K. San Diego Air Basin (San Diego County APCD)

The San Diego Air Basin is comprised of a single air district, the San Diego County APCD, which consists of San Diego County. The air basin is currently designated as nonattainment for both the 24-hour and the annual State PM10 standards. The air basin is also designated as nonattainment for the State annual PM2.5 standard.

Figure K-1 shows the location of the PM10 (a) and PM2.5 (b) monitoring sites throughout the air basin. All sites are located in the more densely populated western portion of the air basin.

Figure K-1. PM10 and PM2.5 Monitoring Sites throughout the Air Basin.

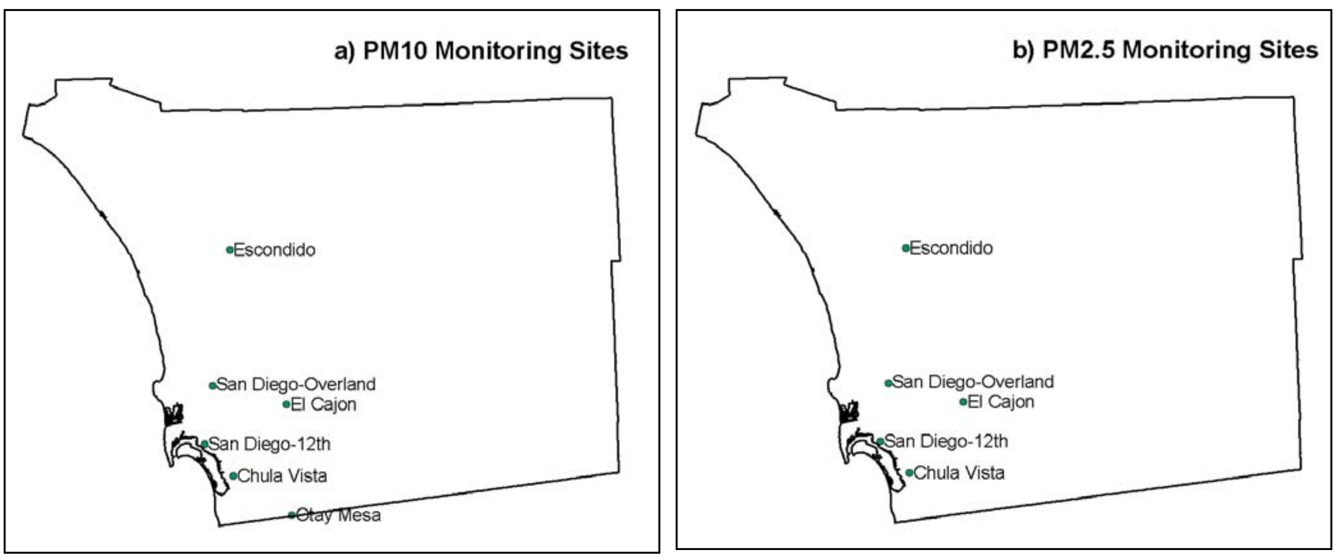


Table K-1 provides information on yearly variations in the highest PM10 and PM2.5 concentrations recorded across the San Diego County APCD in 2001 through 2003. During this period, PM10 levels exceeded the State 24-hour standard of 50 $\mu g/m^3$ an estimated four hundred and fifty-three times, and consistently exceeded the State annual PM10 standard of 20 $\mu g/m^3$. In 2002 and 2003, PM10 levels also exceeded the national annual PM10 standard of 50 $\mu g/m^3$. Particulate levels exceeded the State annual PM2.5 standard of 12 $\mu g/m^3$ in 2002 and 2003.

Table K-1. PM10 and PM2.5 Air Quality in San Diego County APCD.

Year	PM10 (ug/m^3)			PM2.5 (ug/m^3)	
	Calculated Days over State Std.	Max 24-hour (Std.=50)	Max Annual Average (Std.=20)	Max 24-hour*	Max Annual Average (Std.=12)
2001	129	106	48	60.	Incomplete Data
2002	173	131	52	54	16
2003	151	289**	53	239**	16

* The maximum 24-hour PM2.5 values are provided for information only.
** These values were excluded for determining attainment status. See text.

