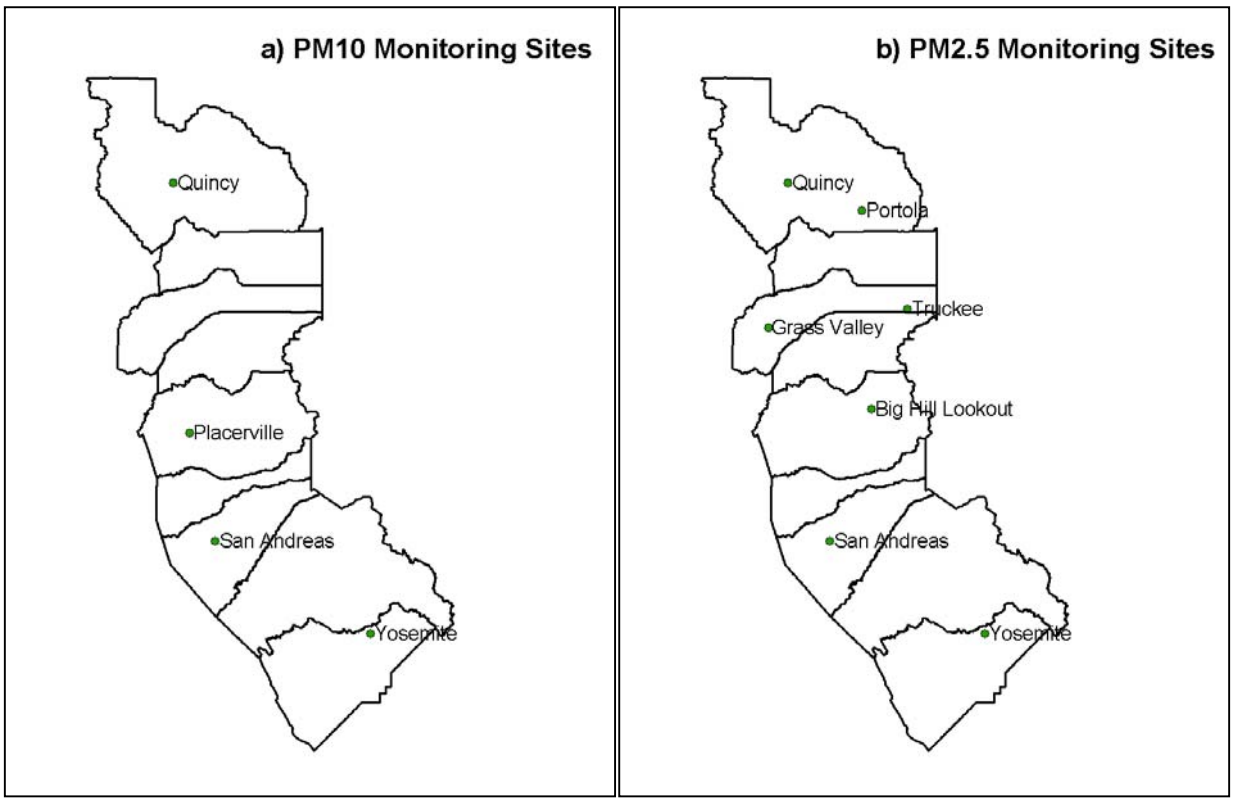
E. Mountain Counties Air Basin

The Mountain Counties Air Basin is comprised of seven air districts: the Northern Sierra AQMD, which includes Plumas, Sierra, and Nevada Counties; a portion of the Placer County APCD that consists of the central portion of Placer County; a portion of the El Dorado County AQMD, which consists of the western portion of El Dorado County; the Amador County APCD, which consists of Amador County; the Calaveras County APCD, which consists of Calaveras County; the Tuolumne County APCD, which consists of Tuolumne County; and the Mariposa County APCD, which consists of Mariposa County.

The following areas in the basin are currently designated as nonattainment for the State PM10 standards: the Northern Sierra, Placer, El Dorado, and Calaveras air districts, and Yosemite National Park in the Mariposa air district. Within the Northern Sierra AQMD, Plumas County currently exceeds both the 24-hour and annual PM10 standards; however, recent PM10 data are not available for Sierra and Nevada Counties and these areas are designated nonattainment based on historical data. Placer County APCD is also designated nonattainment based on historical data. El Dorado County AQMD currently exceeds the 24-hour PM10 standard; the Calaveras County APCD exceeds the annual PM10 standard; and Yosemite exceeds both PM10 standards. The Amador and Tuolumne air districts, and the western portion of the Mariposa air district are designated as unclassified for the State PM10 standards, since no PM10 data are available for these areas. Only the Portola Valley located in the Northern Sierra AQMD is currently designated as nonattainment for the State annual average PM2.5 standard, with the rest of the Mountain Counties Air Basin designated as unclassified – available data are insufficient to support designation as attainment or nonattainment.

