still in operation. From viewing the map it is clear that all of the populated areas and most of the rural portions of the county have had ambient air monitoring performed at some time in the past. The existing monitoring site locations are the result of years of sampling and evaluating data to determine the optimum network configuration. The SLOAPCD air monitoring network is a dynamic system that can and should change with changing conditions.

Figure 2 shows a map of all currently operating ambient air monitoring stations in San Luis Obispo County. Table 2 lists these stations, the agency or company which operates them, the pollutant or meteorological parameters which are monitored at each location and the monitoring objective.

There are currently ten permanent ambient air monitoring stations in San Luis Obispo County. Eight of these stations are operated by the APCD as part of our SLAMS network. The ARB operates two stations in the county as part of their SLAMS network: one at Paso Robles and one in San Luis Obispo.

3.2.1 Ozone Monitoring Network

All ambient air monitoring stations in the county except for MESA2, CDF and Grover Beach monitor for ozone (see Table 2). The SLAMS network in San Luis Obispo County features ozone monitors located in Atascadero, Red Hills, Carrizo Plains, Paso Robles, Morro Bay, San Luis Obispo, and Nipomo.

Atascadero – Operated by the SLOAPCD since 1988, this population-oriented neighborhood scale ozone monitor is located near the central business district of downtown Atascadero and is bounded on two sides by elementary schools. It provides a measurement of representative ozone concentration for the City of Atascadero. Ozone concentrations at this site exhibit strong diurnal fluctuations caused by titration of ozone by oxides of nitrogen from nearby mobile and residential sources. Measured concentrations at this site are often similar to those recorded at Paso Robles and are some of the highest in the SLAMS network. The highest ozone concentrations at Atascadero occur when high pressure over the interior southwest U.S. causes transport of "old" ozone and other pollutants into SLO County from the east. Under these infrequent conditions transported ozone enhanced by local pollutants can cause highly elevated concentrations. The prevailing West or Northwest winds from the coast help keep ozone levels at Atascadero low most of the time.

Paso Robles – Operated by ARB since 1974, this population-oriented neighborhood scale ozone monitor provides a representative ozone concentration for the suburban areas of the City of Paso Robles. The conditions under which elevated ozone levels occur and the location's prevailing winds are similar to Atascadero. NOx monitoring is not performed at this site so the degree of removal of ambient ozone by titration is not known here, but is believed to be similar to that of other cities in the county.

Morro Bay – Operated since 1975 by SLOAPCD, this site provides regional scale and General/Background ozone monitoring. Located in downtown Morro Bay, the monitor generally measures background levels of ozone from the predominant northwest winds blowing off of the Pacific Ocean. Under unusual meteorological conditions noted in section 2.2 the Morro Bay site can record elevated ozone concentrations transported from urban areas as far south as the Los Angeles basin.

San Luis Obispo – Operated by ARB since 1970, this population-oriented, neighborhood scale ozone monitor provides a representative ozone concentration for the City of San Luis Obispo. The monitor is located in the urban area where ozone concentrations are significantly affected by the process of depletion by titration with local mobile and stationary NOx sources. As a result the concentrations recorded here are often lower than at Morro Bay.

Nipomo Regional Park – Operated by SLOAPCD since 1998, this station provides monitoring of background levels of ozone on a regional scale. The station was relocated in 1998 from Wilson Street several miles away. The ozone concentrations measured here are representative of interior portions of the Nipomo Mesa and are the highest recorded in the coastal region of San Luis Obispo County.

Red Hills – Operated by SLOAPCD since 2000, this station is located on the summit of the Red Hills near the community of Shandon at an elevation of about 2000 feet. This site consistently records the highest and most persistent ozone concentrations in the county.

Carrizo Plains – Operated by SLOAPCD since January 2006 this station monitors background levels and ozone transport on a regional scale. The monitor is located in an outbuilding at the Carrizo Plains School. The ozone concentrations recorded here are second only to Red Hills in concentration and persistence.

The SLAMS monitoring objectives met by the existing ozone network are:

1) Highest Concentration – The Red Hills and Carrizo Plains stations consistently record the highest ozone concentrations in the county. The high ozone levels tend to occur in the interior areas of the county during summer, either following long periods of wind stagnation, or as a result of offshore winds which can transport pollutants from interior regions to the northeast.
2) High Population Exposure – The Paso Robles, Atascadero and San Luis Obispo monitors provide a good representation of the ozone levels in the major cities of the county.
3) Source Impact – Because ozone is a secondary pollutant the effect of emissions from any single source are experienced 5 to 7 hours later and often many miles distant. As a regional pollutant, monitoring for specific sources of ozone is not performed.
4) General/Background – The monitors at Morro Bay and Nipomo Regional Park provide regional background ozone levels.
5) Regional Transport – The stations located at Carrizo Plains and Red Hills provide excellent surveillance of regional transport of ozone in the interior part of the county. Coastal monitoring stations have provided evidence in the past of regional transport of ozone over water from distant urban sources.

Welfare-related impacts are not currently addressed in the District's SLAMS ozone network and are not thought to be significant.

3.2.2 Nitrogen Dioxide Monitoring Network

The SLAMS network in San Luis Obispo County features nitrogen dioxide (NO_2) monitors at Atascadero, Morro Bay, and Nipomo Regional Park. NO_2 levels have always been well below the state and federal standards at all locations in our county. For this reason, except in the case of Morro Bay, NO_2 monitoring is most useful here as an indicator of depletion of ambient ozone through titration with nitric oxide. Having at least one NO_2 monitor in each geographical region of the county also serves a long-term air quality surveillance role.

Atascadero – Operated by SLOAPCD since 1990, this population-oriented monitor is considered neighborhood scale and highest concentration for $NO_{2.}$ This, the only NO_2 monitor in the Salinas River air basin, records the highest NO, NO_2 and NOx levels in the county. The monitor's location downtown has established a strong diurnal inverse relationship between ozone and NO_2 levels caused by local mobile sources and residential and commercial combustion of natural gas.

Morro Bay – Operated by SLOAPCD since 2001 this monitor is neighborhood scale and monitors emissions from a specific source: the Morro Bay power plant, located less than a mile upwind.

Nipomo Regional Park – Operated by the SLOAPCD since 1998, this monitor is regional in scale and is representative of background concentrations on the Nipomo Mesa. The site's location in a large natural area away from local or mobile sources makes it ideal for regional surveillance of NO_2. NO_2 monitoring had also been performed at the previous location of the Nipomo monitoring station on Wilson Street.

The SLAMS monitoring objectives met by the existing NO_2 network are:

1) Highest Concentration – The Atascadero monitor historically has measured the highest NO_2 concentrations in the county. NO_2 levels are the result of titration of ambient ozone by local sources of nitric oxide and as a result values are always relatively low.
2) General/Background – With no significant local sources present the monitor at Nipomo Regional Park provides an excellent measure of background NO_2 levels on the Nipomo Mesa.
3) Source Impact – The monitor at Morro Bay is placed to monitor local impacts of emissions from the Morro Bay Power Plant, the single greatest stationary source of oxides of nitrogen in the county.

Regional Transport and Welfare-Related impacts of NO_2 are not currently addressed by the District's SLAMS network and are not thought to be significant.

Table 2: Ambient Air Quality Parameters Monitored in San Luis Obispo County in 2009/2010

	O_3	NO	NO_2	NOx	SO_2	PM_{10}	$PM_{2.5}$	TEOM	WS	WD	ATM
APCD Stations											
Atascadero	P	P,C	P,C	P,C		P	P		X	X	X
Morro Bay	B	S	S	S		P			X	X	
Nipomo Regional Park	B	B	B	B		P			X	X	X
Grover Beach									X	X	
MESA2					S	S			X	X	X
CDF								S	X	X	
Carrizo Plains	B								X	X	X
Red Hills	C								X	X	X
ARB Stations											
San Luis Obispo	P					P	P		X	X	X
Paso Robles	P					P			X	X	X

Acronyms:

	C Maximum Concentration	P Population S Source	B Background Concentration
O_3 Ozone	SO_2 Sulfur Dioxide	PM_{10} Particulates < 10 microns (samples every sixth day)	WS Wind Speed
NO Nitric Oxide	CO Carbon Monoxide		WD Wind Direction
NO_2 Nitrogen Dioxide	TEOM Particulates <10 microns (monitored continuously)	$PM_{2.5}$ Particulates < 2.5 microns (samples every sixth day)	ATM Ambient Temp
NOx Oxides of Nitrogen			

Table 3: Air Quality Parameters and Monitoring Objectives in SLO County in 2009/2010

	Parameter	Monitoring Objective				
		Highest Conc.	Pop.	Source	General Background	Transport
OZONE	Atascadero		x			
	Morro Bay				x	
	Nipomo				x	
	Carrizo				x	x
	Red Hills	x				x
	SLO		x			
	Paso		x			
NITROGEN DIOXIDE	Atascadero	x	x			
	Morro Bay			x		
	Nipomo				x	
SULFUR DIOXIDE	Mesa 2	x	x	x		
PARTICULATES	Atascadero		x			
	Morro Bay				x	
	Nipomo		x			
	SLO		x			
	Paso		x			
	MESA2	x		x		
	CDF			x		

3.2.3 Sulfur Dioxide Monitoring Network

The sulfur dioxide (SO_2) monitoring network in San Luis Obispo County currently consists of one station: MESA2. More extensive SO_2 monitoring has been performed in the past and included monitors at Nipomo, Morro Bay, Grover Beach and (in now-decommissioned stations at MESA and Ralcoa Way) on the Nipomo Mesa.

MESA2 – Operated by the APCD since 2006 this monitor performs surveillance of a nearby oil refinery. It is considered middle scale and highest concentration for SO_2. Since it is located close to a major source for SO_2 emissions it is representative only of the immediate locality. The station was sited to optimize surveillance of the nearby coke calciner which has recently shut down. The highest historical SO_2 levels were measured at the two decommissioned stations: MESA and Ralcoa Way.

The SLAMS SO_2 monitoring objectives met by the network are:

1) Highest Concentration – The monitor at MESA2 currently records the highest SO_2 levels in the county. Higher historical levels were measured at two nearby but now decommissioned stations: MESA and Ralcoa Way. The Mesa 2 station is not optimally sited for measuring the highest possible SO_2 concentrations from the nearby refinery.

2) Source Impact – The monitor at MESA2 is invaluable in determining the SO_2 source impact upon the region.

Monitoring objectives not addressed by the existing SO_2 network are: General/Background; Population; Regional Transport; and Welfare-Related. Historical SO_2 monitoring performed elsewhere in the county has provided good evidence that monitoring for these objectives is not needed

3.2.4 PM_{10} and $PM_{2.5}$ Particulate Monitoring Network

The particulate monitoring network in San Luis Obispo County consists of PM_{10} monitors (at Paso Robles, Atascadero, Morro Bay, San Luis Obispo, Mesa 2, CDF and Nipomo Regional Park) and $PM_{2.5}$ monitors (at Atascadero, Mesa2 and San Luis Obispo). The PM_{10} network has been in place since 1988. Originally, all particulate monitoring in the county was performed as part of ARB's network. In the past ten years, however, the District's PM_{10} sampling program has become independent with our own processing facilities and operating procedures. Today, the Paso Robles and San Luis Obispo PM_{10} samplers remain part of ARB's network while all other samplers in the county are in the District's network. The $PM_{2.5}$ FRM monitors at Atascadero were part of the ARB network but were operated by the SLOAPCD. The $PM_{2.5}$ samplers began operation in 1999 in response to the establishment of a new federal particulate standard for $PM_{2.5}$ in 1997 and were replaced by a single BAM 1020a $PM_{2.5}$ monitor in May 2009.

Paso Robles – Operated by ARB since 1991 this PM_{10} monitor is urban in scale and representative of the city of Paso Robles.

Atascadero – Operated by SLOAPCD. The PM_{10} monitor has been operated since 1988. The collocated RFM $PM_{2.5}$ monitors began operation in 1999 and were replaced by a single BAM 1020a continuous monitor in May 2009. The FRM samplers were taken offline in March 2010. All are urban in scale and representative of particulate concentrations in the city of Atascadero.

Morro Bay – Operated by SLOAPCD since 1986. This monitor is neighborhood scale and representative of particulate concentrations in Morro Bay. The monitor was originally placed to measure source impacts from the Morro Bay power plant. Due to the monitors proximity to the coast it is possibly biased by the particulate present in marine aerosols.

San Luis Obispo – Operated by ARB, the PM_{10} sampler has been in place since 1988, and the $PM_{2.5}$ sampler since 1999. These population-oriented monitors are neighborhood in scale and represent particulate concentrations in the City of San Luis Obispo.

MESA2 – Operated by the APCD since 2006, this site featured collocated PM_{10} samplers which were replaced by a single BAM 1020a PM_{10} monitor in June 2009. A BAM 1020a $PM_{2.5}$ sampler was installed at the same time. This site monitors source impacts from the nearby oil refinery and coastal dunes and is middle scale. These monitors record some of the highest particulate levels in the county and are thought to be strongly influenced by their proximity to extensive coastal sand dunes and the Oceano Dunes State Vehicular Recreation Area (ODSVRA) in the direction of the prevailing wind.

CDF – Originally established for the Nipomo Mesa Phase 2 Particulate Study, this site has become a permanent part of our SLAMS particulate network. The site features a TEOM PM_{10} monitor which is neighborhood in scale and measures source impacts from the ODSVRA.

Nipomo Regional Park – Operated at this location by SLOAPCD since 1998, it was previously located at Wilson Street in Nipomo where it had been in place since 1990. At this location the monitor is regional in scale and is representative of PM_{10} concentrations on the Nipomo Mesa.

4.0 STATISTICAL ANALYSIS

Four statistical tests were run to examine the comprehensiveness and suitability of the SLOAPCD monitoring network. These tests and the results are described below.

4.1 Measured Concentration Analysis

Individual monitors are ranked based on the concentration of pollutants they measure. Monitors that measure high concentrations or design values are ranked higher than monitors that measure low concentrations. Results can be used to determine which monitors are less useful in meeting the monitoring objective. Three-year average design values were calculated for the period 2007 to 2009 for ozone and $PM_{2.5}$. For PM_{10} the annual arithmetic mean for 2009 was used. Monitors were grouped according to their monitoring objective and ranked within that group. The results of the measured concentration analysis are presented in Tables 4, 5 & 6.

4.1.1 Ozone Measured Concentration Analysis

In Table 4 the analysis broke out three groups based on monitoring objective. Red Hills was appropriately ranked #1 for transport/highest concentration.

Of the three population-oriented monitors only Atascadero and Paso Robles are in the same air basin. Although the sites are very similar, Atascadero records the highest concentrations of ozone and would be the monitor to retain if one were to be dropped. The monitor at Paso Robles is part of the ARB network, however, and cannot be changed by the District.

Three ozone monitors were grouped as background-oriented monitors. All three monitors will be retained because they are in different air basins and the information they provide is unique and useful.

Table 4: Ozone Measured Concentration Analysis

Site	Address	AQS Site Code	Design Value (ppm)	Monitoring Objective	Spatial Scale	Rank
Red Hills	3601 Gillis Canyon Road	06-079-8005	.084	Transport/Highest Concentration	Residential	1
Atascadero	6005 Lewis Avenue	06-079-8001	.066	Population	Population	1
Paso Robles	235 Santa Fe Avenue	06-079-0005	.064	Population	Urban	2
San Luis Obispo	3220 South Higuera Street	06-079-2006	.059	Population	Urban	3
Carrizo Plains School	9640 Carrizo Highway	06-079-8006	.080	Background	Residential	1
NRP	Nipomo Regional Park	06-079-4002	.061	Background	Residential	2
Morro Bay	Morro Bay Blvd & Kern	06-079-3001	.056	Background	Residential	3

4.1.2 $PM_{2.5}$ Measured Concentration Analysis

Table 5 presents the ranking of PM2.5 monitors. The Mesa2 monitor had insufficient data for this test. Although Atascadero ranked higher than San Luis Obispo in this analysis the samplers are in different air basins and so both should be retained. The Atascadero and San Luis Obispo monitors are both part of the ARB network.

Table 5: PM2.5 Measured Concentration Analysis

Site	Address	AQS Site Code	Design Value (ug)	Monitoring Objective	Spatial Scale	Rank
Atascadero	6005 Lewis Avenue	06-079-8001	8.4	Population	Urban	1
San Luis Obispo	3220 South Higuera Street	06-079-2006	6.8	Population	Urban	2
Mesa2	1300 Guadalupe Road	06-079-2004	Insufficient data	Source	Middle	n/a

4.1.3 PM_{10} Measured Concentration Analysis

The analysis ranked monitors within three categories based on monitoring objective. The two source-oriented monitors are in place to perform surveillance of a significant area source of fine particulate at the Oceano Dunes SVRA and are both important to this task.

