

**PARTICULATE MATTER (PM_{2.5})
MONITORING NETWORK DESCRIPTION
FOR SAN DIEGO MONITORING PLANNING AREA**

PREPARED BY

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1.0 INTRODUCTION

On July 18, 1997, the U.S. Environmental Protection Agency promulgated a revision to the National Ambient Air Quality Standard (NAAQS) for fine particulate matter (PM2.5). The new PM2.5 NAAQS requires U.S. EPA, state and local governments to design and implement a new national PM2.5 monitoring network. San Diego Air Pollution Control District (District) was given the responsibility to develop the PM2.5 monitoring network plan for this air basin and submit it to the California Air Resources Board for subsequent submittal to the U.S. EPA by July 1, 1998.

1.1 Physical Setting

The San Diego Air Basin (SDAB) is a large and diverse region. Its topography, climate, and patterns of urbanization are not found elsewhere. The SDAB consists of San Diego County. It is bounded on the north by the South Coast Air Basin, on the east by the Southwest Desert Air Basin, on the west by the Pacific Ocean, and on the south by the Mexican State of Baja California. The County is divided by the Laguna Mountain Range which runs approximately parallel to the coast about 45 miles inland and separates the coastal area from the desert portion of the county. The Laguna Mountains reach heights of over 6,000 feet with Cuyamaca Peak rising to 6,515 feet, the highest point in the County. The coastal region is made up of coastal terraces which rise up from the ocean into wide mesas changing into the Laguna Foothills farther east.

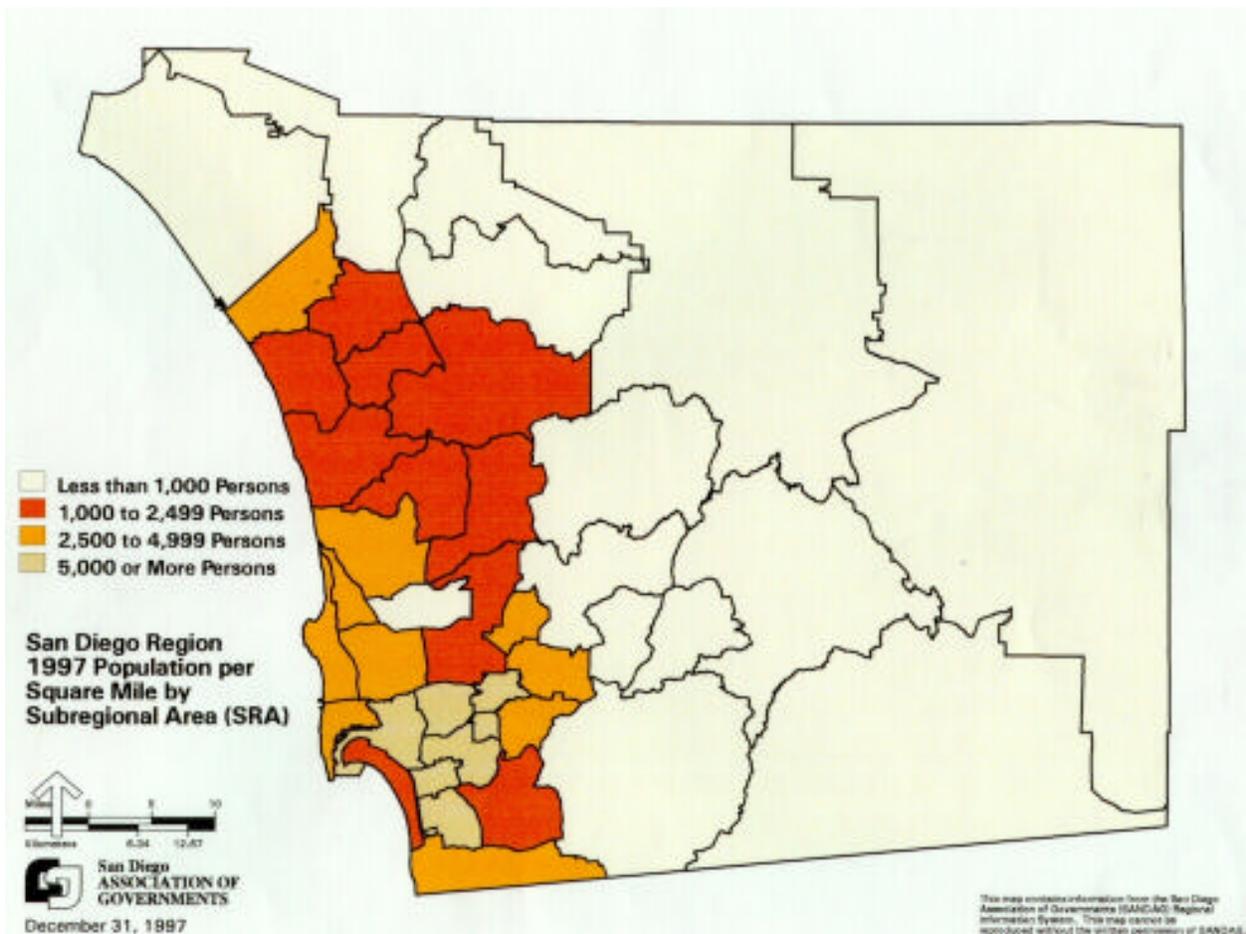
1.2 Population Characteristics

According to 1990 census, the San Diego Metropolitan Statistical Area (MSA) had a population of 2,498,016. In the ten years between 1980-1990, San Diego experienced tremendous population growth. Although this growth abated somewhat in this decade, the population gain in 1996 was the largest in the past five years. The population of San Diego MSA, as of January 1, 1997, is estimated at 2,724,437. The largest portion, 639,535 residents, live in the North City Major Statistical Area. The Central Major Statistical Area has the second highest figure with 619,551. The East County Major Statistical Area contains fewest people, with only 21,206.