Table K-2 provides the 24-hour and annual designation values for the State standards for the 2001-2003 period. Designation values represent the highest 24-hour PM10 concentration measured during the three year period, after concentrations measured during highly irregular and infrequent events have been excluded, and the highest estimated PM10 and PM2.5 annual average in the same period. For example, the high 24-hour PM10 and PM2.5 concentrations in 2003 shown in Table K-1 were due to wildfires and were excluded in determining the designation values shown in Table K-2. The designation values are determined for each site, and the highest site is used for determining an area's designation. Based on these data, the San Diego County APCD currently is nonattainment for both the State 24-hour and annual average PM10 standards, as well as the State annual average PM2.5 standard.

Table K-2. Air District Level Designation Values* for the State PM10 and PM2.5 Standards (2001-2003 Period).

	PM10 (ug/m^3)		PM2.5 (ug/m^3)
	24-Hour (Std.=50)	Annual Average (Std.=20)	Annual Average (Std.=12)
Designation Value	133	53	16

* Designation value is the value used for determining attainment status. It is the highest measured value over three years after excluding highly irregular or infrequent events.

Table K-3 provides designation values for each monitoring site in the air district to provide further information on the geographic distribution of concentrations. Particulate levels exceeded both State PM10 standards consistently across the air district. Highest concentrations occurred at the most southern site of Otay Mesa, where annual average concentrations were significantly higher than concentrations at the remaining sites. PM2.5 levels at the San Diego-12th Street, Chula Vista, and Escondido monitors also exceeded the State annual PM2.5 standard.

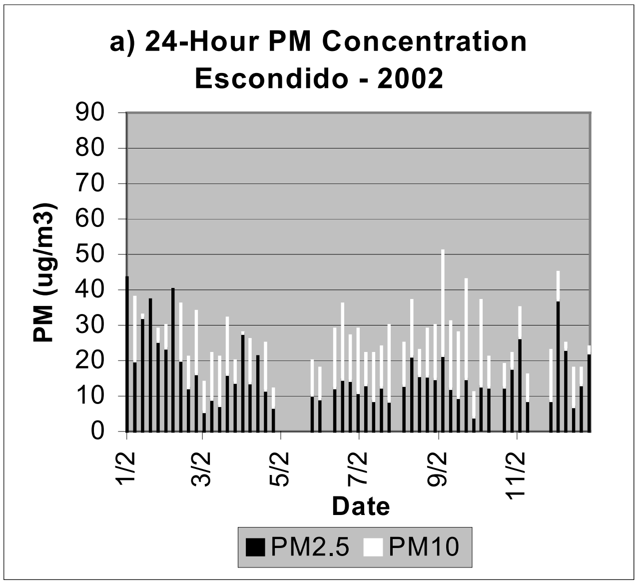
Table K-3. Monitoring Site Level Designation Values* for the State PM10 and PM2.5 Standards (2001-2003 Period).

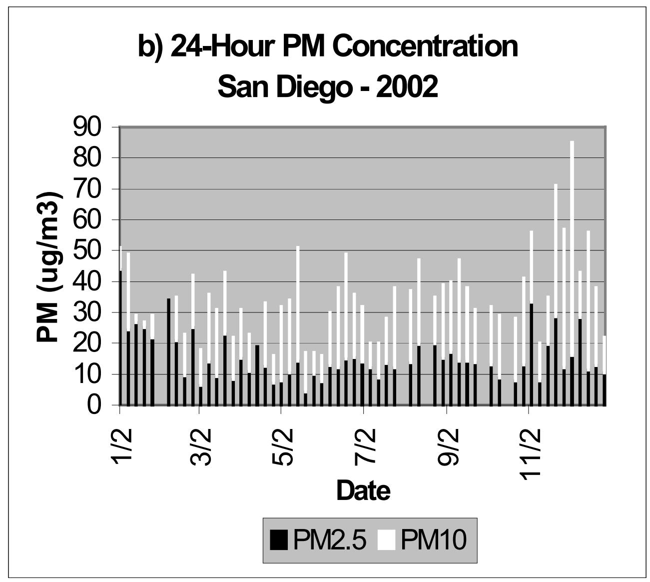
Site	PM10 (ug/m^3)		PM2.5 (ug/m^3)
	24-Hour (Std.=50)	Annual Average (Std.=20)	Annual Average (Std.=12)
Chula Vista	68	29	14
El Cajon	87	38	Incomplete Data
Escondido	82	33	14
Otay Mesa	133	53	No Monitor
San Diego-12th St.	104	38	16
San Diego-Overland Ave.	90	29	Incomplete Data

* Designation value is the value used for determining attainment status. It is the highest measured value over three years after excluding highly irregular or infrequent events.