As was the case with ozone, of the three population-oriented monitors only Atascadero and Paso Robles are in the same air basin. Although the sites are very similar, Atascadero records the highest concentrations of particulate and would be the monitor to retain if one were to be dropped. The monitor at Paso Robles is part of the ARB network, however, and cannot be changed by the District.

The background-oriented monitor at Morro Bay samples boundary conditions on the coast while the monitor at NRP samples coastal interior conditions.

Table 6: PM10 Measured Concentration Analysis

Site	Address	AQS Site Code	Annual Arithmetic Mean 2009	Monitoring Objective	Spatial Scale	Rank
Mesa2	1300 Guadalupe Road, Arroyo Grande	06-079-2004	24.8	Source	Middle	1
CDF	2391 Willow Road, Arroyo Grande	06-079-2007	Insufficient data	Source	Neigh-borhood	n/a
Atascadero	6005 Lewis Avenue, Atascadero	06-079-8001	17.4	Population	Urban	1
Paso Robles	235 Santa Fe Avenue, Paso Robles	06-079-0005	16.2	Population	Urban	2
San Luis Obispo	3220 South Higuera Street, San Luis Obispo	06-079-2006	14.6	Population	Urban	3
Morro Bay	Morro Bay Blvd & Kern, Morro Bay	06-079-3001	20.9	Background	Resi-dential	1
NRP	Nipomo Regional Park, Nipomo	06-079-4002	20.2	Background	Resi-dential	2

4.2 Monitor to Monitor Correlation Analysis

Concentrations at one monitor are compared to concentrations measured at other monitors to determine if concentrations correlate temporally. Monitor pairs with correlation coefficient values near one are highly correlated and are ranked lower than those with correlation coefficient values closer to zero. Monitors that do not correlate well with other monitors exhibit unique temporal concentration variation relative to other monitors and are likely to be important for assessing local emissions, transport and spatial coverage. Monitors with concentrations that correlate well (e.g., $r^2 > 0.75$) with concentrations at another monitor may be redundant.

4.2.1 Correlation of Ozone Monitors in San Luis Obispo County

Figure 3 below depicts a correlation matrix comparing ozone monitors from San Luis Obispo and adjoining counties. The analysis reveals a significant correlation between ozone monitor pairs at Atascadero/Paso Robles, Morro Bay/San Luis Obispo and Red Hills/Carrizo Plains.

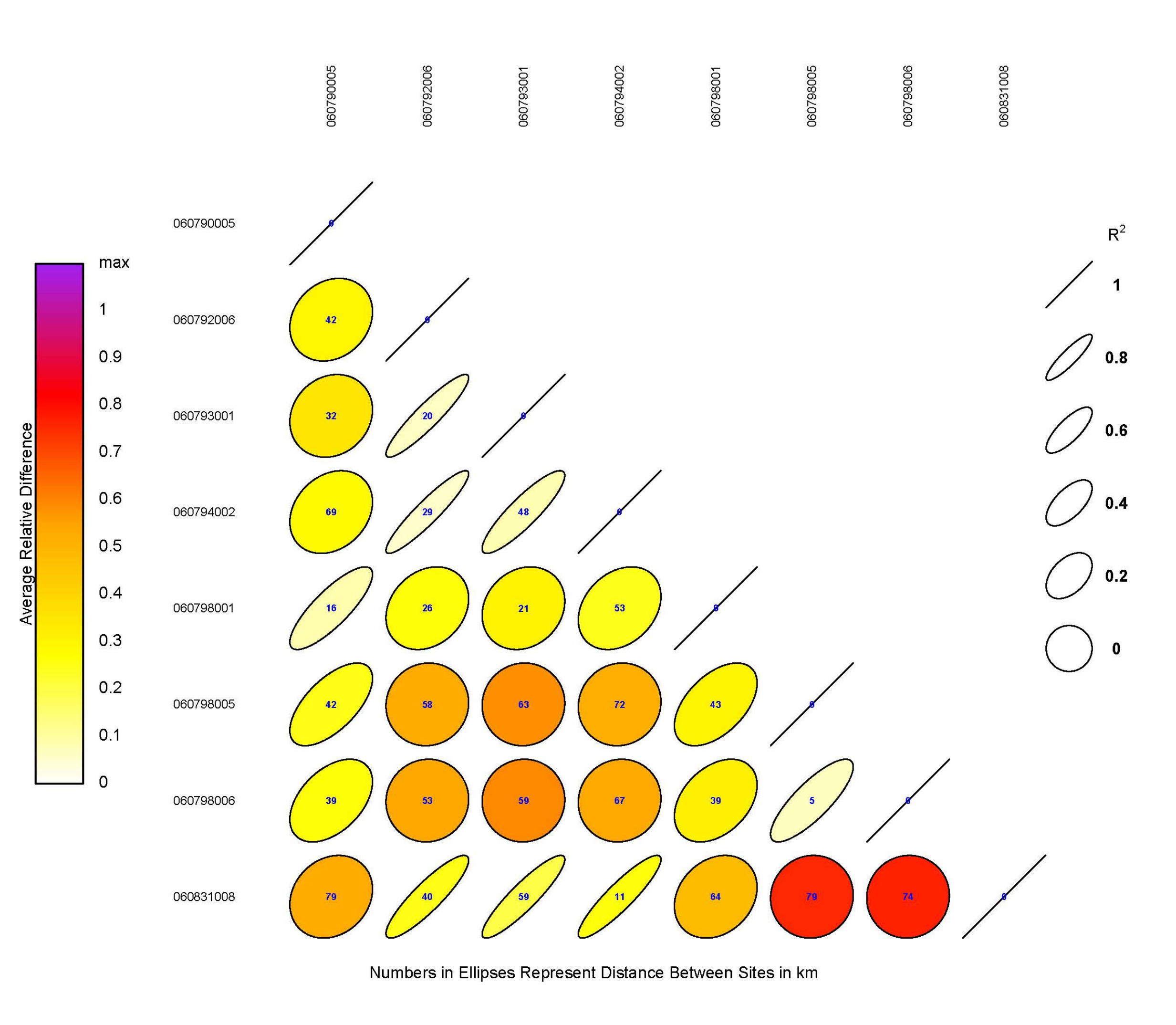

Figure 3: Correlation of Ozone Monitors in San Luis Obispo County

4.2.2 Correlation of FRM PM2.5 Monitors in San Luis Obispo County

Figure 4 depicts a correlation matrix comparing FRM PM2.5 monitors from San Luis Obispo and adjoining counties. There are only two FRM monitors in San Luis Obispo County (at Atascadero and San Luis Obispo) which are in different air basins. As a result they do not correlate well with each other and are not candidates for modification.

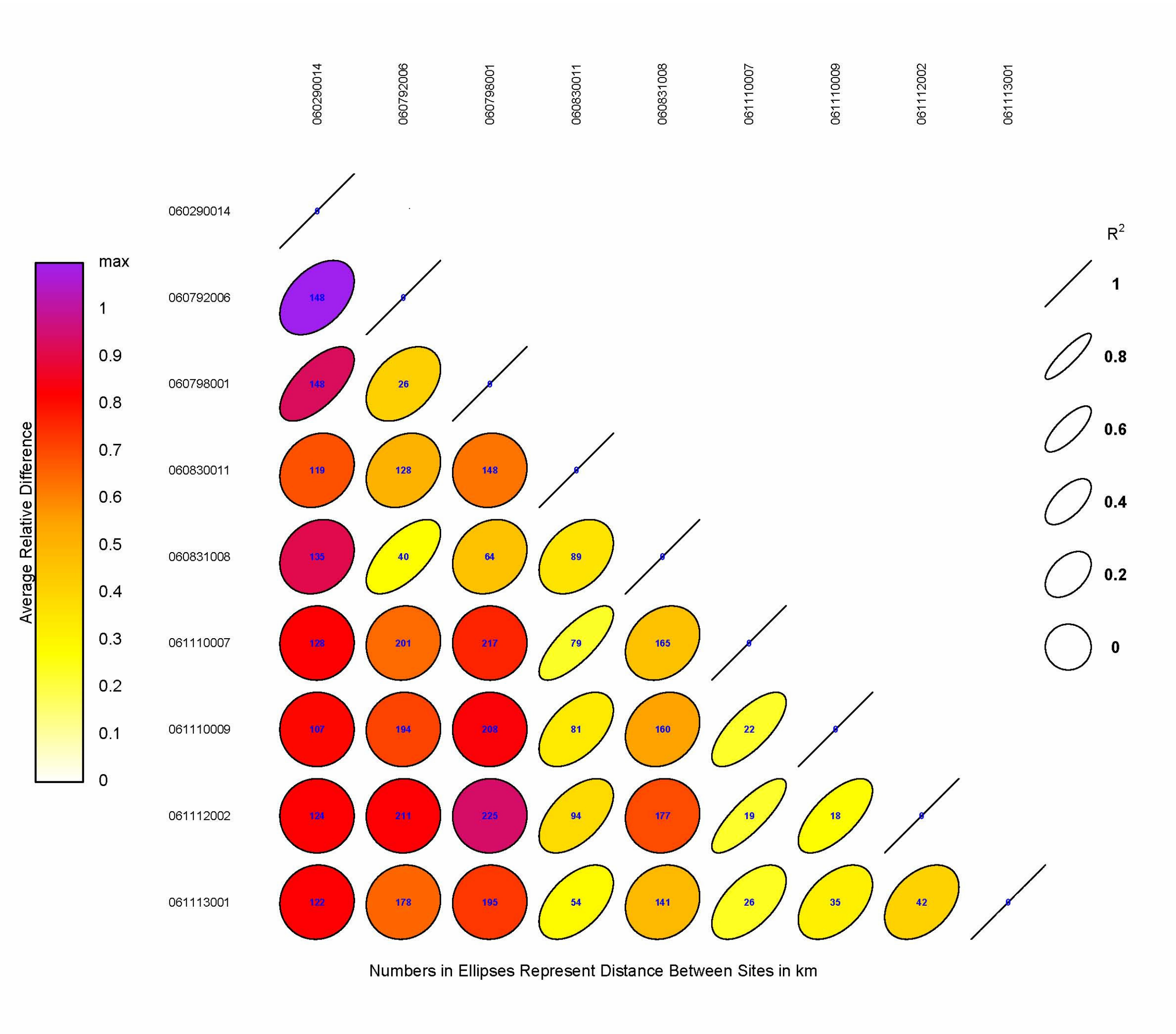

Figure 4: Correlation of FRM PM2.5 Monitors in San Luis Obispo County

4.2.3 Correlation of PM10 Monitors in San Luis Obispo County

Figure 5 depicts a correlation matrix comparing PM10 monitors from San Luis Obispo and adjoining counties. The analysis reveals a significant correlation between monitor pairs at Atascadero/Paso Robles, Morro Bay/San Luis Obispo and Nipomo Regional Park /San Luis Obispo.

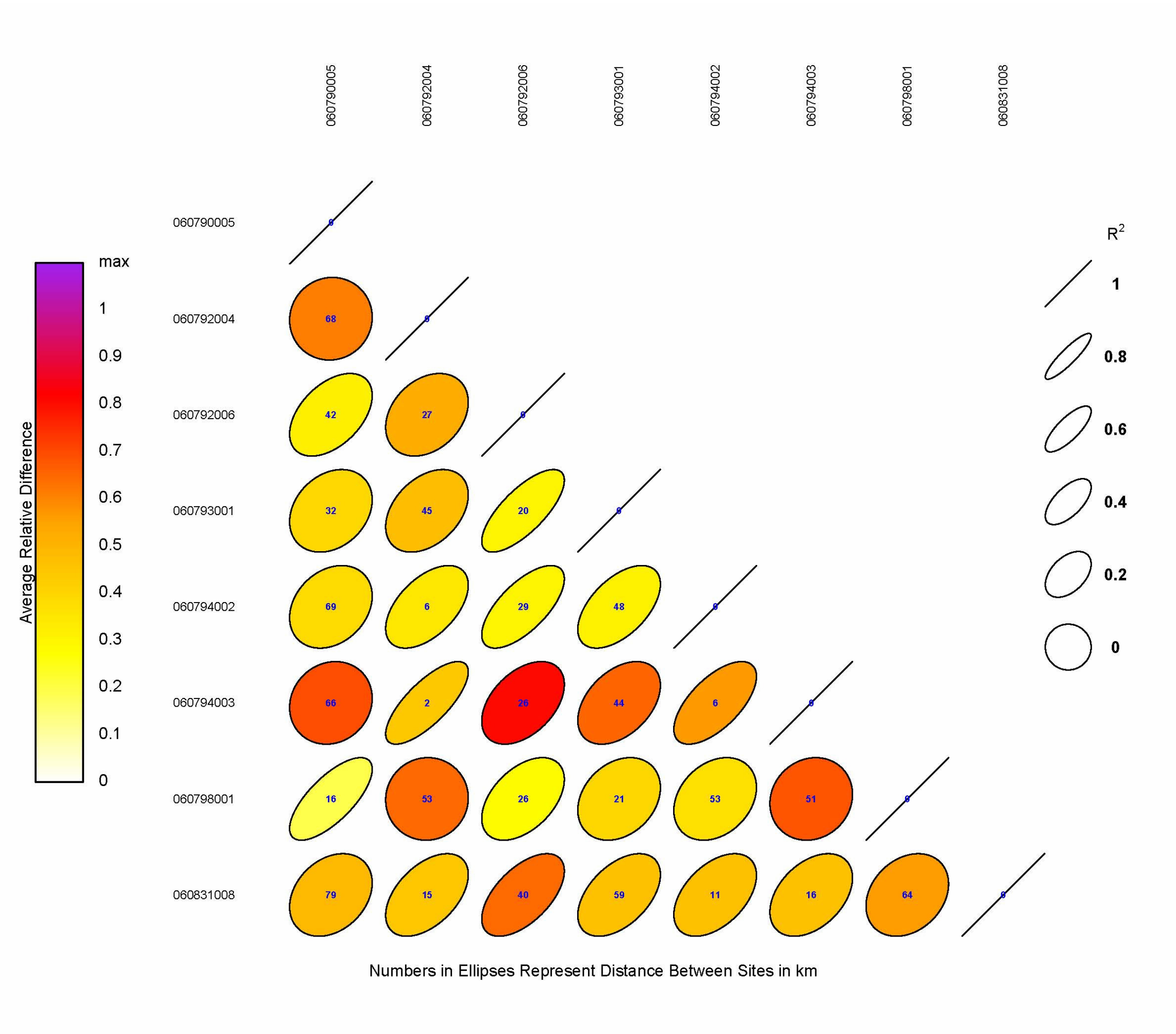

Figure 5: Correlation of PM10 Monitors in San Luis Obispo County

4.3 New Sites Analysis

The new sites analysis provides a way to determine areas where new sites could provide more information to characterize air quality. This is done using a series of criteria between neighboring sites to filter out those site pairs which meet the criteria for "placing" a new site. These criteria include the squared Pearson correlation between sites, the distance between sites, and the average difference between sites. In order to relate the positioning of potential new sites back to the NAAQS a final criterion related to the potential of exceeding 85% of the NAAQS is also accounted for.

The output of the analysis is a Google Earth graphic which depicts existing sites as red or grey circles and proposed “new” sites as yellow dots. The “new” sites are located in a corridor midway between ozone monitor pairs which are significantly different and suggest the possible location of new monitors.