The highest population centers are found in several subregional areas (SRAs) within the MSA. Central San Diego (SRA1) has the largest population region-wide at 163,932. Two other SRAs, Southeast San Diego (SRA5) and Mid City (SRA6) located within Central Major Statistical Area also have large populations (154,353 and 153,490 respectively).

By far, the City of San Diego is the largest city in terms of population with 1,197,077 residents. The second most populated area is the unincorporated portion of the region where 436,377 people reside. The City of Chula Vista comes in third with a population of 156,148. Two other cities with populations greater than 100,000 are Oceanside (149,220) and Escondido (119,916).

Figure 1.2.1 San Diego MSA



1.3 Climate and Weather

A typical meteorological pattern for San Diego involves light and variable or light easterly surface winds overnight, followed by gentle onshore winds from the west or northwest during the day, with mixing depths of 1,500-2,000 feet in the afternoon. The SDAB has five distinct climate zones. . Like the mountains, the climate zones are nearly parallel to the coast:

I. Maritime (coastline to 3 to 5 miles inland)

The climate is dominated by the influence of the Pacific Ocean. The humidity is high and temperatures are mild. Communities of Oceanside, Del Mar, and Chula Vista are in the maritime climatic zone.

II. Coastal (about 5 to 15 miles)

The ocean's influence is diminished but is still significant. Afternoons are a bit warmer, nights are cooler and the climate is dryer. This climatic zone is heavily populated.

III. Transitional (about 20 to 25 miles)

Communities in this zone may experience coastal climate conditions for brief periods but normally have warm, dry climate. Daytime humidity is low. Summer temperatures may exceed 100 deg. F. Winter days are milder, around 60 deg. F, with frosty mornings. Escondido and El Cajon are in transitional zone.

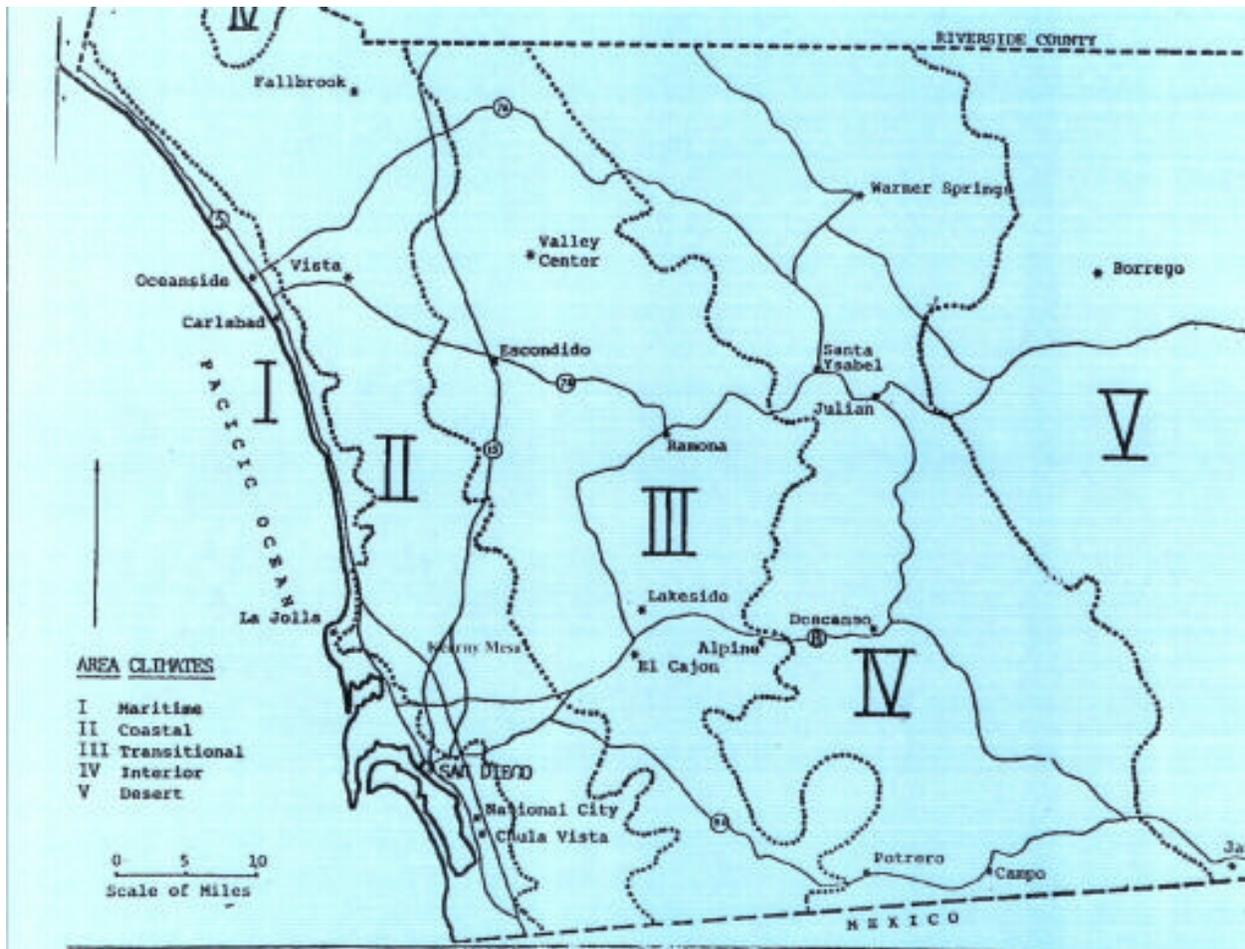
IV. Interior (about 25 to 60 miles)