Figure K-2 illustrates the variation in PM10 and PM2.5 levels throughout 2002 at Escondido (a) and San Diego (b). The total height of the bars represents PM10 concentrations, while the height of the black portion of the bars represents the PM2.5 fraction. PM10 concentrations exhibit no distinct seasonal pattern at Escondido, but PM10 levels are highest during November and December at San Diego. PM2.5 concentrations are highest during the winter at both sites. The colder, more stagnant conditions during this time of the year are conducive to the buildup of PM and favor the formation of secondary ammonium nitrate. In addition, residential wood combustion activity may increase.

Figure K-2. Seasonal Variation in PM10 and PM2.5 Concentrations.





The coarse fraction (particles between PM2.5 and PM10 in size) is highest during the summer through early fall at Escondido and spring through late fall at San Diego. The coarse fraction is primarily due to activities that resuspend dust, such as emissions from paved and unpaved roads and construction. Sea salt may also contribute to the coarse fraction in some coastal areas.

Based on 2000-2003 data, we estimate that PM2.5 contributes approximately 60 percent of ambient PM10 at Escondido during the fall and winter, but only approximately 50 percent at San Diego. On an annual average basis, PM2.5 comprises approximately 48 percent of ambient PM10 at both sites.

Figure K-3. Hourly Variation in PM2.5 Concentrations.

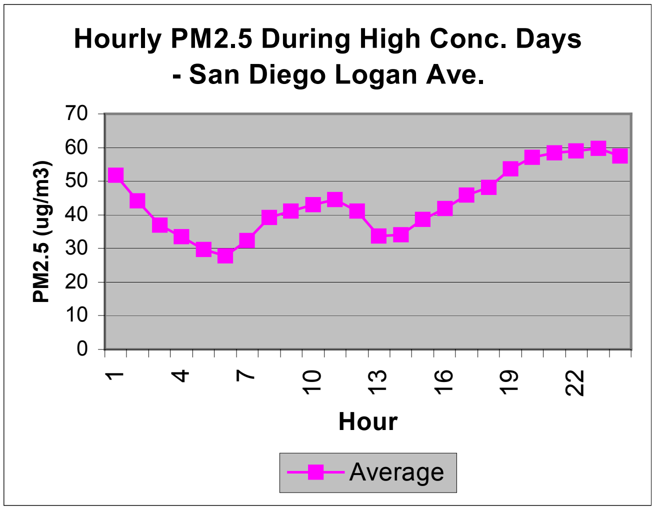
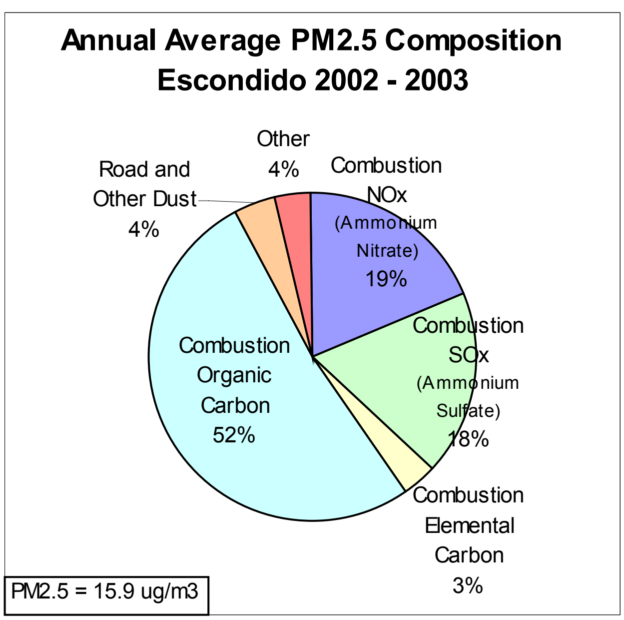


Figure K-3 presents the average hourly variation in PM2.5 for days within the year with the highest PM2.5 concentrations at San Diego-Logan. On most days, PM2.5 levels are highest during the late evening with a smaller peak from 8 a.m. to 12 p.m. Peak evening concentrations generally reflect the influence of lowering inversion heights which trap pollutants close to the surface, as well as increased activity from commute traffic and residential wood combustion in winter months. Morning peaks may reflect activity from commute traffic.