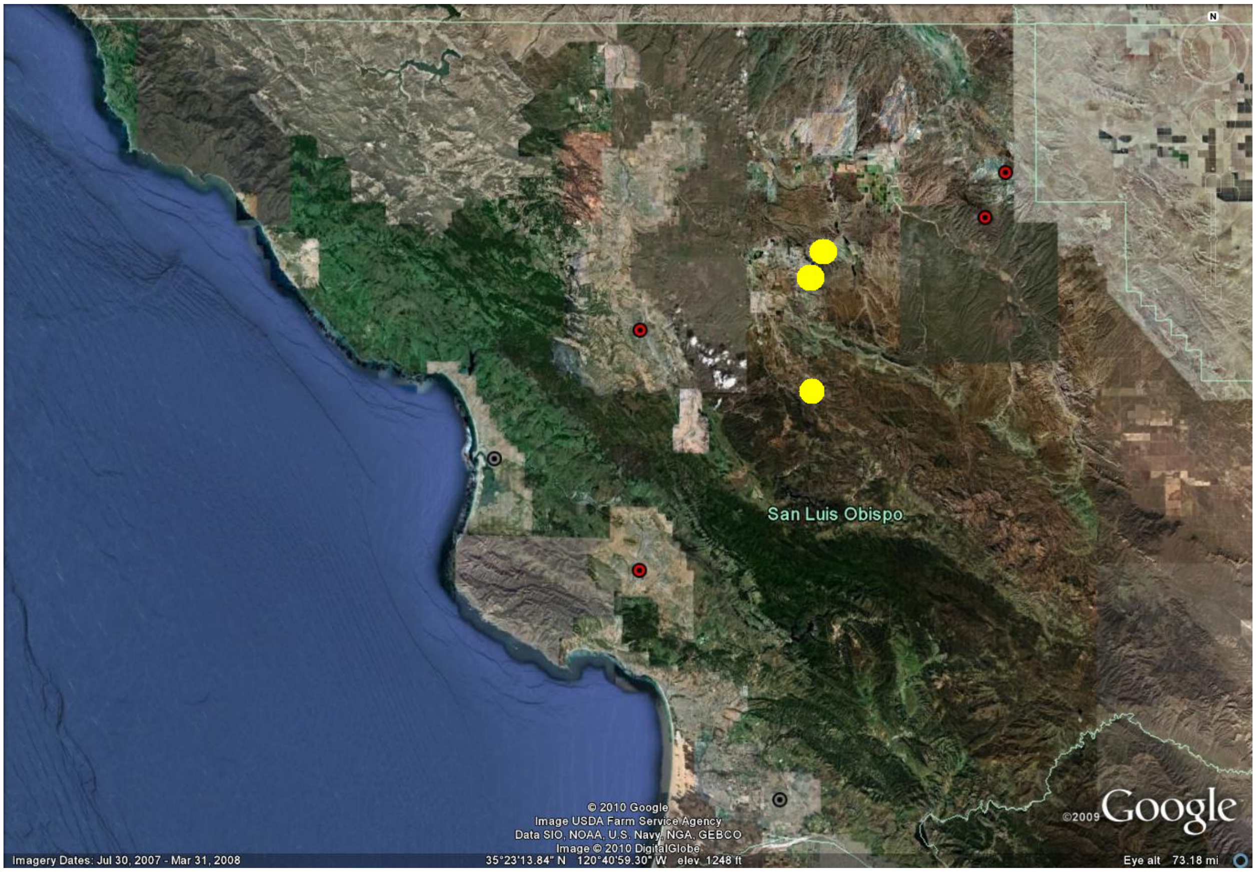

Figure 6: New Sites Analysis for Ozone

Figure 6 depicts the new sites analysis for ozone. The analysis identified three possible new locations for ozone monitors based on the significant differences between interior monitoring sites at Carrizo Plains and Red Hills with Sites at Atascadero and San Luis Obispo. In this case the difference between site pairs is primarily due to the monitor locations. The San Luis Obispo, Atascadero and Carrizo Plains/Red Hills monitors are located in three different air basins: the coastal, Salinas and interior. These three basins have significantly different climates and pollutant characteristics which render them incomparable. The proposed new sites are all located in the sparsely inhabited mountain region separating the air basins and would not be expected to provide any unique or useful air quality information

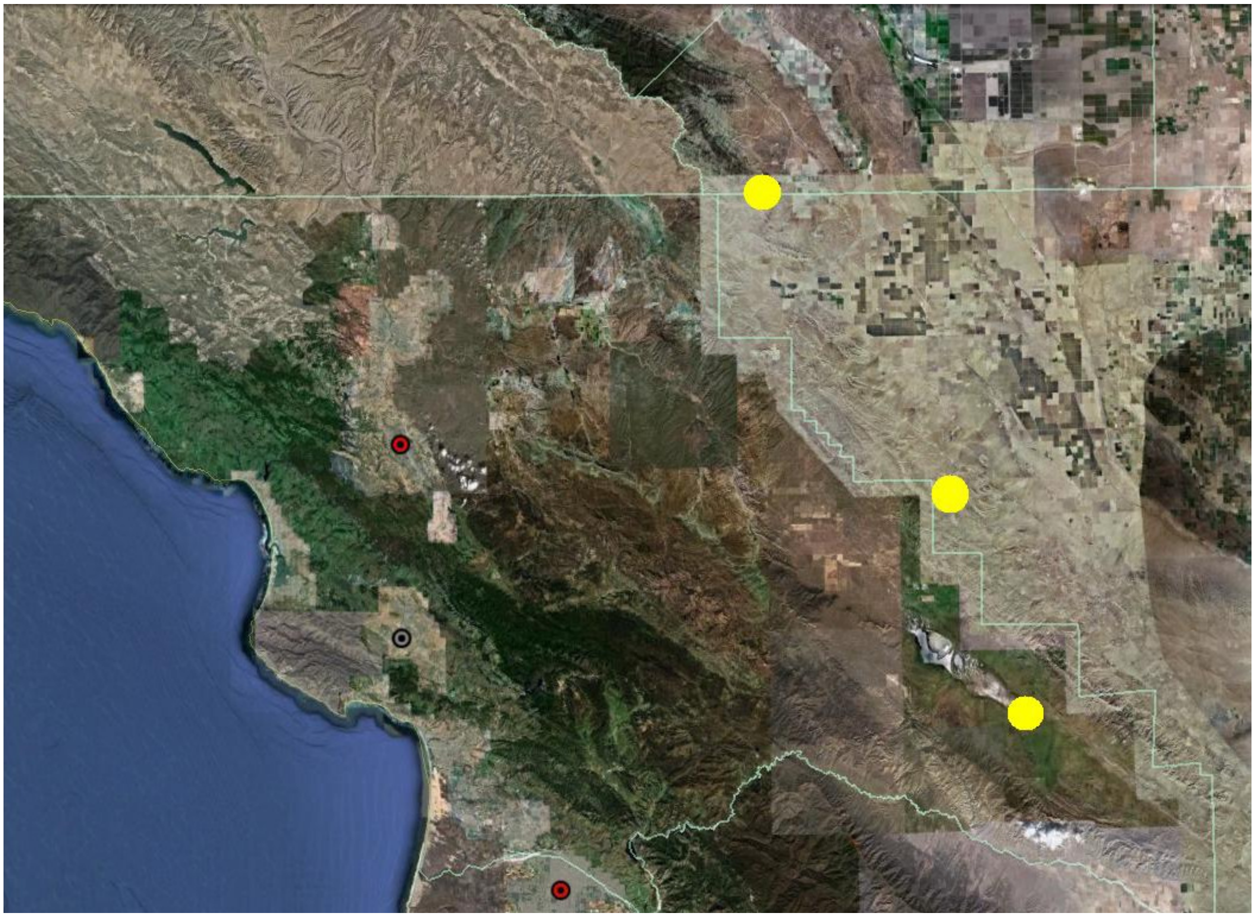

Figure 7: New Sites Analysis for FRM PM2.5

Figure 7 depicts the new sites analysis for FRM PM2.5. The analysis identified one possible new location for an FRM monitor in the Carrizo Plains based on the significant difference between monitors at Atascadero and the nearest site pair located in Southern California.

An assessment of the level of PM10 air pollution in the Carrizo Plains was done in 2006. One year of PM10 monitoring was conducted at the Carrizo Plains School using a standard hi-volume sampler running on a 1-in-6 day schedule. The monitoring results showed that there was no significant difference between the values measured at Atascadero and Carrizo Plains and that the Atascadero data may be used to interpolate PM10 concentrations on the Carrizo Plains.

The Carrizo Plains region experiences relatively low PM10 concentrations and is very similar in this respect with the Upper Salinas Basin and the existing site at Atascadero. This suggests that the placing an additional PM2.5 monitor would not provide unique and useful information.

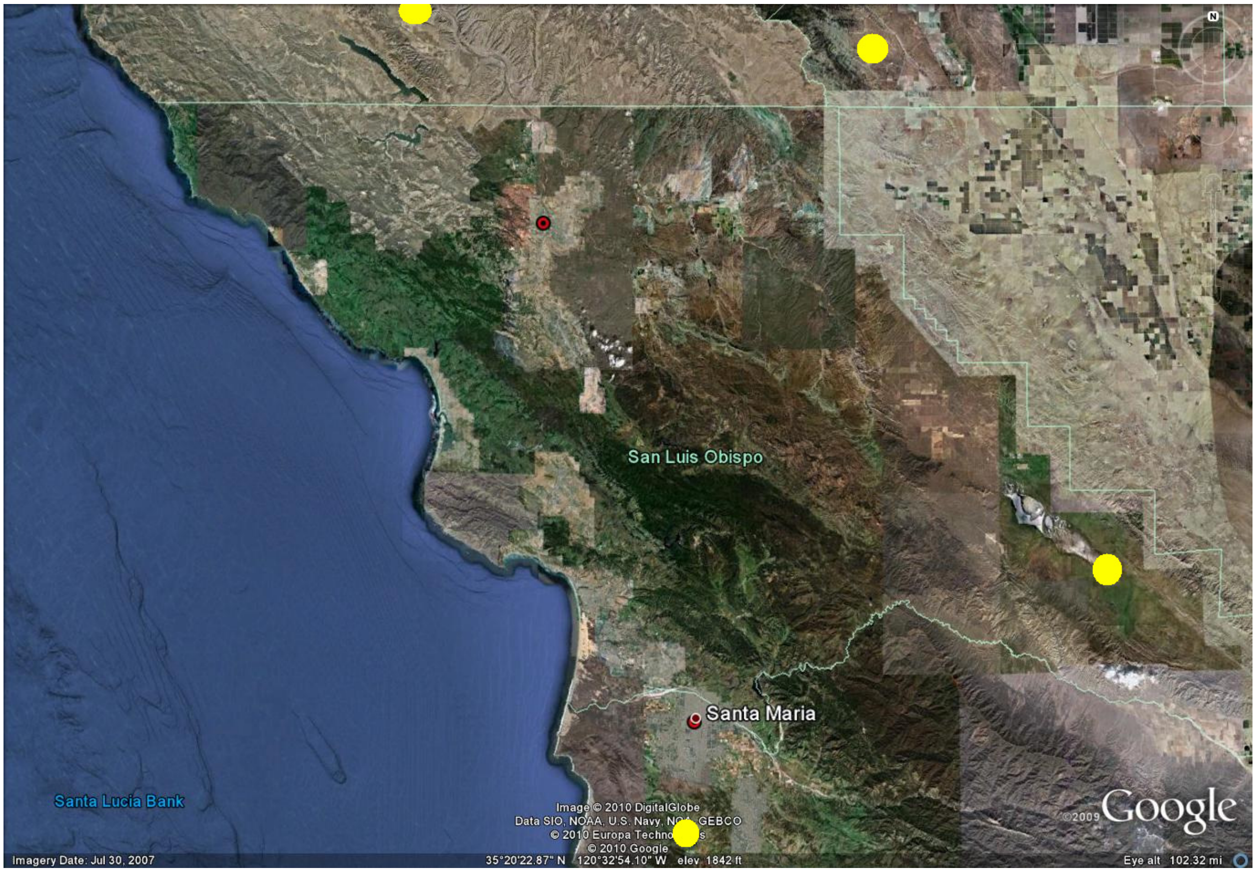

Figure 8: New Sites Analysis for PM10

Figure 8 depicts the new sites analysis for PM10. The analysis identified one possible new location for a PM10 monitor in the Carrizo Plains based on the significant difference between the monitor at Atascadero and the nearest site pair located in Southern California. An assessment of the level of PM10 air pollution in the Carrizo Plains was done in 2006. One year of PM10 monitoring was conducted at the Carrizo Plains School using a standard hi-volume sampler running on a 1-in-6 day schedule. The monitoring results showed that there was no significant difference between the values measured at Atascadero and Carrizo Plains and that the Atascadero data may be used to interpolate PM10 concentrations on the Carrizo Plains. For this reason locating a new PM10 monitor on the Carrizo Plains would be redundant.

4.4 Area Served Analysis

This exercise uses a spatial analysis technique known as Voronoi or Thiessen polygons to show the area represented by a monitoring site. The shape and size of each polygon is dependent on the proximity of the nearest neighbors to a particular site. The output of the analysis is a Google Earth image which displays each polygon along with the monitor within it.

Figures 9 and 10 depict the results of this analysis for PM10 and ozone respectively. The analyses for both PM10 and ozone indicate that the network is comprehensive and adequately covers population centers, rural areas and air basins of the county. Prior analyses have shown that the PM10 monitoring at Atascadero can be used to interpolate concentrations in the county's interior.

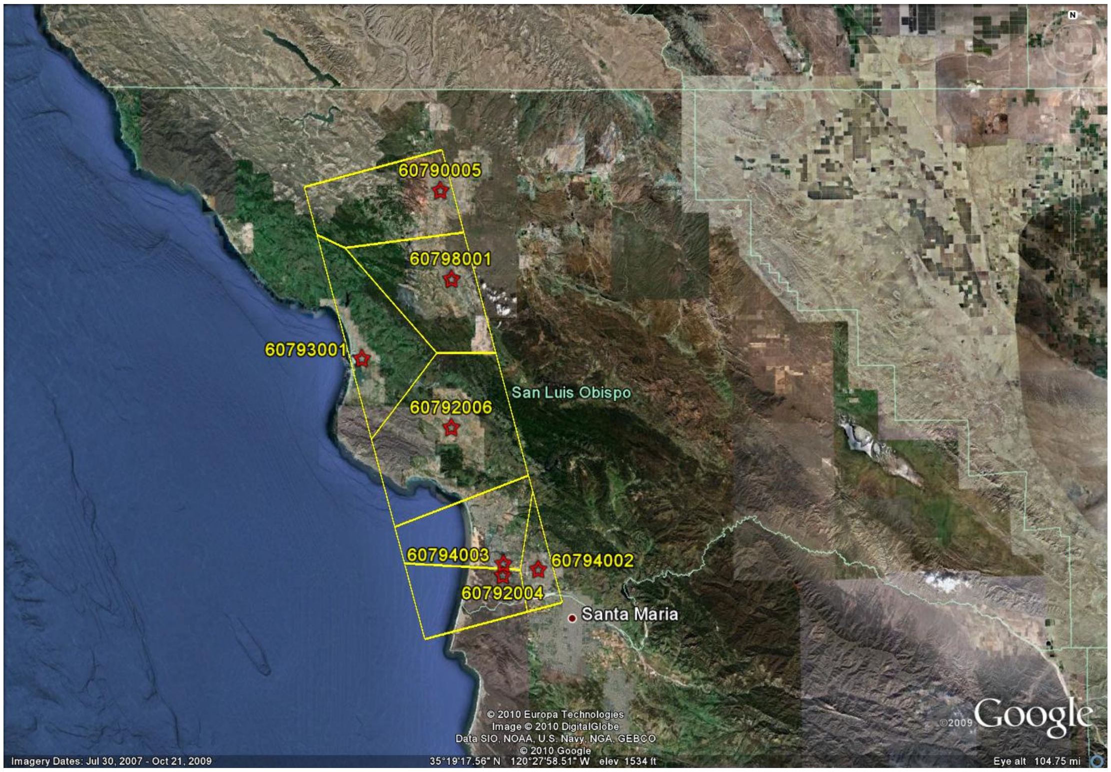

Figure 9: Area Served Analysis for PM10

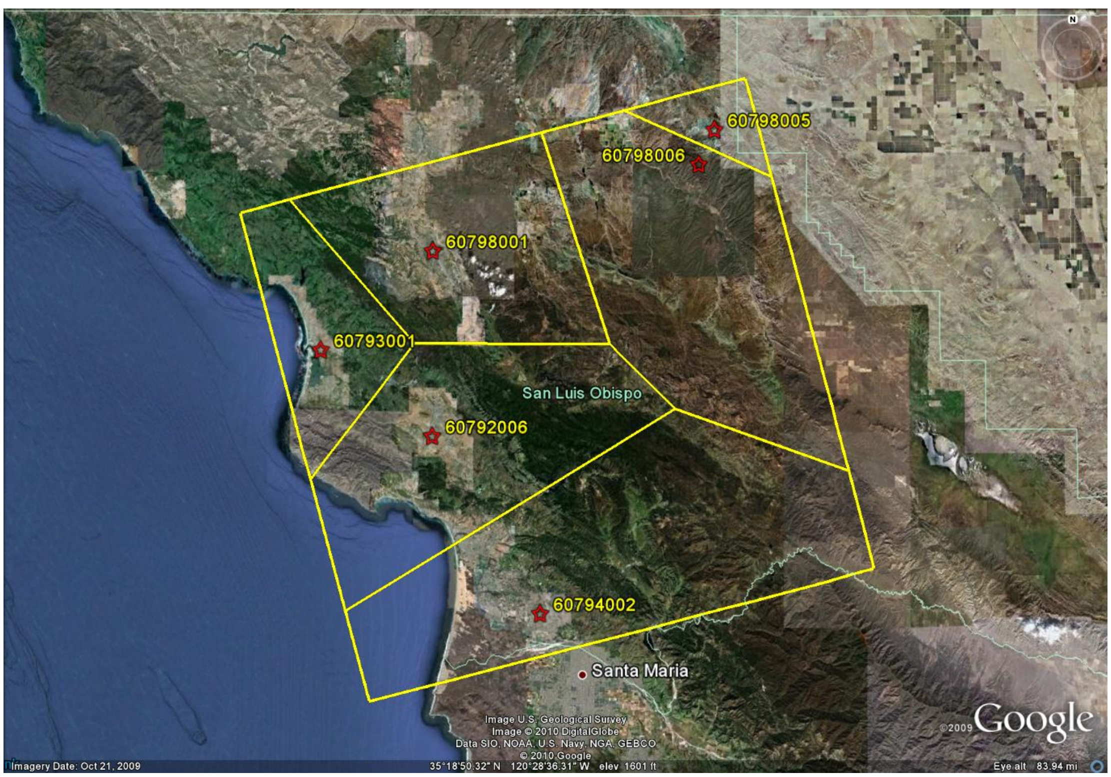

Figure 10: Area Served Analysis for Ozone

5.0 SITUATIONAL ANALYSIS

This section examines the network taking into account research, policy and resource needs.