The terrain rising from 2,000 to 6,500 feet, produces dramatic contrasts in climate. The western slope communities such as Ramona (1,600 feet), Alpine (2,000 feet), Descanso (2,500 feet) are more at the mercy of the inversion layer which traps pollutants. High mountain communities such as Pine Valley and Julian, located further inland, above 4,000 feet and thus above the inversion layer, are relatively free of air pollution.

V. Desert (about 60 miles inland to the eastern border)

San Diego's air pollution has little or no impact on the desert. Temperatures in the desert can reach 120 deg. F in the summer and a much milder 80 deg. F in the winter.

Figure 1.3.1 San Diego Climate Zones



1.4 Dominant Economic Activities and Emission Sources

The economy of San Diego County is largely dominated by service industries and tourism. The decline of the huge aerospace and defense manufacturing complex of the previous decade has left in its wake a mix of light manufacturing and service oriented companies, very few of which are significant contributors to air pollution. Mobile sources have far more impact, and contribute the vast bulk of locally-generated pollutants. The region is similar to much of Southern California in that its culture is dominated by the automobile. Transport of some pollutants (ozone and ozone precursors) from the South Coast Air Basin is also a serious problem.

Stationary sources of NO_x, VOC's, and particulate matter are power generation facilities, concrete and asphalt plants, auto refinishing shops, and light manufacturing.

The city of San Diego, located in the southwestern corner of the San Diego Air Basin, is the sixth largest city in the United States. The western third of this region is largely urbanized and experiences the bulk of the air pollution problems. It contains virtually all of the transportation corridors, automobile density, and industry responsible for locally generated pollutants. The eastern two-thirds, rural mountains and desert, is sparsely populated and generally enjoys relatively clean air year-round.

The data from the most recent ambient air study of this region, the Southern California Ozone Study of 1997, is still in the process of evaluation. A less recent but still relevant study, performed in 1989, still provides us with our best insight into the major sources of pollution in this area. It was determined that vehicular traffic emissions are by far the largest contributor to nitrogen oxides and volatile organic compounds, which react with ambient oxygen in a well-characterized fashion to produce ozone, the major pollutant in Southern California's air.

Stationary sources of particulate matter have been identified and regulated for some time. Of the top ten particulate matter sources, five are mineral processing facilities (sand, gravel, concrete, and asphalt), four are power generation plants, and one is a manufacturer of products derived from kelp. All are located in the southwestern part of the air basin.

The top ten emitters of oxides of nitrogen are similar to the above list; seven are power plants, two are manufacturing facilities, and one is a local university.

Oxides of sulfur are produced by power generation facilities and by other local manufacturers. The oxides of sulfur emissions are very low.

1.5 PM2.5 Monitoring Requirements

Based on the current population estimate, San Diego MPA is required to operate four core monitors; two on everyday sampling and two on a 1-in-3 day schedule. One additional core monitor will be required to operate on a everyday schedule since San Diego is also a PAMS area.

2.0 PM2.5 MONITORING NETWORK ELEMENTS

Several types of PM2.5 monitors will be part of the PM2.5 monitoring network. This section summarizes the PM2.5 monitors: (1) planned for deployment in 1998 and 1999; and (2) existing particulate matter monitors at the PM2.5 sites.

2.1 PM2.5 Monitors Planned for Deployment

To satisfy monitoring objectives of the PM2.5 program several types of PM2.5 monitors will be needed. The most important objective of the PM2.5 monitoring program is developing a data base for comparison to the annual-average and 24-hour-average PM2.5 NAAQS. The FRM monitors will collect mass measurements to support area designations such as attainment or nonattainment. The PM2.5 data from these sites should also help better define boundaries of nonattainment areas. Other monitoring instruments including continuous analyzers and speciation samplers will provide temporally resolved data or full chemical characterization of PM2.5 data in San Diego.

Table 2.1.1 PM2.5 Monitoring Network

Site Location	AIRS Site ID	PM2.5 FRM	PM2.5 Speciation	PM2.5 TEOM/BAM
Chula Vista	060730001	X		
El Cajon-Redwood Avenue	060730003	X	Y	
San Diego-Overland Avenue	060730006	XX		
Escondido-E Valley Parkway	060731002	X		Y
San Diego-12th Avenue	060731007	X		