Figure E-1 shows the PM10 (a) and PM2.5 (b) monitoring sites throughout the Mountain Counties Air Basin.

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



Northern Sierra AQMD

Table E-1 provides information on the yearly variations in the highest PM10 and PM2.5 concentrations recorded across the Northern Sierra AQMD in 2001 through 2003. Although data are insufficient to determine the calculated days exceeding the State 24-hour PM10 standard of 50 $\mu g/m^3$, in 2001 at least three days were measured with concentrations above the standard. In 2003, particulate levels did not exceed either the State annual PM10 standard of 20 $\mu g/m^3$ or the State annual PM2.5 standard of 12 $\mu g/m^3$, however, data were insufficient to determine if this was also the case in 2001 and 2002.

Table E-1. PM10 and PM2.5 Air Quality in the Northern Sierra AQMD.

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	Incomplete Data	60	Incomplete Data	120	Incomplete Data
2002	Incomplete Data	48	Incomplete Data	41	Incomplete Data
2003	0	47	18	48	7

* The maximum 24-hour PM2.5 values are provided for information only.

Table E-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. 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 Northern Sierra AQMD currently is nonattainment for the State 24-hour PM10 standard. The Portola Valley portion of the District is also designated as nonattainment for the State annual PM2.5 standard.

Table E-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	60	18	13**

* 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.
** Based on data substitution.

Table E-3 provides designation values for each monitoring site in the air district to provide further information on the geographic distribution of concentrations. The data show that Quincy, the only PM10 monitor in the Northern Sierra AQMD, exceeded the 24-hour PM10 standard. The monitor at Truckee did not exceed the State PM2.5 standard. However, although the data at Portola were incomplete, we estimated through data substitution procedures that the design value would be 13 $\mu g/m^3$ and therefore this region does exceed the State annual PM2.5 standard. Therefore, the Portola Valley area within the Northern Sierra AQMD is designated as nonattainment.

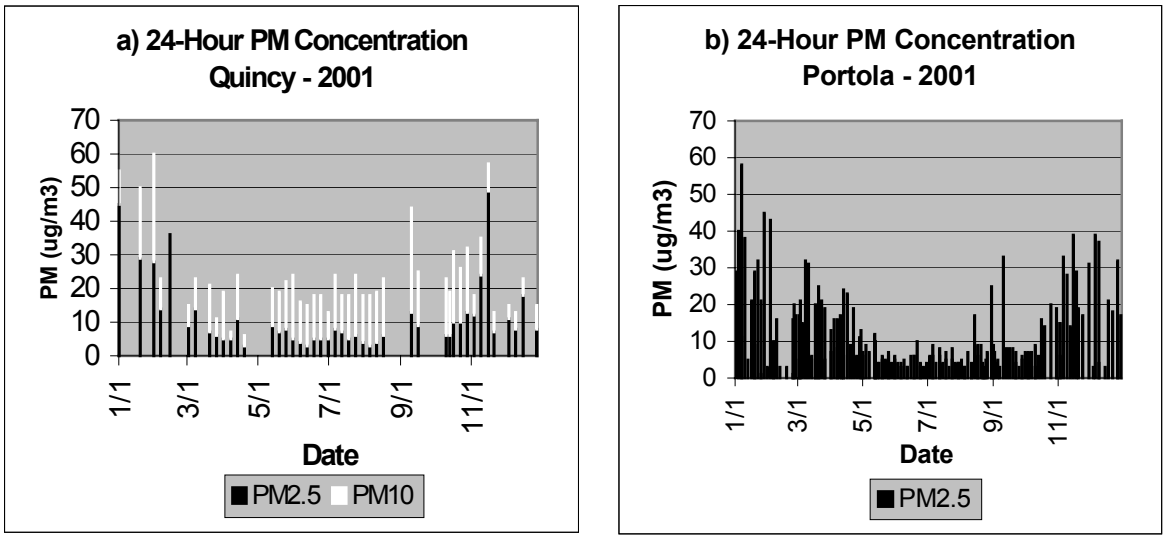
Table E-3. Monitoring Site Level Designation Values* for the State PM10 and PM2.5 Standards (2001-2003 Period).

Site	PM10 (ug/m^3)		PM2.5 (ug/m^3)
	24-Hour (Std.=50)	**Annual Average (Std.=20)**	**Annual Average (Std.=12)**
Grass Valley	No monitor	No monitor	Incomplete Data
Truckee	No monitor	No monitor	7
Portola	No monitor	No monitor	Incomplete Data
Quincy	60	18	13**

* 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.
** Based on data substitution.