5.1 Risk of Future NAAQS Exceedances

In San Luis Obispo County we are at risk for exceeding NAAQS standards for ozone in the eastern interior valleys and for PM2.5 on the Nipomo Mesa.

The eastern interior valleys are strongly influenced by their proximity to the San Joaquin Valley with its relatively high pollutant levels. Although the region is sparsely populated the District operates two monitoring stations to perform surveillance in the areas where people live and to document transport of pollutants from outside of the county. This is the only region of the county with ozone concentrations routinely high enough to violate federal standards.

On the Nipomo Mesa the state PM10 standard is exceeded frequently during wind events but the federal PM10 standard is exceeded only rarely. The Nipomo Mesa is downwind of a significant source of fine particulate in the Oceano Dunes State Vehicular Recreation Area (ODSVRA). The District is currently working with the California State Parks Department to find ways to mitigate emissions from their facility. In the meantime three monitoring locations at CDF, NRP and MESA2 perform surveillance of particulate emissions. No other area of the county is at risk for exceeding the NAAQS for airborne particulates.

5.2 Demographic Shifts

All of San Luis Obispo County is experiencing population growth. Most of the increase in population, however, has occurred within 25 miles of the coast with two areas; Paso Robles/Templeton and the Nipomo Mesa growing the most rapidly. Both of these fast-growing areas have an adequate complement of monitors for ozone, PM10 and PM2.5 - the pollutants of greatest concern.

5.3 Scientific Research and Public Health

The Atascadero monitoring station has historical importance as a research site. The station has hosted a variety of special instrumentation and has played and important role in epidemiological and other studies.

The particulate monitoring network on the Nipomo Mesa has been expanded in recent years to address the public health risk from particulate emissions upwind at the ODSVRA. The network may be modified to meet the needs of air quality surveillance as we move forward with mitigating impacts from the state park.

5.4 Other Circumstances

The San Luis Obispo and Paso Robles monitoring stations are operated by ARB. Although they are included in this assessment, they are not under the District's authority and may not be readily modified by the results of our analyses. The ARB is performing its own network assessment which will address the technical aspects related to these stations.

6.0 DISCUSSION AND CONCLUSIONS

6.1 Reduction of Measurements

The statistical analyses performed in section 4 revealed several instances of apparent measurement redundancy in the ambient air monitoring network. Each of these instances is discussed below:

In both the ozone and particulate networks, monitoring redundancies were identified in the Atascadero/Paso Robles and Morro Bay/NRP couplings by the Measured Concentration and Monitor Correlation analyses. This suggests that either of the stations in the couplings could be dropped and the data from the remaining station could be interpolated to represent that area.

In the case of Atascadero/Paso Robles the ozone and particulate monitors are both operated by different agencies, have long monitoring histories and are located in larger cities within the county. These factors and a small but notable difference in pollutant concentrations at the sites are considered by the SLOAPCD to outweigh budgetary considerations at this time.

In the case of Morro Bay/Nipomo coupling the Morro Bay monitor measures boundary conditions near the shore and most often represents conditions offshore while the NRP monitor measures background at a coastal interior site and has the highest design value in the coastal zone. For this reason they are both considered valuable and capable of generating useful information.

6.2 Addition of Measurements

The statistical and situational analyses performed in sections 4 & 5 did not turn up any instance where additional monitoring was indicated. The SLOAPCD ambient monitoring network is very comprehensive as it currently exists. Additional monitoring may become necessary in certain areas, such as the Nipomo Mesa, as the air quality situation changes over time. The District is prepared to address additional monitoring needs as they evolve.

6.3 Proposed Changes to the Monitoring Network

No changes to the SLOAPCD ambient air monitoring network are proposed at this time as a result of this network assessment.

2010 Ambient Air Monitoring Network Assessment

July 2010

VENTURA COUNTY AIR
POLLUTION CONTROL DISTRICT

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ACRONYMS

AQS: ....Air Quality System
BAM ....Beta Attenuation Mass Monitor
CARB ....California Air Resources Board
CFR ....Code of Federal Regulations
CMSA ....Consolidated Metropolitan Statistical Area
CO ....Carbon Monoxide
District: ....Ventura County Air Pollution Control District
EPA ....U. S. Environmental Protection Agency
FEM ....Federal Equivalent Method
FRM ....Federal Reference Method
NAAQS ....National Ambient Air Quality Standards
NMHC ....Non-Methane Hydrocarbons
NO2 ....Nitrogen Dioxide
O3 ....Ozone
PAMS ....Photochemical Assessment Monitoring Systems
PM................Particulate Matter
$PM_{2.5}$ ....Particulates less than or equal to 2.5 microns in size
PM_{10} ....Particulates less than or equal to 10 microns in size
SIP ....State Implementation Plan
SLAMS: ......State and Local Air Monitoring Stations
SO2 ....Sulfur Dioxide
VCAPCD: .....Ventura County Air Pollution Control District

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EXECUTIVE SUMMARY

Purpose

The purpose of this Ambient Air Monitoring Network Assessment is to assess the status of the Ventura County Air Pollution Control District's (District) ambient air monitoring network with respect to the following: (1) Whether the network is sufficient to meet the goals and objectives of the District; (2) Whether the network provides adequate air quality information for the residents of the County; (3) Whether the District's resources could be better utilized by removing monitors from service or repositioning monitors, and; (4) Whether any gaps in the network exist that could be corrected by the addition of new monitors.

Background

This document is prepared in part to fulfill the new requirements specified in the revised Monitoring Regulations Part 58. The Ventura County Air Pollution Control District's air monitoring network was evaluated to determine if it meets the District's monitoring objectives. Considerations were given to: population and geographical coverage; air quality trends; parameters monitored, attainment classification and emissions inventory.

Findings

Ventura County is well served by the District's ozone, $PM_{2.5}$ and PM_{10} air monitoring efforts. The District's air monitoring network provides air quality coverage to the vast majority of the population and inhabited areas of the County. The monitors in the network exceed the minimum number of monitors required by federal regulations.

There are potentially some monitoring parameters which should be further reviewed and prioritized for consolidation. Those parameters are:

Ozone: The Ventura - Emma Wood monitoring site includes an ozone monitor, is a Type 1 PAMS site, and collects meteorological data; as such, this site could be considered the District's lowest value site; it monitors only ozone, is a Type 1 PAMS site, and meteorological data is collected. Monitored ozone values are less than the federal ozone standard; the site's current ozone design value is approximately 89 percent of the federal standard. Therefore, the District could consider removal of this monitoring site; however, federal regulations allow removal of a monitor if it has a probability of less than 10 percent of exceeding 80 percent of the applicable NAAQS. Several exceptions apply to this threshold, which the District should explore. The region of the County served by the Ventura - Emma Wood ozone monitor may be adequately served by the El Rio monitoring site.

$PM_{2.5}$: Of the four FRM $PM_{2.5}$ monitors operating in the County, either the Thousand Oaks or Piru monitors might be a candidate for removal. In addition to giving consideration to removal of individual FRM $PM_{2.5}$ monitors, the District should give strong consideration to replacing all of the FRM and continuous $PM_{2.5}$ monitors with federal equivalent method (FEM) $PM_{2.5}$ monitors. This would allow the District to eliminate up to four FRM $PM_{2.5}$ monitors (however, there may be requirements to site a colocated FRM with an FEM).

PM_{10}: Consideration could be given to removing either the El Rio or Simi Valley PM_{10} monitor.

Future monitoring requirements such as the addition of a near-roadway NO_2 monitor and possibly an SO_2 monitor make it important that the District look for opportunities to streamline its monitoring operations, while continuing to provide adequate and sufficient air quality data to the public.

1.0 Introduction

The Ventura County Air Pollution Control District's Network Assessment Plan is an examination and evaluation of the District's network of air pollution monitoring stations. This assessment is required by Title 40, Code of Federal Regulations, Part 58.10(d) (40 CFR 58.10(d)). The requirement to submit an assessment of the air pollution monitoring system is provided for in §58.10, (d) which states:

"The State, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and where new technologies are appropriate for incorporation in the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby States and Tribes or health effects studies. For $PM_{2.5}$, the assessment also must identify needed changes to population-oriented sites. The State, or where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan to the Regional Administrator. The first assessment is due July 1, 2010."

A network assessment includes (1) re-evaluation of the objectives and budget for air monitoring, (2) evaluation of a network's effectiveness and efficiency relative to its objectives and costs, and (3) development of recommendations for network reconfigurations and improvements.

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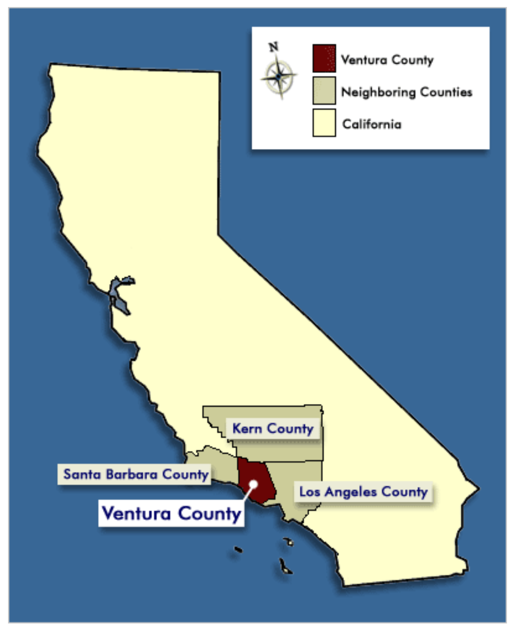
2.0 Regional Description

2.1. Physical Setting

Ventura County is located along the southern portion of the central California coast between Santa Barbara and Los Angeles Counties. Its diverse topography is characterized by mountain ranges to the north, two major river valleys (the Santa Clara, which trends east-west, and the Ventura, which trends roughly north-south), and the Oxnard Plain to the south and west.

The "north half" of the county is mountainous and sparsely populated. The "south half" includes the populated areas where the Ventura County Air Pollution Control District has established its air monitoring network. The south half of the County includes the Oxnard Plain, the Ventura Coastal area and four inland valleys: the Simi Valley, the Conejo Valley, the Santa Clara River Valley, and the Ojai Valley. These areas are described in more detail in Section 3. The approximate land area of Ventura County is 1,832 square miles; with the Los Padres National Forest comprising approximately 964 square miles.



Generally, steep hills border the inland valleys. Bluffs dominate the coastline north of the mouth of the Ventura River, while the coastline south of the Ventura River to Point Mugu is near sea level. The Santa Monica Mountains rise above the Oxnard Plain and continue east into Los Angeles County.

The south half of the County has ten incorporated cities and includes both urban and agricultural areas. Outside of the urban and agricultural areas, the countryside is dominated by sage brush, chaparral scrub, and oak forest plant communities typical of a Mediterranean climate. These generally cover the lower hillsides and southern exposures of higher slopes, while conifer forests typically occur in deep valleys and on the northern slopes of higher elevations.

Agriculture is the dominant non-urban activity in the Oxnard Plain and Santa Clara River Valley, along much of the river valleys, and on the neighboring hillsides.[1]

[1] Ventura County Air Pollution Control District, $PM_{2.5}$ Monitoring Network Plane, June 1998.

2.2. Population

The 2000 Census lists the population for Ventura County as 753,197 persons. According to Census Bureau estimates the County population in 2009 totaled 836,080 persons[2]. The overwhelming majority of the population resides in the southern portion of the County. In 2009 approximately 88 percent of the County's population resided in one of the County's ten cities. In 2000 there were approximately 752 residents in the north-half of the County. Overall population growth in the County between 2000 and 2009 was 11 percent. Population growth, by city, between 2000 and 2009 ranged from one percent in Port Hueneme to 18 percent in Moorpark.

Table 1: Ventura County Population, 2000 and 2009

	Population				
City	2000	% of 2000 Total	2009	% of 2009 Total	% Growth
Camarillo	57,084	7.6	66,149	7.9	16%
Fillmore	13,643	1.8	15,639	1.9	15%
Moorpark	31,415	4.2	37,086	4.4	18%
Ojai	7,862	1.0	8,157	1.0	4%
Oxnard	170,358	22.6	197,067	23.6	16%
Port Hueneme	21,845	2.9	22,171	2.7	1%
San Buenaventura	100,916	13.4	108,787	13.0	8%
Santa Paula	28,598	3.8	29,725	3.6	4%
Simi Valley	111,351	14.8	125,814	15.0	13%
Thousand Oaks	117,005	15.5	128,564	15.4	10%
Balance of County	93,120	12.4	96,921	11.6	4%
County Total	**753,197**		**836,080**		11%

[2] U.S. Census Bureau, http://factfinder.census.gov/

2.3. Topography and Climate

The majority of the population resides in the southern half of the County – the District has focused its air monitoring efforts there. The south half of the county is divided into six air basins: Ventura Coastal, Oxnard Plain, Ojai Valley, Santa Clara River Valley, Simi Valley, and the Conejo Valley).

The climate of the coastal shore region is dominated by the cool moist Pacific Ocean. The inland coastal plain is also affected by the proximity of the ocean, but as the distance from the ocean increases so does the heating affects of the land mass.

The Ojai Valley is a bowl shape, surrounded by mountains, and has a warm dry climate. There is only one pathway for the flow of air to enter or exit the valley. The shape of the valley prevents the escape of pollutants that are produced in the valley as well as transported in.

The Santa Clara River Valley allows the transport of air pollutants to and from the Santa Clarita Valley in Los Angeles County.

The Simi Valley is horse shoe shaped with the open end to the west. The sea breeze flows in from the west during the afternoon bringing in air pollutants which are combined with those produced locally. The Simi Valley is also adjacent to the Los Angeles basin and does see transport of air pollutants in the mornings and afternoons when winds are light and easterly. The mountains around Simi trap the air pollutants and the inversion limits mixing aiding the production of ozone.

The Conejo Valley is a west to east valley with the western edge raised above the coastal plain and the eastern end narrows toward the Los Angeles air basin. The topographical shape of the valley and the wind patterns limit the amount of trapping of air pollutants.

2.3.1. Weather Patterns

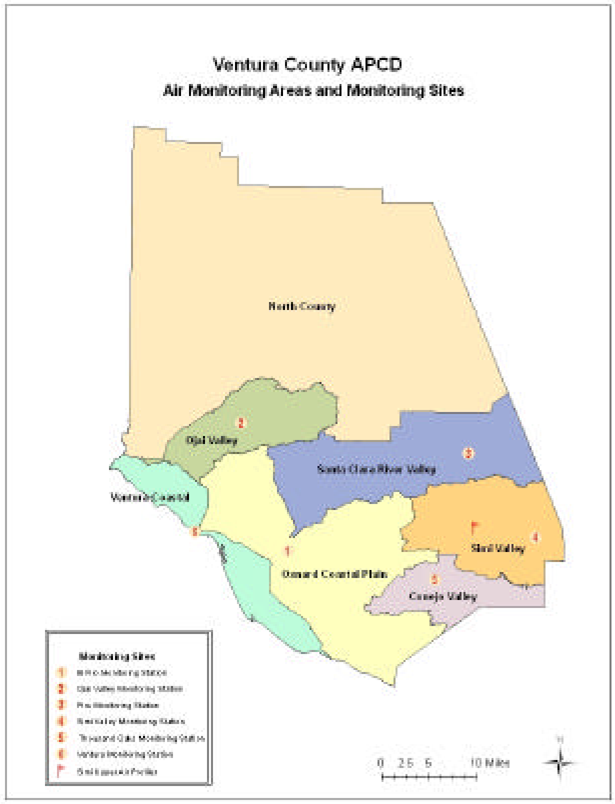
The weather of the south half of the County is primarily controlled by the differences in the thermal mass of the land and of the Pacific Ocean. The ocean remains relatively constant and slow to change temperature (55F-65F), while the land mass varies daily and seasonally in temperature (30F-110F).