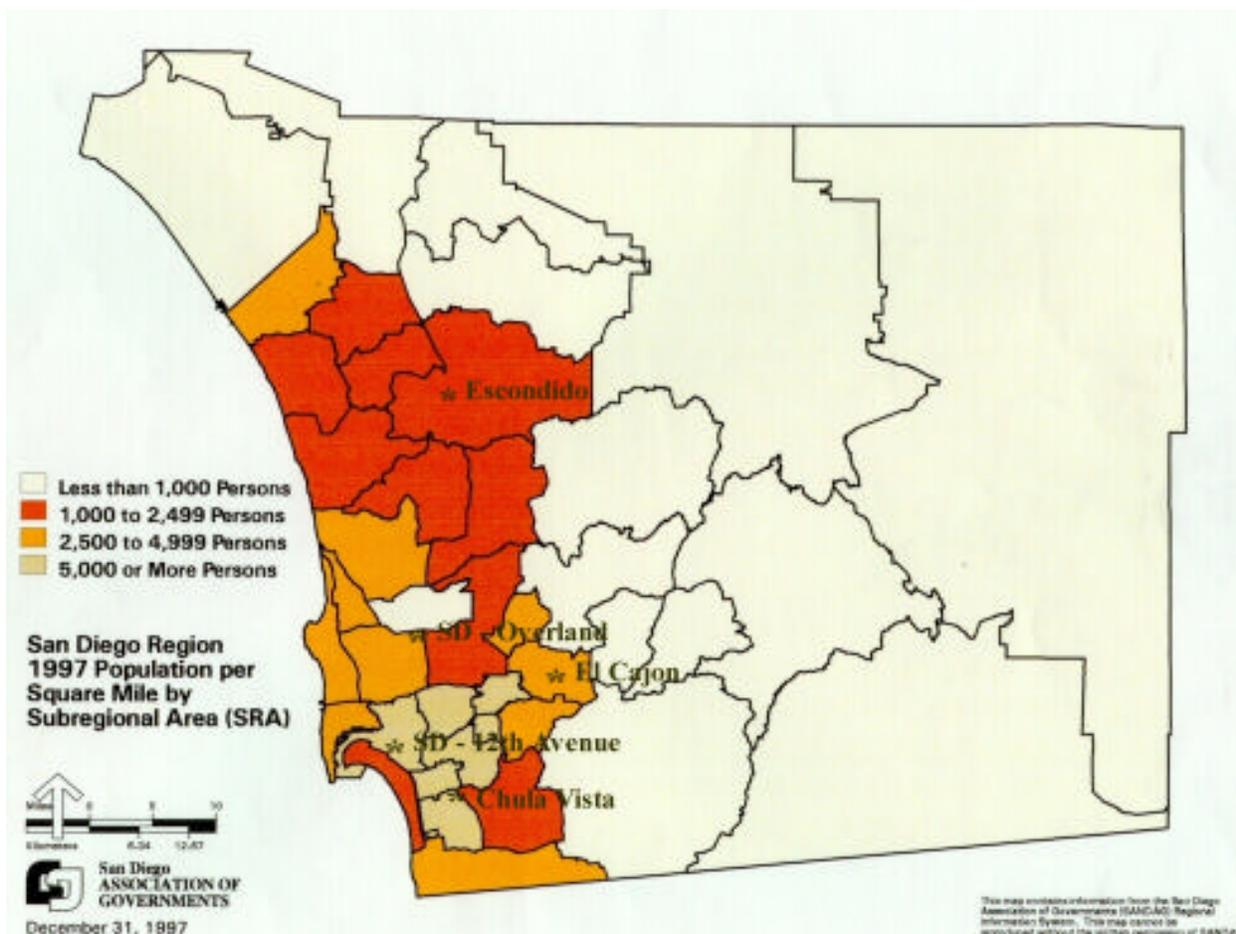
Codes:

X - Monitor to be deployed in 1998

Y - Monitor to be deployed in 1999

XX- Collocated particulate monitors used for precision data to be deployed in 1998

Figure 2.1.1 PM2.5 Monitoring Sites



2.2 Existing Particulate Matter Monitors

A description of the existing particulate matter monitors within the San Diego MPA is summarized below:

Table 2.2.1 Existing Particulate Matter Monitors

Site Location	AIRS Site ID	PM10 SSI
Chula Vista	060730001	X
El Cajon-Redwood Avenue	060730003	X
Escondido-E Valley Parkway	060731002	X
Oceanside-Mission Avenue	060730005	XX
Otay Mesa-Paseo International	060732007	XX
San Diego-12th Avenue	060731007	X
San Diego-Overland Avenue	060730006	X

Codes:

X Existing monitor

XX Collocated particulate matter monitor used for precision data

2.3 PM2.5 Quality Assurance

The ARB Quality Assurance/Quality Control Section is currently developing a schedule for implementing quality assurance procedures. The District will initially adopt the ARB QA plan until an in-house plan can be developed.

2.4 Laboratory Analyses

The District is establishing a dedicated weighing room to weigh the PM2.5 filters. Samples collected from the speciation monitors will be analyzed through a network of contract laboratories in the United States. The names of the contract laboratories are yet to be determined.

3.0 PM2.5 MONITORING SITES TO BE DEPLOYED IN 1998

We are planning to operate five PM2.5 monitoring sites in 1998. This section defines why these sites were selected for PM2.5 monitoring. The selected sites, along with the more important parameters that characterize each site, are listed here.

3.1 Monitor Siting

Currently the District is monitoring PM10 at seven sites located throughout the county. We considered several factors to select the proposed PM2.5 monitoring sites out of the existing network. We reviewed previous PM10 data and ranked all the sites with regard to the severity of the PM10 problem. Additionally, we wanted to make sure that these monitoring sites are located in each of the three populated climate zones of the air basin. San Diego's emission sources were also considered in this PM2.5 network siting proposal.