Figure E-2 (a) illustrates the variation in PM10 and PM2.5 levels throughout 2001 at Quincy. The total height of the bars represents PM10 concentrations, while the height of the black portion of the bars represents the PM2.5 fraction.
Figure E-2 (b) shows the variation in PM2.5 levels throughout the same year at Portola. At Quincy, higher PM10 concentrations occurred during the late summer, fall and winter months. PM2.5 levels were highest in the late fall and winter at both Quincy and Portola. The colder, more stagnant conditions during this time of the year are conducive to buildup of PM. In addition, increased activity from residential wood combustion may also occur.

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



During the late summer, the PM10 concentration peak at Quincy was driven by the coarse fraction (particles between PM2.5 and PM10 in size), while at Portola a PM2.5 concentration peak was recorded. The coarse fraction is primarily due to activities that resuspend dust, such as emissions from unpaved and paved roads and construction. High PM2.5 concentrations during the summer may have been caused by wildfires. Based on 2000-2003 data, we estimate the PM2.5 contribution to ambient PM10 at Quincy to be approximately 51 percent during the fall, 67 percent during the winter, and 30 percent during the rest of the year. On an annual average, basis, we estimate that PM2.5 comprises approximately 45 percent of the PM10 ambient levels.

Figure E-3. Hourly Variation in PM2.5 Concentration.

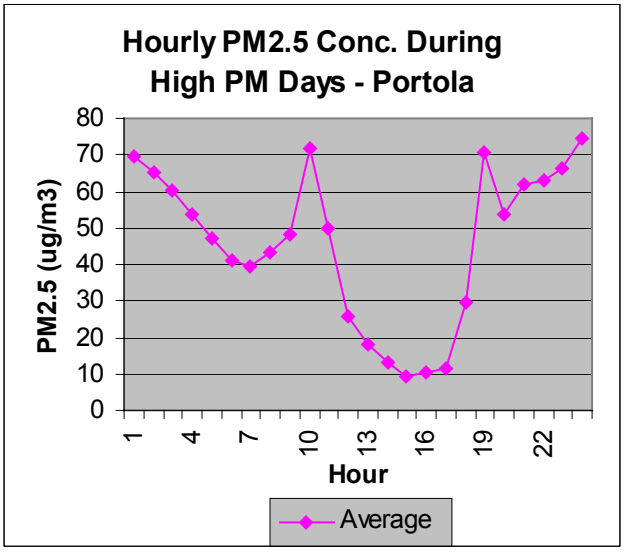
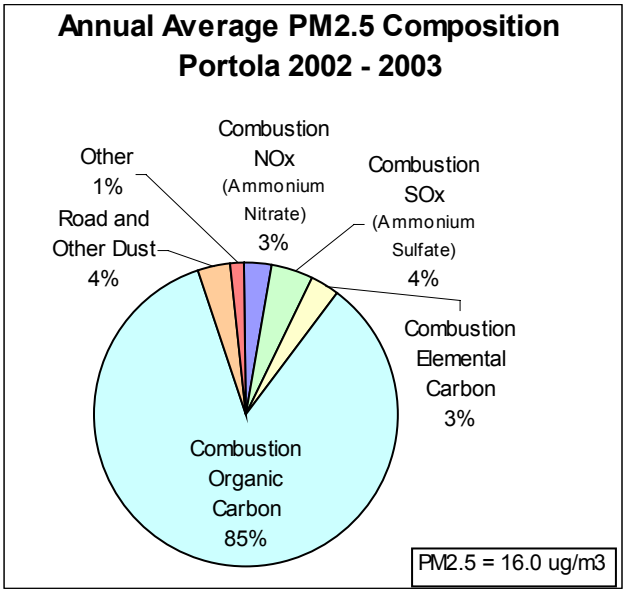


Figure E-3 presents the average hourly variation in PM2.5 levels of days within the year with the highest PM2.5 concentrations at Portola. Two peak periods occur, from approximately 7 p.m. to 3 a.m. and from 9 a.m. to 11 a.m. Peak evening concentrations generally reflect the influence of lowering inversion heights which trap pollutants close to the surface, as well as increased activity from evening commute traffic and residential wood combustion during winter months. The morning peak may be due to increased motor vehicle activity.

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



Data for Figure E-4 are from analysis of ambient PM2.5 data collected at Portola 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 the major fraction (85 percent) of PM2.5 is organic carbon. 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.

Secondary ammonium nitrate and ammonium sulfate - formed in the atmosphere through chemical reactions of NOx and SOx from mobile and stationary source combustion processes, together contribute about 7 percent to PM2.5 levels. Elemental carbon from combustion sources and dust from roads and other sources also contribute to PM2.5 levels, but to a much lesser extent.