Diurnal wind patterns consist of light night to morning winds and the afternoon sea breeze. The late evening to morning winds are a light drainage flow wind from the northeast or east. As the evening air cools, it flows toward the ocean. From mid to late morning the sea breeze begins its push from the ocean to the land. Afternoon sea breeze winds from the west to southwest are a steady 5-15 mph. The sea breeze continues through the afternoon into the early evening.

The early summer months have a typical weather pattern of low clouds and fog along the coast and inland during the night and morning hours, with afternoons becoming sunny. The mid to late summer season typically sees the establishment of the semi-permanent subtropical high pressure area that positions itself in the eastern Pacific and/or over southern California. When the high pressure area sets up it is the basis for the occurrence of high temperatures and high ozone concentrations. The winter storm season runs from late October to late March. Santa Ana wind season occurs from late September to mid May. Santa Ana winds are dry strong northeasterly winds. The Santa Ana winds typically follow on the heels of winter type weather systems. During these times the air is very mixed or unstable, not allowing the formation or trapping of air pollutants.

3.0 Overview of Air Monitoring Network

The Ventura County Air Quality Control District operates six air monitoring sites and one upper air profiler within Ventura County. The District's monitoring network has been designed to provide ozone, $PM_{2.5}$ and PM_{10} monitoring coverage to the majority of the inhabited regions of the County. The District has conducted air monitoring for ozone or oxidants in Ventura County since 1963. The District's present-day air monitoring network is designed to provide air monitoring coverage to those areas with a majority of the residents of Ventura County. Locations of the District's monitoring sites are shown Figure 1 (page 8).



The air monitoring network serves the following areas of Ventura County:

<u>Conejo Valley</u> – an inland area, which includes the city of Thousand Oaks and the communities of Westlake Village and Newbury Park, covering 75 square miles and home to 138,000 people. The area is surrounded by foothills and low-lying mountains. The eastern edge of the Conejo Valley is the border between Ventura and Los Angeles Counties. There are no major stationary sources in its boundaries. The area is impacted primarily by mobile sources. This area is served by the District's monitoring station at Thousand Oaks High School, Moorpark Road, in Thousand Oaks.

<u>Ojai Valley</u> – an inland area including the City of Ojai and the communities of Oak View, and Meiners Oaks, which covers 102 square miles and is home to 30,000 people. The Ojai Valley is surrounded by mountain ranges. There is one major stationary source[3] on the southeastern edge of the region; however, it may be influenced by oil production

[3] For the purpose of this report a major stationary source is considered to be a facility that has been issued a federal Part 70 operating permit (also referred to as a Title V permit).

activities occurring to the south, in the Ventura Coastal area. The area is impacted primarily by mobile sources. The Ojai Valley is served by the District's monitoring station at the County fire station, Ojai Avenue, in Ojai.

<u>Oxnard Coastal Plain</u> – a broad coastal area from the Pacific Ocean to several inland valleys, covering 286 square miles and has a population of 190,000 people. The Oxnard Coastal Plain area is a relatively flat plain area with foothills and mountains at its northern border. The Oxnard Coastal Plain is home to considerable agricultural activities. Emission sources within the area include several of the County's major stationary sources, including natural gas-fired cogeneration facilities, several oil and gas production and processing facilities, and a paper products manufacturer. Its air quality is influenced by emission sources in the Ventura Coastal area that include a deepwater port, two natural gas-fired electric generating units, two naval bases, and several natural gas-fired cogeneration facilities. The area is impacted by marine shipping operations occurring off of the County's coast and mobile sources. This area is served by the District's monitoring station at Rio Mesa High School, Central Avenue, in Oxnard.

<u>Santa Clara River Valley</u> – an inland area, covering 204 square miles and home to 49,000 people. The Valley is surrounded by foothills and low-lying mountains. The eastern edge of the Santa Clara River Valley is the border between Ventura and Los Angeles Counties. The area is also home to considerable agricultural activities. There are oil production and processing activities occurring throughout the Valley. There are two major stationary sources in its boundaries. The area is impacted primarily by mobile sources. This area is served by the District's monitoring station on Pacific Avenue, in Piru.

<u>Simi Valley</u> – an inland area, which covers the cities of Simi Valley and Moorpark, is 142 square miles and is home to 148,000 people. The Valley is surrounded by foothills and low-lying mountains. The eastern edge of the Simi Valley is the border between Ventura and Los Angeles Counties. There are two major stationary sources in its boundaries. The area is impacted primarily by mobile sources. This area is served by the District's monitoring station at Simi Valley High School, on Cochran Street, in Simi Valley.

<u>Ventura Coastal</u> - a coastal area, which covers 119 square miles and has a population of 197,000 people. The Ventura Coastal monitoring area represents an area that borders the Pacific Ocean, with Santa Barbara County to the west. This area encompasses the city of Port Hueneme and portions of the cities of Ventura and Oxnard. Some agricultural activities occur in the Ventura Coastal area. Emission sources within the area include a deepwater port and a number of the County's major stationary sources, including two natural gas-fired electric generating units, two naval bases and several natural gas-fired cogeneration facilities. In addition to stationary sources, the area is impacted by mobile sources and marine shipping operations

occurring off of the County's coast. This area is served by the District's monitoring station at the Emma Wood State Park group campground, west of Ventura.

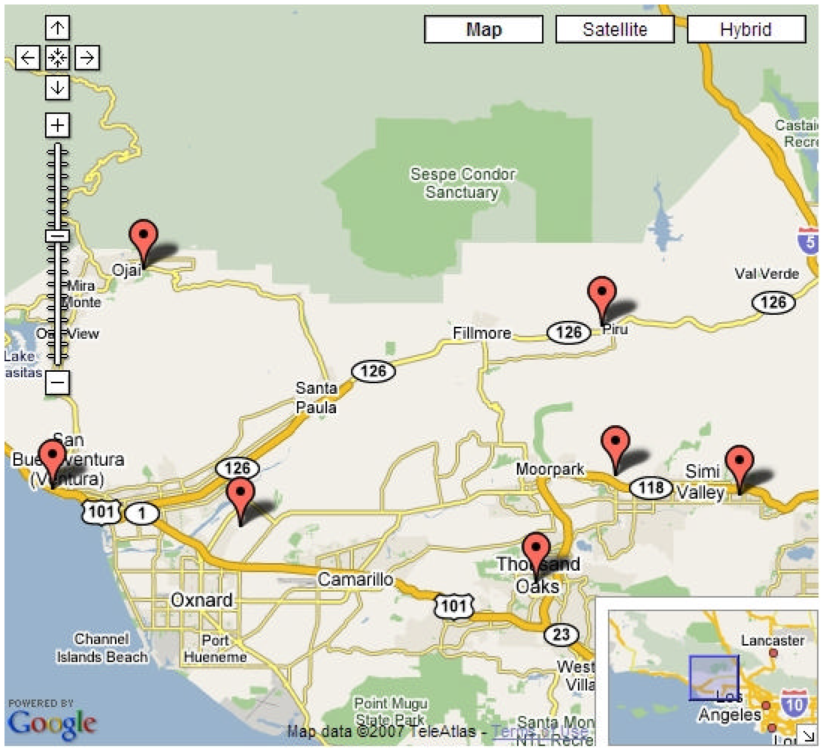


Figure 1: Ventura County APCD Air Monitoring Stations

Table 2 lists the pollutants or parameters currently measured at each site and the assigned Air Quality System (AQS) identification number for each monitoring site. The table also identifies the respective air monitoring region served by the monitoring station.

Table 2: Air Monitoring Stations,
Region Served and Pollutants Monitored

Site Name and Region Served	AQS ID	Parameters Monitored
El Rio – Rio Mesa School #2 Region: Oxnard Coastal Plain	061113001	NO_2, Ozone, Total NMHC, PM_{10}, BAM $PM_{2.5}$, FRM $PM_{2.5}$, VOCs, carbonyls, Meteorology
Ojai – Ojai Avenue Region: Ojai Valley	061111004	Ozone, BAM $PM_{2.5}$, PM_{10}, Meteorology
Piru – Pacific Avenue Region: Santa Clara River Valley	061110009	Ozone, BAM $PM_{2.5}$, FRM $PM_{2.5}$, Meteorology
Simi Valley – Cochran Street Region: Simi Valley	061112002	Ozone, NO_2, Total NMHC, PM_{10}, BAM $PM_{2.5}$, FRM $PM_{2.5}$ Toxics (Cr^{6+}, aldehydes, total metals), VOCs, speciated $PM_{2.5}$, Meteorology
Simi Valley Upper Air Profiler	061110008	Meteorology only
Thousand Oaks – Moorpark Road Region: Conejo Valley	061110007	Ozone, BAM $PM_{2.5}$, FRM $PM_{2.5}$, Meteorology
Ventura – Emma Wood State Beach Region: Ventura Coastal	061112003	Ozone, VOCs, Meteorology

Notes:
1) BAM $PM_{2.5}$ – continuous/hourly $PM_{2.5}$
2) FRM $PM_{2.5}$ – Federal Reference Method, 24 hour filer samples every 3 or 6 days
3) Total NMHC - non-methane hydrocarbons

Table 3: Pollutants Monitored and Monitoring Objectives

Pollutant	Monitoring Site	Monitoring Objectives and Spatial Scale			
		Highest Concentration	Population	Background	Spatial Scale
Ozone	El Rio		✓		Urban
	Ojai		✓		Urban
	Piru	✓			Urban
	Simi Valley	✓			Urban
	Thousand Oaks		✓		Urban
	Ventura - Emma Wood			✓	Urban
NO2	El Rio		✓		Urban
	Simi Valley	✓			Urban
$PM_{2.5}$	El Rio		✓		Neighborhood
	Piru		✓		Neighborhood
	Simi Valley		✓		Neighborhood
	Thousand Oaks		✓		Neighborhood
PM10	El Rio		✓		Neighborhood
	Ojai		✓		Urban
	Simi Valley	✓			Neighborhood

3.1. Program Budget and Staffing

The FY 2010 budget for the District's Air Monitoring Division is approximately $1,672,810. Of this amount approximately $1,144,600 is for salaries and benefits and $268,210 is for services and supplies. The District has also allocated $260,000 for fixed asset items. Funding for the Division comes from the District's general fund, federal grants, state subvention and contract revenue. In future years the Division will need additional fixed assets funds to replace the District's upper air profiler, for installation of a near-roadway NO_2 monitor, for the possible installation of an SO_2 monitor, and for minor to major upgrades and repairs to some air monitoring shelters.

The Air Monitoring Division includes the following staffing:

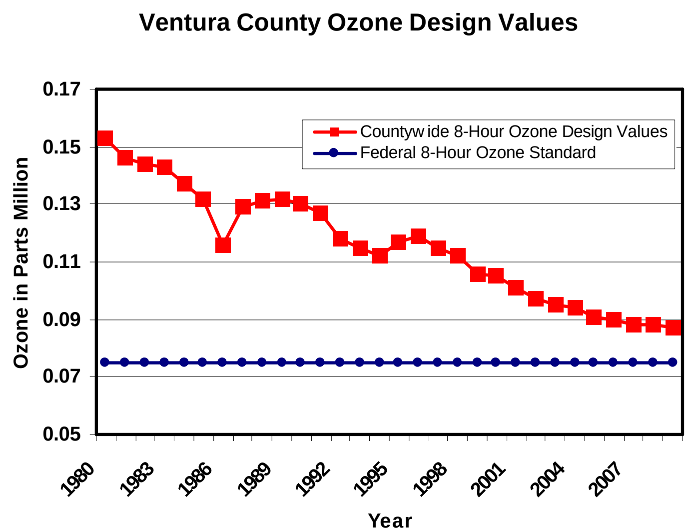
1. One supervising instrument technician and two instrument technicians whose primary functions are to operate the air monitoring network;
2. One supervising meteorologist and one meteorologist who are responsible for providing daily air quality forecasts, agricultural burn forecasts and providing assistance in maintaining and operating the District's five Beta Attenuation Mass Monitors (BAM) $PM_{2.5}$ monitors and the District's upper air profiler. The meteorologists also assist the instrument technicians with PM monitor set up and recovery and air quality instrumentation tasks;
3. One supervising chemist and one chemist who are primarily responsible for operating, maintaining and conducting data analysis for the District's PAMS program;
4. One supervising air quality specialist and one air quality specialist who are responsible for operating the District's $PM_{2.5}$ filter weighing program and data input into EPA's Air Quality System (AQS).

4.0 Current and Historical Air Quality Conditions

For over 30 years the Ventura County APCD has developed numerous air quality attainment and management plans, rules and regulations to reduce emissions of ozone precursors - reactive organic compounds (ROC) and oxides of nitrogen (NOx) – as well as particulate matter (PM). Historical trends for ozone and PM show a continued improvement in the County's air quality. Previous air monitoring in the County has shown that ambient levels of carbon monoxide (CO) and sulfur dioxide (SO2) are significantly below federal air quality standards. This section presents County-wide air quality data and trends; air quality data and trends for each individual air monitoring station are shown in the Appendices.

4.1. Ozone

Ventura County is a severe nonattainment area for ozone. The District monitors for ozone at all six of its air monitoring stations. The current federal ozone standard is an 8-hour average of 0.075 parts per million (ppm), which has been exceeded at various monitoring sites in Ventura County. The federal ozone standard is exceeded most frequently at Simi Valley, followed by Ojai and Piru. El Rio and Ventura-Emma Wood exceed the federal ozone standard infrequently and record similar levels of ozone. The District's continuous ozone data is provided to EPA's AIRNow website. The number of monitors in the District's ozone monitoring network exceeds the federal requirements.



County-wide ozone design values and days exceeding the standard have continued to decline in spite of increasing population and vehicle miles in the County. Ozone trends for each air monitoring site are shown in the Appendices.

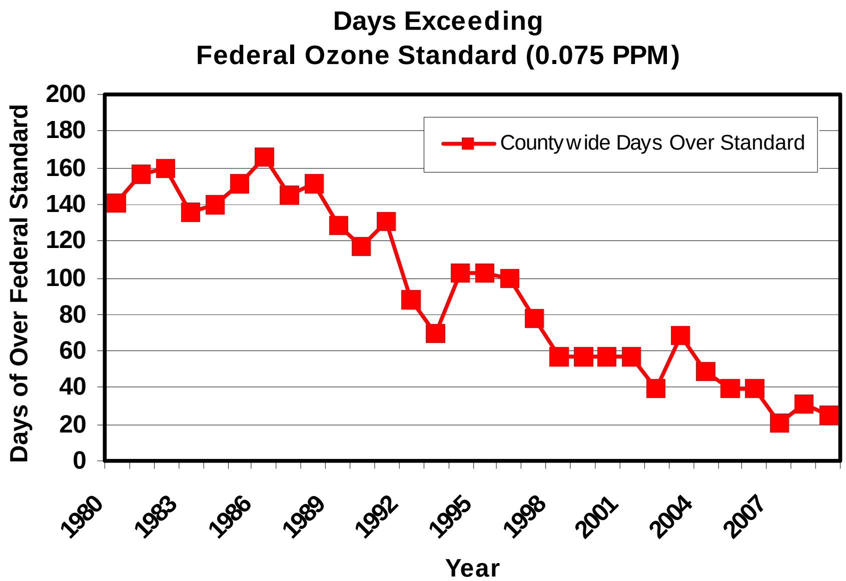
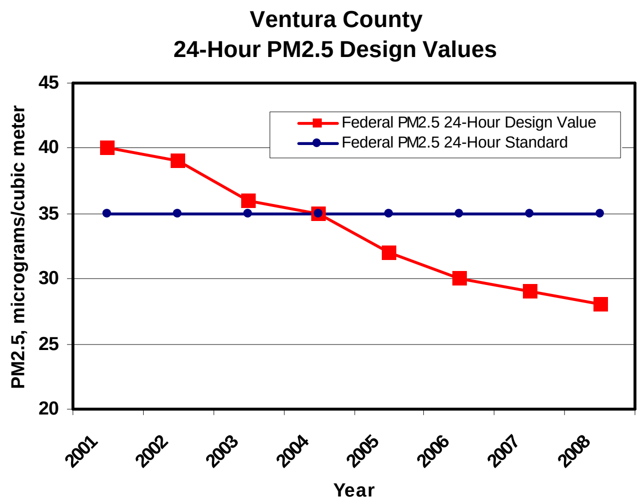


Figure 2: Days Exceeding Federal Ozone Standard

4.2. Particulate Matter – 2.5 microns ($PM_{2.5}$)

The District operates Federal Reference Method (FRM) monitors for $PM_{2.5}$ at four of its air monitoring sites – El Rio, Piru, Simi Valley and Thousand Oaks. The District began its $PM_{2.5}$ monitoring program in 1999 with the installation of monitors at the El Rio and Thousand Oaks sites; $PM_{2.5}$ monitors were added at Simi Valley and Piru in 2000. The County is in attainment of both federal $PM_{2.5}$ standards - the annual arithmetic mean of 15 micrograms per cubic meter (µg/m^3) and the 24-hour standard of 35 µg/m^3. Historical $PM_{2.5}$ values for each air monitoring site are shown in the Appendices. The number of monitors in the District's $PM_{2.5}$ monitoring network exceeds the federal requirements.