3.2 Site Description

A total of five sites are proposed for operation in 1998. All of these core sites will operate FRM monitors that will be purchased through national contracts. Data from all sites can be compared to both the annual-average standard and the 24-hour-average standard because each site meets the following conditions:

- a) Population-oriented location; and
- b) Representative of a neighborhood

The Chula Vista site is an existing NAMS/SLAMS site located at 80 J Street, Chula Vista. The monitoring station sits in the parking lot of a school district storage facility, adjacent to a Fire Department substation. Nearby are two elementary schools. The rest of the surrounding area is residential. Population density is moderate. Local vehicular traffic is light to moderate. The site is downwind from large electrical generating plant.

The El Cajon site is an existing NAMS/SLAMS/PAMS site located at 1221 Redwood Avenue in El Cajon. The monitoring station is in a fenced area between an elementary school and a residence. The nearest roadway is about 25 feet away. The surrounding area is residential; the downtown business district on Main Street begins about two blocks away. Population density is moderate. Local vehicular traffic is light to moderate. El Cajon, approximately 15 miles downwind from the central urban core, is a receptor site for ozone and ozone precursors.

The San Diego-Overland site is an existing NAMS/SLAMS/PAMS site located in a parking lot within the San Diego County Central Operations Center on Overland Avenue. The area surrounding the monitoring station is used for vehicle storage, fleet maintenance and repair, and administrative offices. Further away, between 400 feet and one mile, is a commercial area of

office space, service industries, and light manufacturing. It is populated mainly during the day. Local vehicular traffic is moderate.

The Escondido site is an existing NAMS/SLAMS site located in the parking lot of the Department of Social Services on E. Valley Parkway in Escondido. To the north, the area is entirely residential. To the south lies the outskirts of Escondido's central business district, a mix of retail businesses and office space. Population density is moderate. Local vehicular traffic is moderate.

The San Diego-12th Avenue site is an existing NAMS/SLAMS site located in the parking lot of a police vehicle maintenance and repair facility operated by the City of San Diego. The nearest roadway is about 50 feet away. The surrounding area is commercial, downwind of the city's urban core. The area is a mix of light manufacturing, offices, automobile paint shops, service industries, and social services. Also upwind lies San Diego Bay, with moderate commercial and U. S. Naval shipping activity. Local vehicular traffic is moderate.

Table 3.2.1 PM2.5 Monitoring Sites to be Deployed in 1998

Site Location	AIRS Site ID	Operating Agency	Spatial Scale	Monitoring Objective	Site Type	Measurement Method
Chula Vista	060730001	SDAPCD	Neighborhood	R	C	Sequential
El Cajon-Redwood Avenue	060730003	SDAPCD	Neighborhood	M,P	C	Sequential
San Diego-Overland Avenue	060730006	SDAPCD	Neighborhood	R,P	C	Sequential
Escondido-E Valley Parkway	060731002	SDAPCD	Neighborhood	R,T	C	Sequential
San Diego-12th Avenue	060731007	SDAPCD	Neighborhood	M	C	Sequential

Monitoring Objectives:

R - To determine representative high concentrations in a populated area.

M - To determine the highest concentration expected to occur in the area covered by the network (more than one site per area may be needed).

T - To determine the extent of regional pollutant transport.

Site Type:

C - Core SLAMS

4.0 PM2.5 MONITORING SITES TO BE DEPLOYED IN 1999

We are not required to establish any additional PM2.5 monitoring sites in 1999 that would operate FRM monitors. We are, however, planning to deploy one PM2.5 chemical speciation monitor and a continuous PM2.5 monitor in 1999.

4.1 PM2.5 Chemical Speciation Sampling

We are proposing to locate our only chemical speciation sampler at El Cajon. This location is at the eastern vertex of the urban triangle. It lies immediately downwind from major area precursor sources. El Cajon is also a Photochemical Air Monitoring Stations type (2) site. Data from this site will be used for source attribution analyses.

Table 4.1.1 PM2.5 Chemical Speciation Monitoring

Site Location	AIRS Site ID	Operating Agency	Monitoring Method
El Cajon-Redwood Avenue	060730003	SDAPCD	To be determined

4.2 Continuous PM2.5 Monitoring

We will include our final recommendation for a continuous PM2.5 monitoring site in our 1999 monitoring network plan. However, we find Escondido to be most suited for continuous PM2.5 monitoring. This site is in the north eastern portion of the greater San Diego urban area. It lies downwind from precursor sources located in the Interstate 15 and Highway 78 corridor. This continuous monitor will provide hourly temporal resolution of PM2.5 data. Additionally, this sampler can be used to identify impact of transported PM2.5 from South Coast Air Basin to San Diego.

Table 4.2.1 Continuous PM2.5 Monitors to be Deployed in 1999

Site Location	AIRS Site ID	Operating Agency	Monitoring Objective	Monitoring Method
Escondido-E Valley Parkway	060731002	SDAPCD	T	To be determined

5.0 SAMPLING FREQUENCY

The federal requirements call for everyday sampling for PM_{2.5} at certain core SLAMS and one in three day sampling at all other PM_{2.5} sites. All PM₁₀ sites should sample on a one in three day schedule. In order to collect sufficient data and at the same time conserve monitoring resources, we are proposing alternative sampling frequencies for PM₁₀.

5.1 PM_{2.5} FRM Sampling Frequency

All core and non-core sites will be operated in accordance to the Federal requirements, on everyday and one in three day schedule respectively. The table below summarizes the sampling frequencies.