Figure E-5 illustrates the quarterly variation in PM2.5 levels and its chemical components expressed in $\mu g/m^3$ (a) and as percent of PM2.5 (b) at Portola. As in Figure E-4, chemical components have been associated with possible emission sources based on emission inventory information. On average, during the 2002-2003 period, higher PM2.5 concentrations were recorded during the fall and winter (Figure E-5 a). The PM2.5 chemical composition is very similar throughout the year (Figure E-5 b), with organic carbon the principal contributor (approximately 85 percent during the fall and winter and 75 percent during the spring and summer). During the spring and summer, ammonium sulfate and dust contribute slightly more to ambient PM2.5 than during the fall and winter.

Figure E-5 (a). Chemical Composition of Average Quarterly PM2.5 and Link to Emission Source Type.

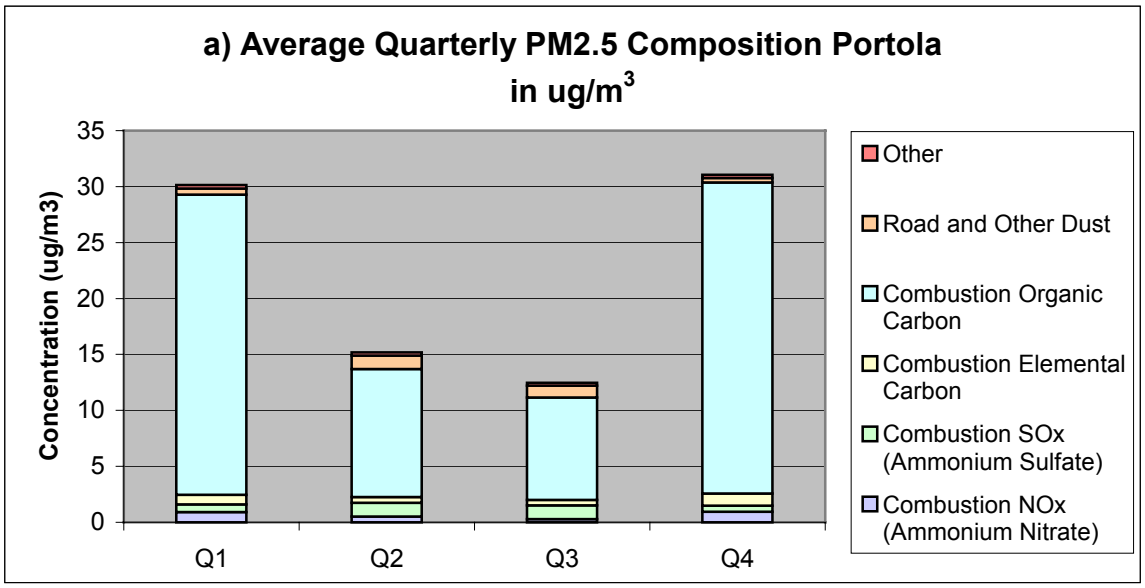
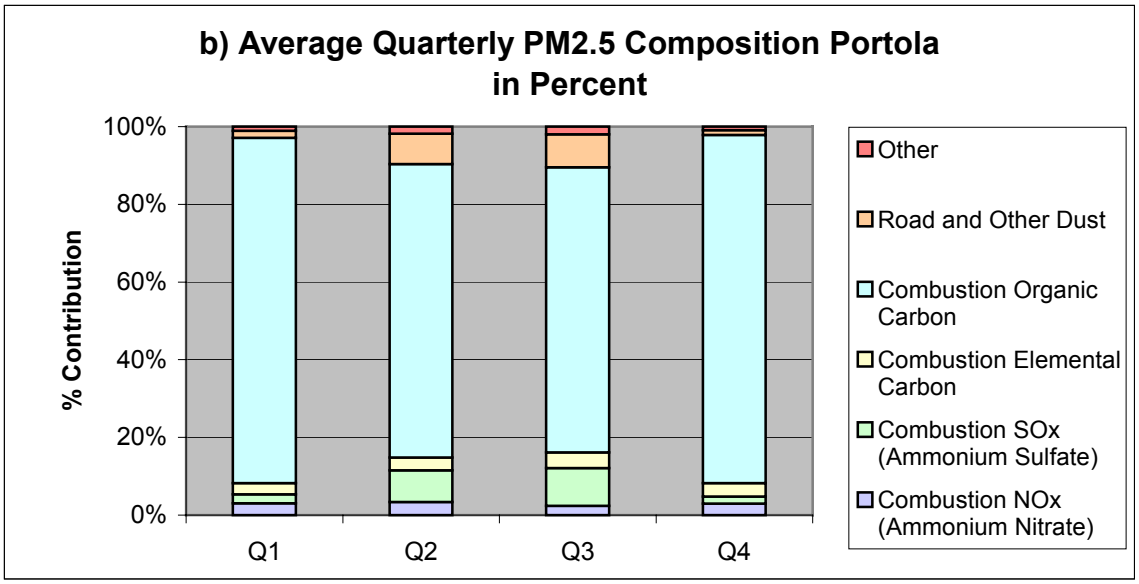


Figure E-5 (b). Chemical Composition of Average Quarterly PM2.5 and Link to Emission Source Type.