In addition to monitoring $PM_{2.5}$ using the Federal Reference Method, the District also operates continuous $PM_{2.5}$ monitors (beta attenuation mass monitors, or BAMs) at all of its sites except Ventura-Emma Wood. The continuous

$PM_{2.5}$ data is provided to EPA's AIRNow website.

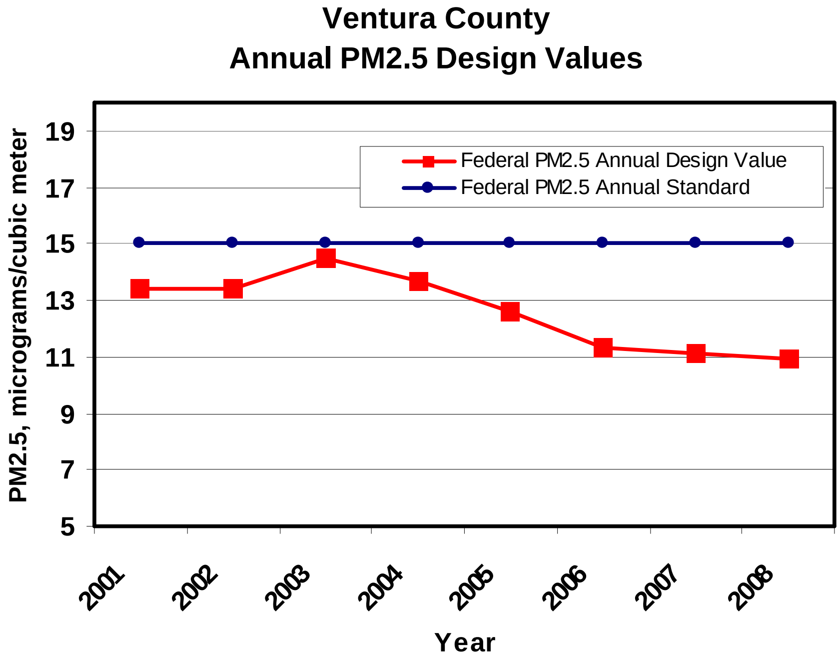
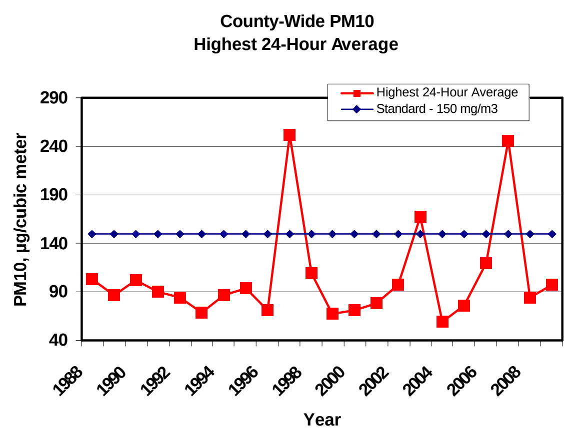


Figure 3: Annual $PM_{2.5}$ Design Values

4.3. Particulate Matter – 10 microns (PM_{10})

The District operates Federal Reference Method (monitors) for PM_{10} at three of its air monitoring sites – El Rio, Ojai and Simi Valley. The federal 24-Hour standard for PM_{10} is 150 µg/m^3, not to be exceeded more than once per year on average over 3 years. The District began its PM_{10} monitoring program in 1988 with monitors in El Rio and Simi Valley; the Ojai Valley PM_{10} monitor was added in 1996. The County is in attainment with the federal PM_{10} standard. Historical PM_{10} values for each air monitoring site are shown in the Appendices.



4.4. Other Pollutants

In addition to monitoring for ozone, $PM_{2.5}$ and PM_{10}, the District also monitors for non-methane hydrocarbons, VOCs, carbonyls, Toxics (Cr^{6+}, total metals and aldehydes), NO_2 and speciated $PM_{2.5}$

5.0 Network Analysis

The District's network of ozone, $PM_{2.5}$ and PM_{10} air monitors was evaluated using several different methods: a ranking based upon air quality data and monitor-to-monitor correlation. In some cases consideration was given to the value of the air monitor or air monitoring site in the District's overall monitoring goals.

Monitor Ranking: Monitors are ranked against one another based on comparisons of the pollutant they measure. Monitors that have higher concentrations, design values, frequency of exceedances, etc. are ranked higher than monitors that have low concentrations, design values or frequency of exceedances.

Monitor-to-Monitor Correlation: Using diagnostic tools provided by EPA, monitors were compared to each other to determine if concentrations correlate temporally. According to EPA, monitors with concentrations that correlate well (e.g., r^2 greater than 0.75) with concentrations at another monitor may be redundant. Conversely, a monitor with concentrations that do not correlate with other nearby monitors may be unique and have more value for spatial monitoring objectives[4].

The Ojai Valley has a unique topography in that it is a bowl shape, surrounded by mountains, and has a warm dry climate. There is only one pathway for the flow of air to enter or exit the valley. The shape of the valley prevents the escape of pollutants that are produced in the valley as well as transported in. For these reasons, it is the District's opinion that ozone, PM_{10} and continuous $PM_{2.5}$ monitoring should continue in the Ojai Valley.

5.1. Area and Population Served

Each of the District's air monitoring sites has at a minimum an ozone monitor. Instrumentation at monitoring other sites includes FRM $PM_{2.5}$ monitors, continuous $PM_{2.5}$ monitors (BAMs), PM_{10} monitors and monitors for hydrocarbons, carbon monoxide (CO) and oxides of nitrogen (NOx). The District has located each of its air monitoring sites in relation to specific geographic areas of the County, depending upon each area's population, topography and meteorology. Because the north-half of the County is mountainous and sparsely populated, no air monitoring sites have been located in that area. As shown previously in Table 1 (page 3), the County's growth rate between 2000 and 2009 has been approximately 11 percent. Growth between individual cities has ranged from one percent to 18 percent, while the approximate growth between the District's air monitoring regions has ranged from four percent (Ojai Valley) to 14 percent (Simi Valley). Because the District has designed its network with consideration given to the distinct geographic, topographic and meteorological areas of

[4] U.S. Environmental Protection Agency, Ambient Air Monitoring Network Assessment Guidance, EPA-454/D-07-001, February 2007.

the County, the areas and population served by the District's air monitoring vary greatly. Table 4, below, displays the area and population served by each of its air monitoring sites; area and population for each air monitoring site are based upon data from the 2000 Census. District staff evaluated EPA's "area served" assessment tool for use in this assessment, however due to the large area that the county's north-half encompasses and the unique topography of the monitoring regions, it was not feasible to use for this assessment. Table 5 displays the distance (in miles) between each pair of air monitoring sites.

Table 4: Air Monitoring Regions - Area and Population Served

Site Name and Region Served	AQS ID	Area Served (Sq. Miles)	Population Served	Population Density (Pop./Sq. Mi)
El Rio – Rio Mesa School #2 Region: Oxnard Coastal Plain	061113001	286	190,000	664
Ojai – Ojai Avenue Region: Ojai Valley	061111004	102	30,000	294
Piru – Pacific Avenue Region: Santa Clara River Valley	061110009	204	49,000	240
Simi Valley – Cochran Street Region: Simi Valley	061112002	142	148,000	1,042
Thousand Oaks – Moorpark Road Region: Conejo Valley	061110007	75	138,000	1,840
Ventura – Emma Wood State Beach Region: Ventura Coastal	061112003	119	197,000	1,655

Table 5: Distance Between Air Monitoring Sites, in Miles

Monitor Site	Thousand Oaks	Piru	Ojai	Simi Valley	Ventura - Emma Wood	El Rio
Thousand Oaks	1					
Piru	22	1				
Ojai	42	39	1			
Simi Valley	19	18	54	1		
Ventura - Emma Wood	42	48	20	58	1	
El Rio	26	35	23	42	16	1

5.2. Ozone

The first evaluation was to rank the District's ozone monitors using data from 2000 through 2009. Rankings were evaluated for four factors; the number of days the federal ozone standard was exceeded at each site, each site's peak eight-hour ozone reading, each site's ozone design value and the percent each site is to the federal ozone standard. Each station was ranked one (1) through six (6), with one being the highest value. From this analysis, the ozone monitor at Simi Valley serves the area with the most severe ozone problem in the County, followed by the monitor at the Ojai monitoring site. Although the rankings of the District's ozone monitors show that the El Rio monitor scores the lowest values in the County, it is one of the District's highest value monitoring sites. The El Rio site is the District's PAMS (Photochemical Assessment Monitoring Stations) Type 2 site. The El Rio site also monitors for NO2, non-methane hydrocarbons, carbonyls and VOCs and is a part of the District's $PM_{2.5}$ and PM_{10} monitoring network. The Ventura - Emma Wood site on the other hand is the District's lowest value site: it monitors for ozone, collects meteorological data and is a PAMS Type 1 site, which is not required by EPA's air monitoring regulations (although the District has committed to operate it as a part of an alternative program). Federal regulations require that Ventura County have at a minimum two ozone monitors[5]; the District's air monitoring network exceeds this criteria.

[5] 40 CFR Part 58, Appendix D, Section 4.1

Table 6: Historical Ozone Data, 2000- 2009

Ozone Monitor	Ave. Days/Yr. Exceeding Standard	Peak 8-Hour Value, PPM	Ozone Design Value, PPM	Percent of Federal Standard
Simi Valley	33.6	0.101	0.093	125%
Ojai	25.3	0.099	0.089	119%
Piru	20.1	0.094	0.084	113%
Thousand Oaks	8.6	0.088	0.081	108%
Ventura - Emma Wood	1.0	0.075	0.067	89%
El Rio	0.2	0.073	0.065	86%

Table 7: Relative Rankings of Ozone Monitors

Ozone Monitor	Days Exceeding Standard	Peak 8-Hour Value	Ozone Design Value	Percent of Federal Standard
Simi Valley	1	1	1	1
Ojai	2	2	2	2
Piru	3	3	3	3
Thousand Oaks	4	4	4	4
Ventura - Emma Wood	5	5	5	5
El Rio	6	6	6	6

The ozone monitor-to-monitor correlation matrix was used to develop a correlation between each pair of the District's ozone monitors, based upon data from 2005 through 2008. From this analysis, the ozone monitor pairs of Ventura-Emma Wood/El Rio, Ojai/Piru and Piru/Simi Valley have the highest correlations, indicating each pair's possible redundancy. A number of monitor pairs have low correlations, indicating each pair's uniqueness to one another.

Table 8: Correlation Matrix of Ozone Monitors, 2005 - 2008

Ozone Monitor	Thousand Oaks	Piru	Ojai	Simi Valley	Ventura - Emma Wood	El Rio
Thousand Oaks	1					
Piru	0.56	1				
Ojai	0.40	0.77	1			
Simi Valley	0.56	0.76	0.64	1		
Ventura - Emma Wood	0.16	0.04	0.03	0.04	1	
El Rio	0.43	0.18	0.11	0.16	0.69	1

5.2.1. Analysis of Ozone Network

Because the Ojai monitoring site is located in an area that is geographically and meteorologically distinct from the rest of the County, District staff believes the Ojai site should not considered for removal. Furthermore, the Ojai monitoring station serves a small geographical area with a small population, thus the addition of another ozone monitor in the Ojai Valley is not warranted. The Simi Valley, Thousand Oaks and Piru monitoring sites all exceed the federal ozone standard. The Ventura - Emma Wood and El Rio ozone monitors are District's only monitors that are in attainment with the federal ozone standard. The Ventura - Emma Wood monitor records slightly higher values, and has a higher design value than the El Rio monitor. The two sites are approximately 16 miles apart (see Table 5). The El Rio monitor is located at a high-value site that is the District's PAMS Type 2 site, and monitors for $PM_{2.5}$ (FRM and continuous), PM_{10}, non-methane hydrocarbons and carbonyls. The Ventura - Emma Wood is the District's lowest value site in that it monitors only for ozone and is the District's PAMS Type 1 site. In light of this, it appears that the Ventura - Emma Wood ozone monitor is the only monitor that may be considered for removal.

5.3. $PM_{2.5}$

The District's $PM_{2.5}$ monitoring network consists of four sites using FRM $PM_{2.5}$ monitors and five sites using continuous (BAM) $PM_{2.5}$ monitors. The sites using FRM $PM_{2.5}$ monitors were ranked according to five different $PM_{2.5}$ values – annual average, annual design value, 98th percentile ranking and 24-hour design value. Data from 2000 through 2009 was used; however, some monitors did not have sufficient history to perform averaging periods until after 2000 (El Rio, Piru and Simi Valley in particular). Each station was ranked one (1) through four (4), with one being the highest value. Tables 8 and 9 present the data and rankings of each $PM_{2.5}$ monitor. This analysis shows the $PM_{2.5}$ monitor at Simi Valley serves the area with the most severe $PM_{2.5}$ problem in the County, followed by the monitors at Thousand Oaks, El Rio and Piru. It should be noted that all monitors meet the federal 24-hour and annual arithmetic mean $PM_{2.5}$ standards. Federal regulations require that Ventura County have at a minimum one $PM_{2.5}$ monitor[6]; the District's air monitoring network exceeds this criteria.

It should be noted that at all four of the District's FRM $PM_{2.5}$ monitoring sites, plus the Ojai monitoring site, the District operates continuous (BAM) $PM_{2.5}$ monitors. The continuous monitors are used to provide the public with real-time $PM_{2.5}$ air quality data.

Table 9: Historical $PM_{2.5}$ Data

$PM_{2.5}$ Monitor	Annual Average, µg/m3	Annual Design Value, µg/m3	% of Annual Design Value	98th Percentile, µg/m3	24-Hour Design Value, µg/m3
Simi Valley	12.5	12.4	82%	33.2	34
Thousand Oaks	11.6	11.7	78%	29.7	29
El Rio	11.3	11.2	74%	26.3	27
Piru	10.2	10.0	67%	22.2	22

Table 10: Relative Rankings of $PM_{2.5}$ Monitors

$PM_{2.5}$ Monitor	Annual Average	Annual Design Value	98th Percentile	24-Hour Design Value
Simi Valley	1	1	1	1
Thousand Oaks	2	2	2	2
El Rio	3	3	3	3
Piru	4	4	4	4

The monitor-to-monitor correlation matrix was used to develop correlations between each pair of the District's $PM_{2.5}$ monitors, based upon data from 2005 through 2008. From this analysis, the $PM_{2.5}$ monitor pair of Simi Valley/Piru has a correlation of 0.72, which is approaching EPA's criteria (a correlation of 0.75) for the pair's possible

[6] 40 CFR Part 58, Appendix D, Section 4.7

redundancy; the Simi Valley/Thousand Oaks monitor pair has a correlation of 0.764, indicating a possible redundancy, according to EPA's criteria.

Table 11: Correlation Matrix of $PM_{2.5}$ Monitors, 2005 - 2008

$PM_{2.5}$ Monitor	Thousand Oaks	Piru	Simi Valley	El Rio
Thousand Oaks	1			
Piru	.653	1		
Simi Valley	.764	.724	1	
El Rio	.593	.550	.511	1

5.3.1. Analysis of $PM_{2.5}$ Network

The Thousand Oaks, Piru and El Rio sites all have annual design values less than 80 percent of the federal standard. The Simi Valley/Thousand Oaks and Simi Valley/Piru monitor pairs have correlations of .764 and .724, respectively. The Piru monitor ranks lowest among the four monitors, with El Rio ranking third lowest. This analysis would indicate that either the Thousand Oaks or Piru $PM_{2.5}$ monitor might be candidates for removal.

In addition to giving consideration to removal of individual FRM $PM_{2.5}$ monitors the District will be giving strong consideration to replacing all of the FRM and continuous $PM_{2.5}$ monitors with federal equivalent method (FEM) $PM_{2.5}$ monitors.