Table 5.1.1 PM_{2.5} Sampling Frequency

Site Location	AIRS Site ID	Sampling Frequency
Chula Vista	06073001	1 in 3 day
El Cajon-Redwood Avenue	06073003	Everyday
San Diego-Overland Avenue	06073006	1 in 3 day
Escondido-E Valley Parkway	06073102	Everyday
San Diego-12th Avenue	06073107	Everyday

5.2 PM_{2.5} Chemical Speciation Sampling Frequency

The PM_{2.5} Speciation Sampler will be operated on the required sampling frequency of 1 in 12 days. This sampling frequency will be reviewed in future if it does not adequately support control plans. Appropriate sampling frequency will be determined in the future and it will depend on data needs and available resources.

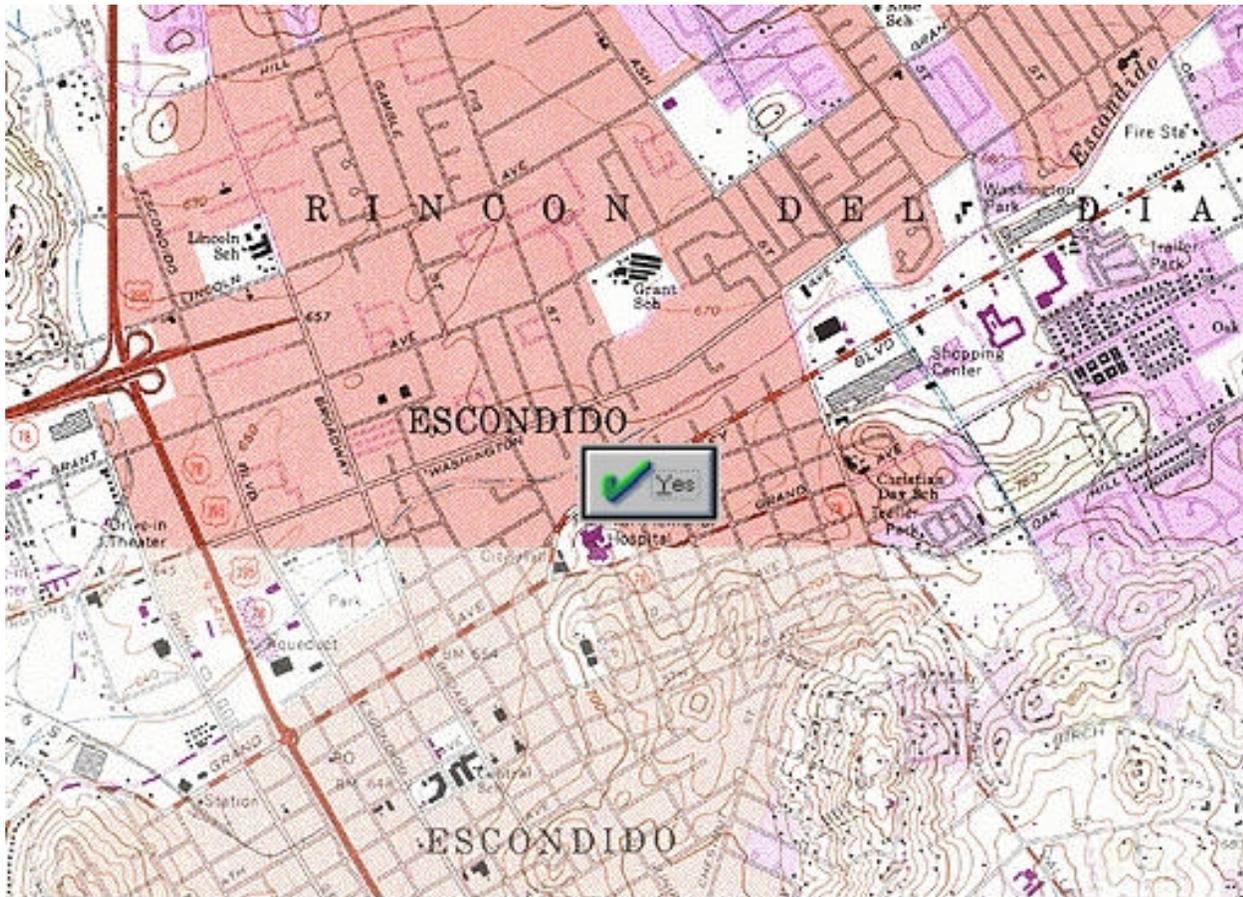
5.3 PM₁₀ Sampling Frequency

The U.S. EPA's new minimum required sampling frequency for PM₁₀ is 1 in 3 day. The Air Resources Board and the local air pollution control districts in California are requesting that the U.S. EPA Region 9 grant a statewide waiver allowing sampling at the current schedule of 1 in 6 day.

All San Diego PM₁₀ sites operate on 1 in 6 day schedule.