Placer County APCD

No recent PM10 or PM2.5 data are available for the Placer County APCD portion of the air basin.

El Dorado County AQMD

Table E-4 provides information on the yearly variations in the highest PM10 and PM2.5 concentrations recorded across the El Dorado County AQMD portion of the air basin in 2001 through 2003. We estimate that during this period, particulate levels exceeded the State 24-hour PM10 standard of 50 $\mu g/m^3$ six times, but did not exceed the annual PM10 standard of 20 $\mu g/m^3$. Data were insufficient to determine if the PM2.5 levels exceeded the State annual standard of 12 $\mu g/m^3$.

Table E-4. PM10 and PM2.5 Air Quality in El Dorado County AQMD.

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	6	51	16	No Monitor	No Monitor
2002	0	36	16	No Monitor	No Monitor
2003	0	50	14	22	Incomplete Data

* The maximum 24-hour PM2.5 values are provided for information only.

Table E-5 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. 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 El Dorado County AQMD portion of the air basin currently is nonattainment for the State 24-hour PM10 standard. The District is unclassified for the State annual PM2.5 standard – available data are insufficient to support designation as attainment for nonattainment.

Table E-5. 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	51	16	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.

Table E-6 provides designation values for each monitoring site in the air district to provide further information on the geographic distribution of concentrations. The data show that the Placerville monitor, the only PM10 monitor in the air district, exceeded the 24-hour PM10 standard, but did not exceed the annual PM10 standard. The data for Big Hill Lookout, the only PM2.5 monitor in the air district were not complete enough to determine attainment status for PM2.5.

Table E-6. Monitoring Site Level Designation Values* for 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)
Placerville	51	16	No Monitor
Big Hill Lookout	No Monitor	No Monitor	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 E-6 illustrates the variation in daily PM10 levels throughout 2001 at Placerville. Figure E-7 presents the variation in daily PM2.5 levels at Big Hill Lookout during the May 2003 through February 2004 period. Data were missing from mid-August through early November 2004. The height of the white bars represents PM10 concentrations, while the height of the black bars represents PM2.5 concentrations. In Placerville, PM10 concentrations tended to be higher from August through November, while at Big Hill Lookout, PM2.5 levels were higher in November and February. The colder, more stagnant conditions during the late fall and winter are conducive to buildup of PM. In addition, increased activity from residential wood combustion may also occur.

Figure E-6. Seasonal Variation in PM10 Concentrations.

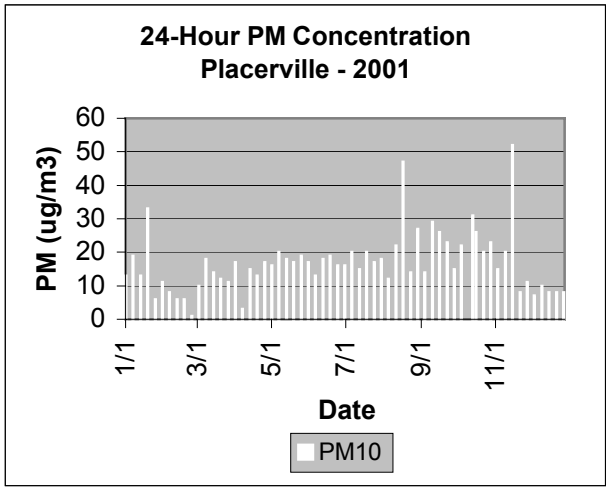


Figure E-7. Seasonal Variation in PM2.5 Concentrations.

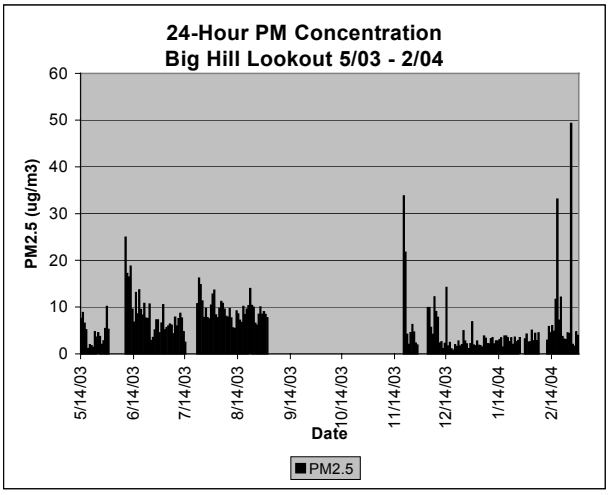


Figure E-8. Hourly Variation in PM2.5 Concentration.

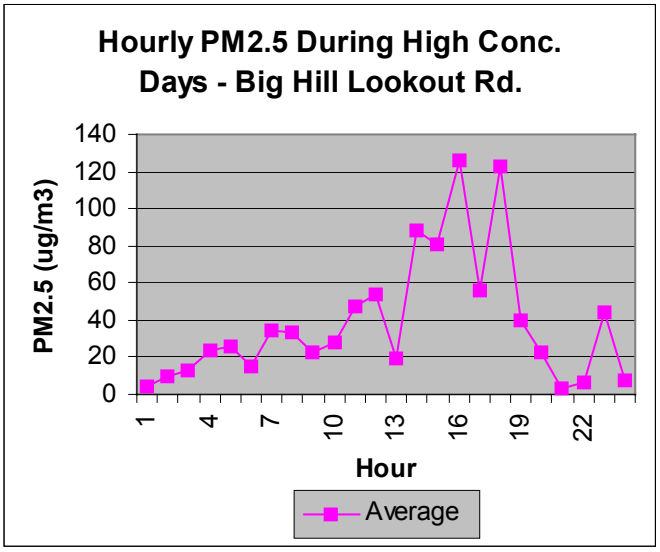


Figure E-8 presents the average hourly variation in PM2.5 levels for the days with the highest PM2.5 concentrations at Big Hill Lookout. Peak PM2.5 levels were recorded during the afternoon from 2 p.m. through 6 p.m. Mid-day PM2.5 concentration peaks can often reflect the influence of daytime secondary particle formation.

Although no chemical composition data is available, based on data from the Northern Sierra AQMD, and data collected as part of the 2000 California Regional PM10 and PM2.5 Air Quality Study at the Angels Camp monitoring site, we estimate that secondary ammonium nitrate and sulfate comprise approximately 10 to 30 percent of PM2.5

Amador County APCD

No recent PM10 or PM2.5 ambient monitoring data are available for the Amador County APCD.

Calaveras County APCD

Table E-7 provides information on the yearly variations in the highest PM10 and PM2.5 concentrations recorded across the Calaveras County APCD in 2001 through 2003. During this period, particulate levels exceeded the State annual standard of 20 $\mu g/m^3$, however no exceedances were recorded for either the State 24-hour PM10 or the annual PM2.5 standards.

Table E-7. PM10 and PM2.5 Air Quality in the Calaveras 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	0	42	19	31	8
2002	0	47	21	40	10
2003	0	39	18	20	9

* The maximum 24-hour PM2.5 values are provided for information only.

Table E-8 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. 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 Calaveras County APCD currently is nonattainment for the State PM10 annual average standard. The District is unclassified for the State annual PM2.5 standard – available data are insufficient to support designation as attainment for nonattainment.

Table E-8. 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	47	21	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.

Table E-9 provides designation values for each monitoring site in the air district to provide further information on the geographic distribution of concentrations. Only a single monitoring site at San Andreas is operated in the District.

Table E-9. 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)
San Andreas	47	21	10

* 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 E-9. Seasonal Variation in PM10 and PM2.5 Concentrations.

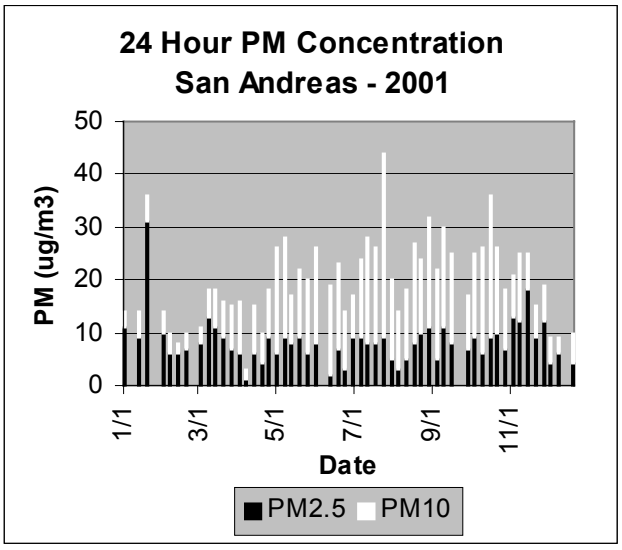


Figure E-9 illustrates the variation in PM10 and PM2.5 levels throughout 2001 at San Andreas. The total height of the bars represents PM10 concentrations, while the height of the black portion of the bars represents the PM2.5 fraction. The coarse fraction (particles between PM2.5 and PM10 in size) was largest during the spring through early fall. The coarse fraction is primarily due to activities that resuspend dust, such as emissions from paved and unpaved road dust and construction. In contrast, PM2.5 levels were highest during the winter. The colder, more stagnant conditions during the late fall and winter are conducive to buildup of PM. In addition, increased activity from residential wood combustion may also occur.

Based on 2000-2003 data, we estimate that the PM2.5 fraction accounts for 69 percent of PM10 during the winter and 49 percent during the fall. On an annual average, we estimate that PM2.5 comprises 47 percent of the PM10 ambient levels. Although no chemical composition data is available, based on data from the Northern Sierra AQMD, and data collected as part of the 2000 California Regional PM10 and PM2.5 Air Quality Study at the Angels Camp monitoring site, we estimate that secondary ammonium nitrate and sulfate comprise approximately 10 to 30 percent of PM2.5.

Tuolumne County APCD

No PM10 or PM2.5 data are available for the Tuolumne County APCD.

Mariposa County APCD

Table E-10 provides information on the yearly variations in the highest PM10 and PM2.5 concentrations recorded across the Mariposa County APCD in 2001 through 2003. During this period, particulate levels are estimated to have exceeded the State 24-hour PM10 standard of 50 $\mu g/m^3$ sixty-one times. Particulate levels also consistently exceeded the State annual PM10 standard of 20 $\mu g/m^3$. Data were insufficient to determine if PM2.5 levels exceeded the State PM2.5 standard of 12 $\mu g/m^3$.

Table E-10. PM10 and PM2.5 Air Quality in the Mariposa 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	37	277**	30	No Monitor	No Monitor
2002	18	72	26	29	Incomplete Data
2003	6	58	21	54	Incomplete Data

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

Table E-11 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 maximum 24-hour PM10 concentration in 2001 shown in Table E-10 was identified as an extreme concentration event and was excluded in determining the designation values shown in Table E-11. 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 Yosemite National Park portion of Mariposa County APCD currently is nonattainment for both the State 24-hour and annual average PM10 standards. The District is unclassified for the State annual PM2.5 standard – available data are insufficient to support designation as attainment for nonattainment.

Table E-11. 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	135	21	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.

Table E-12 provides designation values for each monitoring site in the air district to provide further information on the geographic distribution of concentrations. The only monitoring site in the air district is located in Yosemite National Park. Only the western portion of Mariposa County APCD which contains Yosemite National Park is designated as nonattainment for the State PM10 standards. The remainder of the air district is unclassified.

Table E-12. 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)**
Yosemite Village	135	30	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 E-10 illustrates the variation in PM10 levels in Yosemite throughout 2001 (a) and 2002 (b), while Figure E-11 presents the variation in PM2.5 from February 2002 throughout March 2004. The height of the white bars represents PM10 concentrations, while the height of the black bars represents PM2.5 concentrations. PM2.5 data in Figure E-11 are missing from August 2003 through June 2003. During 2001, very high PM10 concentrations were recorded in August and September and may have been due to fire impacts. During 2002 the higher PM10 concentrations were recorded during January through April. PM2.5 data show the higher PM2.5 concentrations occurring during the August-October months. The colder, more stagnant conditions during the late fall and winter are conducive to buildup of PM. In addition, increased activity from residential wood combustion may also occur.

Figure E-10. Seasonal Variation in PM10 Concentrations in Yosemite.

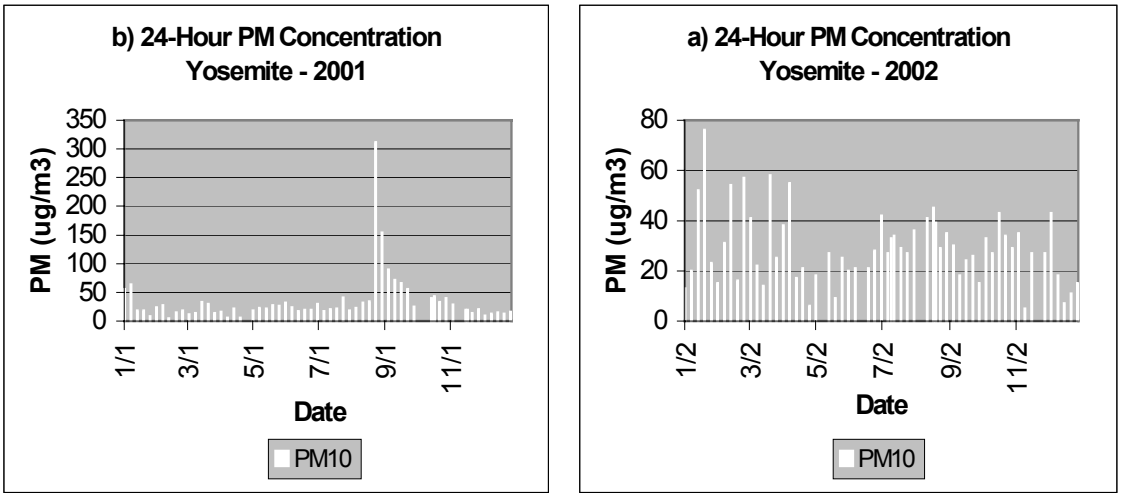


Figure E-11. Seasonal Variation in PM2.5 Concentrations in Yosemite.

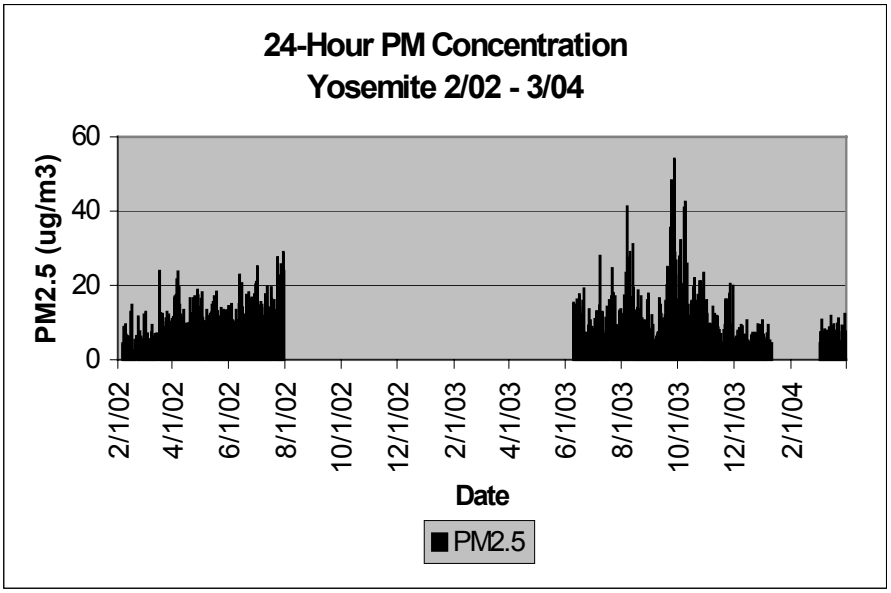


Figure E-12. Hourly Variation in PM2.5 Concentrations.

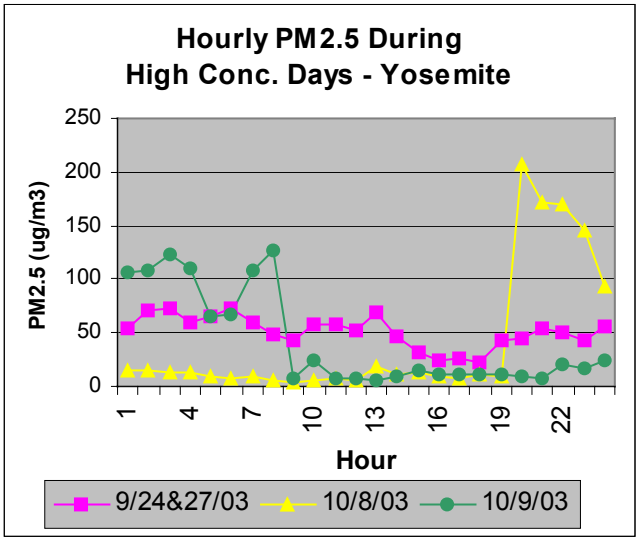


Figure E-12 illustrates the variation in hourly PM2.5 levels for the days with the highest PM2.5 concentrations in Yosemite. There are days when ambient PM2.5 levels are highest during the late evening; other days when high PM2.5 levels occur during the night, with another concentration peak at 7 to 8 a.m.; and yet other days when PM2.5 levels remain high throughout the day. Peak evening concentrations generally reflect the influence of lower inversion heights which trap pollutants close to the surface, as well as increased residential wood combustion activity during winter months. Peak morning concentrations often reflect increased motor vehicle activity. Finally, elevated PM2.5 concentrations throughout the day may reflect the impacts of secondary PM formation or continuous fire activity.

Although no chemical composition data is available, based on data from the Northern Sierra AQMD, and data collected as part of the 2000 California Regional PM10 and PM2.5 Air Quality Study at the Angels Camp monitoring site, we estimate that secondary ammonium nitrate and sulfate comprise approximately 10 to 30 percent of PM2.5.