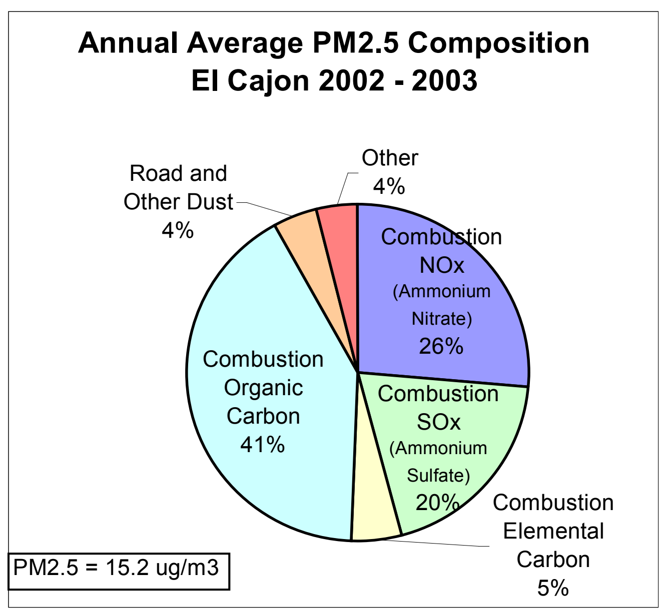
Data for Figure K-4 are from analysis of ambient PM2.5 data collected at Escondido (a) and El Cajon (b) from the State's PM2.5 speciation network. Chemical components have been associated with possible emission sources based on emission inventory information. The data show that on an annual average basis organic carbon is the major component of PM2.5 (approximately 40 to 50 percent).

Figure K-4. Chemical Composition of Annual Average PM2.5 and Link to Emission Source Type.

a) Escondido

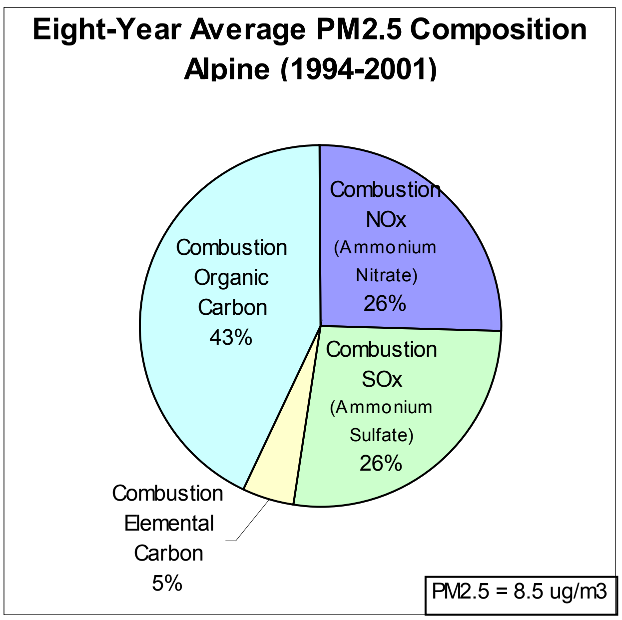


b) El Cajon



The majority of organic carbon is suspected to be due to directly emitted carbon from combustion sources. Key sources include vehicles, residential wood combustion, agricultural and prescribed burning, and stationary combustion sources. However, a fraction may be due to secondary organic aerosol formation from anthropogenic and biogenic VOC emissions. Ammonium nitrate and ammonium sulfate - formed in the atmosphere from chemical reactions of NOx and SOx from mobile and stationary source combustion processes - also contribute significantly to ambient PM2.5 (approximately 40 to 46 percent). Dust from roads and other dust producing activities and elemental carbon from combustion processes contribute to a lesser extent.

Figure K-5. Chemical Composition of Annual Average PM2.5 and Link to Emission Source Type at Alpine.



Data for Figure K-5 are from analysis of ambient PM2.5 data collected at Alpine as part of the Southern California Children's Health Study. The data show principal contributions from organic carbon (43 percent). Ammonium nitrate and ammonium sulfate also contribute significantly (approximately 52 percent) to ambient PM2.5. Elemental carbon from combustion processes contributes to a lesser extent.

Figures K-6 and K-7 illustrate the quarterly variation in PM2.5 levels and its chemical components expressed in μg/m^3 (a) and as percent of PM2.5 (b) at Escondido and El Cajon respectively for 2002-2003. As in the previous figures, chemical components have been associated with possible emission sources based on emission inventory information. At both places the higher PM2.5 concentrations in the fall and winter were due to increases in the organic carbon component. Increased levels of the ammonium sulfate component occurred during the spring and summer. The sunnier, warmer conditions during this time of the year are conducive to the formation of secondary ammonium sulfate through reactions in the atmosphere of SOx emitted from mobile and stationary combustion sources. Secondary organic aerosol formation may also be enhanced during warmer months.