Appendix A: PM2.5 Site Topographic Maps

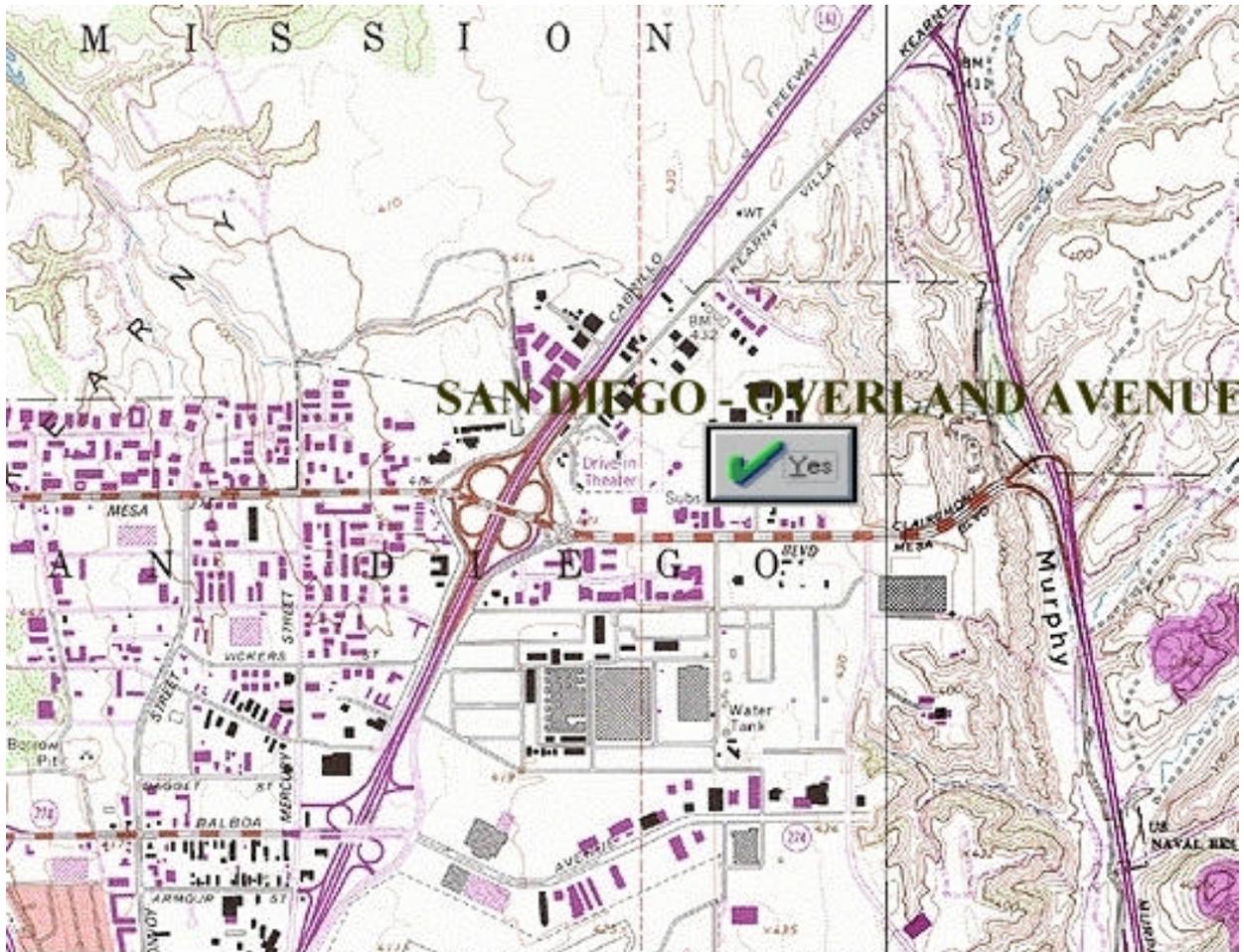




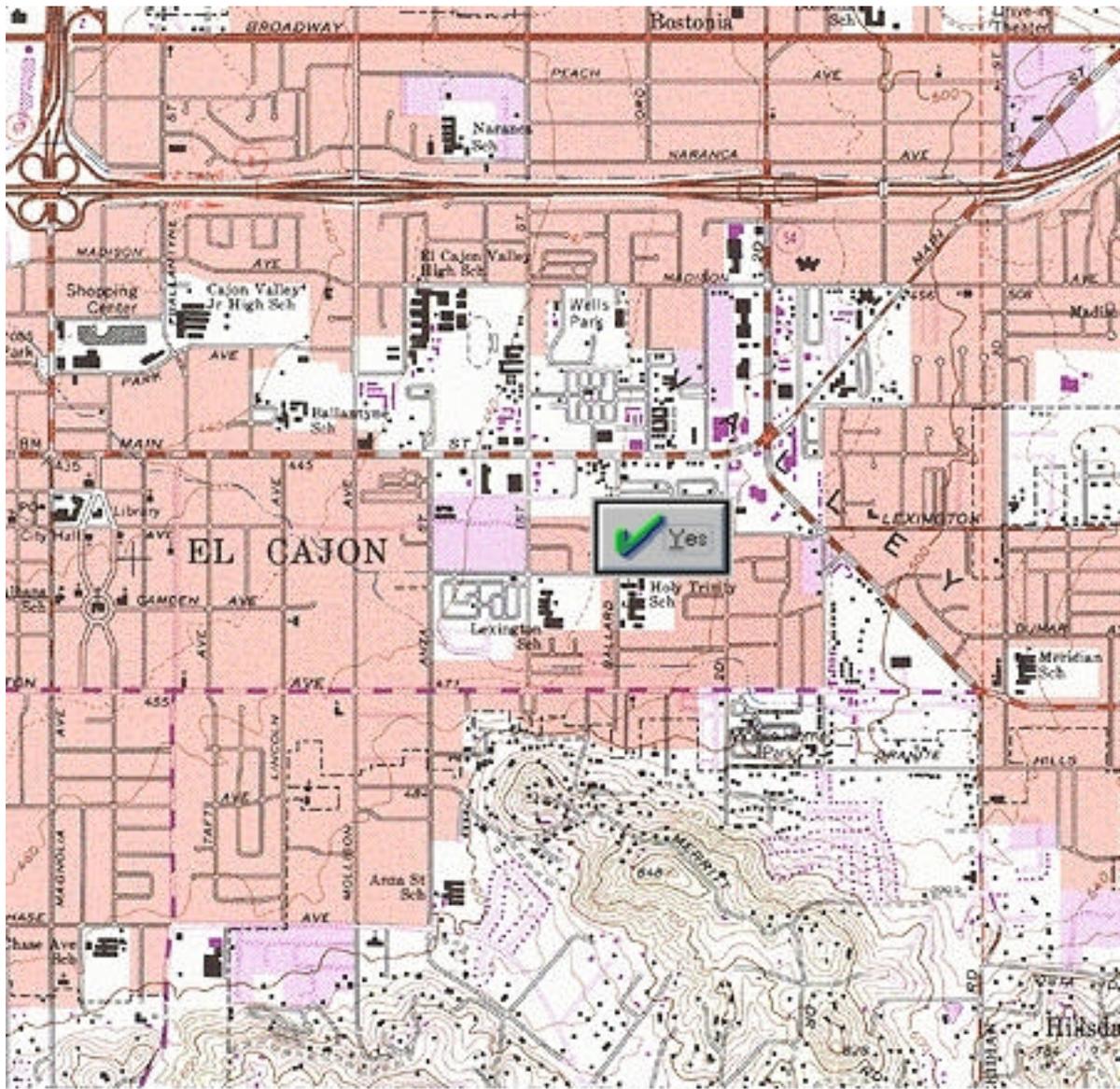