5.4. PM_{10}

The District's PM_{10} monitors were ranked using three different values – annual average, three-year average and the highest 24-hour average. Data from 2000 through 2009 was used. Each station was ranked one (1) through three (3), with one being the highest value. Tables 11 and 12 present the data and rankings of each PM_{10} monitor. The rankings show the monitor at El Rio serves the area with the most severe PM_{10} problem in the County, followed by Simi Valley and Ojai. Federal regulations require that Ventura County have at a minimum one to two PM_{10} monitors[7]; the District's air monitoring network exceeds this criteria.

[7] 40 CFR Part 58, Appendix D, Section 4.6

Table 12: Historical PM_{10} Data

PM_{10} Monitor	Annual Average, µg/m3	3-Year Average, µg/m3	High 24-Hour Average, µg/m3
El Rio	27.60	27.67	98.0
Simi Valley	27.56	22.56	84.3
Ojai	21.79	27.56	54.4

Table 13: Relative Rankings of PM_{10} Monitors

PM_{10} Monitor	Annual Average	3-Year Average	High 24-Hour Average
El Rio	1	1	1
Simi Valley	2	2	2
Ojai	3	3	3

The monitor-to-monitor correlation matrix for the three PM_{10} monitors was based upon data from 2005 through 2008. Because of the uniqueness of the Ojai Valley, the District believes the Ojai monitor should be left in place; therefore, the only monitor pair to evaluate is the El Rio/Simi Valley pair, which does not show a strong correlation, indicating that the pair's uniqueness and that they may not be suitable for removal.

Table 14: Correlation Matrix of
PM_{10} Monitors, 2005 - 2008

PM_{10} Monitor	El Rio	Ojai	Simi Valley
El Rio	1		
Ojai	0.554	1	
Simi Valley	0.352	0.592	1

5.4.1. Analysis of PM_{10} Network

Although the El Rio/Simi Valley pair of monitors does not have a high correlation, both monitors are less than 65 percent of the federal annual PM_{10} standard. All three monitors show occasional spikes in excess of the federal PM_{10} standard; these spikes are caused by smoke from wildfires within the County; the most recent spike of 246 $\mu g/m^3$ (occurring in 2007) was flagged as an exceptional event and submitted to the California Air Resources Board for review and submittal to EPA. Federal regulations require that the District maintain one to two PM_{10} monitors; because the District exceeds the minimum monitoring requirements and the El Rio and Simi Valley pair of monitors have recorded less than the federal standard, either one of these monitors could be a candidate for removal. In the future, the District should consider the use of FEM PM_{10} monitors as that technology develops.

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APPENDICES

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APPENDIX A: HISTORICAL AIR MONITORING IN VENTURA COUNTY

1.0 Ozone and Oxidant Monitoring

Table 15: Historical Ozone and Oxidant Monitoring Locations

Air Monitoring Area	Monitoring Site	Dates of Operation
Coastal Area	Ventura – Loma Vista	Intermittent 10/1963 –3/1973
	Oxnard – A Street	5/1965 – 4/1966
	Port Hueneme – Civil Engineering Lab	Intermittent 3/1973 –10/1980
	Ventura – Telegraph Road	4/1973 – 11/1977
	Point Mugu – 13th Street	8/1973 – 8/1977
	Ventura – Figueroa Street	9/1979 – 7/1984
	La Conchita – 7128 Santa Paula Avenue	7/1983 – 10/1983
	Ventura – Emma Wood State Beach	2/1984 – Present
Ventura/Oxnard Plain Area	Camarillo – Magnolia	8/1969 – 9/1971
	Camarillo – Palm	9/1971 –11/1974
	Camarillo – Elm	12/1974 – 5/1978
	El Rio – Rio Mesa School	9/1978 – 2/1992
	El Rio – Rio Mesa School #2	12/1979 – Present
Ojai Valley Area	Ojai – Signal Street	Intermittent 4/1965 – 10/1980
	Ojai – 1401 Maricopa Highway	3/1981 – 3/1983
	Ojai – 1768 Maricopa Highway	11/1982 – 3/1996
	Casitas Pass (Air Resources Board)	10/1983 – 10/2002
	Ojai – Ojai Avenue	3/1996 – Present
Santa Clara River Valley Area	Santa Paula – Santa Barbara Street	4/1972 – 6/1978
	Piru – Main Street	Intermittent 7/1976 –9/1981
	Piru - 2 Miles SW	9/1981 – 11/2000
	Piru – Pacific Avenue	11/2000 – Present
Simi Valley Area	Moorpark College	5/1972 – 9/1972
	Simi Valley – Cochran Street I	11/1973 to 8/1985
	Simi Valley – Cochran Street	6/1985 - Present
Conejo Valley Area	Thousand Oaks – Windsor Drive	Intermittent 5/1973 – 2/1992
	Thousand Oaks – Moorpark Road	2/1992 – Present
North Half	Lockwood Valley	8/1979 – 8/1980
Offshore	Anacapa Island – Lighthouse	Intermittent 5/1984 – 10/1992

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2.0 2004 Network Reductions

In 2003, District staff conducted an assessment of the Ventura County air monitoring network, in consultation with EPA Region IX staff. The assessment was conducted in anticipation of new requirements under 40 CFR Part 58. The District determined that the existing network should be reduced to prepare for anticipated future monitoring program increases. On June 24, 2004, EPA Region IX approved the following reductions:

Table 16: Historical Network Reductions

Parameter	Location	Shutdown Date
PM_{10}	Thousand Oaks – Moorpark Road	July 22, 2004
	Piru – Pacific Avenue	July 27, 2004
Sulfur Dioxide	El Rio – Rio Mesa School #2	July 28, 2004
Carbon Monoxide	El Rio – Rio Mesa School #2	March 21, 2004
	Simi Valley – Cochran Street	March 28, 2004
Nitrogen Oxides	Ojai – Ojai Avenue	July 28, 2004
	Ventura – Emma Wood State Beach	July 29, 2004
	Thousand Oaks – Moorpark Road	July 22, 2004

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APPENDIX B: HISTORICAL AIR QUALITY DATA

Table 17: Days Exceeding Federal Ozone Standard (0.075 PPM)

Year	El Rio	Ojai	Piru	Simi Valley	Thousand Oaks	Ventura (Emma Wood)	Countywide
2009	1	11	11	24	5	0	25
2008	0	12	11	27	6	0	31
2007	0	4	4	19	2	1	21
2006	0	19	21	30	5	0	39
2005	0	20	20	35	6	1	39
2004	1	34	22	35	12	2	49
2003	0	59	43	42	22	2	68
2002	0	28	18	25	4	0	39
2001	0	33	31	46	11	4	57
2000	0	33		53	13	0	57
1999	1	26		51	10	0	57
1998	2	25		52	22	0	57
1997	2	37		70	25	3	78
1996	9	67		89	37	15	100
1995	13			97	37	9	103

Table 18: $PM_{2.5}$ Annual Mean
(Federal Standard = 15 µg/m^3)

Year	El Rio	Piru	Simi Valley	Thousand Oaks
2008	10.1	9.7	10.7	10.3
2007	10.6	10.2	11.6	10.5
2006	9.8	9.3	10.3	9.8
2005	10.5	9.2	11.2	10.5
2004	11.3	10.1	12.5	11.3
2003	11.7	11.0	14.2	11.9
2002	13.0	12.0	14.6	12.6
2001	13.1		14.9	14.1
2000				13.5
1999			13.7	12.5

Table 19: $PM_{2.5}$ Highest 24-Hour Average (Federal Standard = 35 µg/m^3)

Year	El Rio	Piru	Simi Valley	Thousand Oaks
2009	19.7	20.5	22.2	21.7
2008	23.4	29.4	35.6	27.8
2007	39.9	34.3	48.8	31.5
2006	29.8	28.0	31.7	28.4
2005	35.2	20.4	42.4	27.8
2004	28.5	28.1	41.2	38.3
2003	81.7	26.1	116.0	31.4
2002	29.4	30.6	46.4	31.7
2001	41.0	37.2	50.0	45.5
2000	45.7	37.6	55.3	53.7
1999	36.7		64.6	53.2

Table 20: PM_{10} Highest 24-Hour Average (Standard = 150 µg/m^3)

Year	El Rio	Ojai	Simi Valley
2009	97.4	37.5	76.8
2008	79	62.4	83.6
2007	245.5	98.5	118.5
2006	119.4	46.4	56.9
2005	54	60.4	76
2004	59.6	43.8	48.7
2003	81.7	56.5	167.7
2002	29.4	41.9	65.4
2001	41	50.3	78
2000	45.7	46.3	71
1999	36.7	53.6	67.6
1998	70.3	109.5	49.1
1997	252.5	36.2	106.9
1996	63.5	38.8	71.2
1995	62		94
1994	54		86
1993	63.2		68
1992	58		84
1991	59		90
1990	102		90
1989	70		87
1988	64		103

APPENDIX C: EL RIO MONITORING STATION

Figure 4:

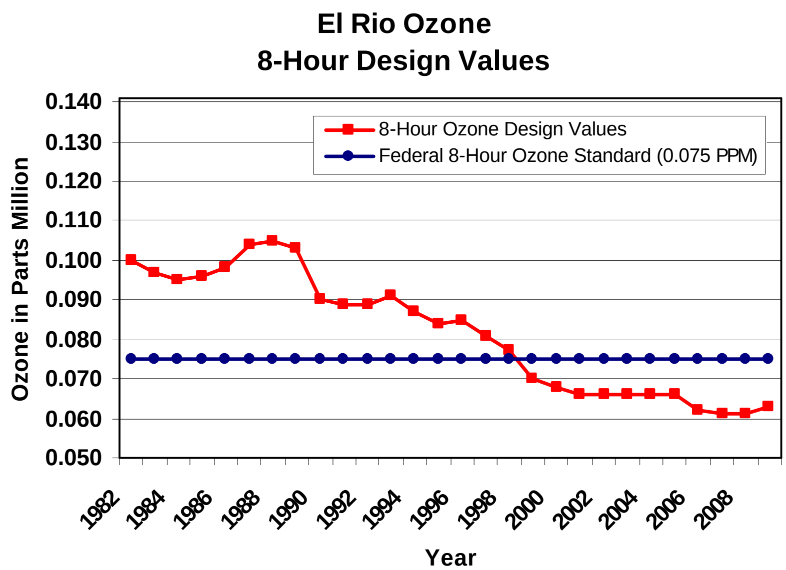


Figure 5:

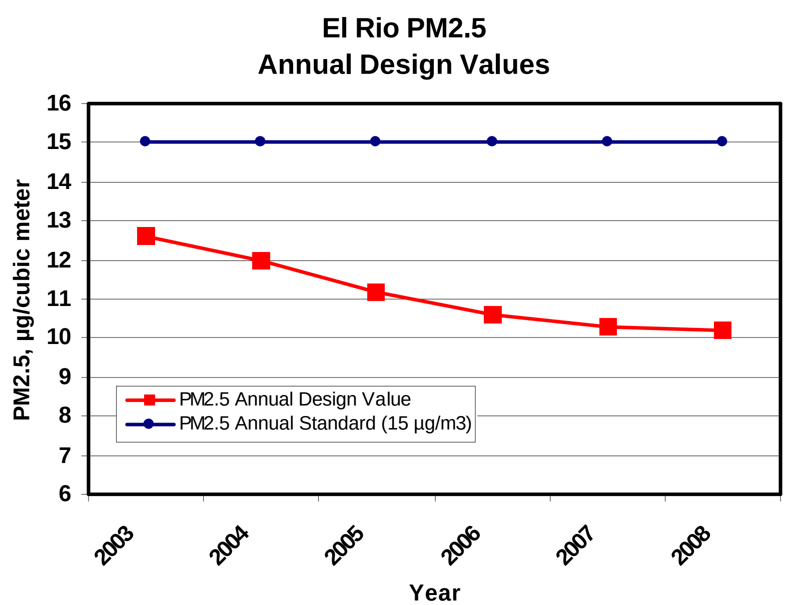


Figure 6:

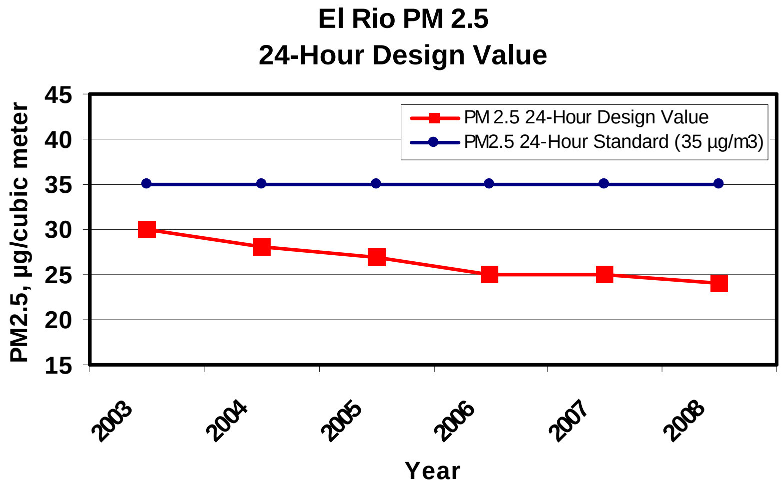
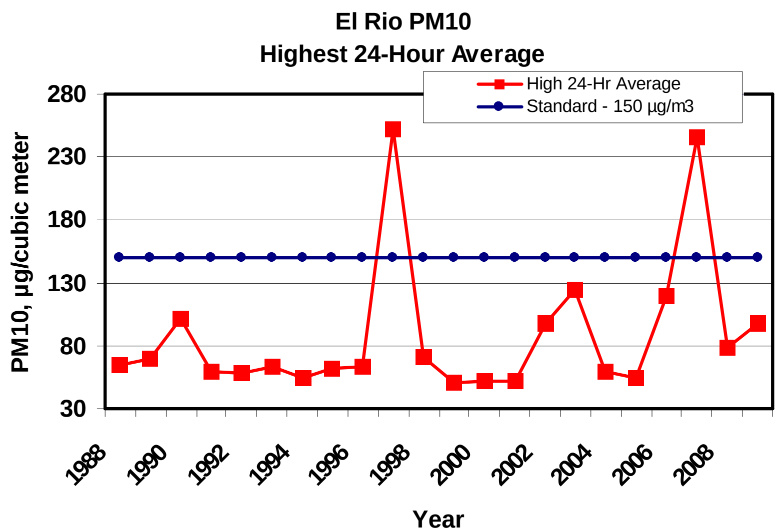


Figure 7:



APPENDIX D: OJAI MONITORING STATION

Figure 8:

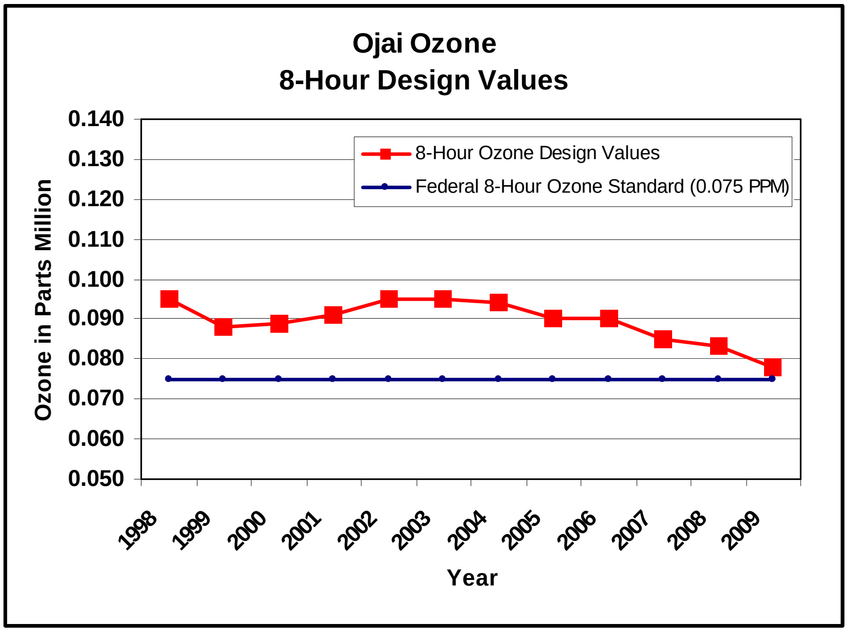
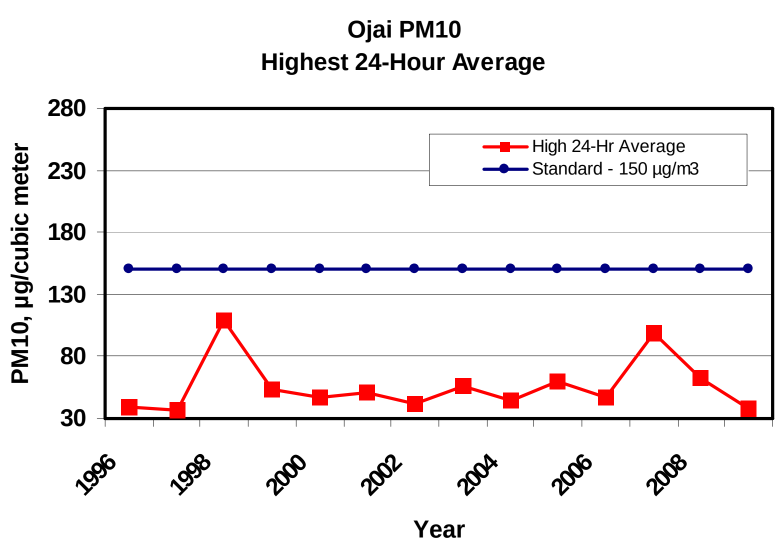