Figure K-6. Chemical Composition of Average Quarterly PM2.5 and Link to Emission Source Type.

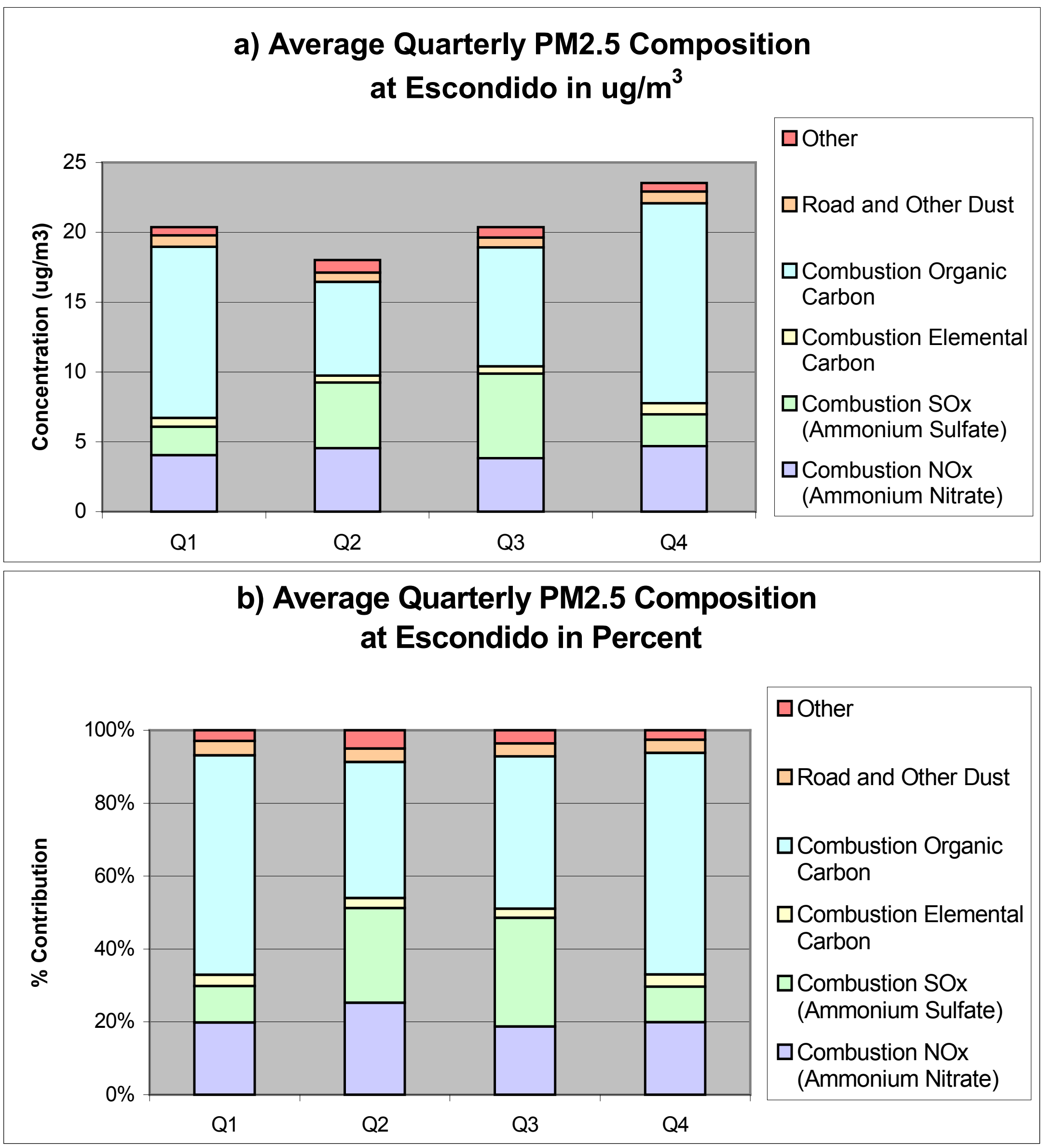


Figure K-7. Chemical Composition of Average Quarterly PM2.5 and Link to Emission Source Type.