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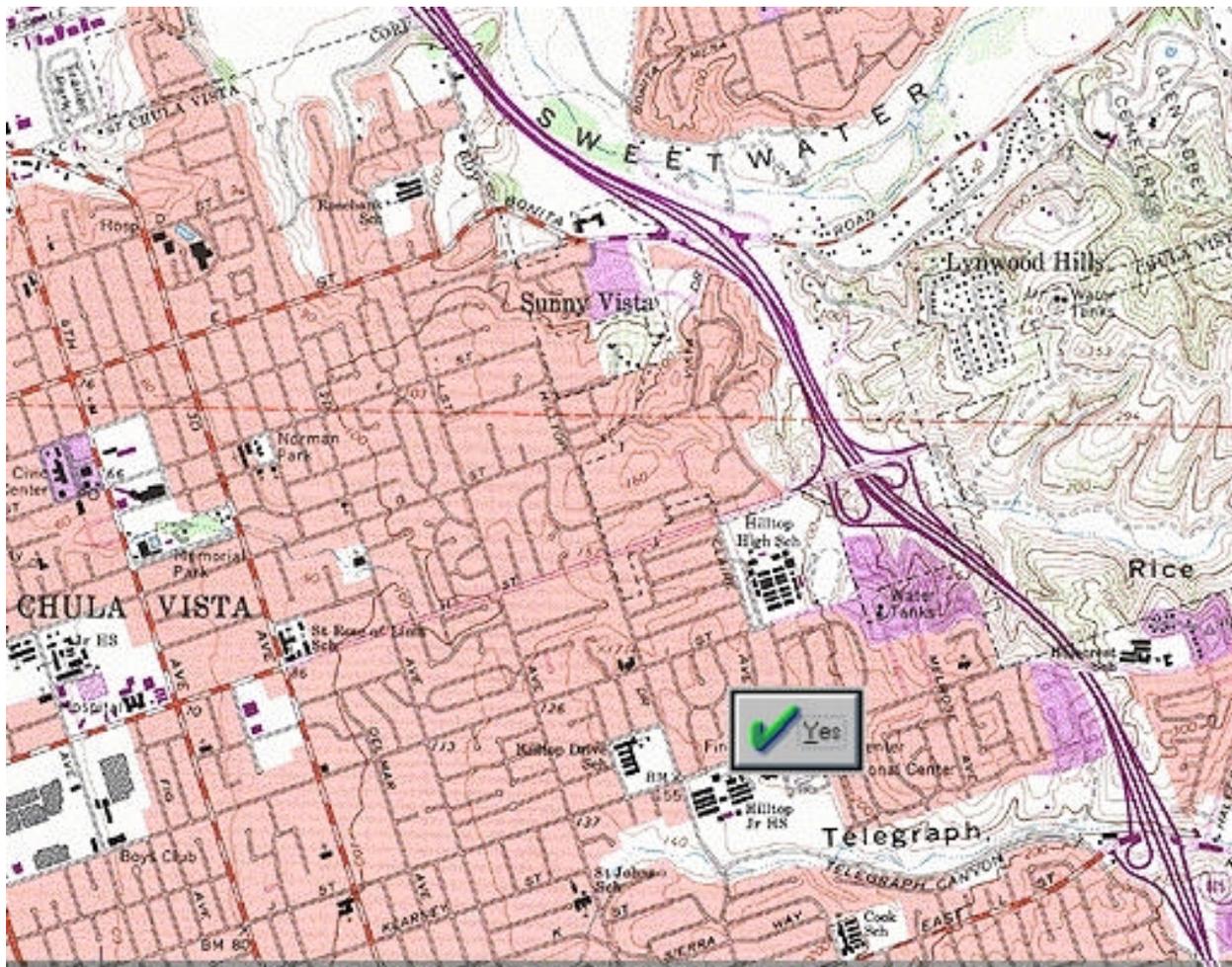
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