Figure 9:



APPENDIX E: PIRU MONITORING STATION

Figure 10:

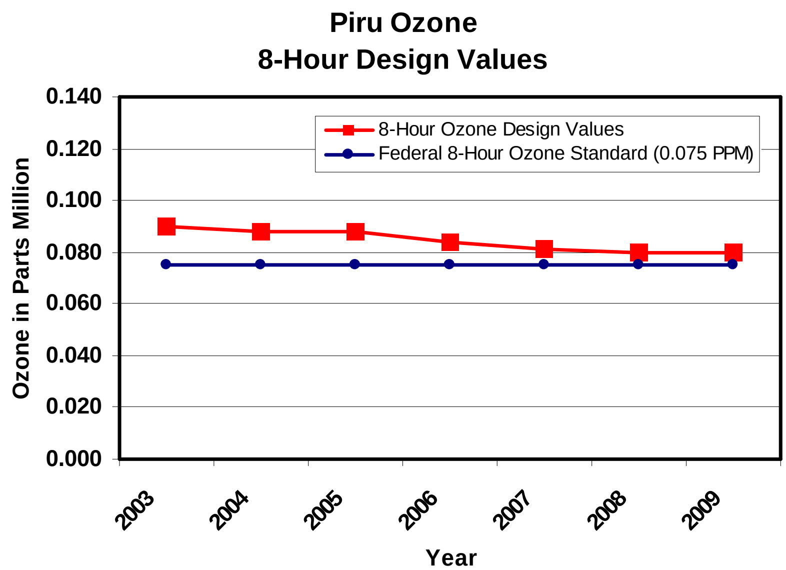


Figure 11:

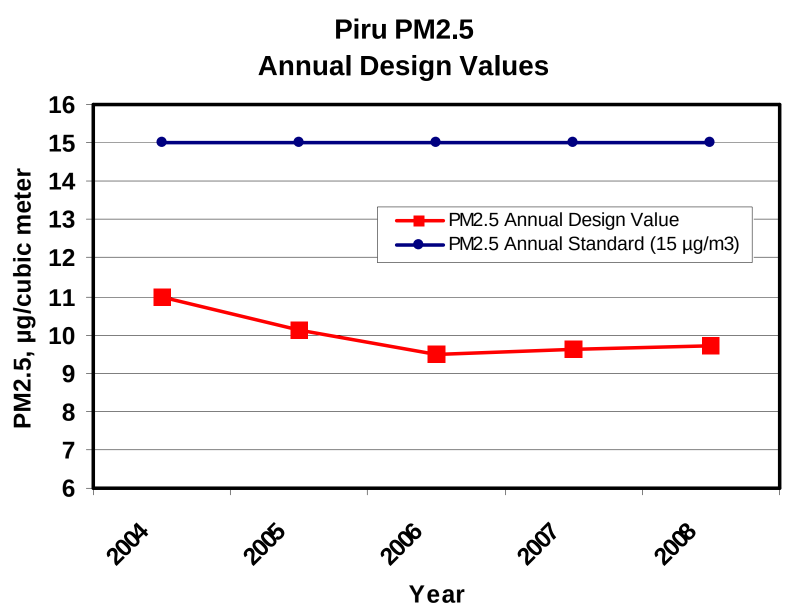
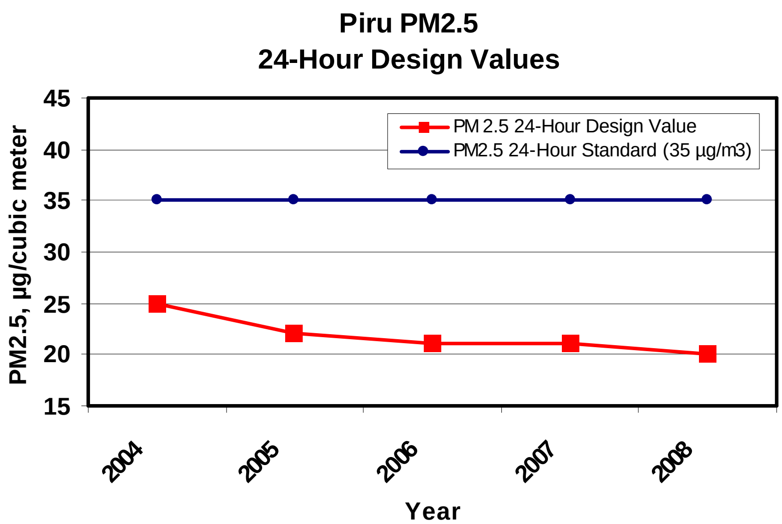


Figure 12:


Piru PM2.5
24-Hour Design Values
PM 2.5 24-Hour Design Value
PM2.5 24-Hour Standard (35 µg/m3)
PM2.5, µg/cubic meter
45
40
35
30
25
20
15
2004
2005
2006
2007
2008
Year

APPENDIX F: SIMI VALLEY MONITORING STATION

Figure 13:

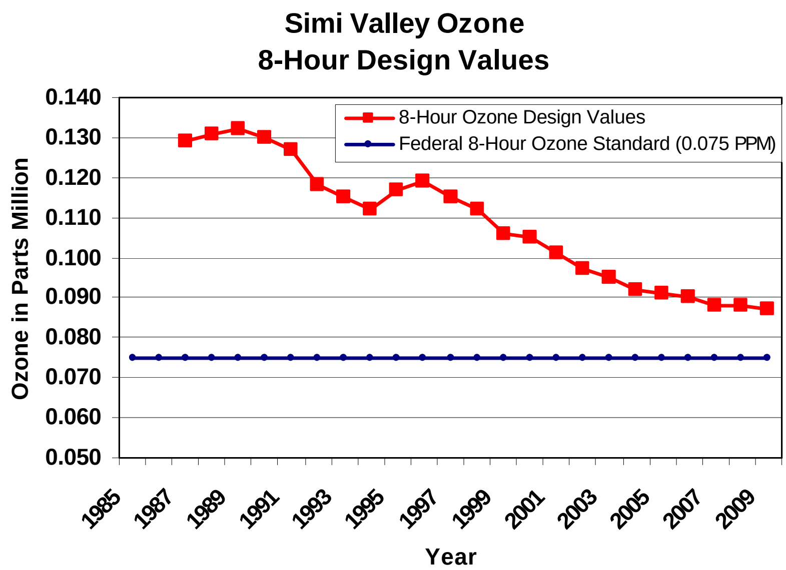


Figure 14:

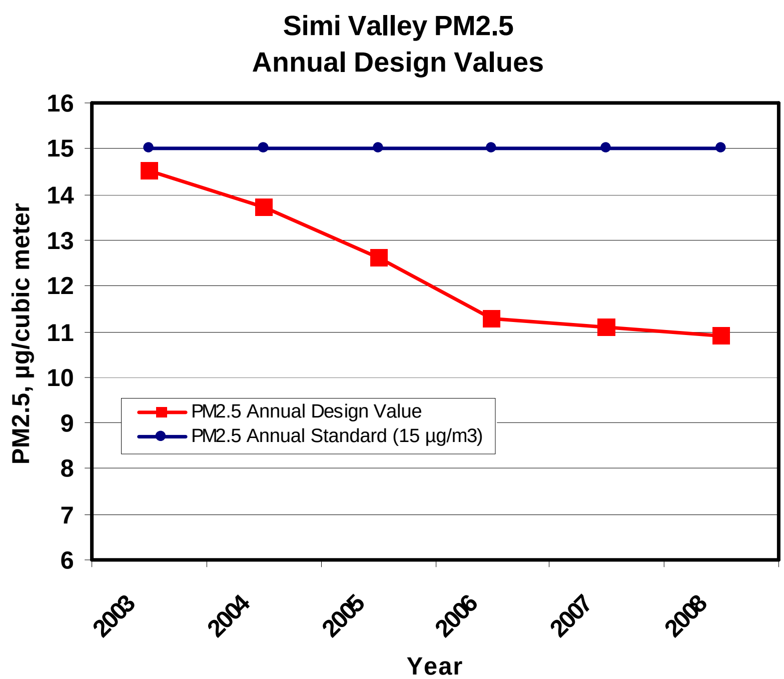


Figure 15:

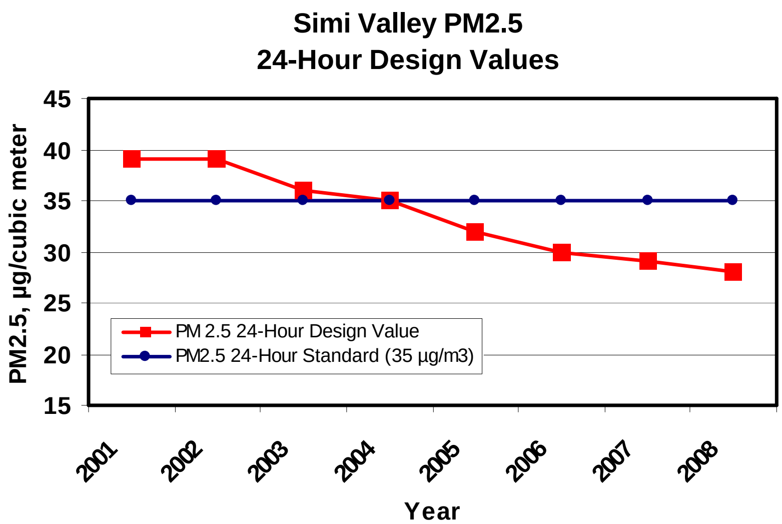
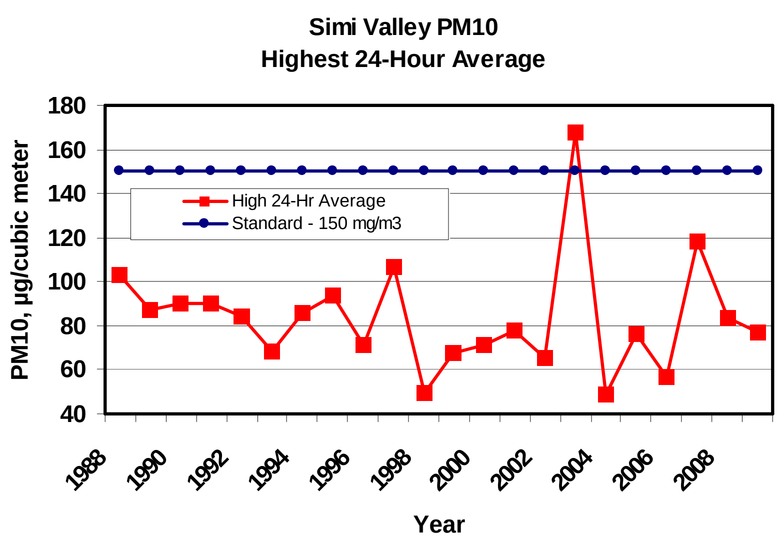


Figure 16:



APPENDIX G: THOUSAND OAKS MONITORING STATION

Figure 17:

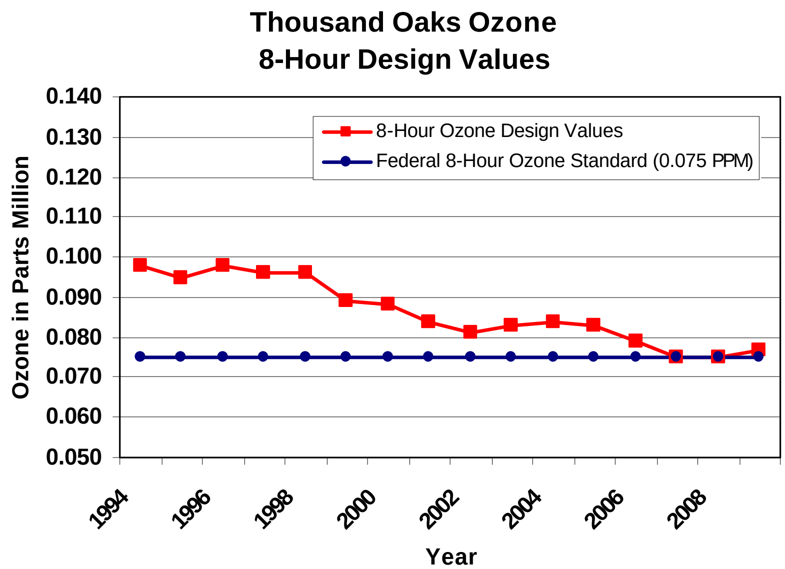


Figure 18:

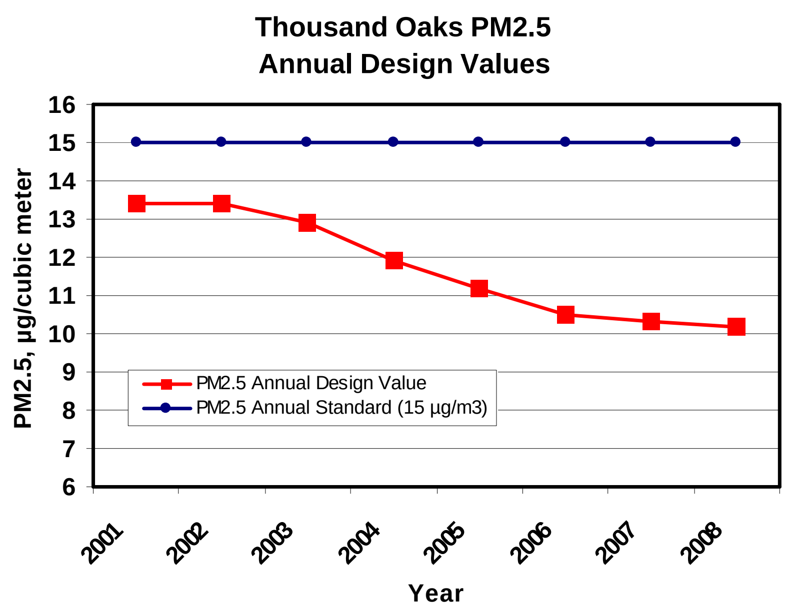
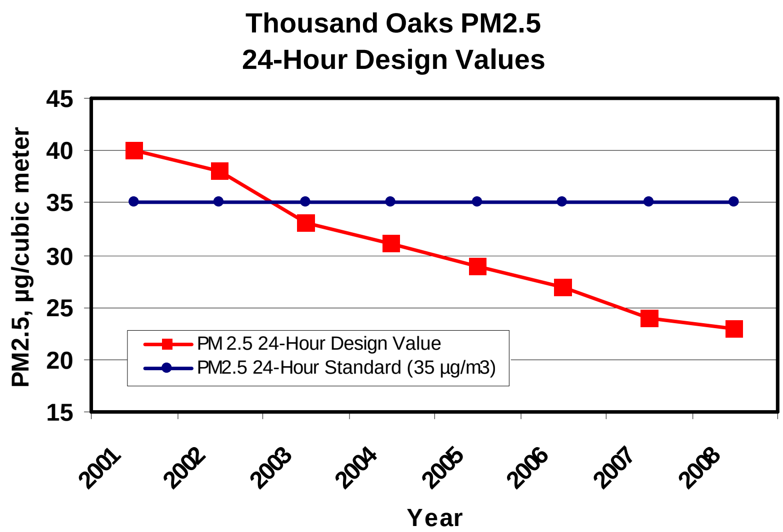


Figure 19:


Thousand Oaks PM2.5
24-Hour Design Values
PM2.5, µg/cubic meter
45
40
35
30
25
20
15
PM 2.5 24-Hour Design Value
PM2.5 24-Hour Standard (35 µg/m3)
2001
2002
2003
2004
2005
2006
2007
2008
Year

APPENDIX H: VENTURA - EMMA WOOD MONITORING STATION

Figure 20: