7.0 MULTIVARIATE ANALYSIS

In order to aid in the determination of whether distant or local sources were responsible for acidic species and oxidants observed in this study, particulate mass and composition data and gas concentrations of certain species were analyzed for the four sites. The data from each site were screened to provide data sets with the maximum number variables consistent with having as many complete data records as possible. The correlation matrices were calculated and principal component analysis was utilized to estimate the number of factors and their physical interpretation for each data set. The five major components present in all the data sets were soil dust, wood smoke, sulfate, nitrate, and nitric acid. The Source Apportionment by Factors with Explicit Restrictions (SAFER) model was used to estimate the composition of soil and wood smoke at Sequoia and Yosemite and the contribution of these species to PM_{10} was estimated using the Chemical Mass Balance (CMB) model. Blodgett and Tehachapi were not modeled because of a lack of sufficient elemental and organic carbon data. Finally, the inter-site correlations of selected species were examined for signs of regional transport.

7.1 Principal Component Analysis

The discussion in this section will concentrate on the PM_{10} data from Sequoia and Yosemite because the data were more complete from these sites. All forms of multivariate analysis require two things: data from as many sampling periods as possible, and all the air quality variables must be present for each sampling period in the analysis. To meet these two somewhat contradictory goals, the data are screened to eliminate variables with too many missing values. The selection of variables which gives the largest number of complete time periods while retaining the most variables was determined for each site. The final data sets contained between 18 and 25 variables and about 50 sampling periods for each site. Table 7-1 gives the details for each site. For air quality data, experience has shown that 60 to 100 sampling periods are preferable; with fewer data points, the influence of error becomes greater and the results are less certain.

Air quality particulate and gas data are typically highly inter-correlated, as seen in Table 7-2, which gives the inter-correlations of the Sequoia PM_{10} data. Obviously, interpretation of a large correlation matrix is difficult. The purpose of the Principal Component Analysis (PCA) is to make the interpretation easier by determining the overall structure of the data, i.e., the inter-correlations and relationships between the variables which can be explained by transport, common sources, chemical transformation, or other processes. The PCA identifies those groups of correlated air quality variables that are statistically independent and explain the majority of the co-variation seen in the data.

The data sets from each of the four sites showed five major principal components; two related to soil dust and wood smoke, and three related to secondary species: sulfate, nitrate, and nitric acid. This is seen most clearly in the PCA of Yosemite PM_{10} data given in Table 7-3 and somewhat less clearly in Table 7-4, which gives the PCA of the Sequoia PM_{10} data set. The interpretation of PCA of data of this type is discussed in Henry and Hidy (1979). The purpose here is not to engage in a detailed explanation of the PCA results, but only to indicate the major features of the data. From the fact that the principal components are constructed to be statistically independent of each other, it follows that concentrations of soil, wood smoke, sulfate, nitrate, and nitric acid vary pretty much independently of each other. This is not

Table 7-1 Variables Included in the Data Sets

	Sequoia PM_{10}	Yosemite PM_{10}	Sequoia $PM_{2.5}$	Yosemite $PM_{2.5}$	Blodget $PM_{2.5}$	Tehachapi $PM_{2.5}$
1	O3	O3	O3	O3	O3	O3
2	MTGC	MTGC	MTGC	MTGC	MTGC	MTGC
3	N3IC	N3IC	N3IC	N3IC	N3IC	N3IC
4	S4IC	S4IC	S4IC	S4IC	S4IC	S4IC
5	N4CC	N4CC	N4CC	N4CC	N4CC	N4CC
6	NAAC	NAAC	NAAC	NAAC	NAAC	NAAC
7	KPAC	KPAC	KPAC	KPAC	ALXC	KPAC
8	OCTC	OCTC	OCTC	OCTC	SIXC	ALXC
9	ECTC	ECTC	ECTC	ECTC	SUXC	SIXC
10	ALXC	ALXC	ALXC	ALXC	KPXC	SUXC
11	SIXC	SIXC	SIXC	SIXC	CAXC	KPXC
12	SUXC	SUXC	SUXC	SUXC	FEXC	CAXC
13	KPXC	KPXC	KPXC	KPXC	SPSUMC	FEXC
14	CAXC	CAXC	CAXC*	CAXC	PNN3IC	ZNXC*
15	MNXC	MNXC	FEXC	FEXC	GSN3IC	SPSUMC
16	FEXC	FEXC	ZNXC	ZNXC	HNDDGC	PNN3IC
17	CUXC	ZNXC	SPSUMC	SPSUMC	GSS4IC*	GSN3IC
18	ZNXC	SPSUMC	BKN3IC	GSN3IC	GSN4CC	HNDDGC
19	BRXC	GSN3IC	GSN3IC	HNDDGC		GSS4IC
20	SPSUMC	HNDDGC	HNDDGC			GSN4CC
21	BKN3IC		GSS4IC			
22	GSN3IC		GSN4CC			
23	HNDDGC					
24	GSS4IC					
25	GSN4CC					
26						
No. of Obs.	51	53	51	53	46	42

*possibly noise dominated

Table 7-2 Correlations of Sequoia PM_{10} Data

	O3	MTG	N3I	S4I	N4C	NAAC	KPA	OCT	ECTC	ALX	SIXC	SUX	KPX	CAX	MNX	FEX	CUX	ZNX	BRX	SPSUM	GSN3I	HNDDG	GSS4I
MTGC	-0.028																						
N3IC	0.237	0.224																					
S4IC	0.395	0.266	0.137																				
N4CC	0.364	0.351	0.116	0.972																			
NAAC	0.281	0.122	0.671	0.402	0.281																		
KPAC	0.114	0.561	0.308	0.252	0.293	0.181																	
OCTC	0.016	0.636	0.026	0.383	0.411	0.062	0.579																
ECTC	-0.118	0.197	0.208	-0.069	0.014	0.098	0.334	0.244															
ALXC	0.194	0.618	0.458	0.006	0.024	0.252	0.163	0.135	-0.065														
SIXC	0.191	0.586	0.539	0.04	0.05	0.307	0.124	0.154	-0.05	0.954													
SUXC	0.292	0.478	-0.001	0.772	0.798	0.219	0.233	0.411	0.021	0.124	0.108												
KPXC	0.152	0.795	0.487	0.064	0.117	0.231	0.695	0.472	0.236	0.741	0.723	0.198											
CAXC	0.259	0.561	0.359	0.062	0.045	0.289	0.019	0.269	-0.085	0.816	0.845	0.12	0.639										
MNXC	-0.022	0.687	0.146	-0.014	0.046	0.068	0.137	0.219	-0.009	0.791	0.726	0.149	0.623	0.649									
FEXC	0.196	0.589	0.534	0.067	0.082	0.291	0.154	0.154	-0.077	0.95	0.982	0.115	0.732	0.801	0.764								
CUXC	0.207	0.107	0.019	0.063	0.074	-0.027	0.067	0.235	0.097	0.248	0.234	0.074	0.203	0.191	0.166	0.241							
ZNXC	-0.052	0.523	-0.077	0.349	0.378	0.062	0.214	0.379	-0.051	0.395	0.334	0.434	0.383	0.271	0.447	0.395	0.363						
BRXC	0.111	0.645	-0.067	0.274	0.36	-0.137	0.187	0.472	-0.087	0.423	0.396	0.584	0.438	0.471	0.496	0.384	0.242	0.418					
SPSUMC	0.218	0.795	0.488	0.462	0.495	0.393	0.554	0.745	0.349	0.638	0.677	0.475	0.778	0.636	0.537	0.671	0.292	0.462	0.509				
GSN3IC	0.495	0.081	0.205	0.274	0.238	0.156	-0.019	0.254	-0.037	0.225	0.295	0.206	0.19	0.405	0.081	0.319	0.151	0.115	0.252	0.37			
HNDDGC	0.427	-0.026	0.113	0.174	0.128	0.099	-0.116	0.196	-0.056	0.144	0.217	0.115	0.079	0.355	0.024	0.233	0.1	0.051	0.204	0.256	0.98		
GSS4IC	0.587	0.051	0.174	0.532	0.51	0.299	0.028	0.07	-0.19	0.132	0.161	0.38	0.023	0.176	-0.02	0.166	0.21	0.185	0.244	0.23	0.361	0.296	
GSN4CC	0.377	0.237	0.058	0.471	0.459	0.043	0.125	0.355	-0.237	0.264	0.24	0.417	0.238	0.33	0.156	0.294	0.135	0.31	0.46	0.39	0.696	0.64	0.404

Table 7-3 Principal Compnent Analysis of the Corellation Matrix of Yosemite PM_{10} Data

	Principle Components (x1000)				
O3	373	-686	309	10	35
MTGC	691	681	150	-28	93
N3IC	526	-297	-338	-224	654
S4IC	327	-405	658	-356	75
N4CC	378	-272	754	-323	-173
NAAC	393	-299	-379	-317	680
KPAC	660	571	62	29	172
OCTC	580	753	210	33	44
ECTC	515	776	221	3	67
ALXC	876	-284	-220	138	-233
SIXC	859	-383	-240	89	-185
SUXC	509	-350	570	-408	22
KPXC	950	-131	-120	110	-137
CAXC	910	-65	-298	99	-75
MNXC	890	-121	-209	192	-219
FEXC	848	-375	-182	135	-264
ZNXC	378	72	-90	-400	167
SPSUMC	774	585	173	12	39
GSN3IC	94	-227	390	802	350
HNDDGC	68	-227	391	808	336
Eigenvalue	8.0899	3.8242	2.4295	2.1105	1.4673
Proportion	0.404	0.191	0.121	0.106	0.073
Cumulative	0.404	0.596	0.717	0.823	0.896
Interpretation	Soil	Wood Smoke	Sulfate	Nitric Acid	Nitrate

Table 7-4 Principal Component Analysis of Correlation Matrix of Sequoia PM_{10} Data

Variable	Principal Components (x1000)				
O3	374	423	449	243	-19
MTGC	792	-214	-432	-171	17
N3IC	475	-174	133	760	-1
S4IC	492	751	-150	86	-268
N4CC	522	721	-239	27	-244
NAAC	380	107	102	680	-201
KPAC	460	53	-583	277	309
OCTC	567	197	-438	-197	439
ECTC	77	-90	-440	343	515
ALXC	774	-519	207	-9	-194
SIXC	783	-495	262	63	-156
SUXC	546	577	-274	-170	-240
KPXC	801	-386	-212	122	180
CAXC	736	-382	346	-85	-23
MNXC	647	-515	-25	-268	-189
FEXC	798	-468	257	43	-162
CUXC	311	-6	39	-174	83
ZNXC	549	43	-235	-397	-203
BRXC	626	60	-102	-559	-28
SPSUMC	917	-25	-215	107	193
BKN3IC	656	314	-186	312	-75
GSN3IC	475	328	617	-73	474
HNDDGC	350	296	664	-125	513
GSS4IC	386	530	312	100	-276
GSN4CC	552	437	341	-291	187
Eigenvalue	8.7996	3.802	2.8226	2.2224	1.6345
Proportion	0.352	0.152	0.113	0.089	0.065
Cumulative	0.352	0.504	0.617	0.706	0.771
Interpretation	Soil	Sulfate	Wood Smoke Nitric Acid	Nitrate	Wood Smoke Organic Carbon

surprising for smoke and soil, but the three secondary species might be expected to vary together since they are all probably primarily transported into the area. One explanation for the independent behavior is that although they may come from transport, the nitrate and nitric acid concentrations are influenced by local conditions such as temperature and atmospheric stability that affect the dissociation of nitrate and the deposition of nitric acid.

7.2 Multivariate Receptor Modeling

The PM_{10} data from Sequoia and Yosemite were analyzed by two- and three-dimensional forms of the SAFER Model. The model is described in Henry and Kim (1990), but the simplified two-dimensional, graphical form used here was first described by Lawton and Sylvestre (1971), although they apply it to a completely different type of problem, the deconvolution of spectra of mixtures of two components.

A subset of variables that only come from soil and wood smoke was selected. These are soluble potassium (KPAC), organic carbon (OCTC), elemental carbon (ECTC), aluminum (ALXC), silicon (SIXC), potassium (KPXC), calcium (CAXC), manganese (MNXC), and iron (FEXC). The variables were normalized by the standard deviations to make them comparable in magnitude before the eigenvector analysis. Figure 7-1 shows the data points plotted in the eigenspace of the normalized data. In this Figure, each point represents a possible source composition that is consistent with the observed data. However, most of the points correspond to source compositions that are not physically possible, e.g., one of the species is negative, or the source would require negative source contributions. Henry (1987) shows that only points

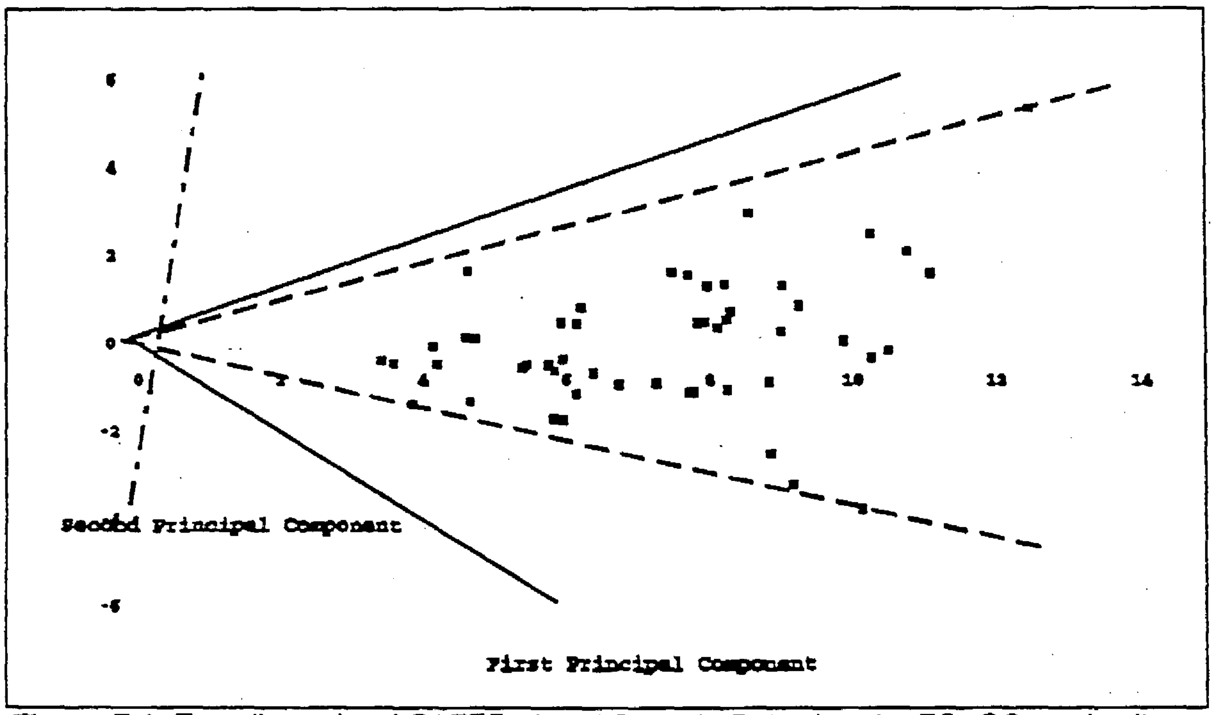

Figure 7-1 Two-dimensional SAFER plot of Sequoia PM_{10} data for EC, OC, and soil elements. For non-negativity, the soil source must lie between the top solid and dotted lines and the wood smoke source between the bottom two lines.

that lie in the two regions bounded by the solid lines on the outside and the dotted lines on the inside will correspond to source compositions that are non-negative and have non-negative source contributions.

While the non-negativity constraints are important, additional physical constraints on the source compositions are necessary to further reduce the range of possible source compositions. One additional constraint is that the sum of the species in the source composition be less than or equal to one, i.e.,

$$a_{OCTC}+a_{ECTC}+a_{ALXC}+a_{SIXC}+a_{KPXC}+a_{CAXC}+a_{MNXC}+a_{FEXC} \leq 1, \qquad \text{Eq. (7-1)}$$

where a_i is the mass fraction of species i in the source. However, this condition can be tightened by assuming that the inorganic elements are present as their highest oxide and that organic carbon is five sixths of the total organic mass. The above condition now becomes:

$$1.2\,a_{OCTC}+a_{ECTC}+1.89a_{ALXC}+2.14a_{SIXC}+1.2a_{KPXC}+1.4a_{CAXC}+1.58a_{MNXC}+1.43a_{FEXC} \leq 1. \qquad \text{Eq. (7-2)}$$

Remembering that the data have been normalized to the standard deviations of the species, the a_i must be unnormalized by multiplying by the standard deviations:

$$1.2\sigma_{OCTC}\,a_{OCTC}+a_{ECTC}+1.89\sigma_{ALXC}a_{ALXC}+2.14\sigma_{SIXC}a_{SIXC}+$$
$$1.2\sigma_{KPXC}a_{KPXC}+1.4\sigma_{CAXC}a_{CAXC}+1.58\sigma_{MNXC}a_{MNXC}+1.43\sigma_{FEXC}a_{FEXC} \leq 1. \qquad \text{Eq. (7-3)}$$

For the case in Figure 1, the equality part of the constraint reduces down to the equation

$$x_2 = -3.7821+9.4652x_1, \qquad \text{Eq. (7-4)}$$

where x_1 is the first principal component and x_2 is the second. This equation is shown as the line not passing through the origin in Figure 7-1. If the source composition must lie on this line, then the possible soil and wood smoke sources are to be found on the two segments of this line intersected by the top and bottom non-negativity regions. The end points of these two segments represent the range of source compositions that are consistent with the data and obey all the physical constraints, and are given in Table 7-5.

In Table 7-5, two of the compositions are marked as preferred based on physical reasoning. For soil dust, the preferred composition has zero elemental carbon. For the wood smoke source, the preferred composition has the minimum amount of aluminum, silicon, and other soil-related species. The results for data from Yosemite are given in Table 7-6. The preferred soil dust compositions are very similar at the two sites. However, the preferred wood smoke source composition at Yosemite has much more organic carbon and, necessarily, much less elemental carbon and soluble potassium.

7.3 SAFER Modelling Results

This sub-section addresses the question of how well the preferred compositions determined by SAFER for soil dust and wood smoke explain the observed total mass, which was not one of the species in the analysis and, thus, serves as an independent check on the model results. A Chemical Mass Balance model was applied using the preferred source compositions in Tables 7-5 and 7-6 to calculate the contributions of soil dust and wood smoke to PM_{10} at Sequoia and Yosemite. The average CMB results for Sequoia and Yosemite are given in Table 7-7.

Table 7-5 Range of Source Compositons Determined by SAFER for Sequoia (Mass Percent)

	Wood Smoke		Soil Dust	
Species				
KPAC	1.54	0.99	0.04	0.20
OCTC	55.37	38.80	10.44	15.09
ECTC	26.46	16.70	0.00	2.74
ALXC	0.00	3.83	10.37	9.30
SIXC	1.24	10.29	25.79	23.25
KPXC	2.75	2.57	2.28	2.33
CAXC	0.38	1.13	2.41	2.20
MNXC	0.02	0.05	0.10	0.10
FEXC	0.41	1.90	4.47	4.05
Preferred Composition	X		X	

Table 7-6 Range of Source Compositons Determined by SAFER for Yosemite (Mass Percent)

	Wood Smoke		Soil Dust	
Species				
KPAC	0.46	0.44	0.25	0.3
OCTC	70.54	64.34	12.41	24.98
ECTC	13.81	12.34	0	2.99
ALXC	0.3	1.35	10.13	8
SIXC	0	2.58	24.22	18.98
KPXC	0.43	0.7	2.97	2.42
CAXC	0.32	0.52	2.2	1.79
MNXC	0.01	0.02	0.11	0.09
FEXC	0	0.55	5.12	4.01
Preferred Composition	X		X	

Table 7-7 Average Chemical Mass Balance Results Using the Preferred Source Profiles

	Sequoia		Yosemite	
	µg/m³	percent	µg/m³	percent
Soil Dust	11.1	53	11.5	47
Wood Smoke	7.6	36	13.2	54
Sulfate	1.9	9	1.9	8
Nitrate	0.72	3	0.33	1
Ammonium	0.8	4	0.66	3
Predicted PM_{10}	22.1	105	27.6	113
Observed PM_{10}	21.1	100	24.4	100

The agreement between predicted and observed PM_{10} in Table 7-7 is quite good for Sequoia, although there is an over-prediction of about five percent. Figure 7-2 shows the scatter plot of the predicted versus observed reduced PM_{10}, where reduced PM_{10} is defined as PM_{10} less the sulfate, nitrate, and ammonium, and predicted reduced total mass is just the sum of the CMB estimates of soil and wood smoke . The Figure shows that the reduced PM_{10} is over-predicted too. The good relationship between observed and predicted organic carbon is seen in Figure 7-3. The soil elements, except potassium, show as good or better agreement than organic carbon. Predicted versus observed elemental carbon at Sequoia is seen in Figure 7-4. The plot for the potassium species is similar. The average agreement is not bad, but there is a lot of scatter.

For Yosemite, the CMB results in Table 7-7 show that on average the PM_{10} is over-predicted by 13 percent. Over-prediction by the CMB is somewhat surprising since the source profiles used in the CMB had the maximum amount of silicon in soil dust and the maximum amount of elemental carbon in wood smoke that can be allowed by the data and the additional physical constraints imposed by the SAFER model. Thus, the source contributions of soil and smoke and are probably on the low side, if anything. The most likely explanation for the over-prediction is that the wood smoke source is not well predicted by the model. The problem is that the composition of wood smoke is probably highly variable; thus, it is not well predicted

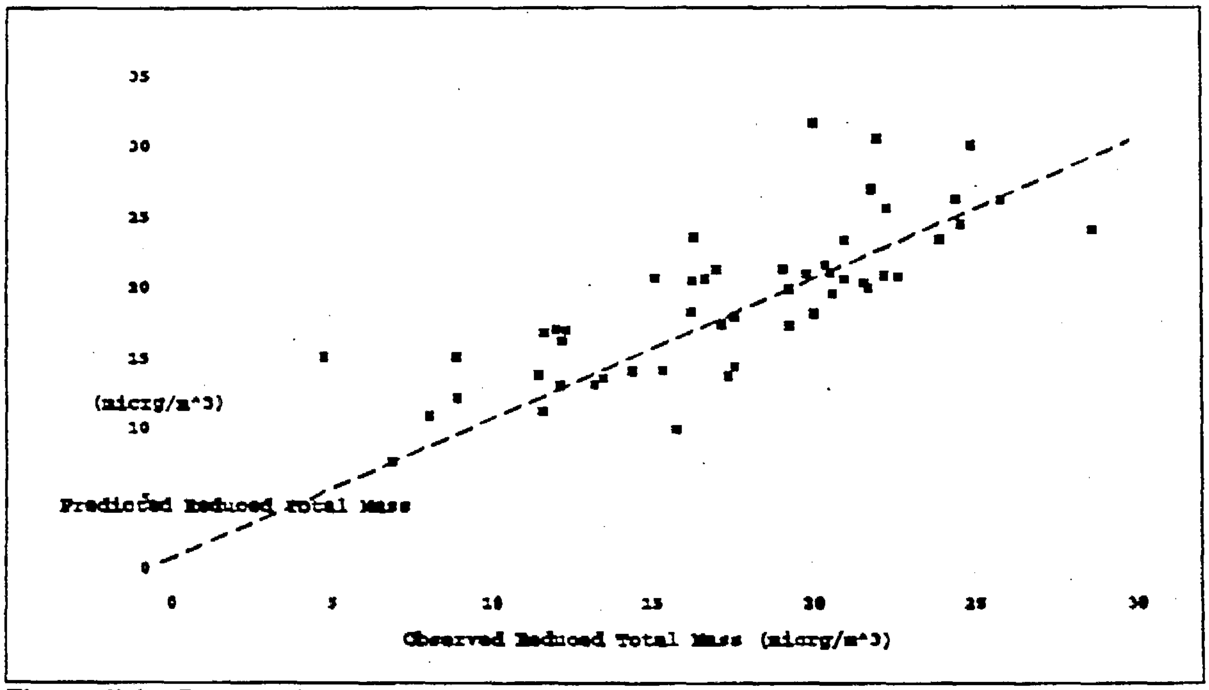

Figure 7-2 Predicted versus observed Sequoia PM_{10} reduced total mass (total mass minus sulfate, nitrate, and ammonium).

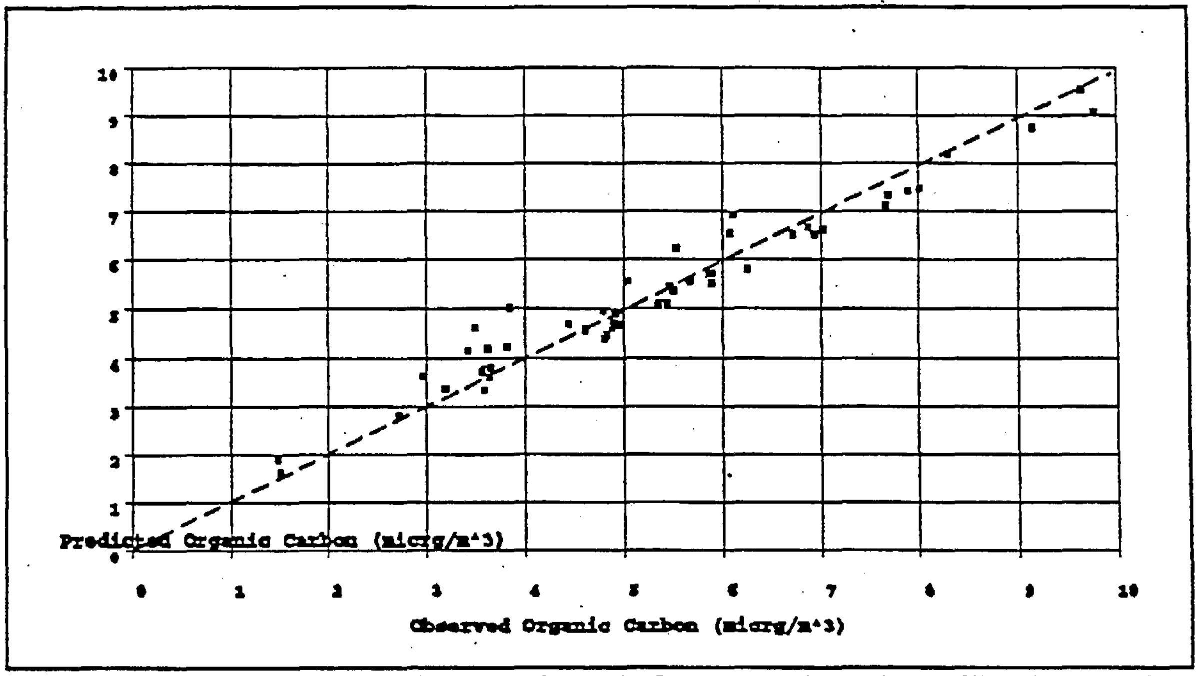

Figure 7-3 Predicted versus observed Sequoia PM_{10} organic carbon. The degree of agreement seen here is typical of all species except elemental carbon and potassium.

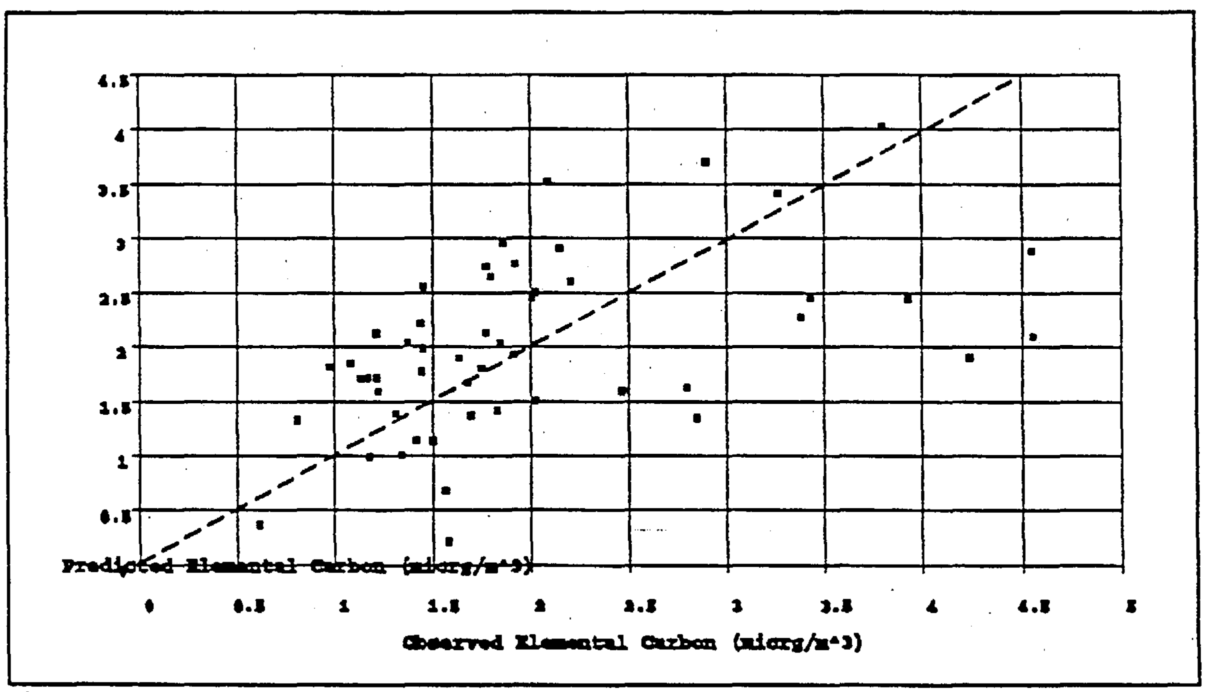

Figure 7-4 Predicted versus observed elemental carbon for Sequoia PM_{10}.

by the CMB approach, which assumes constant source compositions. This is especially true at Yosemite. In fact, careful examination of the eigenvalues of the Yosemite data for the nine soil and smoke species indicates that there may be three factors instead of two. A three-source SAFER model was calculated for Yosemite, with the resulting soil source being about the same as in the two-source model. The other two sources were wood smoke and a source containing only organic carbon and nothing else. This organic carbon "source" is probably the model's way of trying to deal with a highly varying source composition for wood smoke. Of course, it is also possible that there is a source of organic carbon that is not related to elemental carbon, soluble potassium, or soil elements.

The above results are for the PM_{10} data. When applied to the $PM_{2.5}$ data the SAFER model found no source compositions which explained the data and satisfied the non-negativity constraints. That is to say, the reported concentrations cannot be explained by any physically meaningful set of source compositions.

7.4 Inter-Site Correlations

The multivariate analysis above gives little information about the secondary particulate and gases species, although the PCA does show that the sulfate, nitrate, and nitric acid vary independently. Presumably, most of the secondary species and such primary pollutants as sulfur dioxide are transported into these remote areas. One way to look for regional transport is to examine the inter-site correlations of the species of interest. Table 7-8 contains the inter-site correlations for eight species of interest for the four sites in this study. The receptor modeling above shows that PM_{10} is dominated by local sources, as is organic carbon. This is borne out

Table 7-8 Inter-site Correlations for Selected Species (BLOD = Blodgett, SLK = Sequoia, TEH = Tehachapi, YOS = Yosemite)

Ozone	BLOD	SLK	TEH
BLOD	1.000		
SLK	0.632	1.000	
TEH	0.627	0.478	1.000
YOS	0.840	0.662	0.632

PM_{10}	BLOD	SLK	TEH
BLOD	1.000		
SLK	0.132	1.000	
TEH	0.300	0.168	1.000
YOS	0.007	0.242	-0.027

Total Nitrate	BLOD	SLK	TEH
BLOD	1.000		
SLK	0.717	1.000	
TEH	0.444	0.363	1.000
YOS	0.113	0.337	-0.165

Nitrate	BLOD	SLK	TEH
BLOD	1.00		
SLK	0.425	1.00	
TEH	0.149	0.264	1.00
YOS	0.435	0.373	0.093

Nitric Acid	BLOD	SLK	TEH
BLOD	1.000		
SLK	0.776	1.000	
TEH	0.537	0.438	1.000
YOS	0.170	0.361	-0.077

Sulfate	BLOD	SLK	TEH
BLOD	1.000		
SLK	0.162	1.000	
TEH	0.647	0.295	1.000
YOS	0.560	0.546	0.578

Sulfur Dioxide	BLOD	SLK	TEH
BLOD	1.000		
SLK	-0.023	1.000	
TEH	0.053	0.202	1.000
YOS	0.061	0.309	0.339

Organic Carbon	BLOD	SLK	TEH
BLOD	1.000		
SLK	-0.046	1.000	
TEH	0.086	-0.100	1.000
YOS	-0.305	-0.014	-0.336

by the low inter-site correlations seen in the table for these two species. Sulfur dioxide also has very low inter-site correlations. On the other hand, ozone has the highest overall correlations, reaching a high of 0.840 between Blodgett and Yosemite. These high correlations can be explained in part by the diurnal pattern of ozone and, perhaps, in part by regional transport. Nitric acid and total nitrate also show some high inter-site correlations, and as with ozone these are at least partly caused by the diurnal pattern of nitric acid which is quite strong at all the sites. Finally, particulate sulfate and nitrate show moderately high inter-site correlations. Sulfate is the species most likely to exhibit signs of regional transport. However, a strong regional character is not evident in the inter-site correlations for sulfate or nitrate. In conclusion, regional transport may play a role in determining the concentrations of the secondary and gaseous species, but if this is so, it is not conspicuous in the inter-site correlations.

8.0 SUMMARY AND CONCLUSIONS

The four sampling locations were, from north to south, Blodgett Experimental Forest, Yosemite, Giant Forest (Sequoia), and Tehachapi. The sites are roughly equidistant from each other along a line parallel to the axis of the Sierra Nevada at elevations ranging from about 670 m to 1900 m. The elevation, topography, and vegetation are variable between sites. Variability of local environmental conditions between sites raises the question of whether the data recorded at each site reflect local conditions at each site, or regional air pollution patterns. For example, local mobile source emissions (i.e., from within a 5 km radius of the site) were probably greatest at Tehachapi, and least at Blodgett. The Giant Forest site was situated on an exposed ridge, and may therefore have been affected by topographically controlled thermal convection. The Blodgett site was situated under a 20 m forest canopy, while all other sites were situated in openings.

The maximum 24-hour average PM_{10} concentration was 49.7 $\mu g/m^3$ found at the Yosemite site on August 23, 1990, with the highest diurnal concentration (77.4 $\mu g/m^3$) occurring during the morning period (0700 to 1200 PDT) and the second highest concentrations (70.6 $\mu g/m^3$) occurring after midnight (0000 to 0700 PDT).

Organic carbon, elemental carbon, sulfate, aluminum, and silicon are the major components of PM_{10} which accounts for 75% of the average PM_{10} mass at the Yosemite site and 62% of the average PM_{10} mass at the Sequoia Lower Keweah site. PM_{10} organic carbon is the single largest component and accounts for 43% of the average PM_{10} mass at the Yosemite site and 25% of the average PM_{10} mass at the Sequoia Lower Keweah site. These averages are biased high at the Yosemite site owing to the occurrence of the forest fire during August 22 to 24, 1990.

Maximum 24-hour average PM_{10} organic carbon of 22.3 $\mu g/m^3$ was found at the Yosemite site on August 23, 1990; with the highest diurnal concentration (39.9 $\mu g/m^3$) occurring during the morning (0700 to 1200 PDT) and the second highest concentrations (30.1 $\mu g/m^3$) occurring after midnight (0000 to 0700 PDT). The maximum 24-hour average $PM_{2.5}$ mass concentrations of 38.0 $\mu g/m^3$ was also found at the Yosemite site on August 22, 1990; with the highest diurnal concentration (66.1 $\mu g/m^3$) occurring during the morning (0700 to 1200 PDT) and the second highest concentration (58.7 $\mu g/m^3$) occurring after midnight (0000 to 0700 PDT).

The average $PM_{2.5}$ concentrations were highest (15.7 $\pm$ 9.8 $\mu g/m^3$) at the Yosemite site, which is 40 to 50% higher than the averages at the Tehachapi and Sequoia Lower Keweah sites, and nearly a factor of 2.6 higher than the averages in the Blodgett site.

Organic carbon, elemental carbon, sulfate, nitrate, and ammonium are the major components of $PM_{2.5}$ fraction. The largest variation was found for average PM_{10} organic carbon concentrations. It varied from 0.7 $\pm$ 0.5 $\mu g/m^3$ at the Blodgett site, to 2.1 $\pm$ 2.3 $\mu g/m^3$ at the Tehachapi site, to 5.3 $\pm$ 1.2 $\mu g/m^3$ at the Sequoia Lower Keweah site, and to 11.9 $\pm$ 6.1 $\mu g/m^3$ at the Yosemite site.

Average and maximum $PM_{2.5}$ mass and chemical compositions at the Blodgett site were at least a factor of 2 lower than the other sites. During the study, the maximum 24-hour $PM_{2.5}$ concentrations were found: at the Tehachapi site for nitrate (3.1 $\mu g/m^3$); at the Tehachapi and

Sequoia site for sulfate (3.1 $\mu g/m^3$) and ammonium (1.2 $\mu g/m^3$), and at the Yosemite site for organic carbon (25.8 $\mu g/m^3$) and elemental carbon (3.5 $\mu g/m^3$).

Average sulfur dioxide concentrations varied form 3.5 $\pm$ 1.2 $\mu g/m^3$ at the Tehachapi site, to 3.3 $\pm$ 0.5 $\mu g/m^3$ at the Sequoia Lower Keweah site, to 1.6 $\pm$ 1.2 $\mu g/m^3$ at the Yosemite site, and to 0.34 $\pm$ 0.15 $\mu g/m^3$ at the Blodgett site. Similar trends were found for ammonia at these four sites. While the average ammonia concentrations at the Tehachapi site (3.5 $\pm$ 1.2 $\mu g/m^3$) were similar to the average in the Sequoia Lower Keweah site (3.3 $\pm$ 0.5 $\mu g/m^3$); it is a factor of 2 to 10 higher than the averages found at the Yosemite and Blodgett site. Average nitric acid concentrations also rank highest at the Tehachapi site (4.7 $\pm$ 1.9 $\mu g/m^3$), which was 30% and 60% higher than averages observed at the Yosemite and Sequoia sites, respectively, and a factor of 6 higher than the averages of the Blodgett site.

Formic acid concentrations ranged from approximately 1 ppb to 40 ppb; those of acetic acid ranged from approximately 0.5 ppb to 13 ppb. Mean formic acid concentrations were 18 ppb at Tehachapi and between 12 and 13 ppb at the three other sites. Mean acetic acid concentrations ranged from 3.9 ppb at Blodgett to 8.0 ppb at Yosemite. Formic acid was more abundant at all sites except Yosemite. The August 3 to 6 sampling interval was a period of particularly high carboxylic acid levels throughout the region. The greater diurnal fluctuation of formic acid is reflected in a bimodal appearance of the data, with a lower peak around 9 ppb consisting mainly of nighttime measurements, and a higher peak around 15 ppb consisting mainly of daytime measurements. The acetic acid histogram did not show bimodality.

Comparison of these results with previous studies indicated that carboxylic acid levels measured in the Sierra Nevada are higher than those measured in past studies. In many cases, average concentrations of both formic and acetic acids observed during this study were greater than the maxima observed in other studies.

In relation to levels of strong acids previously measured at Sierra Nevadan sites, organic acids appear to be significant contributors to the overall acidity. Statistical analysis of the data suggests that formic acid and acetic acid levels are influenced by regional emissions possibly coupled to additional local inputs. The contribution of biogenic and local emissions to the observed levels of formic acid and acetic acid needs to be determined and suggests that further work is warranted to better understand the role of organic acids in the atmospheric environment and their effects on the Sierra Nevada.

The high levels of organic acids measured during this program led to questions being raised regarding the current state of sampling and analysis methods for organic acids. How reliable are the existing ambient air and precipitation data? Can existing methods be improved to the point where network monitoring can be introduced? How well can primary and secondary sources of organic acids be identified with the current information base? Based on these questions, a review of the literature was performed to assess the current state of knowledge regarding measurements of organic acids in ambient air.

The results of this review of the literature led to the following general statements:

- Existing data sets for formic and acetic acids in air and precipitation for rural and remote areas vary widely, e.g.; marine boundary layer gaseous formic acid levels at Mauna Loa Observatory in the range of 0.1-1.0 ppbv have been observed, compared with 0.5-3 ppbv in boundary layer measurements in Austria and Germany, 1-10 ppbv in California's South Coast Air Basin, and levels averaging up to nearly 20 ppbv at elevated sites in the Sierra Nevada. This suggests that, in some cases at least, their wet and dry deposition is significant relative to inorganic acids.

- Sampling of common organic acids on alkaline filters, cartridges, denuders, etc. is relatively simple. Preserving the samples until analysis, and demonstrating the absence of interferences for specific acids is still difficult and problematical.

- Analytical methods using ion exchange, ion exclusion, and related chromatographic techniques are well developed, but issues concerning the resolution of common organic acids on existing columns (hence potential interferences) remain.

- Sources of primary emissions of organic acids are still not well characterized in most areas. Mechanisms of secondary acid formation are generally known but not quantified for given atmospheric conditions.

- Improvements in sampling and analysis methods are required before a monitoring network for gaseous- and hydrometeor-phase formic and acetic acids can be established.

The Chemical Mass Balance (CMB) receptor model was applied to this data set to estimate the source contributions to $PM_{2.5}$ using the source profiles identified as follows. No source-specific source profiles were measured for this study.

The potential source types in the study area are: 1) primary geological material; 2) primary motor vehicle exhaust; 3) primary marine aerosol (including NaCl and $NaNO_3$); 4) primary vegetative burning; 5) secondary ammonium sulfate; 6) secondary ammonium nitrate; 7) secondary organic carbon; and 8) regional SJV profiles developed from analysis of SJVAQS/AUSPEX particulate samples.

Contributions to the average apportionments were different for all four sites. Local sources had the greatest impact on Blodgett with primary geological material contributing 28% (1.6 ± 0.7 $\mu g/m^3$) and primary motor vehicles contributing 22% (1.4 ± 0.8 $\mu g/m^3$). Secondary ammonium sulfate contributed 18% (1.2 ± 0.8 $\mu g/m^3$).

Yosemite was dominated by vegetative burning (from both campfires and forest fires). Results from the CMB calculation showed 6.8 ± 9.8 $\mu g/m^3$ (43% of $PM_{2.5}$ mass) vegetative burning for the 24 hr average. Motor vehicles contributed 2.4 ± 1.1 $\mu g/m^3$ (15% of $PM_{2.5}$ mass) during the same period. Primary geological material, secondary organic carbon, and secondary ammonium sulfate are other significant sources, contributing 11% to 14% (1.7 to 2.3 $\mu g/m^3$) of the $PM_{2.5}$ mass.

The mid-valley regional and secondary organic carbon sources are the major contributors at the Sequoia Lower Keweah site, which accounts for 55% of the $PM_{2.5}$ mass. Secondary ammonium sulfate contributed 1.4 ± 0.7 $\mu g/m^3$, primary motor vehicle and vegetative burning both contributed approximately 1 $\mu g/m^3$, whereas primary geological material contributed 0.2 ± 0.4 $\mu g/m^3$, with $PM_{2.5}$ mass being 10.9 $\mu g/m^3$ over the sampling period.

Tehachapi appeared to be impacted by emissions both from the SJV and SoCAB. The lower valley regional profile along with primary motor vehicle exhaust were the major contributors at the Tehachapi site, accounting for 31% and 20% of the $PM_{2.5}$, respectively. Secondary ammonium sulfate contributions are high, and vary from 15 to 25 $\mu g/m^3$ depending on the sampling period and day. Unlike any of the other sites, secondary ammonium nitrate accounted for 8% of the $PM_{2.5}$ mass.

For the PM_{10} averages at Sequoia and Yosemite, the major difference was the increased contribution of primary geological material. This source accounted for 43% of the mass at Sequoia and 40% of the mass at Yosemite.

Spatial and temporal patterns were also evaluated and these patterns were similar to those observed for the twenty four-hr results. Average source contribution estimates of $PM_{2.5}$ were low for all sites, varying from 6.5 $\mu g/m^3$ at Blodgett to 15.8 $\mu g/m^3$ at Yosemite. When the effect of vegetative burning is excluded from Yosemite, this decreases to 9.0 $\mu g/m^3$, a value close to the 10.9 and 10.8 $\mu g/m^3$ results from Sequoia and Tehachapi.

When diurnal patterns were evaluated, the Blodgett, primary motor vehicle and primary geological sources were substantially larger during the day, contributing 30% and 28% vs. 17% and 23%, respectively, consistent with local activity and emissions somewhat proportional to traffic volume and other activity factors. For Sequoia, the major day/night difference was in the contribution of the motor vehicle source. As was observed at Blodgett, this source contribution was greatest during the day time period. Unlike the other sites, the major diurnal change observed at Tehachapi was the increased contribution secondary sulfate and nitrate at night, a pattern is consistent with emissions in nearby regions coupled with transport and transformation to the impacted area. Excluding the contribution of vegetative burning at Yosemite, the impact of local activity on the day/night contributions is observed. Primary motor vehicle and geological sources are greatest during the day time periods.

From the CMB results we can conclude, the major sources of particulates at Blodgett were of local origin (geological and motor vehicle), Yosemite and Sequoia were best described by a regional (SJV) source profile and secondary organic carbon, while Tehachapi was impacted by both regional and local (motor vehicle) sources. The highest loadings occurred at Yosemite during a forest fire and for that sampling period the results were dominated by the vegetative burning contribution.

The data were also analyzed by Principal Components Analysis (PCA) and the Source Apportionment by Factors with Explicit Restrictions (SAFER) multivariate receptor model. The data sets from each of the four sites showed five major principal components; two related to soil dust and wood smoke, and three related to secondary species: sulfate, nitrate, and nitric acid. The SAFER model was then used to determine the range of possible source compositions of the sources of airborne particles. The data set was found to have only three main sources: wood smoke, soil dust, and a source of organic carbon presumably from transport.

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APPENDIX A

SIERRA NEVADA DATA BASE

A.0 SIERRA NEVADA DATA BASES

A.1 Data Base Structures and Features

Fox Pro 2.0 (Fox Software, Inc., 1991), a relational data base management system which is commercially available for implementation on microcomputers, is used to document and compile the measurements. It can handle 256 fields of up to 4,000 characters per record and up to one billion records per file. This system can be implemented on most IBM PC-compatible desk top computers. The data base files (*.DBF) can also be read directly into a variety of popular statistical, plotting, data base, and spreadsheet programs without having to use any specific conversion software.

The structure of each data base file was established by defining the fields for data to be stored. One of five field types -- character, date, numerical, logical, or memo -- can be assigned to each observable. Sampling sites and particle size fractions are defined as "Character" fields, sampling dates are defined as "Date" fields, and measured data are defined as "Numeric" fields. "Logical" fields are used to represent a "yes" or "no" value applied to a variable and "Memo" fields are designed to accommodate large blocks of textual information and can be used to document the data validation processes.

A prefix "PV" is assigned to AUSPEX particulate and visibility data files, and data from the Sierra Nevada Study forms the supplemental data base for AUSPEX. This prefix differentiates these files from other data sets in the SARMAP data base. Each observable is identified by a field name which follows a pattern for that type of observable. For example, in the ambient particle concentration file, the first two characters represent the measurement species (e.g., AL for aluminum, SI for silicon, CA for calcium), the third character designates the analysis method (i.e., "X" for x-ray fluorescence analysis, "I" for ion chromatography, "T" for thermal/optical carbon analysis, "A" for atomic absorption spectrophotometry, "C" for automated colorimetry, "G" for gravimetric weighing, "D" for optical densitometry), and the last character uses a "C" to identify a species concentration or a "U" to identify the uncertainty (i.e., precision) of the corresponding measurement. Each measurement method is associated with a separate validation field to document the sample validity for that method. These flags, as well as the comments, are recorded in a validation flags summary file which accompanies each record.

Data contained in different XBase files can be linked by indexing on and relating to common attributes in each file. Sampling site, sampling hour, sampling period, particle size, and sampling substrate IDs are, in general, the common fields among various data files which can be used to relate data in one file to the corresponding data in another file.

To assemble the final data files, information was merged from many data sets derived from field monitoring and laboratory analyses by relating information on the common fields cited above. Detailed explanations and programming techniques for manipulation of this data base in FoxPro are presented by Christensen *et al.* (1989).

A.2 Data File Descriptions

Table A-1 summarizes the validated data files that constitute the Sierra Nevada aerosol and gaseous data bases. File structures, contents, and current status are detailed in Tables A-2 to A-4 for each file. These tables state the number of records, recent update, missing value codes, and data precisions in each file. The field sequence, field name, data type and format,

Table A-1

Summary of Sierra Nevada Aerosol Data Bases

Category	Data Base File	Data Base Description	Total Number of Records	Reference Table Number
Documentation	PVDATA1.TXT	Ambient data base structure documentation.	NA	NA
I. $PM_{2.5}$, PM_{10}, and Gaseous	PVSFSF3.DBF	Contains $PM_{2.5}$ mass, elements (Al to U), organic and elemental carbon, ions[a], backup nitrate, total (gas + particle) nitrate, nitric acid, ammonia, and sulfur dioxide concentrations.	106	Table A-2
	PVSFSF4.DBF	Contains $PM_{2.5}$ front and backup filters for organic and elemental carbon fraction concentrations.	106	Table A-3
II. Organic Acids	PVSFSF5.DBF	Contains formic and acetic acids analysis from cartridge.	127	Table A-4
III. $PM_{2.5}$ and Gaseous Flags	PVVAL1.DBF	Contains Level II field and laboratory data validation flags and comments for each one of the $PM_{2.5}$ and gaseous samples.	232	Table A-5

[a] Soluble chloride, nitrate, sulfate, sodium, and potassium.

Table A-2

Sierre Nevada Data Base Structure
for $PM_{2.5}$ Mass, Chemical, and Gaseous Concentrations
(File: PVSFSF3.DBF)

Number of data records	:	106
Date of last update	:	2/17/92
Missing value code	:	-99
Precisions	:	Reported with values.

Field	Name	Data Type	Width	Explanation
1	SITE	Character	3	Sampling site: 'BLO' = Blodgett 'TEH' = Tehachapi
2	DATE	Date	8	Measurement date.
3	JDAT	Numeric	3	Julian measurement date: DDD.
4	HR	Numeric	2	Sampling start hour: HH (PDT).
5	MN	Numeric	2	Sample start minute: MM (PDT).
6	SC	Numeric	2	Sample start second: SS (PDT).
7	HE	Numeric	2	Sampling stop hour: HH (PDT).
8	ME	Numeric	2	Sample end minute: MM (PDT).
9	SE	Numeric	2	Sample end second: SS (PDT).
10	SIZE	Character	1	Particle size range: 'F' = fine (0 - 2.5 μm).
11	PER	Numeric	1	Sampling period: '1' = 0001-0700 PDT. '2' = 0701-1200 PDT. '3' = 1201-1700 PDT. '4' = 1701-2400 PDT.
12	MTGC	Numeric	10.4	Mass, $\mu g/m^3$.
13	MTGU	Numeric	10.4	Mass uncertainty, $\mu g/m^3$.
14	CLIC	Numeric	10.4	Soluble chloride, $\mu g/m^3$.
15	CLIU	Numeric	10.4	Soluble chloride uncertainty, $\mu g/m^3$.
16	N3IC	Numeric	10.4	Soluble nitrate, $\mu g/m^3$.
17	N3IU	Numeric	10.4	Soluble nitrate uncertainty, $\mu g/m^3$.
18	S4IC	Numeric	10.4	Soluble sulfate, $\mu g/m^3$.
19	S4IU	Numeric	10.4	Soluble sulfate uncertainty, $\mu g/m^3$.
20	N4CC	Numeric	10.4	Soluble ammonium, $\mu g/m^3$.
21	N4CU	Numeric	10.4	Soluble ammonium uncertainty, $\mu g/m^3$.
22	NAAC	Numeric	10.4	Soluble sodium, $\mu g/m^3$.
23	NAAU	Numeric	10.4	Soluble sodium uncertainty, $\mu g/m^3$.
24	KPAC	Numeric	10.4	Soluble potassium, $\mu g/m^3$.
25	KPAU	Numeric	10.4	Soluble potassium uncertainty, $\mu g/m^3$.
26	OCTC	Numeric	10.4	Organic carbon, $\mu g/m^3$.
27	OCTU	Numeric	10.4	Organic carbon uncertainty, $\mu g/m^3$.
28	ECTC	Numeric	10.4	Elemental carbon, $\mu g/m^3$.
29	ECTU	Numeric	10.4	Elemental carbon uncertainty, $\mu g/m^3$.
30	ALXC	Numeric	10.4	Aluminum, $\mu g/m^3$.
31	ALXU	Numeric	10.4	Aluminum uncertainty, $\mu g/m^3$.
32	SIXC	Numeric	10.4	Silicon, $\mu g/m^3$.
33	SIXU	Numeric	10.4	Silicon uncertainty, $\mu g/m^3$.

Table A-2 (continued)

Sierra Nevada Data Base Structure
for $PM_{2.5}$ Mass, Chemical, and Gaseous Concentrations
(File: PVSFSF3.DBF)

Field	Name	Data Type	Width	Explanation
34	PHXC	Numeric	10.4	Phosphorus, $\mu g/m^3$.
35	PHXU	Numeric	10.4	Phosphorus uncertainty, $\mu g/m^3$.
36	SUXC	Numeric	10.4	Total sulfur, $\mu g/m^3$.
37	SUXU	Numeric	10.4	Total sulfur uncertainty, $\mu g/m^3$.
38	CLXC	Numeric	10.4	Total chlorine, $\mu g/m^3$.
39	CLXU	Numeric	10.4	Total chlorine uncertainty, $\mu g/m^3$.
40	KPXC	Numeric	10.4	Total potassium, $\mu g/m^3$.
41	KPXU	Numeric	10.4	Total potassium uncertainty, $\mu g/m^3$.
42	CAXC	Numeric	10.4	Calcium, $\mu g/m^3$.
43	CAXU	Numeric	10.4	Calcium uncertainty, $\mu g/m^3$.
44	TIXC	Numeric	10.4	Titanium, $\mu g/m^3$.
45	TIXU	Numeric	10.4	Titanium uncertainty, $\mu g/m^3$.
46	VAXC	Numeric	10.4	Vanadium, $\mu g/m^3$.
47	VAXU	Numeric	10.4	Vanadium uncertainty, $\mu g/m^3$.
48	CRXC	Numeric	10.4	Chromium, $\mu g/m^3$.
49	CRXU	Numeric	10.4	Chromium uncertainty, $\mu g/m^3$.
50	MNXC	Numeric	10.4	Manganese, $\mu g/m^3$.
51	MNXU	Numeric	10.4	Manganese uncertainty, $\mu g/m^3$.
52	FEXC	Numeric	10.4	Iron, $\mu g/m^3$.
53	FEXU	Numeric	10.4	Iron uncertainty, $\mu g/m^3$.
54	COXC	Numeric	10.4	Cobalt, $\mu g/m^3$.
55	COXU	Numeric	10.4	Cobalt uncertainty, $\mu g/m^3$.
56	NIXC	Numeric	10.4	Nickel, $\mu g/m^3$.
57	NIXU	Numeric	10.4	Nickel uncertainty, $\mu g/m^3$.
58	CUXC	Numeric	10.4	Copper, $\mu g/m^3$.
59	CUXU	Numeric	10.4	Copper uncertainty, $\mu g/m^3$.
60	ZNXC	Numeric	10.4	Zinc, $\mu g/m^3$.
61	ZNXU	Numeric	10.4	Zinc uncertainty, $\mu g/m^3$.
62	GAXC	Numeric	10.4	Gallium, $\mu g/m^3$.
63	GAXU	Numeric	10.4	Gallium uncertainty, $\mu g/m^3$.
64	ASXC	Numeric	10.4	Arsenic, $\mu g/m^3$.
65	ASXU	Numeric	10.4	Arsenic uncertainty, $\mu g/m^3$.
66	SEXC	Numeric	10.4	Selenium, $\mu g/m^3$.
67	SEXU	Numeric	10.4	Selenium uncertainty, $\mu g/m^3$.
68	BRXC	Numeric	10.4	Bromine, $\mu g/m^3$.
69	BRXU	Numeric	10.4	Bromine uncertainty, $\mu g/m^3$.
70	RBXC	Numeric	10.4	Rubidium, $\mu g/m^3$.
71	RBXU	Numeric	10.4	Rubidium uncertainty, $\mu g/m^3$.
72	SRXC	Numeric	10.4	Strontium, $\mu g/m^3$.
73	SRXU	Numeric	10.4	Strontium uncertainty, $\mu g/m^3$.
74	YTXC	Numeric	10.4	Yttrium, $\mu g/m^3$.
75	YTXU	Numeric	10.4	Yttrium uncertainty, $\mu g/m^3$.
76	ZRXC	Numeric	10.4	Zirconium, $\mu g/m^3$.
77	ZRXU	Numeric	10.4	Zirconium uncertainty, $\mu g/m^3$.

Table A-2 (continued)

Sierra Nevada Data Base Structure
for $PM_{2.5}$ Mass, Chemical, and Gaseous Concentrations
(File: PVSFSF3.DBF)

Field	Name	Data Type	Width	Explanation
78	MOXC	Numeric	10.4	Molybdenum, $\mu g/m^3$.
79	MOXU	Numeric	10.4	Molybdenum uncertainty, $\mu g/m^3$.
80	PDXC	Numeric	10.4	Palladium, $\mu g/m^3$.
81	PDXU	Numeric	10.4	Palladium uncertainty, $\mu g/m^3$.
82	AGXC	Numeric	10.4	Silver, $\mu g/m^3$.
83	AGXU	Numeric	10.4	Silver uncertainty, $\mu g/m^3$.
84	CDXC	Numeric	10.4	Cadmium, $\mu g/m^3$.
85	CDXU	Numeric	10.4	Cadmium uncertainty, $\mu g/m^3$.
86	INXC	Numeric	10.4	Indium, $\mu g/m^3$.
87	INXU	Numeric	10.4	Indium uncertainty, $\mu g/m^3$.
88	SNXC	Numeric	10.4	Tin, $\mu g/m^3$.
89	SNXU	Numeric	10.4	Tin uncertainty, $\mu g/m^3$.
90	SBXC	Numeric	10.4	Antimony, $\mu g/m^3$.
91	SBXU	Numeric	10.4	Antimony uncertainty, $\mu g/m^3$.
92	BAXC	Numeric	10.4	Barium, $\mu g/m^3$.
93	BAXU	Numeric	10.4	Barium uncertainty, $\mu g/m^3$.
94	LAXC	Numeric	10.4	Lanthanum, $\mu g/m^3$.
95	LAXU	Numeric	10.4	Lanthanum uncertainty, $\mu g/m^3$.
96	AUXC	Numeric	10.4	Gold, $\mu g/m^3$.
97	AUXU	Numeric	10.4	Gold uncertainty, $\mu g/m^3$.
98	HGXC	Numeric	10.4	Mercury, $\mu g/m^3$.
99	HGXU	Numeric	10.4	Mercury uncertainty, $\mu g/m^3$.
100	TLXC	Numeric	10.4	Thallium, $\mu g/m^3$.
101	TLXU	Numeric	10.4	Thallium uncertainty, $\mu g/m^3$.
102	PBXC	Numeric	10.4	Lead, $\mu g/m^3$.
103	PBXU	Numeric	10.4	Lead uncertainty, $\mu g/m^3$.
104	URXC	Numeric	10.4	Uranium, $\mu g/m^3$.
105	URXU	Numeric	10.4	Uranium uncertainty, $\mu g/m^3$.
106	SPSUMC	Numeric	10.4	Sum of chemical species including all chemical species except soluble chloride, soluble potassium, and total sulfur, $\mu g/m^3$.
107	SPSUMU	Numeric	10.4	Sum of chemical species uncertainty, $\mu g/m^3$.
108	BKN3IC	Numeric	10.4	$PM_{2.5}$ nylon backup nitrate (volatilized nitrate), $\mu g/m^3$.
109	BKN3IU	Numeric	10.4	$PM_{2.5}$ nylon backup nitrate uncertainty, $\mu g/m^3$.
110	GSN3IC	Numeric	10.4	Gas sampler, total nitrate (nitric acid plus particulate nitrate), $\mu g/m^3$.
111	GSN3IU	Numeric	10.4	Gas sampler, total nitrate uncertainty, $\mu g/m^3$.
112	HNDDGC	Numeric	10.4	Nitric acid by denuder difference [total nitrate (GSN3IC) minus the sum of nitrate (N3IC) and volatilized nitrate (BKN3IC)]*1.016129, $\mu g/m^3$.
113	HNDDGU	Numeric	10.4	Nitric acid (HNO_3) by denuder difference uncertainty, $\mu g/m^3$.
114	GSS4IC	Numeric	10.4	Sulfur dioxide, $\mu g/m^3$.
115	GSS4IU	Numeric	10.4	Sulfur dioxide uncertainty, $\mu g/m^3$.
116	GSN4CC	Numeric	10.4	Ammonia, $\mu g/m^3$.

Table A-2 (continued)

Sierra Nevada Data Base Structure
for $PM_{2.5}$ Mass, Chemical, and Gaseous Concentrations
(File: PVSFSF3.DBF)

Field	Name	Data Type	Width	Explanation
117	GSN4CU	Numeric	10.4	Ammonia uncertainty, $\mu g/m^3$.
118	BTDC	Numeric	10.4	babs, Mm^{-1}.
119	BTDU	Numeric	10.4	babs uncertainty, Mm^{-1}.
120	FTVOC	Numeric	10.4	Volume of air sampled through $PM_{2.5}$ Teflon Substrate.
121	FQVOC	Numeric	10.4	Volume of air sampled through $PM_{2.5}$ Quartz Substrate.
122	GTVOC	Numeric	10.4	Volume of air sampled through Gaseous Teflon Substrate.
123	GQVOC	Numeric	10.4	Volume of air sampled through Gaseous Quartz Substrate.
124	VFLAG	Character	2	Level II validation flag: 'blank' = valid, 'S1' = suspect, 'S2' = highly suspect, 'V' = void.

Table A-3

Sierra Nevada Data Base Structure
for Front and Backup $PM_{2.5}$ Quartz Filter Carbon Fraction Concentrations
(File: PVSFSF4.DBF)

Number of data records	:	106
Date of last update	:	2/17/93
Missing value code	:	-99
Precisions	:	Reported with values.

Field	Name	Data Type	Width	Explanation
1	SITE	Character	3	Sampling site: 'BLO' = Blodgett 'TEH' = Tehachapi
2	DATE	Date	8	Measurement date.
3	JDAT	Numeric	3	Julian measurement date: DDD.
4	HR	Numeric	2	Sampling start hour: HH (PDT).
5	MN	Numeric	2	Sample start minute: MM (PDT).
6	SC	Numeric	2	Sample start second: SS (PDT).
7	HE	Numeric	2	Sampling stop hour: HH (PDT).
8	ME	Numeric	2	Sample end minute: MM (PDT).
9	SE	Numeric	2	Sample end second: SS (PDT).
10	SIZE	Character	1	Particle size range: 'F' = fine (0 - 2.5 μm).
11	PER	Numeric	1	Sampling period: '1' = 0001-0700 PDT. '2' = 0701-1200 PDT. '3' = 1201-1700 PDT. '4' = 1701-2400 PDT.
12	OCTC	Numeric	10.4	Organic carbon, $\mu g/m^3$.
13	OCTU	Numeric	10.4	Organic carbon uncertainty, $\mu g/m^3$.
14	O1TC	Numeric	10.4	Organic carbon evolved between ambient and 120°C (fraction 1), $\mu g/m^3$.
15	O1TU	Numeric	10.4	Organic carbon evolved between ambient and 120°C (fraction 1) uncertainty, $\mu g/m^3$.
16	O2TC	Numeric	10.4	Organic carbon evolved between 120°C and 250°C (fraction 2), $\mu g/m^3$.
17	O2TU	Numeric	10.4	Organic carbon evolved between 120°C and 250°C (fraction 2) uncertainty, $\mu g/m^3$.
18	O3TC	Numeric	10.4	Organic carbon evolved between 250°C and 450°C (fraction 3), $\mu g/m^3$.
19	O3TU	Numeric	10.4	Organic carbon evolved between 250°C and 450°C (fraction 3) uncertainty, $\mu g/m^3$.
20	O4TC	Numeric	10.4	Organic carbon evolved between 450°C and 550°C (fraction 4), $\mu g/m^3$.
21	O4TU	Numeric	10.4	Organic carbon evolved between 450°C and 550°C (fraction 4) uncertainty, $\mu g/m^3$.
22	OPTC	Numeric	10.4	Pyrolized organic carbon, $\mu g/m^3$.
23	OPTU	Numeric	10.4	Pyrolized organic carbon uncertainty, $\mu g/m^3$.
24	ECTC	Numeric	10.4	Elemental carbon, $\mu g/m^3$.
25	ECTU	Numeric	10.4	Elemental carbon uncertainty, $\mu g/m^3$.

Table A-3 (continued)

Sierra Nevada Data Base Structure
for Front and Backup $PM_{2.5}$ Quartz Filter Carbon Fraction Concentrations
(File: PVSFSF4.DBF)

Field	Name	Data Type	Width	Explanation
26	E1TC	Numeric	10.4	Elemental carbon evolved at 550°C (fraction 1), $\mu g/m^3$.
27	E1TU	Numeric	10.4	Elemental carbon evolved at 550°C (fraction 1) uncertainty, $\mu g/m^3$.
28	E2TC	Numeric	10.4	Elemental carbon evolved between 550°C and 700°C (fraction 2), $\mu g/m^3$.
29	E2TU	Numeric	10.4	Elemental carbon evolved between 550°C and 700°C (fraction 2) uncertainty, $\mu g/m^3$.
30	E3TC	Numeric	10.4	Elemental carbon evolved between 700°C and 800°C (fraction 3), $\mu g/m^3$.
31	E3TU	Numeric	10.4	Elemental carbon evolved between 700°C and 800°C (fraction 3) uncertainty, $\mu g/m^3$.
32	BKOCTC	Numeric	10.4	Backup organic carbon, $\mu g/m^3$.
33	BKOCTU	Numeric	10.4	Backup organic carbon uncertainty, $\mu g/m^3$.
34	BKO1TC	Numeric	10.4	Backup organic carbon evolved between ambient and 120°C (fraction 1), $\mu g/m^3$.
35	BKO1TU	Numeric	10.4	Backup organic carbon evolved between ambient and 120°C (fraction 1) uncertainty, $\mu g/m^3$.
36	BKO2TC	Numeric	10.4	Backup organic carbon evolved between 120°C and 250°C (fraction 2), $\mu g/m^3$.
37	BKO2TU	Numeric	10.4	Backup organic carbon evolved between 120°C and 250°C (fraction 2) uncertainty, $\mu g/m^3$.
38	BKO3TC	Numeric	10.4	Backup organic carbon evolved between 250°C and 450°C (fraction 3), $\mu g/m^3$.
39	BKO3TU	Numeric	10.4	Backup organic carbon evolved between 250°C and 450°C (fraction 3) uncertainty, $\mu g/m^3$.
40	BKO4TC	Numeric	10.4	Backup organic carbon evolved between 450°C and 550°C (fraction 4), $\mu g/m^3$.
41	BKO4TU	Numeric	10.4	Backup organic carbon evolved between 450°C and 550°C (fraction 4) uncertainty, $\mu g/m^3$.
42	BKOPTC	Numeric	10.4	Pyrolized backup organic carbon, $\mu g/m^3$.
43	BKOPTU	Numeric	10.4	Pyrolized backup organic carbon uncertainty, $\mu g/m^3$.
44	BKECTC	Numeric	10.4	Backup elemental carbon, $\mu g/m^3$.
45	BKECTU	Numeric	10.4	Backup elemental carbon uncertainty, $\mu g/m^3$.
46	BKE1TC	Numeric	10.4	Backup elemental carbon evolved at 550°C (fraction 1), $\mu g/m^3$.
47	BKE1TU	Numeric	10.4	Backup elemental carbon evolved at 550°C (fraction 1) uncertainty, $\mu g/m^3$.
48	BKE2TC	Numeric	10.4	Backup elemental carbon evolved between 550°C and 700°C (fraction 2), $\mu g/m^3$.
49	BKE2TU	Numeric	10.4	Backup elemental carbon evolved between 550°C and 700°C (fraction 2) uncertainty, $\mu g/m^3$.

Table A-3 (continued)

Sierra Nevada Data Base Structure
for Front and Backup $PM_{2.5}$ Quartz Filter Carbon Fraction Concentrations
(File: PVSFSF4.DBF)

Field	Name	Data Type	Width	Explanation
50	BKE3TC	Numeric	10.4	Backup elemental carbon evolved between 700°C and 800°C (fraction 3), $\mu g/m^3$.
51	BKE3TU	Numeric	10.4	Backup elemental carbon evolved between 700°C and 800°C (fraction 3) uncertainty, $\mu g/m^3$.
52	VFLAG	Character	2	Level II validation flag: 'blank' = valid, 'S1' = suspect, 'S2' = highly suspect, 'V' = void.

Table A-4

Sierra Nevada Data Base Structure
for Organic Acids Concentrations
(File: PVSFSF5.DBF)

Number of data records	:	127
Date of last update	:	2/20/93
Missing value code	:	-99
Precisions	:	Reported with values.

Field	Name	Data Type	Width	Explanation
1	SITE	Character	3	Sampling site: 'BLO' = Blodgett 'TEH' = Tehachapi 'SLK' = Sequoia Lower Keweah 'YOS' = Yosemite
2	DATE	Date	8	Measurement date.
3	JDAT	Numeric	3	Julian measurement date: DDD.
4	HR	Numeric	2	Sampling start hour: HH (PDT).
5	MN	Numeric	2	Sample start minute: MM (PDT).
6	SC	Numeric	2	Sample start second: SS (PDT).
7	HE	Numeric	2	Sampling stop hour: HH (PDT).
8	ME	Numeric	2	Sample end minute: MM (PDT).
9	SE	Numeric	2	Sample end second: SS (PDT).
10	SIZE	Character	1	Particle size range: 'F' = fine (0 - 2.5 μm).
11	PER	Numeric	1	Sampling period: '1' = 0001-0700 PDT. '2' = 0701-1200 PDT. '3' = 1201-1700 PDT. '4' = 1701-2400 PDT.
12	FOHC	Numeric	10	Formic acid, ppm
13	FOHU	Numeric	10	Formic acid uncertainty, ppm
14	ACHC	Numeric	10	Acetic acid, ppm
15	ACHU	Numeric	10	Acetic acid uncertainty, ppm
16	VFLAG	Character	2	Level II validation flag: 'blank' = valid, 'SI' = suspect, 'S2' = highly suspect, 'V' = void

Table A-5

Sierra Nevada Data Base Structure for $PM_{2.5}$, PM_{10}, and Gaseous Validation Flags (File: PVVAL1.DBF)

Number of data records	:	232
Date of last update	:	2/23/93
Missing value code	:	-99
Precisions	:	Reported with values.

Field	Name	Data Type	Width	Explanation
1	SITE	Character	3	Sampling site: 'BLO' = Blodgett 'TEH' = Tehachapi 'SLK' = Sequoia Lower Keweah. 'YOS' = Yosemite.
2	DATE	Date	8	Measurement date.
3	JDAT	Numeric	3	Julian measurement date: DDD.
4	HR	Numeric	2	Sampling start hour: HH (PDT).
5	MN	Numeric	2	Sample start minute: MM (PDT).
6	SC	Numeric	2	Sample start second: SS (PDT).
7	HE	Numeric	2	Sampling stop hour: HH (PDT).
8	ME	Numeric	2	Sample end minute: MM (PDT).
9	SE	Numeric	2	Sample end second: SS (PDT).
10	SIZE	Character	1	Particle size range: 'F' = fine (0 - 2.5 μm), 'G' = gas sampler (0 - 2.5 μm, 'T' = PM_{10} (0 - 10 μm).
11	PER	Numeric	1	Sampling period: '1' = 0001-0700 PDT. '2' = 0701-1200 PDT. '3' = 1201-1700 PDT. '4' = 1701-2400 PDT.
12	DURATION	Numeric	8.1	Sample duration (minutes).
13	TID	Character	10	Identification code for Teflon sampling substrate.
14	QID	Character	10	Identification code for quartz sampling substrate.
15	TVOC	Numeric	7.3	Volume of air sampled through Teflon substrate, m^3.
16	TVOU	Numeric	7.3	Uncertainty of air volume sampled through Teflon substrate, m^3.
17	QVOC	Numeric	7.3	Volume of air sampled through quartz substrate, m^3.
18	QVOU	Numeric	7.3	Uncertainty of air sampled through quartz substrate, m^3.
19	TFFLG	Character	10	Field validation flags for Teflon sample.
20	QFFLG	Character	10	Field validation flags for quartz sample.
21	MTGF	Character	10	Lab validation flags for gravimetric analysis.
22	ANIF	Character	10	Lab validation flags for anion chromatography analysis for chloride, nitrate and sulfate.

Table A-5 (continued)

Sierra Nevada Data Base Structure
for $PM_{2.5}$, PM_{10}, and Gaseous Validation Flags
(File: PVVAL1.DBF)

Field	Name	Data Type	Width	Explanation
23	N4CF	Character	10	Lab validation flags for automated colorimetry analysis for ammonium.
24	NAAF	Character	10	Lab validation flags for atomic absorption spectrophotometry analysis for soluble sodium.
25	KPAF	Character	10	Lab validation flags for atomic absorption spectrophotometry analysis for soluble potassium.
26	OETF	Character	10	Lab validation flags for thermal/optical reflectance carbon analysis.
27	ELXF	Character	10	Lab validation flags for x-ray fluorescence analysis.
28	BKN3IF	Character	10	Lab validation flags for anion chromatography analysis for backup nylon nitrate.
29	BKEOTF	Character	10	Lab validation flags for thermal/optical reflectance for quartz backup carbon analysis.
30	GSN3IF	Character	10	Lab validation flags for anion chromatography analysis for quartz/nylon total nitrate.
31	GSS4IF	Character	10	Lab validation flags for anion chromatography analysis for gaseous sulfur dioxide.
32	GSN4CF	Character	10	Lab validation flags for automated colorimetry analysis for gaseous ammonia.
33	COMMENTS	Character	240	Validation notes

Table A-6

Sierra Nevada Ambient Field Sampling Data Validation Flags[a]

Validation Flag	Sub Flag	Description
A		Sampler adjustment or maintenance.
	A1	Sampler audit during sample period.
	A2	Sampler cleaned.
	A3	Particle size cut device regreased or replaced.
B		Field Blank.
D		Sample dropped.
	D1	Sample dropped after sampling.
	D2	Filter dropped during unloading.
F		Filter damaged or ripped.
	F1	Filter damaged in the field.
	F2	Filter damaged when removed from holder.
	F3	Filter wrinkled.
	F4	Filter torn due to over-tightened filter holder.
	F5	Teflon membrane separated from support ring.
	F6	Pinholes in filter.
G		Filter deposit damaged.
	G1	Deposit scratched or scraped, causing a thin line in the deposit.
	G2	Deposit smudged, causing a large area of deposit to be displaced.
	G3	Filter returned to lab with deposit side down in PetriSlide.
	G4	Evidence that part of deposit has fallen off filter.
	G5	Finger touched filter in the field (without gloves).
	G6	Finger touched filter in the lab (with gloves).
H		Filter holder assembly problem.
	H1	Filter misaligned in holder - possible air leak.
	H2	Filter holder loose in sampler - possible air leak.
	H3	Filter holder not tightened sufficiently - possible air leak.
	H4	Filter support grid upside down.
I		Inhomogeneous filter deposit.
	I1	Evidence of impaction - deposit heavier in center of filter.
	I2	Random areas of darker or lighter deposit on filter.
	I3	Light colored deposit with dark specks.
	I4	Non-uniform deposit near edge - possible air leak.
	I5	Discoloration on sample.
J		Filter misaligned, possible leakage.

Table A-6 (continued)

Sierra Nevada Ambient Field Sampling Data Validation Flags[a]

Validation Flag	Sub Flag	Description
K		(reserved)
L		(reserved)
M		Sampler malfunction.
	M1	Dichotomous sampler assembled with virtual impactor 180° out of phase; only PM_{10} data reported.
N		Foreign substance on deposit.
	N1	Insects on deposit, removed before analysis.
	N2	Particles on deposit much larger than inlet device allows.
	N3	Metallic particles observed on deposit.
O		Sampler operation error.
	O1	Pump was not switched on after changing samples.
	O2	Timer set incorrectly.
	O3	Filter loaded in wrong port.
P		Power failure during sampling.
Q		Flow rate error.
	Q1	Initial or final flow rate differed from nominal by > ±10%.
	Q2	Final flow rate differed from initial by > ±10%.
	Q3	Initial or final flow rate not recorded, used estimated flow rate.
	Q4	Nominal flow rate assumed.
	Q5	Initial flow readjusted prior to sampling.
	Q6	Initial flow exceeded ±15% of nominal flow.
R		Replacement filter used.
	R1	Filter that failed flow rate or QC checks replaced with spare.
	R2	Filter sampling sequence changed from order designated on field data sheet.
S		
	S1	Sample "suspect", but not invalid.
	S2	Sample "suspect"; care should be taken when using data for statistical or modeling analysisi.

Table A-6 (continued)

Sierra Nevada Ambient Field Sampling Data Validation Flags[a]

Validation Flag	Sub Flag	Description
T		Sampling time error.
	T1	Sampling duration error of > ±10%.
	T2	Sample start time error of > ±10% of sample duration.
	T3	Elapsed time meter reading not recorded or recorded incorrectly. Sample duration estimated based on readings from previous or subsequent sample.
	T4	Nominal sample duration assumed.
	T5	Sample ran during prescribed period, plus part of next period.
	T6	More than one sample was run to account for the prescribed period.
U		Unusual local particulate sources during sample period.
	U1	Local construction activity.
	U2	Forest fire or slash or field burning.
V		Void sample, Invalid.
W		Wet Sample.
X		No sample was taken this period, sample run was skipped.
Y		(reserved)
Z		
	Z1	Teflon and quartz filters were loaded reversely in SFS.
	Z2	$PM_{2.5}$ and PM_{10} filter pack switched.
	Z3	Fine and Coarse filters were loaded reversely in dichotomous sampler.

[a] Flagged samples are categorized as valid, suspect, or invalid. Any flags except 'S1', 'S2' and 'V' or no flags at all indicate valid samples. The 'S1' or 'S2' flag in combination with any other flags indicates samples of suspect validity. The 'V' flag in combination with any other flags indicates invalid samples. Notes from Field Data Sheets not covered by the flags are recorded in the memo field of the database.

Table A-7

Sierra Nevada Chemical Analysis Data Validation Flags

Validation Flag	Sub Flag	Description
a		(reserved)
b		blanks.
	b0	unspecified field blank.
	b1	field/dynamic blank.
	b2	laboratory control blank.
	b3	distilled-deionized water blank.
	b4	method blank.
	b5	extract/solution blank.
	b6	transport blank
c		sample spectrum being reprocessed or recalculated.
	c1	carbon run recalculated.
	c2	ion run reprocessed due to integration failure.
	c3	ion run recalculated with high concentration range calibration curve.
	c4	average of several replicate runs.
	c5	ion analyses were performed with high concentration range calibration curve.
	c6	XRF spectrum reprocessed using manually adjusted background.
d		data point deleted from main data base.
e		use of IC filter in ion analyses.
	e1	extract analyzed with IC filter.
	e2	extract analyzed without IC filter.
f		filter damaged.
	f1	filter damaged, outside of analysis area.
	f2	filter damaged, within analysis area.
	f3	Teflon membrane substrate separated from the ring.
	f4	filter deposit side facing down in Petri slides.
	f5	filter dropped during handling.
	f6	filter stuck to Petri slide.
g		(reserved)

Table A-7 (continued)

Sierra Nevada Chemical Analysis Data Validation Flags

Validation Flag	Sub Flag	Description
h		(reserved)
i		abnormal sample deposit.
	i1	inhomogeneous sample deposit.
	i2	deposit smeared or scraped after sampling.
	i3	deposit appears to have fallen off.
	i4	abnormal deposit area, possible air leakage during sampling
	i5	non-white carbon punch after carbon analysis.
	i6	large particles on fine particle sample.
	i7	particles on filter holder.
	i8	visible deposition on the back of the filter.
	i9	deposit trapped between layers of filters; layers separated prior to chemical analysis.
j		abnormal deposit area, possible leakage during sampling.
k		(reserved)
l		analysis value lower than minimal detection limit.
m		(reserved)
n		various dilution factors used in ion analyses.
	n0	1:10 dilution was made on sample extract.
	n1	1:20 dilution was made on sample extract.
	n2	1:2 dilution was made on sample extract.
	n3	1:3 dilution was made on sample extract.
	n4	1:4 dilution was made on sample extract.
	n5	1:5 dilution was made on sample extract.
	n6	1:100 dilution was made on sample extract.
	n7	1:50 dilution was made on sample extract.
	n8	1:110 dilution was made on sample extract.
	n9	1:21 dilution was made on sample extract.
	n10	1:11 dilution was made on sample extract.
o		(reserved)
p		(reserved)

Table A-7 (continued)

Sierra Nevada Chemical Analysis Data Validation Flags

Validation Flag	Sub Flag	Description
q		quality control standards.
	q1	routine quality control standard.
	q2	Environmental Resources Associates (ERA) quality control standard.
	q3	(NBS) simulated rainwater standard.
	q4	calibration standard.
r		replicate analysis
	r1	first replicate analysis on the same analyer.
	r2	second replicate analysis on the same analyzer.
	r3	third replicate analysis on the same analyzer.
	r4	sample rerun, replaced with new value.
	r5	replicate on different analyzer.
	r6	re-extraction was made for sample rerun.
	r7	Sample rerun, no improvement, used old value.
	r8	Sample rerun, no change, replaced with the averaged value.
s		suspect of sample validity.
t		(reserved)
u		(reserved)
v		void sample.
	v1	sample void due to quality control standard check exceeded $\pm 10\%$ of specified concentration range.
	v2	sample void due to replicate analysis exceeded $\pm 10\%$ of specified concentration range.
	v3	sample void due to potential contamination.
	v4	fine concentration statistically greater than the total.
	v5	concentration out of expected range.

Table A-7 (continued)

Sierra Nevada Chemical Analysis Data Validation Flags

Validation Flag	Sub Flag	Description
w		
	w1	Pre-weight is questionable.
	w2	Post-weight is questionable.
	w3	Reweighed at Level I validation without corrections (within ±15 μg/filter).
	w4	Reweighed at Level I validation with corrections (exceeded ±15 μg/filter)
	w5	Pre-weight checked.
	w6	Pre-weight changed.
x		Filter missing.
y		(reserved)
z		(reserved)

and description of each field name are also documented. Data flags document the data validation process. Table A-5 summarizes the field and laboratory validation flags, whereas Tables A-6 and A-7 interpret the field sampling and chemical analysis data validation flags respectively, for the aerosol and gaseous measurements. The individual flags appear in the field to which they apply.

Copies of these data base structures and their definitions for filter-based measurements are contained in the data documentation file entitled PVDATA1.TXT. These documentation files are updated when changes are made in the data base. Users should review the current documentation on the set of disks containing the data base since this documentation may differ from the tables presented here.

A.3 Ambient Mass and Chemical Data

A.3.1 $PM_{2.5}$, PM_{10}, and Gaseous Data

Four files are included in the mass and chemical concentration data bases:

- Ambient $PM_{2.5}$ particle mass, chemical speciation, and gaseous data are in the file PVSFSF3.DBF.
- Ambient $PM_{2.5}$ carbon fraction data are in the file PVSFS4.DBF.

The PVSFSF3.DBF file summarizes the diurnal (0001 to 0700, 0701 to 1200, 1201 to 1700, 1701 to 2400 PST) $PM_{2.5}$ particle mass concentrations and their propagated uncertainties between 07/13/90 and 08/24/90 for Blodgett and Tehachapi sites. Data bases from Sequoia Lower Keweah and Yosemite are documented in Chow *et al.* (1993) as part of the AUSPEX aerosol data bases. Samples were collected with the Sequential Filter Samplers (SFSs). The data base structure is described in Table A-2.

Comprehensive chemical analyses for light absorption, 38 elements from aluminum (Al) to uranium (U), chloride (Cl^-), nitrate (NO_3^-), sulfate ($SO_4^=$), ammonium (NH_4^+), soluble sodium (Na^+), soluble potassium (K^+), organic carbon (OC), and elemental carbon (EC), were performed on all samples. Gaseous measurements for nitric acid (HNO_3), sulfur dioxide (SO_2), and ammonia (NH_3) are included in this table.

A.3.2 Carbon Fraction Data

Carbon analysis from this study uses the Thermal/Optical Reflectance (TOR) method. This method measures carbon which exits the particle phase under different temperature and oxidation conditions. Non-light-absorbing carbon fractions are defined as organic carbon (OC) and light-absorbing carbon fractions are defined as elemental carbon (EC) (Chow *et al.*, 1992c). Only the OC and EC fractions are reported in ambient $PM_{2.5}$ file (i.e., PVSFSF3.DBF). These carbon fractions are useful for comparison with other carbon analysis methods. Seven carbon fractions are presented in files PVSFSF4.DBF for $PM_{2.5}$ carbon fractions with the file contents explained in Table A-3. They are:

- Carbon evolved in a helium atmosphere at temperatures between ambient and 120 °C (OC1).
- Carbon evolved in a helium atmosphere at temperatures between 120 °C and 250 °C (OC2).
- Carbon evolved in a helium atmosphere at temperatures between 250 °C and 450 °C (OC3).
- Carbon evolved in a helium atmosphere at temperatures between 450 °C and 550 °C (OC4).
- Carbon evolved in an oxidizing atmosphere at 550 °C (EC1).

- Carbon evolved in an oxidizing atmosphere between 550 °C and 700 °C (EC2).

- Carbon evolved in an oxidizing atmosphere between at 700 °C and 800°C (EC3).

A.4 Organic Acids Data

The PVSFSF5.DBF file summarizes the diurnal (0001 to 0700, 0701 to 1200, 1201 to 1700, 1701 to 2400) formic and acetic acids measurements and their propagated uncertainties between 07/13/90 and 08/24/90 for Blodgett, Tehachapi, Sequoia Lower Keweah, and Yosemite sites.

APPENDIX B

SUMMARY OF SIERRA NEVADA $PM_{2.5}$ AND PM_{10} SOURCE CONTRIBUTION ESTIMATES

Table B-1

Individual Source Contributions to $PM_{2.5}$ Mass at Blodgett, Yosemite, Sequoia, and Tehachapi Between 7/13/90 to 8/24/90

Site[a]	Date/Time[b]		Primary Geological SCE ± σ (μg/m³)	Regional Transport SCE ± σ (μg/m³)	Primary Motor Veh. Exhaust SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Sulfate SCE ± σ (μg/m³)	Secondary Nitrate SCE ± σ (μg/m³)	Secondary OC SCE ± σ (μg/m³)	Marine Aerosol SCE ± σ (μg/m³)	Calculated Mass ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Unexplained Mass ± σ (μg/m³)
BLO	07/13/90	17	1.30 ± 0.14	0.00 ± 0.00	1.43 ± 0.94	1.32 ± 0.62	0.99 ± 0.19	0.00 ± 0.00	0.00 ± 0.00	0.56 ± 0.27	5.60 ± 1.18	5.59 ± 1.12	-0.01 ± 1.63
BLO	07/14/90	00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 1.10	0.00 ± 0.00
BLO	07/14/90	07	0.40 ± 0.10	0.00 ± 0.00	0.76 ± 0.86	0.62 ± 0.71	0.37 ± 0.20	0.00 ± 0.00	0.00 ± 0.00	0.33 ± 0.19	2.48 ± 1.15	3.91 ± 1.70	1.43 ± 2.05
BLO	07/14/90	12	0.49 ± 0.13	0.00 ± 0.00	2.26 ± 1.15	0.60 ± 0.67	0.27 ± 0.23	0.00 ± 0.00	0.00 ± 0.00	0.06 ± 0.38	3.68 ± 1.41	3.16 ± 1.54	-0.52 ± 2.09
BLO	07/14/90	17	0.70 ± 0.11	0.00 ± 0.00	1.90 ± 0.92	0.37 ± 0.48	0.38 ± 0.18	0.00 ± 0.00	0.00 ± 0.00	0.22 ± 0.31	3.57 ± 1.10	5.13 ± 1.13	1.56 ± 1.58
BLO	07/21/90	00	0.50 ± 0.08	0.00 ± 0.00	0.50 ± 0.64	0.53 ± 0.48	0.32 ± 0.14	0.00 ± 0.00	0.00 ± 0.00	0.03 ± 0.13	1.88 ± 0.83	2.05 ± 1.10	0.17 ± 1.38
BLO	07/21/90	07	0.37 ± 0.09	0.00 ± 0.00	0.60 ± 0.76	0.57 ± 0.64	0.12 ± 0.17	0.00 ± 0.00	0.00 ± 0.00	0.32 ± 0.17	1.98 ± 1.03	0.67 ± 1.52	-1.31 ± 1.84
BLO	07/21/90	12	0.71 ± 0.13	0.00 ± 0.00	1.98 ± 1.11	0.73 ± 0.68	0.16 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	0.26 ± 0.34	3.84 ± 1.37	2.52 ± 1.56	-1.32 ± 2.08
BLO	07/21/90	17	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 1.10	0.00 ± 0.00
BLO	07/22/90	00	0.70 ± 0.07	0.00 ± 0.00	0.00 ± 0.00	0.89 ± 0.51	0.41 ± 0.11	0.14 ± 0.05	0.00 ± 0.00	0.00 ± 0.00	2.14 ± 0.53	3.94 ± 1.12	1.80 ± 1.24
BLO	07/22/90	07	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 1.54	0.00 ± 0.00
BLO	07/22/90	12	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 1.53	0.00 ± 0.00
BLO	07/22/90	17	1.13 ± 0.12	0.00 ± 0.00	1.24 ± 0.71	0.19 ± 0.47	0.68 ± 0.16	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	3.24 ± 0.87	2.15 ± 1.11	-1.09 ± 1.41
BLO	07/27/90	00	0.58 ± 0.09	0.00 ± 0.00	1.21 ± 0.76	0.00 ± 0.00	1.13 ± 0.18	0.00 ± 0.00	0.00 ± 0.00	0.35 ± 0.22	3.27 ± 0.82	2.15 ± 1.09	-1.12 ± 1.36
BLO	07/27/90	07	1.03 ± 0.15	0.00 ± 0.00	2.40 ± 1.23	0.83 ± 0.71	0.81 ± 0.25	0.00 ± 0.00	0.00 ± 0.00	0.08 ± 0.40	5.15 ± 1.50	5.58 ± 1.60	0.43 ± 2.19
BLO	07/27/90	12	1.62 ± 0.18	0.00 ± 0.00	1.60 ± 1.22	1.20 ± 0.75	1.32 ± 0.25	0.00 ± 0.00	0.00 ± 0.00	0.17 ± 0.31	5.91 ± 1.50	4.84 ± 1.55	-1.07 ± 2.16
BLO	07/27/90	17	1.86 ± 0.20	0.00 ± 0.00	0.00 ± 0.00	1.60 ± 0.64	1.43 ± 0.15	0.00 ± 0.00	0.00 ± 0.00	0.29 ± 0.06	5.18 ± 0.69	10.14 ± 1.21	4.96 ± 1.39
BLO	07/28/90	00	0.62 ± 0.10	0.00 ± 0.00	1.71 ± 0.85	0.00 ± 0.00	1.91 ± 0.23	0.00 ± 0.00	0.00 ± 0.00	0.60 ± 0.30	4.84 ± 0.94	6.76 ± 1.17	1.92 ± 1.50
BLO	07/28/90	07	1.04 ± 0.11	0.00 ± 0.00	0.00 ± 0.00	1.29 ± 0.72	1.55 ± 0.19	0.00 ± 0.00	0.00 ± 0.00	0.47 ± 0.09	4.35 ± 0.76	6.35 ± 1.57	2.00 ± 1.74
BLO	07/28/90	12	1.25 ± 0.16	0.00 ± 0.00	0.00 ± 0.00	1.44 ± 0.75	1.91 ± 0.21	0.00 ± 0.00	0.00 ± 0.00	0.40 ± 0.09	5.00 ± 0.80	5.51 ± 1.53	0.51 ± 1.73
BLO	07/28/90	17	1.70 ± 0.17	0.00 ± 0.00	1.75 ± 0.96	0.00 ± 0.00	2.22 ± 0.26	0.00 ± 0.00	0.00 ± 0.00	0.48 ± 0.31	6.15 ± 1.06	8.20 ± 1.17	2.05 ± 1.58
BLO	07/29/90	00	0.57 ± 0.11	0.00 ± 0.00	1.94 ± 0.86	0.00 ± 0.00	2.41 ± 0.26	0.00 ± 0.00	0.00 ± 0.00	0.28 ± 0.32	5.20 ± 0.96	6.95 ± 1.11	1.75 ± 1.47
BLO	07/29/90	07	1.37 ± 0.15	0.00 ± 0.00	1.18 ± 1.15	1.25 ± 0.74	1.94 ± 0.26	0.00 ± 0.00	0.00 ± 0.00	0.18 ± 0.26	5.92 ± 1.42	5.44 ± 1.52	-0.48 ± 2.08
BLO	07/29/90	12	1.26 ± 0.16	0.00 ± 0.00	2.00 ± 1.18	0.00 ± 0.00	2.08 ± 0.29	0.00 ± 0.00	0.00 ± 0.00	0.09 ± 0.35	5.43 ± 1.27	9.52 ± 1.60	4.09 ± 2.04
BLO	07/29/90	17	6.93 ± 0.50	0.00 ± 0.00	2.74 ± 1.16	0.00 ± 0.00	1.13 ± 0.23	0.00 ± 0.00	0.00 ± 0.00	0.07 ± 0.45	10.87 ± 1.36	23.92 ± 1.61	13.05 ± 2.11
BLO	08/03/90	00	1.90 ± 0.16	0.00 ± 0.00	0.00 ± 0.00	1.85 ± 0.68	1.36 ± 0.15	0.00 ± 0.00	0.00 ± 0.00	0.40 ± 0.08	5.51 ± 0.72	8.50 ± 1.14	2.99 ± 1.35
BLO	08/03/90	07	1.31 ± 0.13	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	1.23 ± 0.18	0.00 ± 0.00	0.00 ± 0.00	0.29 ± 0.08	2.83 ± 0.24	2.35 ± 1.54	-0.48 ± 1.56
BLO	08/03/90	12	1.03 ± 0.18	0.00 ± 0.00	3.57 ± 1.36	0.00 ± 0.00	1.81 ± 0.31	0.00 ± 0.00	0.00 ± 0.00	0.22 ± 0.56	6.63 ± 1.51	4.18 ± 1.55	-2.45 ± 2.16
BLO	08/03/90	17	2.01 ± 0.21	0.00 ± 0.00	2.95 ± 1.23	1.69 ± 0.74	2.47 ± 0.30	0.00 ± 0.00	0.00 ± 0.00	0.27 ± 0.47	9.39 ± 1.55	11.60 ± 1.25	2.21 ± 1.99
BLO	08/04/90	00	1.86 ± 0.19	0.00 ± 0.00	2.92 ± 1.01	0.59 ± 0.55	2.03 ± 0.27	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	7.40 ± 1.20	6.56 ± 1.12	-0.84 ± 1.64
BLO	08/04/90	07	1.01 ± 0.15	0.00 ± 0.00	2.41 ± 1.21	1.78 ± 0.84	2.36 ± 0.31	0.00 ± 0.00	0.00 ± 0.00	0.10 ± 0.40	7.66 ± 1.56	11.69 ± 1.62	4.03 ± 2.25
BLO	08/04/90	12	1.98 ± 0.20	0.00 ± 0.00	2.27 ± 1.26	0.00 ± 0.00	2.64 ± 0.33	0.00 ± 0.00	0.00 ± 0.00	0.49 ± 0.40	7.38 ± 1.38	9.86 ± 1.59	2.48 ± 2.11
BLO	08/04/90	17	3.59 ± 0.28	0.00 ± 0.00	1.76 ± 0.98	0.00 ± 0.00	2.59 ± 0.28	0.00 ± 0.00	0.00 ± 0.00	0.78 ± 0.33	8.72 ± 1.11	13.55 ± 1.27	4.83 ± 1.69

Table B-1 (continued)

Individual Source Contributions to $PM_{2.5}$ Mass at Blodgett, Yosemite, Sequoia, and Tehachapi Between 7/13/90 to 8/24/90

Site[a]	Date/Time[b]		Primary Geological SCE ± σ (μg/m³)	Regional Transport SCE ± σ (μg/m³)	Primary Motor Veh. Exhaust SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Sulfate SCE ± σ (μg/m³)	Secondary Nitrate SCE ± σ (μg/m³)	Secondary OC SCE ± σ (μg/m³)	Marine Aerosol SCE ± σ (μg/m³)	Calculated Mass ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Unexplained Mass ± σ (μg/m³)
BLO	08/05/90	00	1.24 ± 0.15	0.00 ± 0.00	2.05 ± 0.98	0.87 ± 0.55	2.06 ± 0.25	0.00 ± 0.00	0.00 ± 0.00	0.22 ± 0.34	6.44 ± 1.21	8.06 ± 1.14	1.62 ± 1.66
BLO	08/05/90	07	1.84 ± 0.19	0.00 ± 0.00	1.69 ± 1.22	0.00 ± 0.00	1.28 ± 0.25	0.00 ± 0.00	0.00 ± 0.00	0.37 ± 0.32	5.18 ± 1.30	2.34 ± 1.53	-2.84 ± 2.01
BLO	08/05/90	12	1.81 ± 0.19	0.00 ± 0.00	1.91 ± 1.30	0.00 ± 0.00	0.95 ± 0.25	0.00 ± 0.00	0.00 ± 0.00	0.80 ± 0.37	5.47 ± 1.39	5.51 ± 1.52	0.04 ± 2.06
BLO	08/05/90	17	3.97 ± 0.31	0.00 ± 0.00	1.06 ± 0.96	0.71 ± 0.63	1.82 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	0.66 ± 0.24	8.22 ± 1.23	9.43 ± 1.19	1.21 ± 1.71
BLO	08/06/90	00	1.17 ± 0.15	0.00 ± 0.00	2.39 ± 1.00	0.00 ± 0.00	1.01 ± 0.21	0.00 ± 0.00	0.00 ± 0.00	0.02 ± 0.38	4.59 ± 1.10	6.11 ± 1.20	1.52 ± 1.63
BLO	08/06/90	07	0.97 ± 0.15	0.00 ± 0.00	2.14 ± 1.16	0.00 ± 0.00	0.89 ± 0.24	0.00 ± 0.00	0.00 ± 0.00	0.09 ± 0.37	4.09 ± 1.25	2.67 ± 1.55	-1.42 ± 1.99
BLO	08/06/90	12	4.07 ± 0.39	0.00 ± 0.00	5.73 ± 1.78	0.67 ± 0.85	0.64 ± 0.34	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	11.11 ± 2.04	9.86 ± 1.58	-1.25 ± 2.58
BLO	08/06/90	17	2.82 ± 0.25	0.00 ± 0.00	2.63 ± 1.08	0.85 ± 0.61	1.20 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	0.37 ± 0.42	7.87 ± 1.35	10.20 ± 1.19	2.33 ± 1.80
BLO	08/22/90	00	0.46 ± 0.06	0.00 ± 0.00	0.00 ± 0.00	1.23 ± 0.55	1.43 ± 0.15	0.00 ± 0.00	0.00 ± 0.00	0.22 ± 0.05	3.34 ± 0.58	4.07 ± 1.08	0.73 ± 1.23
BLO	08/22/90	07	2.93 ± 0.26	0.00 ± 0.00	1.77 ± 1.22	0.00 ± 0.00	1.05 ± 0.24	0.00 ± 0.00	0.00 ± 0.00	0.18 ± 0.33	5.93 ± 1.31	8.13 ± 1.57	2.20 ± 2.04
BLO	08/22/90	12	1.73 ± 0.19	0.00 ± 0.00	2.15 ± 1.28	0.84 ± 0.72	0.64 ± 0.24	0.00 ± 0.00	0.00 ± 0.00	0.56 ± 0.38	5.92 ± 1.55	5.85 ± 1.54	-0.07 ± 2.18
BLO	08/22/90	17	2.47 ± 0.22	0.00 ± 0.00	1.93 ± 0.96	0.28 ± 0.53	0.87 ± 0.19	0.00 ± 0.00	0.00 ± 0.00	0.13 ± 0.32	5.68 ± 1.18	7.28 ± 1.14	1.60 ± 1.64
BLO	08/23/90	00	0.66 ± 0.07	0.00 ± 0.00	0.00 ± 0.00	0.97 ± 0.52	1.34 ± 0.15	0.00 ± 0.00	0.00 ± 0.00	0.26 ± 0.06	3.23 ± 0.55	2.51 ± 1.09	-0.72 ± 1.22
BLO	08/23/90	07	2.54 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	3.53 ± 1.12	1.24 ± 0.18	0.00 ± 0.00	0.00 ± 0.00	0.83 ± 0.13	8.14 ± 1.16	8.85 ± 1.58	0.71 ± 1.96
BLO	08/23/90	12	1.85 ± 0.19	0.00 ± 0.00	1.48 ± 1.22	0.92 ± 0.72	1.06 ± 0.24	0.00 ± 0.00	0.00 ± 0.00	1.16 ± 0.33	6.47 ± 1.49	5.31 ± 1.55	-1.16 ± 2.15
BLO	08/23/90	17	2.67 ± 0.21	0.00 ± 0.00	0.00 ± 0.00	4.81 ± 1.18	1.52 ± 0.17	0.00 ± 0.00	0.00 ± 0.00	1.33 ± 0.19	10.33 ± 1.23	10.19 ± 1.13	-0.14 ± 1.67
BLO	08/24/90	00	0.96 ± 0.11	0.00 ± 0.00	1.04 ± 0.81	0.00 ± 0.00	1.37 ± 0.19	0.00 ± 0.00	0.00 ± 0.00	0.83 ± 0.23	4.20 ± 0.87	9.66 ± 1.19	5.46 ± 1.47
BLO	08/24/90	07	3.36 ± 0.28	0.00 ± 0.00	0.90 ± 1.21	0.00 ± 0.00	0.50 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	0.55 ± 0.25	5.31 ± 1.29	5.18 ± 1.56	-0.13 ± 2.02
BLO	08/24/90	12	1.89 ± 0.18	0.00 ± 0.00	1.54 ± 0.98	0.00 ± 0.00	0.71 ± 0.20	0.00 ± 0.00	0.00 ± 0.00	1.77 ± 0.36	5.91 ± 1.08	6.07 ± 1.30	0.16 ± 1.69
BLO	08/24/90	17	1.68 ± 0.15	0.00 ± 0.00	0.73 ± 0.83	0.00 ± 0.00	1.30 ± 0.18	0.00 ± 0.00	0.00 ± 0.00	1.60 ± 0.28	5.31 ± 0.91	6.44 ± 1.11	1.13 ± 1.44
SLK	07/16/90	00	0.82 ± 0.17	0.00 ± 0.00	1.62 ± 0.71	0.00 ± 0.00	2.30 ± 0.25	0.00 ± 0.00	3.64 ± 1.50	0.00 ± 0.00	8.38 ± 1.69	12.72 ± 1.33	4.34 ± 2.15
SLK	07/16/90	07	0.00 ± 0.00	8.07 ± 1.85	2.68 ± 1.45	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	10.75 ± 1.99	11.28 ± 1.72	0.53 ± 2.63
SLK	07/16/90	12	2.14 ± 0.26	0.00 ± 0.00	3.04 ± 1.20	0.00 ± 0.00	4.22 ± 0.44	0.00 ± 0.00	5.84 ± 2.38	0.00 ± 0.00	15.24 ± 2.71	15.27 ± 1.79	0.03 ± 3.25
SLK	07/16/90	17	2.63 ± 0.26	0.00 ± 0.00	2.12 ± 0.90	0.00 ± 0.00	4.00 ± 0.39	0.00 ± 0.00	4.51 ± 1.82	0.00 ± 0.00	13.26 ± 2.08	20.38 ± 1.73	7.12 ± 2.71
SLK	07/17/90	00	0.00 ± 0.00	4.42 ± 0.77	0.00 ± 0.00	0.00 ± 0.00	3.47 ± 0.46	0.00 ± 0.00	3.12 ± 1.51	0.00 ± 0.00	11.01 ± 1.81	13.26 ± 1.33	2.25 ± 2.25
SLK	07/17/90	07	1.22 ± 0.23	0.00 ± 0.00	3.41 ± 1.27	0.00 ± 0.00	4.35 ± 0.46	0.00 ± 0.00	6.41 ± 2.57	0.00 ± 0.00	15.39 ± 2.91	13.85 ± 1.74	-1.54 ± 3.39
SLK	07/17/90	12	0.00 ± 0.00	8.61 ± 3.06	3.23 ± 1.54	0.00 ± 0.00	2.10 ± 0.69	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	13.94 ± 2.43	13.11 ± 1.75	-0.83 ± 2.99
SLK	07/17/90	17	0.00 ± 0.00	9.41 ± 1.56	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	2.91 ± 1.91	0.00 ± 0.00	12.32 ± 2.28	10.72 ± 1.28	-1.60 ± 2.61
SLK	07/21/90	00	0.00 ± 0.00	9.78 ± 2.31	0.00 ± 0.00	0.00 ± 0.00	1.72 ± 0.68	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	11.50 ± 1.67	15.23 ± 1.39	3.73 ± 2.17
SLK	07/21/90	07	0.00 ± 0.00	7.40 ± 1.19	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	4.17 ± 2.15	0.00 ± 0.00	11.57 ± 2.41	15.34 ± 1.77	3.77 ± 2.99
SLK	07/21/90	12	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
SLK	07/21/90	17	0.00 ± 0.00	6.93 ± 0.96	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	4.76 ± 2.10	0.00 ± 0.00	11.69 ± 2.32	8.82 ± 1.38	-2.87 ± 2.70

Table B-1 (continued)

Individual Source Contributions to $PM_{2.5}$ Mass at Blodgett, Yosemite, Sequoia, and Tehachapi Between 7/13/90 to 8/24/90

Site[a]	Date/Time[b]	Primary Geological SCE ± σ (μg/m³)	Regional Transport SCE ± σ (μg/m³)	Primary Motor Veh. Exhaust SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Sulfate SCE ± σ (μg/m³)	Secondary Nitrate SCE ± σ (μg/m³)	Secondary OC SCE ± σ (μg/m³)	Marine Aerosol SCE ± σ (μg/m³)	Calculated Mass ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Unexplained Mass ± σ (μg/m³)
SLK	07/22/90 00	0.60 ± 0.14	0.00 ± 0.00	0.00 ± 0.00	2.91 ± 0.90	1.59 ± 0.18	0.00 ± 0.00	4.98 ± 1.94	0.00 ± 0.00	10.08 ± 2.15	9.95 ± 1.39	-0.13 ± 2.56
SLK	07/22/90 07	0.00 ± 0.00	4.08 ± 0.92	4.05 ± 1.64	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	6.60 ± 2.79	0.00 ± 0.00	14.73 ± 3.38	10.12 ± 1.70	-4.61 ± 3.78
SLK	07/22/90 12	0.00 ± 0.00	6.59 ± 0.96	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	6.59 ± 0.98	6.72 ± 1.65	0.13 ± 1.92
SLK	07/22/90 17	0.80 ± 0.14	0.00 ± 0.00	0.00 ± 0.00	1.50 ± 0.61	1.93 ± 0.21	0.18 ± 0.07	4.44 ± 1.72	0.00 ± 0.00	8.85 ± 1.84	7.37 ± 1.22	-1.48 ± 2.21
SLK	07/27/90 00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
SLK	07/27/90 07	2.46 ± 0.31	0.00 ± 0.00	4.71 ± 1.39	0.00 ± 0.00	1.49 ± 0.27	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	8.66 ± 1.45	6.11 ± 1.85	-2.55 ± 2.35
SLK	07/27/90 12	0.67 ± 0.19	0.00 ± 0.00	2.54 ± 1.06	0.00 ± 0.00	1.40 ± 0.23	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	4.61 ± 1.10	4.95 ± 1.64	0.34 ± 1.97
SLK	07/27/90 17	0.00 ± 0.00	12.01 ± 2.25	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	12.01 ± 1.50	18.61 ± 1.52	6.60 ± 2.14
SLK	07/28/90 00	0.00 ± 0.00	1.77 ± 0.46	0.00 ± 0.00	2.60 ± 0.80	1.40 ± 0.26	0.00 ± 0.00	0.00 ± 0.00	0.19 ± 0.09	5.96 ± 1.09	9.46 ± 1.25	3.50 ± 1.66
SLK	07/28/90 07	0.00 ± 0.00	4.46 ± 1.46	4.01 ± 1.57	0.00 ± 0.00	1.66 ± 0.46	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	10.13 ± 2.03	9.61 ± 1.69	-0.52 ± 2.64
SLK	07/28/90 12	0.00 ± 0.00	5.50 ± 1.30	0.00 ± 0.00	0.00 ± 0.00	2.07 ± 0.49	0.00 ± 0.00	2.32 ± 1.63	0.00 ± 0.00	9.89 ± 2.05	9.69 ± 1.65	-0.20 ± 2.63
SLK	07/28/90 17	0.00 ± 0.00	3.90 ± 0.96	0.00 ± 0.00	2.78 ± 1.00	3.54 ± 0.46	0.00 ± 0.00	0.00 ± 0.00	0.25 ± 0.14	10.47 ± 1.48	9.98 ± 1.35	-0.49 ± 2.00
SLK	07/29/90 00	0.00 ± 0.00	3.71 ± 0.61	0.00 ± 0.00	0.00 ± 0.00	1.82 ± 0.35	0.00 ± 0.00	0.00 ± 0.00	0.06 ± 0.13	5.59 ± 0.86	12.55 ± 1.32	6.96 ± 1.58
SLK	07/29/90 07	0.00 ± 0.00	3.13 ± 0.96	0.00 ± 0.00	1.96 ± 0.96	2.32 ± 0.40	0.00 ± 0.00	0.00 ± 0.00	0.17 ± 0.15	7.58 ± 1.44	10.94 ± 1.71	3.36 ± 2.24
SLK	07/29/90 12	0.00 ± 0.00	4.83 ± 1.08	0.00 ± 0.00	0.00 ± 0.00	1.39 ± 0.43	0.00 ± 0.00	0.00 ± 0.00	0.13 ± 0.17	6.35 ± 1.14	9.44 ± 1.69	3.09 ± 2.04
SLK	07/29/90 17	0.00 ± 0.00	3.47 ± 0.79	0.00 ± 0.00	1.75 ± 0.83	2.90 ± 0.40	0.00 ± 0.00	3.05 ± 1.51	0.35 ± 0.13	11.52 ± 1.98	13.83 ± 1.32	2.31 ± 2.38
SLK	08/03/90 00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
SLK	08/03/90 07	0.00 ± 0.00	7.45 ± 1.96	0.00 ± 0.00	0.00 ± 0.00	2.43 ± 0.61	0.00 ± 0.00	4.58 ± 2.26	0.00 ± 0.00	14.46 ± 2.73	15.82 ± 1.81	1.36 ± 3.28
SLK	08/03/90 12	0.00 ± 0.00	7.46 ± 1.96	0.00 ± 0.00	0.00 ± 0.00	1.31 ± 0.58	0.00 ± 0.00	4.01 ± 2.15	0.00 ± 0.00	12.78 ± 2.63	13.13 ± 1.79	0.35 ± 3.18
SLK	08/03/90 17	0.00 ± 0.00	9.07 ± 1.54	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	3.76 ± 2.07	0.82 ± 0.29	13.65 ± 2.43	16.44 ± 1.46	2.79 ± 2.83
SLK	08/04/90 00	0.00 ± 0.00	5.53 ± 1.00	0.00 ± 0.00	0.00 ± 0.00	1.83 ± 0.45	0.00 ± 0.00	0.00 ± 0.00	0.06 ± 0.17	7.42 ± 1.11	9.14 ± 1.24	1.72 ± 1.66
SLK	08/04/90 07	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
SLK	08/04/90 12	0.00 ± 0.00	6.56 ± 0.98	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.04 ± 0.21	6.60 ± 1.01	6.28 ± 1.65	-0.32 ± 1.93
SLK	08/04/90 17	0.00 ± 0.00	5.38 ± 1.06	0.00 ± 0.00	0.00 ± 0.00	1.40 ± 0.43	0.00 ± 0.00	5.75 ± 2.27	0.71 ± 0.20	13.24 ± 2.54	8.74 ± 1.21	-4.50 ± 2.81
SLK	08/05/90 00	0.00 ± 0.00	2.24 ± 0.49	0.00 ± 0.00	2.28 ± 0.81	1.70 ± 0.29	0.00 ± 0.00	4.11 ± 1.73	0.18 ± 0.10	10.51 ± 2.06	12.43 ± 1.31	1.92 ± 2.44
SLK	08/05/90 07	0.00 ± 0.00	3.93 ± 1.19	0.00 ± 0.00	4.85 ± 1.46	1.60 ± 0.41	0.00 ± 0.00	8.06 ± 3.18	0.26 ± 0.16	18.70 ± 3.69	19.94 ± 1.91	1.24 ± 4.16
SLK	08/05/90 12	0.00 ± 0.00	5.72 ± 1.42	0.00 ± 0.00	0.00 ± 0.00	1.08 ± 0.47	0.00 ± 0.00	3.12 ± 1.80	0.09 ± 0.19	10.01 ± 2.22	8.11 ± 1.62	-1.90 ± 2.75
SLK	08/05/90 17	0.00 ± 0.00	6.91 ± 0.94	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	3.67 ± 1.84	0.00 ± 0.00	10.58 ± 2.08	10.35 ± 1.30	-0.23 ± 2.45
SLK	08/06/90 00	0.00 ± 0.00	2.56 ± 0.56	0.00 ± 0.00	1.58 ± 0.74	1.12 ± 0.28	0.00 ± 0.00	4.56 ± 1.84	0.00 ± 0.00	9.82 ± 2.14	9.34 ± 1.25	-0.48 ± 2.48
SLK	08/06/90 07	0.61 ± 0.20	0.00 ± 0.00	3.16 ± 1.41	2.25 ± 0.98	1.29 ± 0.24	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	7.31 ± 1.75	9.11 ± 1.69	1.80 ± 2.43
SLK	08/06/90 12	0.00 ± 0.00	5.52 ± 1.30	0.00 ± 0.00	0.00 ± 0.00	1.26 ± 0.46	0.00 ± 0.00	3.58 ± 1.88	0.00 ± 0.00	10.36 ± 2.25	10.78 ± 1.71	0.42 ± 2.83
SLK	08/06/90 17	0.00 ± 0.00	3.20 ± 0.77	0.00 ± 0.00	2.22 ± 0.90	1.68 ± 0.34	0.00 ± 0.00	3.29 ± 1.57	0.15 ± 0.12	10.54 ± 2.04	12.99 ± 1.33	2.45 ± 2.44

Table B-1 (continued)

Individual Source Contributions to $PM_{2.5}$ Mass at Blodgett, Yosemite, Sequoia, and Tehachapi Between 7/13/90 to 8/24/90

Site[a]	Date/Time[b]	Primary Geological SCE ± σ (μg/m³)	Regional Transport SCE ± σ (μg/m³)	Primary Motor Veh. Exhaust SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Sulfate SCE ± σ (μg/m³)	Secondary Nitrate SCE ± σ (μg/m³)	Secondary OC SCE ± σ (μg/m³)	Marine Aerosol SCE ± σ (μg/m³)	Calculated Mass ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Unexplained Mass ± σ (μg/m³)
SLK	08/22/90 00	0.00 ± 0.00	2.96 ± 0.90	3.98 ± 1.51	0.00 ± 0.00	1.58 ± 0.36	0.00 ± 0.00	0.00 ± 0.00	0.11 ± 0.61	8.63 ± 1.92	13.32 ± 1.34	4.69 ± 2.34
SLK	08/22/90 07	0.78 ± 0.27	0.00 ± 0.00	4.91 ± 1.97	0.00 ± 0.00	2.05 ± 0.33	0.00 ± 0.00	3.12 ± 2.00	0.58 ± 0.78	11.44 ± 2.94	15.27 ± 1.80	3.83 ± 3.45
SLK	08/22/90 12	0.00 ± 0.00	2.72 ± 1.04	3.38 ± 1.43	0.00 ± 0.00	2.16 ± 0.40	0.00 ± 0.00	0.00 ± 0.00	0.10 ± 0.55	8.36 ± 1.88	8.95 ± 1.63	0.59 ± 2.49
SLK	08/22/90 17	0.00 ± 0.00	8.14 ± 1.77	3.05 ± 1.47	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.16 ± 0.54	11.35 ± 2.05	12.80 ± 1.35	1.45 ± 2.45
SLK	08/23/90 00	0.00 ± 0.00	1.97 ± 0.49	0.00 ± 0.00	3.43 ± 0.95	2.21 ± 0.31	0.00 ± 0.00	0.00 ± 0.00	0.26 ± 0.10	7.87 ± 1.22	12.19 ± 1.31	4.32 ± 1.79
SLK	08/23/90 07	0.00 ± 0.00	3.56 ± 1.10	0.00 ± 0.00	8.62 ± 1.89	1.76 ± 0.40	0.00 ± 0.00	0.00 ± 0.00	0.19 ± 0.15	14.13 ± 2.20	16.27 ± 1.82	2.14 ± 2.86
SLK	08/23/90 12	0.00 ± 0.00	3.70 ± 1.08	0.00 ± 0.00	2.14 ± 0.99	0.80 ± 0.37	0.00 ± 0.00	0.00 ± 0.00	0.41 ± 0.16	7.05 ± 1.49	9.11 ± 1.69	2.06 ± 2.25
SLK	08/23/90 17	0.00 ± 0.00	4.00 ± 0.96	0.00 ± 0.00	3.51 ± 1.07	1.19 ± 0.36	0.00 ± 0.00	0.00 ± 0.00	0.38 ± 0.15	9.08 ± 1.50	12.53 ± 1.35	3.45 ± 2.02
SLK	08/24/90 00	0.00 ± 0.00	2.27 ± 0.59	2.54 ± 1.01	0.00 ± 0.00	0.88 ± 0.27	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	5.69 ± 1.30	9.58 ± 1.25	3.89 ± 1.80
SLK	08/24/90 07	0.00 ± 0.00	2.05 ± 0.77	0.00 ± 0.00	3.61 ± 1.10	0.98 ± 0.29	0.00 ± 0.00	0.00 ± 0.00	0.60 ± 0.15	7.24 ± 1.45	7.45 ± 1.67	0.21 ± 2.21
SLK	08/24/90 12	0.00 ± 0.00	7.97 ± 1.30	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.38 ± 0.25	8.35 ± 1.17	7.78 ± 1.67	-0.57 ± 2.04
SLK	08/24/90 17	0.00 ± 0.00	4.53 ± 0.59	0.00 ± 0.00	4.38 ± 1.18	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	8.91 ± 1.41	9.53 ± 1.26	0.62 ± 1.89
TEH	07/13/90 00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
TEH	07/13/90 00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
TEH	07/13/90 00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
TEH	07/13/90 00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
TEH	07/14/90 00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
TEH	07/14/90 00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
TEH	07/14/90 00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
TEH	07/14/90 00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
TEH	07/21/90 00	0.00 ± 0.00	5.37 ± 0.48	2.69 ± 1.22	0.00 ± 0.00	2.08 ± 0.43	1.95 ± 0.44	0.00 ± 0.00	0.00 ± 0.00	12.09 ± 1.53	11.32 ± 2.09	-0.77 ± 2.59
TEH	07/21/90 07	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
TEH	07/21/90 12	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 2.82	0.00 ± 0.00
TEH	07/21/90 17	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
TEH	07/22/90 03	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 4.92	0.00 ± 0.00
TEH	07/22/90 07	0.00 ± 0.00	2.05 ± 0.27	3.73 ± 1.24	0.00 ± 0.00	0.60 ± 0.23	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	6.38 ± 1.36	3.45 ± 3.46	-2.93 ± 3.72
TEH	07/22/90 12	0.00 ± 0.00	1.91 ± 0.16	1.22 ± 0.60	0.00 ± 0.00	0.98 ± 0.17	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	4.11 ± 0.74	5.67 ± 3.35	1.56 ± 3.43
TEH	07/22/90 17	0.00 ± 0.00	1.10 ± 0.10	2.17 ± 0.70	0.00 ± 0.00	1.13 ± 0.18	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	4.40 ± 0.79	3.34 ± 2.39	-1.06 ± 2.52
TEH	07/27/90 00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 2.33	0.00 ± 0.00
TEH	07/27/90 07	0.00 ± 0.00	2.84 ± 0.41	5.44 ± 1.65	0.00 ± 0.00	0.91 ± 0.32	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.19 ± 1.80	6.36 ± 3.27	-2.83 ± 3.73
TEH	07/27/90 12	0.00 ± 0.00	3.12 ± 0.40	4.88 ± 1.53	0.00 ± 0.00	1.22 ± 0.33	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.22 ± 1.69	9.57 ± 3.27	0.35 ± 3.68
TEH	07/27/90 17	0.00 ± 0.00	2.88 ± 0.42	6.89 ± 1.81	0.00 ± 0.00	2.61 ± 0.48	2.16 ± 0.78	0.00 ± 0.00	0.00 ± 0.00	14.54 ± 2.13	13.76 ± 2.49	-0.78 ± 3.28

Table B-1 (continued)

Individual Source Contributions to $PM_{2.5}$ Mass at Blodgett, Yosemite, Sequoia, and Tehachapi Between 7/13/90 to 8/24/90

Site[a]	Date/Time[b]	Primary Geological SCE ± σ (μg/m³)	Regional Transport SCE ± σ (μg/m³)	Primary Motor Veh. Exhaust SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Sulfate SCE ± σ (μg/m³)	Secondary Nitrate SCE ± σ (μg/m³)	Secondary OC SCE ± σ (μg/m³)	Marine Aerosol SCE ± σ (μg/m³)	Calculated Mass ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Unexplained Mass ± σ (μg/m³)
TEH	07/28/90 00	0.00 ± 0.00	7.04 ± 0.69	0.00 ± 0.00	0.00 ± 0.00	3.87 ± 0.54	2.22 ± 0.27	0.00 ± 0.00	0.00 ± 0.00	13.13 ± 1.03	10.01 ± 3.41	-3.12 ± 3.56
TEH	07/28/90 05	0.00 ± 0.00	3.99 ± 0.41	4.63 ± 1.41	0.00 ± 0.00	2.43 ± 0.42	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	11.05 ± 1.60	12.16 ± 2.48	1.11 ± 2.95
TEH	07/28/90 12	0.00 ± 0.00	3.35 ± 0.44	4.93 ± 1.77	0.00 ± 0.00	1.78 ± 0.39	1.40 ± 0.59	6.27 ± 2.92	0.00 ± 0.00	17.73 ± 3.55	14.23 ± 3.35	-3.50 ± 4.88
TEH	07/28/90 17	0.00 ± 0.00	2.20 ± 0.30	5.70 ± 1.54	0.00 ± 0.00	3.08 ± 0.45	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	10.98 ± 1.70	10.71 ± 2.44	-0.27 ± 2.97
TEH	07/29/90 00	0.00 ± 0.00	3.29 ± 0.31	4.04 ± 1.31	0.00 ± 0.00	3.11 ± 0.48	3.80 ± 0.63	0.00 ± 0.00	0.00 ± 0.00	14.24 ± 1.63	9.63 ± 2.45	-4.61 ± 2.94
TEH	07/29/90 07	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 3.35	0.00 ± 0.00
TEH	07/29/90 13	0.00 ± 0.00	4.64 ± 0.77	6.09 ± 2.02	0.00 ± 0.00	2.35 ± 0.49	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	13.08 ± 2.26	19.76 ± 4.65	6.68 ± 5.17
TEH	07/29/90 17	0.00 ± 0.00	3.41 ± 0.41	5.85 ± 1.56	0.00 ± 0.00	2.80 ± 0.45	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	12.06 ± 1.75	13.05 ± 2.40	0.99 ± 2.97
TEH	08/03/90 00	0.00 ± 0.00	4.67 ± 0.37	1.70 ± 1.27	0.00 ± 0.00	2.19 ± 0.36	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	8.56 ± 1.45	11.84 ± 2.45	3.28 ± 2.85
TEH	08/03/90 07	0.00 ± 0.00	7.12 ± 0.61	0.00 ± 0.00	0.00 ± 0.00	2.21 ± 0.43	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.33 ± 0.89	31.89 ± 3.73	22.56 ± 3.83
TEH	08/03/90 12	0.00 ± 0.00	3.38 ± 0.36	2.82 ± 1.83	0.00 ± 0.00	3.14 ± 0.42	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.34 ± 1.97	13.73 ± 3.35	4.39 ± 3.89
TEH	08/03/90 17	0.00 ± 0.00	3.24 ± 0.29	3.30 ± 1.67	0.00 ± 0.00	3.85 ± 0.45	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	10.39 ± 1.81	16.54 ± 2.49	6.15 ± 3.08
TEH	08/04/90 00	0.00 ± 0.00	3.40 ± 0.30	2.06 ± 1.37	1.24 ± 0.42	3.03 ± 0.37	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.73 ± 1.58	18.20 ± 2.52	8.47 ± 2.97
TEH	08/04/90 07	0.00 ± 0.00	4.76 ± 0.48	2.78 ± 1.75	0.00 ± 0.00	2.64 ± 0.42	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	10.18 ± 1.93	14.62 ± 3.03	4.44 ± 3.59
TEH	08/04/90 12	0.00 ± 0.00	4.25 ± 0.45	1.32 ± 1.21	0.00 ± 0.00	4.05 ± 0.46	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.62 ± 1.46	21.50 ± 4.25	11.88 ± 4.49
TEH	08/04/90 17	0.00 ± 0.00	2.93 ± 0.32	4.67 ± 1.90	0.00 ± 0.00	4.27 ± 0.50	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	11.87 ± 2.05	18.79 ± 2.53	6.92 ± 3.26
TEH	08/05/90 00	0.00 ± 0.00	2.76 ± 0.23	2.35 ± 1.49	0.00 ± 0.00	4.04 ± 0.43	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.15 ± 1.62	15.72 ± 2.48	6.57 ± 2.96
TEH	08/05/90 07	0.00 ± 0.00	4.26 ± 0.27	0.00 ± 0.00	0.00 ± 0.00	3.16 ± 0.37	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	7.42 ± 0.64	15.05 ± 3.38	7.63 ± 3.44
TEH	08/05/90 15	0.00 ± 0.00	3.52 ± 0.94	3.27 ± 2.68	3.91 ± 2.14	4.70 ± 0.64	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	15.40 ± 3.62	31.84 ± 8.36	16.44 ± 9.11
TEH	08/05/90 17	0.00 ± 0.00	2.76 ± 0.31	4.46 ± 1.94	0.00 ± 0.00	4.22 ± 0.49	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	11.44 ± 2.08	19.85 ± 2.56	8.41 ± 3.30
TEH	08/06/90 00	0.00 ± 0.00	4.83 ± 0.41	1.96 ± 1.42	0.00 ± 0.00	3.40 ± 0.43	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	10.19 ± 1.62	20.44 ± 2.57	10.25 ± 3.04
TEH	08/06/90 07	0.00 ± 0.00	10.19 ± 1.10	0.00 ± 0.00	0.00 ± 0.00	2.47 ± 0.57	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	12.66 ± 1.19	13.07 ± 3.37	0.41 ± 3.57
TEH	08/06/90 12	0.00 ± 0.00	5.04 ± 0.53	2.34 ± 1.78	0.00 ± 0.00	3.31 ± 0.46	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	10.69 ± 1.98	17.54 ± 3.41	6.85 ± 3.94
TEH	08/06/90 17	0.00 ± 0.00	2.78 ± 0.18	0.79 ± 0.73	0.00 ± 0.00	1.85 ± 0.25	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	5.42 ± 0.88	10.28 ± 2.42	4.86 ± 2.58
TEH	08/22/90 01	0.00 ± 0.00	2.00 ± 0.18	2.39 ± 0.92	0.00 ± 0.00	1.95 ± 0.31	1.94 ± 0.38	0.00 ± 0.00	0.00 ± 0.00	8.28 ± 1.13	8.71 ± 2.97	0.43 ± 3.18
TEH	08/22/90 07	0.00 ± 0.00	4.07 ± 0.38	2.04 ± 1.10	0.00 ± 0.00	1.61 ± 0.37	2.96 ± 0.44	0.00 ± 0.00	0.00 ± 0.00	10.68 ± 1.39	14.56 ± 3.38	3.88 ± 3.65
TEH	08/22/90 12	0.00 ± 0.00	4.17 ± 0.55	5.28 ± 1.78	0.00 ± 0.00	2.27 ± 0.47	2.06 ± 0.66	0.00 ± 0.00	0.00 ± 0.00	13.78 ± 2.09	15.72 ± 3.40	1.94 ± 3.99
TEH	08/22/90 17	0.00 ± 0.00	2.68 ± 0.26	3.98 ± 1.24	0.00 ± 0.00	2.27 ± 0.40	4.14 ± 0.61	0.00 ± 0.00	0.00 ± 0.00	13.07 ± 1.53	10.87 ± 2.42	-2.20 ± 2.86
TEH	08/23/90 00	0.00 ± 0.00	2.43 ± 0.20	2.99 ± 1.04	0.00 ± 0.00	2.30 ± 0.36	2.51 ± 0.46	0.00 ± 0.00	0.00 ± 0.00	10.23 ± 1.27	10.63 ± 2.42	0.40 ± 2.73
TEH	08/23/90 07	0.00 ± 0.00	4.19 ± 0.45	3.29 ± 1.35	0.00 ± 0.00	1.72 ± 0.40	3.56 ± 0.55	0.00 ± 0.00	0.00 ± 0.00	12.76 ± 1.65	9.93 ± 3.35	-2.83 ± 3.73
TEH	08/23/90 12	0.00 ± 0.00	4.70 ± 0.53	3.63 ± 1.54	0.00 ± 0.00	1.75 ± 0.42	2.15 ± 0.52	0.00 ± 0.00	0.00 ± 0.00	12.23 ± 1.83	12.57 ± 3.38	0.34 ± 3.84
TEH	08/23/90 17	0.00 ± 0.00	2.27 ± 0.22	3.00 ± 1.09	0.00 ± 0.00	2.13 ± 0.35	3.17 ± 0.49	0.00 ± 0.00	0.00 ± 0.00	10.57 ± 1.33	17.25 ± 2.52	6.68 ± 2.85

Table B-1 (continued)

Individual Source Contributions to $PM_{2.5}$ Mass at Blodgett, Yosemite, Sequoia, and Tehachapi Between 7/13/90 to 8/24/90

Site[a]	Date/Time[b]		Primary Geological SCE ± σ (μg/m³)	Regional Transport SCE ± σ (μg/m³)	Primary Motor Veh. Exhaust SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Sulfate SCE ± σ (μg/m³)	Secondary Nitrate SCE ± σ (μg/m³)	Secondary OC SCE ± σ (μg/m³)	Marine Aerosol SCE ± σ (μg/m³)	Calculated Mass ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Unexplained Mass ± σ (μg/m³)
TEH	08/24/90	00	0.00 ± 0.00	7.45 ± 0.67	0.00 ± 0.00	0.00 ± 0.00	0.99 ± 0.44	2.93 ± 0.34	0.00 ± 0.00	0.00 ± 0.00	11.37 ± 0.99	9.09 ± 2.38	-2.28 ± 2.58
TEH	08/24/90	07	0.00 ± 0.00	6.64 ± 0.83	4.48 ± 1.48	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	11.12 ± 1.74	5.96 ± 3.30	-5.16 ± 3.73
TEH	08/24/90	12	0.00 ± 0.00	6.31 ± 0.67	2.14 ± 1.49	0.00 ± 0.00	0.00 ± 0.00	1.38 ± 0.38	0.00 ± 0.00	0.00 ± 0.00	9.83 ± 1.74	6.29 ± 3.32	-3.54 ± 3.75
TEH	08/24/90	17	0.00 ± 0.00	5.85 ± 0.44	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	2.04 ± 0.24	0.00 ± 0.00	0.00 ± 0.00	7.89 ± 0.70	9.10 ± 2.40	1.21 ± 2.50
YOS	07/13/90	00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
YOS	07/13/90	07	1.66 ± 0.32	0.00 ± 0.00	6.48 ± 1.89	0.00 ± 0.00	0.92 ± 0.31	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.06 ± 1.94	7.74 ± 2.04	-1.32 ± 2.82
YOS	07/13/90	12	3.32 ± 0.33	0.00 ± 0.00	3.81 ± 1.55	0.00 ± 0.00	3.03 ± 0.38	0.00 ± 0.00	11.79 ± 4.18	0.31 ± 0.61	22.26 ± 4.53	19.81 ± 1.89	-2.45 ± 4.91
YOS	07/13/90	17	1.80 ± 0.21	0.00 ± 0.00	2.16 ± 0.98	0.00 ± 0.00	1.51 ± 0.22	0.00 ± 0.00	6.11 ± 2.31	0.00 ± 0.00	11.58 ± 2.53	8.62 ± 1.35	-2.96 ± 2.87
YOS	07/14/90	00	0.73 ± 0.15	0.00 ± 0.00	1.73 ± 0.85	0.00 ± 0.00	0.83 ± 0.16	0.00 ± 0.00	4.63 ± 1.83	0.00 ± 0.00	7.92 ± 2.03	7.78 ± 1.35	-0.14 ± 2.44
YOS	07/14/90	07	1.13 ± 0.21	0.00 ± 0.00	2.47 ± 1.12	0.00 ± 0.00	1.31 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	4.91 ± 1.16	7.87 ± 1.69	2.96 ± 2.05
YOS	07/14/90	12	0.78 ± 0.29	0.00 ± 0.00	6.47 ± 1.73	0.00 ± 0.00	1.75 ± 0.33	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.00 ± 1.78	12.23 ± 1.92	3.23 ± 2.62
YOS	07/14/90	17	0.83 ± 0.16	0.00 ± 0.00	1.24 ± 0.69	0.00 ± 0.00	1.33 ± 0.18	0.00 ± 0.00	10.07 ± 3.42	0.00 ± 0.00	13.47 ± 3.50	9.81 ± 1.31	-3.66 ± 3.74
YOS	07/21/90	00	0.85 ± 0.16	0.00 ± 0.00	2.29 ± 0.93	0.00 ± 0.00	1.65 ± 0.22	0.00 ± 0.00	7.96 ± 2.82	0.00 ± 0.00	12.75 ± 2.98	9.47 ± 1.25	-3.28 ± 3.23
YOS	07/21/90	07	2.02 ± 0.26	0.00 ± 0.00	3.21 ± 1.43	3.18 ± 1.18	1.54 ± 0.26	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.95 ± 1.89	12.70 ± 1.74	2.75 ± 2.57
YOS	07/21/90	12	1.71 ± 0.23	0.00 ± 0.00	1.87 ± 0.96	0.00 ± 0.00	1.46 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	5.04 ± 1.01	11.34 ± 1.73	6.30 ± 2.00
YOS	07/21/90	17	1.96 ± 0.20	0.00 ± 0.00	0.00 ± 0.00	1.71 ± 0.67	1.65 ± 0.19	0.00 ± 0.00	8.76 ± 3.03	0.00 ± 0.00	14.08 ± 3.12	13.31 ± 1.38	-0.77 ± 3.41
YOS	07/22/90	00	0.54 ± 0.14	0.00 ± 0.00	1.90 ± 0.85	0.00 ± 0.00	1.29 ± 0.19	0.00 ± 0.00	4.35 ± 1.74	0.00 ± 0.00	8.08 ± 1.95	7.32 ± 1.21	-0.76 ± 2.29
YOS	07/22/90	07	1.36 ± 0.23	0.00 ± 0.00	2.18 ± 1.06	0.00 ± 0.00	1.37 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	4.91 ± 1.11	8.16 ± 1.91	3.25 ± 2.21
YOS	07/22/90	12	2.37 ± 0.28	0.00 ± 0.00	3.49 ± 1.38	0.00 ± 0.00	1.10 ± 0.23	0.00 ± 0.00	9.87 ± 3.58	0.00 ± 0.00	16.83 ± 3.85	11.01 ± 1.72	-5.82 ± 4.22
YOS	07/22/90	17	1.43 ± 0.19	0.00 ± 0.00	2.43 ± 0.96	0.00 ± 0.00	1.15 ± 0.19	0.00 ± 0.00	4.62 ± 1.85	0.00 ± 0.00	9.63 ± 2.10	7.38 ± 1.30	-2.25 ± 2.47
YOS	07/27/90	00	0.75 ± 0.16	0.00 ± 0.00	2.63 ± 1.00	0.00 ± 0.00	1.82 ± 0.24	0.00 ± 0.00	4.57 ± 1.90	0.00 ± 0.00	9.77 ± 2.17	8.15 ± 1.24	-1.62 ± 2.50
YOS	07/27/90	07	1.53 ± 0.25	0.00 ± 0.00	3.71 ± 1.37	0.00 ± 0.00	1.94 ± 0.29	0.00 ± 0.00	8.94 ± 3.32	0.00 ± 0.00	16.12 ± 3.61	11.11 ± 1.72	-5.01 ± 4.00
YOS	07/27/90	12	3.12 ± 0.32	0.00 ± 0.00	3.43 ± 1.46	3.11 ± 1.22	2.51 ± 0.33	0.00 ± 0.00	8.76 ± 3.35	0.00 ± 0.00	20.93 ± 3.88	15.11 ± 1.79	-5.82 ± 4.27
YOS	07/27/90	17	2.26 ± 0.25	0.00 ± 0.00	3.35 ± 1.16	0.00 ± 0.00	3.40 ± 0.37	0.00 ± 0.00	4.77 ± 2.00	0.00 ± 0.00	13.78 ± 2.35	11.35 ± 1.35	-2.43 ± 2.71
YOS	07/28/90	00	1.12 ± 0.17	0.00 ± 0.00	2.54 ± 0.99	0.00 ± 0.00	2.63 ± 0.30	0.00 ± 0.00	3.79 ± 1.65	0.00 ± 0.00	10.08 ± 1.95	10.08 ± 1.26	0.00 ± 2.32
YOS	07/28/90	07	1.62 ± 0.25	0.00 ± 0.00	3.75 ± 1.44	2.78 ± 1.11	2.61 ± 0.34	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	10.76 ± 1.87	11.18 ± 1.73	0.42 ± 2.55
YOS	07/28/90	12	2.27 ± 0.27	0.00 ± 0.00	3.18 ± 1.27	0.00 ± 0.00	2.86 ± 0.35	0.00 ± 0.00	6.60 ± 2.63	0.00 ± 0.00	14.91 ± 2.95	11.96 ± 1.72	-2.95 ± 3.41
YOS	07/28/90	17	1.93 ± 0.19	0.00 ± 0.00	0.00 ± 0.00	2.76 ± 0.85	2.90 ± 0.29	0.00 ± 0.00	4.39 ± 1.82	0.00 ± 0.00	11.98 ± 2.04	13.24 ± 1.36	1.26 ± 2.45
YOS	07/29/90	00	0.72 ± 0.15	0.00 ± 0.00	0.00 ± 0.00	3.76 ± 0.89	2.62 ± 0.26	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	7.10 ± 0.94	8.27 ± 1.25	1.17 ± 1.56
YOS	07/29/90	07	1.51 ± 0.25	0.00 ± 0.00	3.77 ± 1.48	3.70 ± 1.28	2.22 ± 0.31	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	11.20 ± 2.00	11.94 ± 1.73	0.74 ± 2.64
YOS	07/29/90	12	2.92 ± 0.33	0.00 ± 0.00	5.00 ± 1.58	0.00 ± 0.00	2.56 ± 0.36	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	10.48 ± 1.65	12.52 ± 1.69	2.04 ± 2.36
YOS	07/29/90	17	1.15 ± 0.19	0.00 ± 0.00	2.82 ± 1.04	1.90 ± 0.81	2.43 ± 0.29	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	8.30 ± 1.36	7.63 ± 1.32	-0.67 ± 1.90

Table B-1 (continued)

Individual Source Contributions to $PM_{2.5}$ Mass at Blodgett, Yosemite, Sequoia, and Tehachapi Between 7/13/90 to 8/24/90

Site[a]	Date/Time[b]		Primary Geological SCE ± σ (μg/m³)	Regional Transport SCE ± σ (μg/m³)	Primary Motor Veh. Exhaust SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Sulfate SCE ± σ (μg/m³)	Secondary Nitrate SCE ± σ (μg/m³)	Secondary OC SCE ± σ (μg/m³)	Marine Aerosol SCE ± σ (μg/m³)	Calculated Mass ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Unexplained Mass ± σ (μg/m³)
YOS	08/03/90	00	0.71 ± 0.13	0.00 ± 0.00	0.00 ± 0.00	3.20 ± 0.90	2.73 ± 0.27	0.00 ± 0.00	4.67 ± 1.87	0.00 ± 0.00	11.31 ± 2.10	9.90 ± 1.27	-1.41 ± 2.45
YOS	08/03/90	07	4.44 ± 0.44	0.00 ± 0.00	6.21 ± 1.92	3.82 ± 1.44	2.50 ± 0.39	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	16.97 ± 2.47	15.03 ± 1.80	-1.94 ± 3.06
YOS	08/03/90	12	4.56 ± 0.43	0.00 ± 0.00	4.96 ± 1.73	5.21 ± 1.67	3.73 ± 0.45	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	18.46 ± 2.48	19.84 ± 1.92	1.38 ± 3.14
YOS	08/03/90	17	1.76 ± 0.20	0.00 ± 0.00	2.13 ± 1.00	2.70 ± 0.96	2.85 ± 0.31	0.00 ± 0.00	4.42 ± 1.90	0.00 ± 0.00	13.86 ± 2.38	11.82 ± 1.34	-2.04 ± 2.73
YOS	08/04/90	00	0.69 ± 0.13	0.00 ± 0.00	0.00 ± 0.00	5.81 ± 1.21	2.77 ± 0.27	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.27 ± 1.25	8.84 ± 1.22	-0.43 ± 1.75
YOS	08/04/90	07	2.00 ± 0.26	0.00 ± 0.00	2.94 ± 1.48	5.80 ± 1.68	2.40 ± 0.32	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	13.14 ± 2.28	13.25 ± 1.79	0.11 ± 2.90
YOS	08/04/90	12	2.94 ± 0.35	0.00 ± 0.00	5.37 ± 1.86	4.88 ± 1.61	2.81 ± 0.39	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	16.00 ± 2.52	14.19 ± 1.78	-1.81 ± 3.09
YOS	08/04/90	17	1.97 ± 0.26	0.00 ± 0.00	4.46 ± 1.38	2.76 ± 1.03	3.33 ± 0.39	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	12.52 ± 1.78	13.55 ± 1.38	1.03 ± 2.25
YOS	08/05/90	00	0.74 ± 0.17	0.00 ± 0.00	2.93 ± 1.08	2.65 ± 0.94	3.60 ± 0.37	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.92 ± 1.49	8.99 ± 1.26	-0.93 ± 1.95
YOS	08/05/90	07	2.48 ± 0.31	0.00 ± 0.00	4.75 ± 1.66	3.53 ± 1.31	2.65 ± 0.36	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	13.41 ± 2.17	13.76 ± 1.76	0.35 ± 2.79
YOS	08/05/90	12	3.27 ± 0.35	0.00 ± 0.00	4.72 ± 1.57	3.15 ± 1.24	2.30 ± 0.34	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	13.44 ± 2.06	11.24 ± 1.74	-2.20 ± 2.70
YOS	08/05/90	17	3.47 ± 0.32	0.00 ± 0.00	3.81 ± 1.25	2.32 ± 0.94	1.30 ± 0.23	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	10.90 ± 1.61	9.39 ± 1.28	-1.51 ± 2.06
YOS	08/06/90	00	0.95 ± 0.14	0.00 ± 0.00	0.00 ± 0.00	2.95 ± 0.87	1.12 ± 0.14	0.00 ± 0.00	4.18 ± 1.73	0.00 ± 0.00	9.20 ± 1.95	12.72 ± 1.35	3.52 ± 2.37
YOS	08/06/90	07	1.92 ± 0.28	0.00 ± 0.00	4.93 ± 1.68	3.92 ± 1.38	1.30 ± 0.28	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	12.07 ± 2.21	12.28 ± 1.74	0.21 ± 2.81
YOS	08/06/90	12	3.22 ± 0.38	0.00 ± 0.00	6.40 ± 1.96	4.08 ± 1.49	2.29 ± 0.37	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	15.99 ± 2.52	14.11 ± 1.81	-1.88 ± 3.10
YOS	08/06/90	17	3.43 ± 0.32	0.00 ± 0.00	3.69 ± 1.30	3.15 ± 1.09	1.99 ± 0.28	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	12.26 ± 1.75	13.30 ± 1.37	1.04 ± 2.22
YOS	08/22/90	00	0.41 ± 0.14	0.00 ± 0.00	0.00 ± 0.00	31.12 ± 3.95	2.45 ± 0.25	0.00 ± 0.00	0.00 ± 0.00	0.29 ± 0.09	34.27 ± 3.96	58.73 ± 3.16	24.46 ± 5.07
YOS	08/22/90	07	0.96 ± 0.19	0.00 ± 0.00	0.00 ± 0.00	59.10 ± 6.81	2.59 ± 0.29	0.00 ± 0.00	0.00 ± 0.00	0.43 ± 0.12	63.08 ± 6.82	66.07 ± 3.69	2.99 ± 7.75
YOS	08/22/90	12	1.11 ± 0.19	0.00 ± 0.00	0.00 ± 0.00	15.94 ± 2.70	2.32 ± 0.26	0.00 ± 0.00	0.00 ± 0.00	0.43 ± 0.12	19.80 ± 2.72	15.94 ± 1.81	-3.86 ± 3.27
YOS	08/22/90	17	1.22 ± 0.17	0.00 ± 0.00	0.00 ± 0.00	12.61 ± 2.29	2.31 ± 0.25	0.00 ± 0.00	0.00 ± 0.00	0.29 ± 0.09	16.43 ± 2.31	13.04 ± 1.36	-3.39 ± 2.68
YOS	08/23/90	00	0.21 ± 0.14	0.00 ± 0.00	0.00 ± 0.00	52.67 ± 10.06	1.94 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	0.10 ± 0.08	54.92 ± 10.07	58.69 ± 3.16	3.77 ± 10.55
YOS	08/23/90	07	1.49 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	47.20 ± 5.61	2.30 ± 0.27	0.00 ± 0.00	0.00 ± 0.00	0.29 ± 0.12	51.28 ± 5.62	59.77 ± 3.41	8.49 ± 6.57
YOS	08/23/90	12	1.16 ± 0.20	0.00 ± 0.00	0.00 ± 0.00	6.89 ± 1.62	1.89 ± 0.23	0.00 ± 0.00	0.00 ± 0.00	0.39 ± 0.12	10.33 ± 1.65	16.80 ± 1.85	6.47 ± 2.48
YOS	08/23/90	17	1.73 ± 0.19	0.00 ± 0.00	0.00 ± 0.00	7.02 ± 1.49	1.72 ± 0.20	0.00 ± 0.00	0.00 ± 0.00	0.23 ± 0.09	10.70 ± 1.52	13.31 ± 1.37	2.61 ± 2.05
YOS	08/24/90	00	0.64 ± 0.15	0.00 ± 0.00	0.68 ± 0.73	38.00 ± 4.67	1.36 ± 0.18	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	40.68 ± 4.73	55.86 ± 3.02	15.18 ± 5.61
YOS	08/24/90	07	1.70 ± 0.23	0.00 ± 0.00	0.00 ± 0.00	23.40 ± 4.13	1.65 ± 0.25	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	26.75 ± 4.14	23.95 ± 2.12	-2.80 ± 4.65
YOS	08/24/90	12	2.79 ± 0.30	0.00 ± 0.00	3.01 ± 1.41	3.00 ± 1.15	0.77 ± 0.20	0.00 ± 0.00	0.00 ± 0.00	0.30 ± 0.50	9.87 ± 1.92	8.28 ± 1.68	-1.59 ± 2.55
YOS	08/24/90	17	1.70 ± 0.23	0.00 ± 0.00	3.96 ± 1.25	2.56 ± 0.95	1.09 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.31 ± 1.60	9.41 ± 1.26	0.10 ± 2.04

[a] Site names: "BLO" = Blodgett, "YOS" = Yosemite, "SLK" = Sequoia, "TEH" = Tehachapi.

[b] Sampling periods: 0000 - 0700, 0701 - 1200, 1201 - 1700, 1701 - 2400 (PDT).

Table B-2

Individual Source Contributions to PM_{10} Mass at Yosemite and Sequoia Between 7/13/90 to 8/24/90

Site[a]	Date/Time[b]		Primary Geological SCE ± σ (μg/m³)	Regional Transport SCE ± σ (μg/m³)	Primary Motor Veh. Exhaust SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Sulfate SCE ± σ (μg/m³)	Secondary Nitrate SCE ± σ (μg/m³)	Secondary OC SCE ± σ (μg/m³)	Marine Aerosol SCE ± σ (μg/m³)	Calculated Mass ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Unexplained Mass ± σ (μg/m³)
SLK	07/16/90	00	3.08 ± 0.51	0.00 ± 0.00	1.62 ± 0.71	0.00 ± 0.00	2.30 ± 0.25	0.00 ± 0.00	3.64 ± 1.50	0.31 ± 0.09	10.95 ± 1.76	14.47 ± 2.46	3.52 ± 3.02
SLK	07/16/90	07	9.79 ± 1.16	8.07 ± 1.85	2.68 ± 1.45	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.35 ± 0.15	20.89 ± 2.31	23.66 ± 3.19	2.77 ± 3.94
SLK	07/16/90	12	14.10 ± 1.37	0.00 ± 0.00	3.04 ± 1.20	0.00 ± 0.00	4.22 ± 0.44	0.00 ± 0.00	5.84 ± 2.38	0.78 ± 0.19	27.98 ± 3.03	27.17 ± 3.34	-0.81 ± 4.51
SLK	07/16/90	17	12.58 ± 1.13	0.00 ± 0.00	2.12 ± 0.90	0.00 ± 0.00	4.00 ± 0.39	0.00 ± 0.00	4.51 ± 1.82	0.64 ± 0.15	23.85 ± 2.36	24.98 ± 3.04	1.13 ± 3.85
SLK	07/17/90	00	7.95 ± 0.91	4.42 ± 0.77	0.00 ± 0.00	0.00 ± 0.00	3.47 ± 0.46	0.00 ± 0.00	3.12 ± 1.51	0.65 ± 0.14	19.61 ± 2.03	22.49 ± 2.51	2.88 ± 3.23
SLK	07/17/90	07	11.39 ± 1.21	0.00 ± 0.00	3.41 ± 1.27	0.00 ± 0.00	4.35 ± 0.46	0.00 ± 0.00	6.41 ± 2.57	0.67 ± 0.17	26.23 ± 3.15	25.72 ± 3.27	-0.51 ± 4.54
SLK	07/17/90	12	12.05 ± 1.35	8.61 ± 3.06	3.23 ± 1.54	0.00 ± 0.00	2.10 ± 0.69	0.00 ± 0.00	0.00 ± 0.00	1.08 ± 0.22	27.07 ± 2.79	31.32 ± 3.42	4.25 ± 4.41
SLK	07/17/90	17	5.96 ± 0.74	9.41 ± 1.56	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	2.91 ± 1.91	0.80 ± 0.15	19.08 ± 2.40	16.87 ± 2.48	-2.21 ± 3.45
SLK	07/21/90	00	5.09 ± 0.71	9.78 ± 2.31	0.00 ± 0.00	0.00 ± 0.00	1.72 ± 0.68	0.00 ± 0.00	0.00 ± 0.00	0.60 ± 0.13	17.19 ± 1.82	24.14 ± 2.62	6.95 ± 3.19
SLK	07/21/90	07	8.47 ± 1.04	7.40 ± 1.19	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	4.17 ± 2.15	0.75 ± 0.17	20.79 ± 2.63	26.54 ± 3.32	5.75 ± 4.24
SLK	07/21/90	12	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
SLK	07/21/90	17	6.70 ± 0.84	6.93 ± 0.96	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	4.76 ± 2.10	0.28 ± 0.11	18.67 ± 2.47	17.48 ± 2.55	-1.19 ± 3.55
SLK	07/22/90	00	5.04 ± 0.66	0.00 ± 0.00	0.00 ± 0.00	2.91 ± 0.90	1.59 ± 0.18	0.00 ± 0.00	4.98 ± 1.94	0.21 ± 0.10	14.73 ± 2.25	15.12 ± 2.44	0.39 ± 3.32
SLK	07/22/90	07	2.14 ± 0.58	4.08 ± 0.92	4.05 ± 1.64	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	6.60 ± 2.79	0.20 ± 0.12	17.07 ± 3.43	10.12 ± 3.01	-6.95 ± 4.56
SLK	07/22/90	12	5.31 ± 0.80	6.59 ± 0.96	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.36 ± 0.13	12.26 ± 1.27	11.35 ± 2.98	-0.91 ± 3.24
SLK	07/22/90	17	7.65 ± 0.82	0.00 ± 0.00	0.00 ± 0.00	1.50 ± 0.61	1.93 ± 0.21	0.18 ± 0.07	4.44 ± 1.72	0.00 ± 0.00	15.70 ± 2.01	16.60 ± 2.27	0.90 ± 3.03
SLK	07/27/90	00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
SLK	07/27/90	07	18.16 ± 1.78	0.00 ± 0.00	4.71 ± 1.39	0.00 ± 0.00	1.49 ± 0.27	0.00 ± 0.00	0.00 ± 0.00	0.75 ± 0.20	25.11 ± 2.28	37.57 ± 3.71	12.46 ± 4.35
SLK	07/27/90	12	13.14 ± 1.38	0.00 ± 0.00	2.54 ± 1.06	0.00 ± 0.00	1.40 ± 0.23	0.00 ± 0.00	0.00 ± 0.00	1.03 ± 0.23	18.11 ± 1.77	23.31 ± 3.10	5.20 ± 3.57
SLK	07/27/90	17	9.05 ± 1.02	12.01 ± 2.25	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.40 ± 2.82	21.46 ± 3.35	22.63 ± 2.78	1.17 ± 4.35
SLK	07/28/90	00	3.48 ± 0.57	1.77 ± 0.46	0.00 ± 0.00	2.60 ± 0.80	1.40 ± 0.26	0.00 ± 0.00	0.00 ± 0.00	0.19 ± 0.09	9.44 ± 1.23	10.23 ± 2.25	0.79 ± 2.56
SLK	07/28/90	07	9.77 ± 1.20	4.46 ± 1.46	4.01 ± 1.57	0.00 ± 0.00	1.66 ± 0.46	0.00 ± 0.00	0.00 ± 0.00	0.81 ± 4.13	20.71 ± 4.76	20.18 ± 3.14	-0.53 ± 5.70
SLK	07/28/90	12	7.75 ± 1.06	5.50 ± 1.30	0.00 ± 0.00	0.00 ± 0.00	2.07 ± 0.49	0.00 ± 0.00	2.32 ± 1.63	0.00 ± 4.47	17.45 ± 5.03	10.21 ± 3.07	-7.24 ± 5.89
SLK	07/28/90	17	14.09 ± 1.46	3.90 ± 0.96	0.00 ± 0.00	2.78 ± 1.00	3.54 ± 0.46	0.00 ± 0.00	0.00 ± 0.00	0.25 ± 0.14	24.56 ± 2.08	27.83 ± 2.69	3.27 ± 3.40
SLK	07/29/90	00	5.99 ± 0.74	3.71 ± 0.61	0.00 ± 0.00	0.00 ± 0.00	1.82 ± 0.35	0.00 ± 0.00	0.00 ± 0.00	0.06 ± 0.13	11.58 ± 1.13	15.92 ± 2.39	4.34 ± 2.64
SLK	07/29/90	07	6.39 ± 0.91	3.13 ± 0.96	0.00 ± 0.00	1.96 ± 0.96	2.32 ± 0.40	0.00 ± 0.00	0.00 ± 0.00	0.17 ± 0.15	13.97 ± 1.70	13.30 ± 3.16	-0.67 ± 3.59
SLK	07/29/90	12	7.75 ± 0.98	4.83 ± 1.08	0.00 ± 0.00	0.00 ± 0.00	1.39 ± 0.43	0.00 ± 0.00	0.00 ± 0.00	0.13 ± 0.17	14.10 ± 1.50	16.22 ± 3.06	2.12 ± 3.41
SLK	07/29/90	17	11.30 ± 1.20	3.47 ± 0.79	0.00 ± 0.00	1.75 ± 0.83	2.90 ± 0.40	0.00 ± 0.00	3.05 ± 1.51	0.35 ± 0.13	22.82 ± 2.32	23.93 ± 2.55	1.11 ± 3.45
SLK	08/03/90	00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
SLK	08/03/90	07	9.54 ± 1.14	7.45 ± 1.96	0.00 ± 0.00	0.00 ± 0.00	2.43 ± 0.61	0.00 ± 0.00	4.58 ± 2.26	0.63 ± 0.17	24.63 ± 2.96	28.67 ± 3.43	4.04 ± 4.53
SLK	08/03/90	12	14.99 ± 1.65	7.46 ± 1.96	0.00 ± 0.00	0.00 ± 0.00	1.31 ± 0.58	0.00 ± 0.00	4.01 ± 2.15	1.12 ± 0.24	28.89 ± 3.12	26.34 ± 3.36	-2.55 ± 4.59
SLK	08/03/90	17	15.15 ± 1.53	9.07 ± 1.54	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	3.76 ± 2.07	0.82 ± 0.33	28.80 ± 2.88	28.29 ± 2.82	-0.51 ± 4.03
SLK	08/04/90	00	3.54 ± 0.56	5.53 ± 1.00	0.00 ± 0.00	0.00 ± 0.00	1.83 ± 0.45	0.00 ± 0.00	0.00 ± 0.00	0.84 ± 0.22	11.74 ± 1.25	11.89 ± 2.21	0.15 ± 2.54

Table B-2 (continued)

Individual Source Contributions to PM_{10} Mass at Yosemite and Sequoia Between 7/13/90 to 8/24/90

Site[a]	Date/Time[b]		Primary Geological SCE ± σ ($\mu g/m^3$)	Regional Transport SCE ± σ ($\mu g/m^3$)	Primary Motor Veh. Exhaust SCE ± σ ($\mu g/m^3$)	Vegetative Burning SCE ± σ ($\mu g/m^3$)	Secondary Sulfate SCE ± σ ($\mu g/m^3$)	Secondary Nitrate SCE ± σ ($\mu g/m^3$)	Secondary OC SCE ± σ ($\mu g/m^3$)	Marine Aerosol SCE ± σ ($\mu g/m^3$)	Calculated Mass ± σ ($\mu g/m^3$)	Measured Mass ± σ ($\mu g/m^3$)	Unexplained Mass ± σ ($\mu g/m^3$)
SLK	08/04/90	07	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
SLK	08/04/90	12	7.22 ± 0.95	6.56 ± 0.98	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.78 ± 0.27	14.56 ± 1.40	14.68 ± 2.99	0.12 ± 3.30
SLK	08/04/90	17	13.28 ± 1.36	5.38 ± 1.06	0.00 ± 0.00	0.00 ± 0.00	1.40 ± 0.43	0.00 ± 0.00	5.75 ± 2.27	0.71 ± 0.20	26.52 ± 2.88	23.42 ± 2.42	-3.10 ± 3.76
SLK	08/05/90	00	5.89 ± 0.75	2.24 ± 0.49	0.00 ± 0.00	2.28 ± 0.81	1.70 ± 0.29	0.00 ± 0.00	4.11 ± 1.73	0.77 ± 0.16	16.99 ± 2.20	20.91 ± 2.45	3.92 ± 3.29
SLK	08/05/90	07	7.72 ± 1.00	3.93 ± 1.19	0.00 ± 0.00	4.85 ± 1.46	1.60 ± 0.41	0.00 ± 0.00	8.06 ± 3.18	0.26 ± 0.16	26.42 ± 3.82	31.67 ± 3.56	5.25 ± 5.22
SLK	08/05/90	12	8.45 ± 1.05	5.72 ± 1.42	0.00 ± 0.00	0.00 ± 0.00	1.08 ± 0.47	0.00 ± 0.00	3.12 ± 1.80	0.68 ± 0.25	19.05 ± 2.46	19.51 ± 3.05	0.46 ± 3.92
SLK	08/05/90	17	11.61 ± 1.21	6.91 ± 0.94	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	3.67 ± 1.84	0.57 ± 0.15	22.76 ± 2.41	25.44 ± 2.56	2.68 ± 3.52
SLK	08/06/90	00	4.38 ± 0.63	2.56 ± 0.56	0.00 ± 0.00	1.58 ± 0.74	1.12 ± 0.28	0.00 ± 0.00	4.56 ± 1.84	0.42 ± 0.11	14.62 ± 2.23	14.50 ± 2.27	-0.12 ± 3.18
SLK	08/06/90	07	8.50 ± 1.04	0.00 ± 0.00	3.16 ± 1.41	2.25 ± 0.98	1.29 ± 0.24	0.00 ± 0.00	0.00 ± 0.00	0.48 ± 0.15	15.68 ± 2.03	17.85 ± 3.07	2.17 ± 3.68
SLK	08/06/90	12	9.65 ± 1.14	5.52 ± 1.30	0.00 ± 0.00	0.00 ± 0.00	1.26 ± 0.46	0.00 ± 0.00	3.58 ± 1.88	0.61 ± 0.17	20.62 ± 2.53	20.02 ± 3.15	-0.60 ± 4.04
SLK	08/06/90	17	10.64 ± 1.13	3.20 ± 0.77	0.00 ± 0.00	2.22 ± 0.90	1.68 ± 0.34	0.00 ± 0.00	3.29 ± 1.57	0.56 ± 0.18	21.59 ± 2.34	23.92 ± 2.55	2.33 ± 3.46
SLK	08/22/90	00	5.80 ± 0.74	2.96 ± 0.90	3.98 ± 1.51	0.00 ± 0.00	1.58 ± 0.36	0.00 ± 0.00	0.00 ± 0.00	1.28 ± 0.64	15.60 ± 2.07	21.72 ± 2.52	6.12 ± 3.26
SLK	08/22/90	07	9.15 ± 1.08	0.00 ± 0.00	4.91 ± 1.97	0.00 ± 0.00	2.05 ± 0.33	0.00 ± 0.00	3.12 ± 2.00	1.45 ± 0.80	20.68 ± 3.13	24.84 ± 3.30	4.16 ± 4.55
SLK	08/22/90	12	11.77 ± 1.34	2.72 ± 1.04	3.38 ± 1.43	0.00 ± 0.00	2.16 ± 0.40	0.00 ± 0.00	0.00 ± 0.00	1.51 ± 0.61	21.54 ± 2.32	23.68 ± 3.10	2.14 ± 3.87
SLK	08/22/90	17	12.63 ± 1.32	8.14 ± 1.77	3.05 ± 1.47	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	1.12 ± 0.58	24.94 ± 2.45	28.98 ± 2.71	4.04 ± 3.65
SLK	08/23/90	00	6.23 ± 0.76	1.97 ± 0.49	0.00 ± 0.00	3.43 ± 0.95	2.21 ± 0.31	0.00 ± 0.00	0.00 ± 0.00	0.98 ± 0.18	14.82 ± 1.44	21.27 ± 2.46	6.45 ± 2.85
SLK	08/23/90	07	8.64 ± 1.08	3.56 ± 1.10	0.00 ± 0.00	8.62 ± 1.89	1.76 ± 0.40	0.00 ± 0.00	0.00 ± 0.00	0.74 ± 0.22	23.32 ± 2.46	29.00 ± 3.41	5.68 ± 4.20
SLK	08/23/90	12	11.68 ± 1.31	3.70 ± 1.08	0.00 ± 0.00	2.14 ± 0.99	0.80 ± 0.37	0.00 ± 0.00	0.00 ± 0.00	1.17 ± 0.25	19.49 ± 1.99	20.35 ± 3.11	0.86 ± 3.69
SLK	08/23/90	17	12.85 ± 1.33	4.00 ± 0.96	0.00 ± 0.00	3.51 ± 1.07	1.19 ± 0.36	0.00 ± 0.00	0.00 ± 0.00	1.00 ± 0.23	22.55 ± 2.01	23.18 ± 2.56	0.63 ± 3.25
SLK	08/24/90	00	6.56 ± 0.79	2.27 ± 0.59	2.54 ± 1.01	0.00 ± 0.00	0.88 ± 0.27	0.00 ± 0.00	0.00 ± 0.00	0.45 ± 0.12	12.70 ± 1.53	17.11 ± 2.32	4.41 ± 2.78
SLK	08/24/90	07	11.22 ± 1.28	2.05 ± 0.77	0.00 ± 0.00	3.61 ± 1.10	0.98 ± 0.29	0.00 ± 0.00	0.00 ± 0.00	1.18 ± 0.23	19.04 ± 1.94	19.18 ± 3.06	0.14 ± 3.62
SLK	08/24/90	12	21.14 ± 2.14	7.97 ± 1.30	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	2.08 ± 0.41	31.19 ± 2.47	23.29 ± 3.23	-7.90 ± 4.07
SLK	08/24/90	17	15.65 ± 1.57	4.53 ± 0.59	0.00 ± 0.00	4.38 ± 1.18	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	1.96 ± 0.32	26.52 ± 2.13	25.72 ± 2.52	-0.80 ± 3.30
YOS	07/13/90	00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
YOS	07/13/90	07	9.35 ± 1.12	0.00 ± 0.00	6.48 ± 1.89	0.00 ± 0.00	0.92 ± 0.31	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	16.75 ± 2.22	11.26 ± 3.60	-5.49 ± 4.23
YOS	07/13/90	12	15.56 ± 1.42	0.00 ± 0.00	3.81 ± 1.55	0.00 ± 0.00	3.03 ± 0.38	0.00 ± 0.00	11.79 ± 4.18	0.40 ± 0.63	34.59 ± 4.74	27.03 ± 3.45	-7.56 ± 5.86
YOS	07/13/90	17	8.59 ± 0.86	0.00 ± 0.00	2.16 ± 0.98	0.00 ± 0.00	1.51 ± 0.22	0.00 ± 0.00	6.11 ± 2.31	0.00 ± 0.00	18.37 ± 2.66	15.19 ± 2.46	-3.18 ± 3.62
YOS	07/14/90	00	3.10 ± 0.53	0.00 ± 0.00	1.73 ± 0.85	0.00 ± 0.00	0.83 ± 0.16	0.00 ± 0.00	4.63 ± 1.83	0.00 ± 0.00	10.29 ± 2.09	9.35 ± 2.42	-0.94 ± 3.20
YOS	07/14/90	07	6.23 ± 0.81	0.00 ± 0.00	2.47 ± 1.12	0.00 ± 0.00	1.31 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	10.01 ± 1.40	10.65 ± 3.02	0.64 ± 3.33
YOS	07/14/90	12	6.10 ± 0.90	0.00 ± 0.00	6.47 ± 1.73	0.00 ± 0.00	1.75 ± 0.33	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	14.32 ± 1.97	14.89 ± 3.31	0.57 ± 3.85
YOS	07/14/90	17	2.32 ± 0.50	0.00 ± 0.00	1.24 ± 0.69	0.00 ± 0.00	1.33 ± 0.18	0.00 ± 0.00	10.07 ± 3.42	0.00 ± 0.00	14.96 ± 3.53	10.31 ± 2.30	-4.65 ± 4.21
YOS	07/21/90	00	5.46 ± 0.65	0.00 ± 0.00	2.29 ± 0.93	0.00 ± 0.00	1.65 ± 0.22	0.00 ± 0.00	7.96 ± 2.82	0.00 ± 0.00	17.36 ± 3.05	14.50 ± 2.30	-2.86 ± 3.82

Table B-2 (continued)

Individual Source Contributions to PM_{10} Mass at Yosemite and Sequoia Between 7/13/90 to 8/24/90

Site[a]	Date/Time[b]		Primary Geological SCE ± σ (μg/m³)	Regional Transport SCE ± σ (μg/m³)	Primary Motor Veh. Exhaust SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Sulfate SCE ± σ (μg/m³)	Secondary Nitrate SCE ± σ (μg/m³)	Secondary OC SCE ± σ (μg/m³)	Marine Aerosol SCE ± σ (μg/m³)	Calculated Mass ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Unexplained Mass ± σ (μg/m³)
YOS	07/21/90	07	7.80 ± 0.89	0.00 ± 0.00	3.21 ± 1.43	3.18 ± 1.18	1.54 ± 0.26	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	15.73 ± 2.07	18.90 ± 3.18	3.17 ± 3.79
YOS	07/21/90	12	6.50 ± 0.80	0.00 ± 0.00	1.87 ± 0.96	0.00 ± 0.00	1.46 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.83 ± 1.27	17.05 ± 3.15	7.22 ± 3.40
YOS	07/21/90	17	7.60 ± 0.78	0.00 ± 0.00	0.00 ± 0.00	1.71 ± 0.67	1.65 ± 0.19	0.00 ± 0.00	8.76 ± 3.03	0.00 ± 0.00	19.72 ± 3.21	14.91 ± 2.46	-4.81 ± 4.04
YOS	07/22/90	00	4.22 ± 0.59	0.00 ± 0.00	1.90 ± 0.85	0.00 ± 0.00	1.29 ± 0.19	0.00 ± 0.00	4.35 ± 1.74	0.00 ± 0.00	11.76 ± 2.03	10.40 ± 2.19	-1.36 ± 2.99
YOS	07/22/90	07	8.31 ± 1.00	0.00 ± 0.00	2.18 ± 1.06	0.00 ± 0.00	1.37 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	11.86 ± 1.47	14.35 ± 3.32	2.49 ± 3.63
YOS	07/22/90	12	6.32 ± 0.77	0.00 ± 0.00	3.49 ± 1.38	0.00 ± 0.00	1.10 ± 0.23	0.00 ± 0.00	9.87 ± 3.58	0.00 ± 0.00	20.78 ± 3.92	12.00 ± 3.08	-8.78 ± 4.99
YOS	07/22/90	17	6.29 ± 0.72	0.00 ± 0.00	2.43 ± 0.96	0.00 ± 0.00	1.15 ± 0.19	0.00 ± 0.00	4.62 ± 1.85	0.00 ± 0.00	14.49 ± 2.21	10.67 ± 2.30	-3.82 ± 3.19
YOS	07/27/90	00	6.87 ± 0.79	0.00 ± 0.00	2.63 ± 1.00	0.00 ± 0.00	1.82 ± 0.24	0.00 ± 0.00	4.57 ± 1.90	0.00 ± 0.00	15.89 ± 2.30	13.26 ± 2.24	-2.63 ± 3.21
YOS	07/27/90	07	9.98 ± 1.09	0.00 ± 0.00	3.71 ± 1.37	0.00 ± 0.00	1.94 ± 0.29	0.00 ± 0.00	8.94 ± 3.32	0.00 ± 0.00	24.57 ± 3.76	18.85 ± 3.15	-5.72 ± 4.91
YOS	07/27/90	12	12.14 ± 1.16	0.00 ± 0.00	3.43 ± 1.46	3.11 ± 1.22	2.51 ± 0.33	0.00 ± 0.00	8.76 ± 3.35	0.00 ± 0.00	29.95 ± 4.04	21.97 ± 3.28	-7.98 ± 5.20
YOS	07/27/90	17	13.29 ± 1.24	0.00 ± 0.00	3.35 ± 1.16	0.00 ± 0.00	3.40 ± 0.37	0.00 ± 0.00	4.77 ± 2.00	0.00 ± 0.00	24.81 ± 2.64	23.15 ± 2.60	-1.66 ± 3.71
YOS	07/28/90	00	8.28 ± 0.87	0.00 ± 0.00	2.54 ± 0.99	0.00 ± 0.00	2.63 ± 0.30	0.00 ± 0.00	3.79 ± 1.65	0.00 ± 0.00	17.24 ± 2.13	17.48 ± 2.36	0.24 ± 3.18
YOS	07/28/90	07	9.33 ± 1.01	0.00 ± 0.00	3.75 ± 1.44	2.78 ± 1.11	2.61 ± 0.34	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	18.47 ± 2.11	18.79 ± 3.16	0.32 ± 3.80
YOS	07/28/90	12	12.30 ± 1.23	0.00 ± 0.00	3.18 ± 1.27	0.00 ± 0.00	2.86 ± 0.35	0.00 ± 0.00	6.60 ± 2.63	0.00 ± 0.00	24.94 ± 3.18	19.85 ± 3.17	-5.09 ± 4.49
YOS	07/28/90	17	9.98 ± 0.95	0.00 ± 0.00	0.00 ± 0.00	2.76 ± 0.85	2.90 ± 0.29	0.00 ± 0.00	4.39 ± 1.82	0.00 ± 0.00	20.03 ± 2.24	19.18 ± 2.51	-0.85 ± 3.36
YOS	07/29/90	00	6.49 ± 0.76	0.00 ± 0.00	0.00 ± 0.00	3.76 ± 0.89	2.62 ± 0.26	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	12.87 ± 1.20	14.52 ± 2.30	1.65 ± 2.59
YOS	07/29/90	07	9.32 ± 1.03	0.00 ± 0.00	3.77 ± 1.48	3.70 ± 1.28	2.22 ± 0.31	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	19.01 ± 2.24	17.89 ± 3.16	-1.12 ± 3.87
YOS	07/29/90	12	11.58 ± 1.14	0.00 ± 0.00	5.00 ± 1.58	0.00 ± 0.00	2.56 ± 0.36	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	19.14 ± 1.98	18.12 ± 3.11	-1.02 ± 3.69
YOS	07/29/90	17	6.30 ± 0.73	0.00 ± 0.00	2.82 ± 1.04	1.90 ± 0.81	2.43 ± 0.29	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	13.45 ± 1.53	13.33 ± 2.37	-0.12 ± 2.82
YOS	08/03/90	00	5.41 ± 0.65	0.00 ± 0.00	0.00 ± 0.00	3.20 ± 0.90	2.73 ± 0.27	0.00 ± 0.00	4.67 ± 1.87	0.00 ± 0.00	16.01 ± 2.20	14.98 ± 2.32	-1.03 ± 3.20
YOS	08/03/90	07	25.73 ± 2.22	0.00 ± 0.00	6.21 ± 1.92	3.82 ± 1.44	2.50 ± 0.39	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	38.26 ± 3.29	33.53 ± 3.52	-4.73 ± 4.82
YOS	08/03/90	12	19.52 ± 1.71	0.00 ± 0.00	4.96 ± 1.73	5.21 ± 1.67	3.73 ± 0.45	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	33.42 ± 2.98	29.18 ± 3.53	-4.24 ± 4.62
YOS	08/03/90	17	8.78 ± 0.87	0.00 ± 0.00	2.13 ± 1.00	2.70 ± 0.96	2.85 ± 0.31	0.00 ± 0.00	4.42 ± 1.90	0.00 ± 0.00	20.88 ± 2.53	21.14 ± 2.55	0.26 ± 3.59
YOS	08/04/90	00	5.35 ± 0.66	0.00 ± 0.00	0.00 ± 0.00	5.81 ± 1.21	2.77 ± 0.27	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	13.93 ± 1.41	11.82 ± 2.21	-2.11 ± 2.62
YOS	08/04/90	07	8.84 ± 0.98	0.00 ± 0.00	2.94 ± 1.48	5.80 ± 1.68	2.40 ± 0.32	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	19.98 ± 2.47	14.52 ± 3.16	-5.46 ± 4.01
YOS	08/04/90	12	14.31 ± 1.39	0.00 ± 0.00	5.37 ± 1.86	4.88 ± 1.61	2.81 ± 0.39	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	27.37 ± 2.86	25.47 ± 3.31	-1.90 ± 4.37
YOS	08/04/90	17	10.77 ± 1.05	0.00 ± 0.00	4.46 ± 1.38	2.76 ± 1.03	3.33 ± 0.39	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	21.32 ± 2.05	23.12 ± 2.59	1.80 ± 3.30
YOS	08/05/90	00	6.08 ± 0.72	0.00 ± 0.00	2.93 ± 1.08	2.65 ± 0.94	3.60 ± 0.37	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	15.26 ± 1.65	17.68 ± 2.34	2.42 ± 2.86
YOS	08/05/90	07	12.04 ± 1.21	0.00 ± 0.00	4.75 ± 1.66	3.53 ± 1.31	2.65 ± 0.36	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	22.97 ± 2.47	20.42 ± 3.20	-2.55 ± 4.04
YOS	08/05/90	12	10.79 ± 1.09	0.00 ± 0.00	4.72 ± 1.57	3.15 ± 1.24	2.30 ± 0.34	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	20.96 ± 2.30	16.38 ± 3.27	-4.58 ± 4.00
YOS	08/05/90	17	13.39 ± 1.16	0.00 ± 0.00	3.81 ± 1.25	2.32 ± 0.94	1.30 ± 0.23	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	20.82 ± 1.96	18.43 ± 2.38	-2.39 ± 3.08
YOS	08/06/90	00	1.89 ± 0.44	0.00 ± 0.00	0.00 ± 0.00	2.95 ± 0.87	1.12 ± 0.14	0.00 ± 0.00	4.18 ± 1.73	0.00 ± 0.00	10.14 ± 1.99	12.72 ± 2.37	2.58 ± 3.09

Table B-2 (continued)

Individual Source Contributions to PM_{10} Mass at Yosemite and Sequoia Between 7/13/90 to 8/24/90

Site[a]	Date/Time[b]		Primary Geological SCE ± σ (μg/m³)	Regional Transport SCE ± σ (μg/m³)	Primary Motor Veh. Exhaust SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Sulfate SCE ± σ (μg/m³)	Secondary Nitrate SCE ± σ (μg/m³)	Secondary OC SCE ± σ (μg/m³)	Marine Aerosol SCE ± σ (μg/m³)	Calculated Mass ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Unexplained Mass ± σ (μg/m³)
YOS	08/06/90	07	9.77 ± 1.06	0.00 ± 0.00	4.93 ± 1.68	3.92 ± 1.38	1.30 ± 0.28	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	19.92 ± 2.43	19.36 ± 3.17	-0.56 ± 3.99
YOS	08/06/90	12	13.86 ± 1.34	0.00 ± 0.00	6.40 ± 1.96	4.08 ± 1.49	2.29 ± 0.37	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	26.63 ± 2.83	27.40 ± 3.37	0.77 ± 4.40
YOS	08/06/90	17	12.46 ± 1.11	0.00 ± 0.00	3.69 ± 1.30	3.15 ± 1.09	1.99 ± 0.28	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	21.29 ± 2.05	23.22 ± 2.60	1.93 ± 3.31
YOS	08/22/90	00	6.16 ± 0.76	0.00 ± 0.00	0.00 ± 0.00	37.33 ± 6.03	2.45 ± 0.25	0.00 ± 0.00	0.00 ± 0.00	0.29 ± 0.09	46.23 ± 6.08	73.00 ± 5.91	26.77 ± 8.48
YOS	08/22/90	07	11.47 ± 1.23	0.00 ± 0.00	0.00 ± 0.00	59.10 ± 6.81	2.59 ± 0.29	0.00 ± 0.00	0.00 ± 0.00	0.43 ± 0.12	73.59 ± 6.93	81.47 ± 6.84	7.88 ± 9.74
YOS	08/22/90	12	8.13 ± 0.95	0.00 ± 0.00	0.00 ± 0.00	15.94 ± 2.70	2.32 ± 0.26	0.00 ± 0.00	0.00 ± 0.00	0.43 ± 0.12	26.82 ± 2.87	24.01 ± 3.30	-2.81 ± 4.37
YOS	08/22/90	17	10.28 ± 1.04	0.00 ± 0.00	0.00 ± 0.00	12.96 ± 3.53	2.31 ± 0.25	0.00 ± 0.00	0.00 ± 0.00	0.29 ± 0.09	25.84 ± 3.69	21.77 ± 2.54	-4.07 ± 4.48
YOS	08/23/90	00	5.46 ± 0.72	0.00 ± 0.00	0.00 ± 0.00	60.02 ± 11.18	1.94 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	0.10 ± 0.08	67.52 ± 11.21	70.63 ± 5.84	3.11 ± 12.64
YOS	08/23/90	07	17.13 ± 1.66	0.00 ± 0.00	0.00 ± 0.00	47.20 ± 5.61	2.30 ± 0.27	0.00 ± 0.00	0.00 ± 0.00	0.29 ± 0.12	66.92 ± 5.86	77.37 ± 6.43	10.45 ± 8.70
YOS	08/23/90	12	9.36 ± 1.06	0.00 ± 0.00	0.00 ± 0.00	6.99 ± 3.85	1.89 ± 0.23	0.00 ± 0.00	0.00 ± 0.00	0.39 ± 0.12	18.63 ± 4.00	25.81 ± 3.41	7.18 ± 5.26
YOS	08/23/90	17	12.77 ± 1.20	0.00 ± 0.00	0.00 ± 0.00	7.02 ± 1.49	1.72 ± 0.20	0.00 ± 0.00	0.00 ± 0.00	0.23 ± 0.09	21.74 ± 1.92	26.16 ± 2.68	4.42 ± 3.30
YOS	08/24/90	00	8.66 ± 0.95	0.00 ± 0.00	0.68 ± 0.73	41.83 ± 6.63	1.36 ± 0.18	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	52.53 ± 6.73	70.51 ± 5.68	17.98 ± 8.81
YOS	08/24/90	07	19.25 ± 1.86	0.00 ± 0.00	0.00 ± 0.00	23.40 ± 4.13	1.65 ± 0.25	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	44.30 ± 4.53	52.94 ± 4.38	8.64 ± 6.30
YOS	08/24/90	12	16.21 ± 1.52	0.00 ± 0.00	3.01 ± 1.41	3.00 ± 1.15	0.77 ± 0.20	0.00 ± 0.00	0.00 ± 0.00	0.30 ± 0.50	23.29 ± 2.43	22.01 ± 3.15	-1.28 ± 3.98
YOS	08/24/90	17	15.52 ± 1.49	0.00 ± 0.00	5.93 ± 1.61	2.56 ± 0.95	1.09 ± 0.22	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	25.10 ± 2.39	26.56 ± 2.55	1.46 ± 3.49

[a] Site names: "BLO" = Blodgett, "YOS" = Yosemite, "SLK" = Sequoia, "TEH" = Tehachapi.

[b] Sampling periods: 0000 - 0700, 0701 - 1200, 1201 - 1700, 1701 - 2400 (PDT).

Table B-3

Twenty-four Hour Average Source Contributions to $PM_{2.5}$ Mass at Blodgett, Yosemite, Sequoia, and Tehachapi Between 7/13/90 to 8/24/90

Site[a]	Date/Time[b]		Primary Geological SCE ± σ (μg/m³)	Regional Transport SCE ± σ (μg/m³)	Primary Motor Veh. Exhaust SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Sulfate SCE ± σ (μg/m³)	Secondary Nitrate SCE ± σ (μg/m³)	Secondary OC SCE ± σ (μg/m³)	Marine Aerosol SCE ± σ (μg/m³)	Calculated Mass ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Unexplained Mass ± σ (μg/m³)
BLO	07/14/90	24	0.39 ± 0.20	0.00 ± 0.00	1.18 ± 1.70	0.36 ± 1.08	0.24 ± 0.35	0.00 ± 0.00	0.00 ± 0.00	0.15 ± 0.53	2.32 ± 2.13	2.97 ± 2.78	0.64 ± 3.33
BLO	07/21/90	24	0.37 ± 0.18	0.00 ± 0.00	0.68 ± 1.49	0.43 ± 1.05	0.15 ± 0.31	0.00 ± 0.00	0.00 ± 0.00	0.13 ± 0.40	1.76 ± 1.90	1.26 ± 2.68	-0.50 ± 3.10
BLO	07/22/90	24	0.53 ± 0.14	0.00 ± 0.00	0.36 ± 0.71	0.32 ± 0.69	0.32 ± 0.19	0.04 ± 0.05	0.00 ± 0.00	0.00 ± 0.00	1.57 ± 1.02	1.78 ± 2.68	0.21 ± 1.88
BLO	07/27/90	24	1.26 ± 0.32	0.00 ± 0.00	1.19 ± 1.89	0.89 ± 1.22	1.19 ± 0.42	0.00 ± 0.00	0.00 ± 0.00	0.24 ± 0.56	4.77 ± 2.38	5.76 ± 2.76	0.99 ± 3.64
BLO	07/28/90	24	1.15 ± 0.27	0.00 ± 0.00	1.01 ± 1.28	0.57 ± 1.04	1.93 ± 0.45	0.00 ± 0.00	0.00 ± 0.00	0.50 ± 0.45	5.15 ± 1.80	6.83 ± 2.75	1.68 ± 3.28
BLO	07/29/90	24	2.74 ± 0.55	0.00 ± 0.00	2.03 ± 2.19	0.26 ± 0.74	1.87 ± 0.52	0.00 ± 0.00	0.00 ± 0.00	0.16 ± 0.70	7.05 ± 2.53	12.12 ± 2.95	5.07 ± 3.88
BLO	08/03/90	24	1.63 ± 0.35	0.00 ± 0.00	1.60 ± 1.83	1.03 ± 1.00	1.75 ± 0.49	0.00 ± 0.00	0.00 ± 0.00	0.30 ± 0.74	6.32 ± 2.29	7.22 ± 2.77	0.91 ± 3.59
BLO	08/04/90	24	2.21 ± 0.42	0.00 ± 0.00	2.34 ± 2.25	0.54 ± 1.00	2.39 ± 0.59	0.00 ± 0.00	0.00 ± 0.00	0.35 ± 0.66	7.84 ± 2.65	10.36 ± 2.83	2.52 ± 3.88
BLO	08/05/90	24	2.28 ± 0.43	0.00 ± 0.00	1.66 ± 2.25	0.46 ± 0.84	1.60 ± 0.48	0.00 ± 0.00	0.00 ± 0.00	0.50 ± 0.64	6.49 ± 2.57	6.74 ± 2.72	0.24 ± 3.74
BLO	08/06/90	24	2.21 ± 0.51	0.00 ± 0.00	3.10 ± 2.58	0.39 ± 1.05	0.96 ± 0.51	0.00 ± 0.00	0.00 ± 0.00	0.13 ± 0.68	6.80 ± 2.97	7.37 ± 2.79	0.57 ± 4.07
BLO	08/22/90	24	1.83 ± 0.40	0.00 ± 0.00	1.38 ± 2.01	0.62 ± 1.05	1.02 ± 0.42	0.00 ± 0.00	0.00 ± 0.00	0.26 ± 0.60	5.10 ± 2.42	6.22 ± 2.71	1.12 ± 3.62
BLO	08/23/90	24	1.89 ± 0.36	0.00 ± 0.00	0.31 ± 1.22	2.61 ± 1.85	1.31 ± 0.37	0.00 ± 0.00	0.00 ± 0.00	0.88 ± 0.40	7.00 ± 2.32	6.65 ± 2.72	-0.34 ± 3.57
BLO	08/24/90	24	1.86 ± 0.38	0.00 ± 0.00	1.02 ± 1.94	0.00 ± 0.00	1.03 ± 0.40	0.00 ± 0.00	0.00 ± 0.00	1.19 ± 0.57	5.11 ± 2.10	7.04 ± 2.60	1.93 ± 3.34
SLK	07/21/90	24	0.00 ± 0.00	6.42 ± 2.77	0.00 ± 0.00	0.00 ± 0.00	0.50 ± 0.68	0.00 ± 0.00	2.26 ± 3.01	0.00 ± 0.00	9.17 ± 3.74	10.21 ± 2.64	1.04 ± 4.57
SLK	07/22/90	24	0.41 ± 0.20	2.22 ± 1.33	0.84 ± 1.64	1.29 ± 1.09	1.03 ± 0.28	0.05 ± 0.07	4.12 ± 3.81	0.00 ± 0.00	9.96 ± 4.52	8.56 ± 3.01	-1.40 ± 5.43
SLK	07/27/90	24	0.65 ± 0.36	3.50 ± 2.25	1.51 ± 1.75	0.00 ± 0.00	0.60 ± 0.35	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	6.27 ± 2.36	7.73 ± 2.91	1.46 ± 3.74
SLK	07/28/90	24	0.00 ± 0.00	3.73 ± 2.23	0.84 ± 1.57	1.57 ± 1.28	2.22 ± 0.85	0.00 ± 0.00	0.48 ± 1.63	0.13 ± 0.17	8.96 ± 3.42	9.69 ± 2.99	0.73 ± 4.54
SLK	07/29/90	24	0.00 ± 0.00	3.75 ± 1.76	0.00 ± 0.00	0.92 ± 1.27	2.15 ± 0.79	0.00 ± 0.00	0.89 ± 1.51	0.18 ± 0.29	7.89 ± 2.83	11.94 ± 3.04	4.05 ± 4.16
SLK	08/03/90	24	0.00 ± 0.00	5.75 ± 3.17	0.00 ± 0.00	0.00 ± 0.00	0.78 ± 0.84	0.00 ± 0.00	2.89 ± 3.74	0.24 ± 0.29	9.66 ± 4.50	10.83 ± 2.93	1.17 ± 5.38
SLK	08/04/90	24	0.00 ± 0.00	4.55 ± 1.75	0.00 ± 0.00	0.00 ± 0.00	0.94 ± 0.62	0.00 ± 0.00	1.68 ± 2.27	0.23 ± 0.34	7.40 ± 2.95	6.52 ± 2.40	-0.88 ± 3.79
SLK	08/05/90	24	0.00 ± 0.00	4.68 ± 2.13	0.00 ± 0.00	1.68 ± 1.67	1.05 ± 0.69	0.00 ± 0.00	4.60 ± 4.44	0.13 ± 0.27	12.13 ± 5.21	12.49 ± 3.12	0.36 ± 6.06
SLK	08/06/90	24	0.13 ± 0.20	2.83 ± 1.61	0.66 ± 1.41	1.58 ± 1.52	1.35 ± 0.68	0.00 ± 0.00	3.04 ± 3.06	0.04 ± 0.12	9.62 ± 4.11	10.66 ± 3.02	1.04 ± 5.10
SLK	08/22/90	24	0.16 ± 0.27	3.80 ± 2.24	3.78 ± 3.22	0.00 ± 0.00	1.34 ± 0.63	0.00 ± 0.00	0.65 ± 2.00	0.22 ± 1.25	9.95 ± 4.48	12.66 ± 3.08	2.71 ± 5.44
SLK	08/23/90	24	0.00 ± 0.00	3.25 ± 1.87	0.00 ± 0.00	4.27 ± 2.57	1.53 ± 0.73	0.00 ± 0.00	0.00 ± 0.00	0.31 ± 0.28	9.36 ± 3.29	12.50 ± 3.11	3.14 ± 4.53
SLK	08/24/90	24	0.00 ± 0.00	4.07 ± 1.73	0.74 ± 1.01	2.03 ± 1.61	0.46 ± 0.40	0.00 ± 0.00	0.00 ± 0.00	0.20 ± 0.29	7.51 ± 2.67	8.75 ± 2.96	1.24 ± 3.98
TEH	07/21/90	24	0.00 ± 0.00	1.57 ± 0.48	0.78 ± 1.22	0.00 ± 0.00	0.61 ± 0.43	0.57 ± 0.44	0.00 ± 0.00	0.00 ± 0.00	3.53 ± 1.53	3.30 ± 3.51	-0.22 ± 2.59
TEH	07/27/90	24	0.00 ± 0.00	2.08 ± 0.71	4.16 ± 2.89	0.00 ± 0.00	1.21 ± 0.66	0.63 ± 0.78	0.00 ± 0.00	0.00 ± 0.00	8.08 ± 3.26	7.33 ± 5.75	-0.74 ± 6.18
TEH	07/28/90	24	0.00 ± 0.00	2.81 ± 0.87	2.69 ± 2.35	0.00 ± 0.00	2.08 ± 0.81	0.75 ± 0.65	1.31 ± 2.92	0.00 ± 0.00	9.63 ± 4.07	8.17 ± 5.36	-1.46 ± 6.73
TEH	07/29/90	24	0.00 ± 0.00	1.92 ± 0.44	2.36 ± 1.85	0.00 ± 0.00	1.81 ± 0.68	2.22 ± 0.89	0.00 ± 0.00	0.00 ± 0.00	8.31 ± 2.31	5.62 ± 4.82	-2.69 ± 4.16
TEH	08/03/90	24	0.00 ± 0.00	4.49 ± 0.85	2.05 ± 2.79	0.00 ± 0.00	2.88 ± 0.84	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.42 ± 3.17	17.78 ± 6.11	8.37 ± 6.88
TEH	08/04/90	24	0.00 ± 0.00	3.72 ± 0.79	2.82 ± 3.16	0.36 ± 0.42	3.52 ± 0.88	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	10.43 ± 3.54	18.31 ± 6.33	7.89 ± 7.25
TEH	08/05/90	24	0.00 ± 0.00	2.50 ± 0.42	1.37 ± 2.11	0.00 ± 0.00	3.02 ± 0.71	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	6.88 ± 2.38	12.31 ± 4.87	5.42 ± 5.42
TEH	08/06/90	24	0.00 ± 0.00	5.39 ± 1.30	1.29 ± 2.39	0.00 ± 0.00	2.74 ± 0.88	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.42 ± 2.96	15.34 ± 5.95	5.92 ± 6.65

Table B-3 (continued)

Twenty-four Hour Average Source Contributions to $PM_{2.5}$ Mass at Blodgett, Yosemite, Sequoia, and Tehachapi Between 7/13/90 to 8/24/90

Site[a]	Date/Time[b]		Primary Geological SCE ± σ (μg/m³)	Regional Transport SCE ± σ (μg/m³)	Primary Motor Veh. Exhaust SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Sulfate SCE ± σ (μg/m³)	Secondary Nitrate SCE ± σ (μg/m³)	Secondary OC SCE ± σ (μg/m³)	Marine Aerosol SCE ± σ (μg/m³)	Calculated Mass ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Unexplained Mass ± σ (μg/m³)
TEH	08/23/90	24	0.00 ± 0.00	3.22 ± 0.75	3.19 ± 2.54	0.00 ± 0.00	2.02 ± 0.77	2.85 ± 1.01	0.00 ± 0.00	0.00 ± 0.00	11.27 ± 3.07	12.82 ± 5.90	1.55 ± 6.65
TEH	08/24/90	24	0.00 ± 0.00	6.58 ± 1.34	1.38 ± 2.10	0.00 ± 0.00	0.29 ± 0.44	1.74 ± 0.56	0.00 ± 0.00	0.00 ± 0.00	9.98 ± 2.74	7.86 ± 5.78	-2.12 ± 6.40
YOS	07/13/90	24	1.56 ± 0.50	0.00 ± 0.00	2.77 ± 2.63	0.00 ± 0.00	1.26 ± 0.54	0.00 ± 0.00	4.24 ± 4.78	0.06 ± 0.61	9.90 ± 5.54	8.25 ± 3.09	-1.65 ± 6.35
YOS	07/14/90	24	0.85 ± 0.42	0.00 ± 0.00	2.73 ± 2.33	0.00 ± 0.00	1.27 ± 0.47	0.00 ± 0.00	4.29 ± 3.88	0.00 ± 0.00	9.14 ± 4.57	9.32 ± 3.17	0.18 ± 5.57
YOS	07/21/90	24	1.60 ± 0.43	0.00 ± 0.00	1.73 ± 1.96	1.16 ± 1.36	1.59 ± 0.45	0.00 ± 0.00	4.88 ± 4.14	0.00 ± 0.00	10.95 ± 4.82	11.65 ± 3.08	0.70 ± 5.71
YOS	07/22/90	24	1.35 ± 0.43	0.00 ± 0.00	2.44 ± 2.16	0.00 ± 0.00	1.23 ± 0.42	0.00 ± 0.00	4.67 ± 4.39	0.00 ± 0.00	9.69 ± 4.93	8.28 ± 3.13	-1.41 ± 5.83
YOS	07/27/90	24	1.85 ± 0.51	0.00 ± 0.00	3.23 ± 2.52	0.65 ± 1.22	2.45 ± 0.63	0.00 ± 0.00	6.41 ± 5.47	0.00 ± 0.00	14.59 ± 6.19	11.15 ± 3.08	-3.44 ± 6.92
YOS	07/28/90	24	1.70 ± 0.45	0.00 ± 0.00	2.18 ± 2.16	1.38 ± 1.40	2.75 ± 0.64	0.00 ± 0.00	3.76 ± 3.60	0.00 ± 0.00	11.78 ± 4.49	11.62 ± 3.06	-0.16 ± 5.44
YOS	07/29/90	24	1.47 ± 0.48	0.00 ± 0.00	2.65 ± 2.40	2.42 ± 1.76	2.47 ± 0.61	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	9.01 ± 3.08	9.73 ± 3.02	0.73 ± 4.31
YOS	08/03/90	24	2.60 ± 0.66	0.00 ± 0.00	2.95 ± 2.77	3.60 ± 2.57	2.93 ± 0.72	0.00 ± 0.00	2.65 ± 2.67	0.00 ± 0.00	14.72 ± 4.73	13.60 ± 3.21	-1.12 ± 5.72
YOS	08/04/90	24	1.81 ± 0.53	0.00 ± 0.00	3.03 ± 2.75	4.72 ± 2.82	2.86 ± 0.69	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	12.43 ± 4.04	12.25 ± 3.13	-0.18 ± 5.11
YOS	08/05/90	24	2.43 ± 0.59	0.00 ± 0.00	3.94 ± 2.82	2.84 ± 2.24	2.46 ± 0.66	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	11.67 ± 3.71	10.57 ± 3.05	-1.10 ± 4.81
YOS	08/06/90	24	2.35 ± 0.59	0.00 ± 0.00	3.44 ± 2.89	3.45 ± 2.47	1.66 ± 0.55	0.00 ± 0.00	1.22 ± 1.73	0.00 ± 0.00	12.11 ± 4.26	13.09 ± 3.16	0.98 ± 5.30
YOS	08/22/90	24	0.91 ± 0.35	0.00 ± 0.00	0.00 ± 0.00	28.39 ± 8.63	2.41 ± 0.52	0.00 ± 0.00	0.00 ± 0.00	0.35 ± 0.21	32.05 ± 8.66	38.02 ± 5.36	5.96 ± 10.18
YOS	08/23/90	24	1.12 ± 0.38	0.00 ± 0.00	0.00 ± 0.00	28.68 ± 11.73	1.94 ± 0.46	0.00 ± 0.00	0.00 ± 0.00	0.24 ± 0.21	31.97 ± 11.75	36.95 ± 5.19	4.98 ± 12.84
YOS	08/24/90	24	1.62 ± 0.47	0.00 ± 0.00	1.98 ± 2.02	17.33 ± 6.41	1.22 ± 0.43	0.00 ± 0.00	0.00 ± 0.00	0.06 ± 0.50	22.21 ± 6.77	25.75 ± 4.25	3.54 ± 7.99

[a] Site names: "BLO" = Blodgett, "YOS" = Yosemite, "SLK" = Sequoia, "TEH" = Tehachapi.

[b] Sampling periods: 0000 - 0700, 0701 - 1200, 1201 - 1700, 1701 - 2400 (PDT).

Table B-4

Twenty-four Hour Average Source Contributions to PM_{10} Mass at Yosemite and Sequoia Between 7/13/90 to 8/24/90

Site[a]	Date/Time[b]		Primary Geological SCE ± σ (μg/m³)	Regional Transport SCE ± σ (μg/m³)	Primary Motor Veh. Exhaust SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Sulfate SCE ± σ (μg/m³)	Secondary Nitrate SCE ± σ (μg/m³)	Secondary OC SCE ± σ (μg/m³)	Marine Aerosol SCE ± σ (μg/m³)	Calculated Mass ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Unexplained Mass ± σ (μg/m³)
SLK	07/16/90	24	9.54 ± 2.19	1.68 ± 1.85	2.28 ± 2.20	0.00 ± 0.00	2.72 ± 0.64	0.00 ± 0.00	3.59 ± 3.35	0.51 ± 0.29	20.33 ± 4.81	22.10 ± 6.06	1.76 ± 7.73
SLK	07/17/90	24	8.94 ± 2.16	5.83 ± 3.52	1.38 ± 2.00	0.00 ± 0.00	2.36 ± 0.95	0.00 ± 0.00	3.09 ± 3.54	0.79 ± 0.35	22.39 ± 5.25	23.36 ± 5.90	0.97 ± 7.90
SLK	07/21/90	24	5.20 ± 1.51	6.42 ± 2.77	0.00 ± 0.00	0.00 ± 0.00	0.50 ± 0.68	0.00 ± 0.00	2.26 ± 3.01	0.41 ± 0.24	14.79 ± 4.04	17.67 ± 4.94	2.88 ± 6.39
SLK	07/22/90	24	5.25 ± 1.45	2.22 ± 1.33	0.84 ± 1.64	1.29 ± 1.09	1.03 ± 0.28	0.05 ± 0.07	4.12 ± 3.81	0.18 ± 0.21	14.99 ± 4.74	13.72 ± 5.39	-1.26 ± 7.18
SLK	07/27/90	24	9.16 ± 2.48	3.50 ± 2.25	1.51 ± 1.75	0.00 ± 0.00	0.60 ± 0.35	0.00 ± 0.00	0.00 ± 0.00	0.49 ± 2.84	15.26 ± 4.42	19.28 ± 5.57	4.02 ± 7.11
SLK	07/28/90	24	8.77 ± 2.24	3.73 ± 2.23	0.84 ± 1.57	1.57 ± 1.28	2.22 ± 0.85	0.00 ± 0.00	0.48 ± 1.63	0.30 ± 6.09	17.87 ± 7.33	17.43 ± 5.62	-0.43 ± 9.24
SLK	07/29/90	24	7.99 ± 1.94	3.75 ± 1.76	0.00 ± 0.00	0.92 ± 1.27	2.15 ± 0.79	0.00 ± 0.00	0.89 ± 1.51	0.18 ± 0.29	15.88 ± 3.43	17.77 ± 5.61	1.89 ± 6.59
SLK	08/03/90	24	9.53 ± 2.52	5.75 ± 3.17	0.00 ± 0.00	0.00 ± 0.00	0.78 ± 0.84	0.00 ± 0.00	2.89 ± 3.74	0.60 ± 0.44	19.55 ± 5.18	19.71 ± 5.57	0.16 ± 7.61
SLK	08/04/90	24	6.41 ± 1.75	4.55 ± 1.75	0.00 ± 0.00	0.00 ± 0.00	0.94 ± 0.62	0.00 ± 0.00	1.68 ± 2.27	0.61 ± 0.40	14.19 ± 3.44	13.36 ± 4.44	-0.84 ± 5.61
SLK	08/05/90	24	8.47 ± 2.03	4.68 ± 2.13	0.00 ± 0.00	1.68 ± 1.67	1.05 ± 0.69	0.00 ± 0.00	4.60 ± 4.44	0.59 ± 0.37	21.07 ± 5.59	24.18 ± 5.87	3.11 ± 8.11
SLK	08/06/90	24	8.16 ± 2.02	2.83 ± 1.61	0.66 ± 1.41	1.58 ± 1.52	1.35 ± 0.68	0.00 ± 0.00	3.04 ± 3.06	0.51 ± 0.31	18.12 ± 4.59	19.10 ± 5.57	0.97 ± 7.21
SLK	08/22/90	24	9.73 ± 2.29	3.80 ± 2.24	3.78 ± 3.22	0.00 ± 0.00	1.34 ± 0.63	0.00 ± 0.00	0.65 ± 2.00	1.32 ± 1.32	20.62 ± 5.04	24.90 ± 5.85	4.28 ± 7.72
SLK	08/23/90	24	9.80 ± 2.29	3.25 ± 1.87	0.00 ± 0.00	4.27 ± 2.57	1.53 ± 0.73	0.00 ± 0.00	0.00 ± 0.00	0.98 ± 0.44	19.82 ± 4.02	23.25 ± 5.82	3.43 ± 7.07
SLK	08/24/90	24	13.22 ± 3.05	4.07 ± 1.73	0.74 ± 1.01	2.03 ± 1.61	0.46 ± 0.40	0.00 ± 0.00	0.00 ± 0.00	1.38 ± 0.58	21.90 ± 4.09	21.34 ± 5.62	-0.56 ± 6.95
YOS	07/13/90	24	7.70 ± 2.00	0.00 ± 0.00	2.77 ± 2.63	0.00 ± 0.00	1.26 ± 0.54	0.00 ± 0.00	4.24 ± 4.78	0.08 ± 0.63	16.05 ± 5.88	12.41 ± 5.56	-3.65 ± 8.08
YOS	07/14/90	24	4.15 ± 1.41	0.00 ± 0.00	2.73 ± 2.33	0.00 ± 0.00	1.27 ± 0.47	0.00 ± 0.00	4.29 ± 3.88	0.00 ± 0.00	12.43 ± 4.76	11.06 ± 5.59	-1.38 ± 7.34
YOS	07/21/90	24	6.79 ± 1.57	0.00 ± 0.00	1.73 ± 1.96	1.16 ± 1.36	1.59 ± 0.45	0.00 ± 0.00	4.88 ± 4.14	0.00 ± 0.00	16.14 ± 5.05	16.07 ± 5.60	-0.07 ± 7.54
YOS	07/22/90	24	6.11 ± 1.56	0.00 ± 0.00	2.44 ± 2.16	0.00 ± 0.00	1.23 ± 0.42	0.00 ± 0.00	4.67 ± 4.39	0.00 ± 0.00	14.46 ± 5.15	11.64 ± 5.53	-2.82 ± 7.56
YOS	07/27/90	24	10.49 ± 2.17	0.00 ± 0.00	3.23 ± 2.52	0.65 ± 1.22	2.45 ± 0.63	0.00 ± 0.00	6.41 ± 5.47	0.00 ± 0.00	23.23 ± 6.54	19.12 ± 5.70	-4.11 ± 8.68
YOS	07/28/90	24	9.83 ± 2.04	0.00 ± 0.00	2.18 ± 2.16	1.38 ± 1.40	2.75 ± 0.64	0.00 ± 0.00	3.76 ± 3.60	0.00 ± 0.00	19.91 ± 4.91	18.74 ± 5.64	-1.17 ± 7.49
YOS	07/29/90	24	8.08 ± 1.86	0.00 ± 0.00	2.65 ± 2.40	2.42 ± 1.76	2.47 ± 0.61	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	15.62 ± 3.56	15.63 ± 5.53	0.00 ± 6.58
YOS	08/03/90	24	13.57 ± 3.00	0.00 ± 0.00	2.95 ± 2.77	3.60 ± 2.57	2.93 ± 0.72	0.00 ± 0.00	2.65 ± 2.67	0.00 ± 0.00	25.69 ± 5.57	23.60 ± 6.06	-2.09 ± 8.23
YOS	08/04/90	24	9.52 ± 2.10	0.00 ± 0.00	3.03 ± 2.75	4.72 ± 2.82	2.86 ± 0.69	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	20.15 ± 4.52	18.52 ± 5.70	-1.62 ± 7.28
YOS	08/05/90	24	10.44 ± 2.13	0.00 ± 0.00	3.94 ± 2.82	2.84 ± 2.24	2.46 ± 0.66	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	19.68 ± 4.24	18.20 ± 5.66	-1.48 ± 7.07
YOS	08/06/90	24	9.11 ± 2.09	0.00 ± 0.00	3.44 ± 2.89	3.45 ± 2.47	1.66 ± 0.55	0.00 ± 0.00	1.22 ± 1.73	0.00 ± 0.00	18.87 ± 4.69	20.22 ± 5.82	1.36 ± 7.47
YOS	08/22/90	24	8.88 ± 2.02	0.00 ± 0.00	0.00 ± 0.00	30.30 ± 10.13	2.41 ± 0.52	0.00 ± 0.00	0.00 ± 0.00	0.35 ± 0.21	41.94 ± 10.34	49.62 ± 9.95	7.68 ± 14.35
YOS	08/23/90	24	10.84 ± 2.42	0.00 ± 0.00	0.00 ± 0.00	30.84 ± 13.17	1.94 ± 0.46	0.00 ± 0.00	0.00 ± 0.00	0.24 ± 0.21	43.86 ± 13.41	49.73 ± 9.71	5.87 ± 16.55
YOS	08/24/90	24	14.44 ± 2.98	0.00 ± 0.00	2.56 ± 2.26	18.45 ± 7.95	1.22 ± 0.43	0.00 ± 0.00	0.00 ± 0.00	0.06 ± 0.50	36.72 ± 8.80	43.93 ± 8.23	7.20 ± 12.05

- [a] Site names: "BLO" = Blodgett, "YOS" = Yosemite, "SLK" = Sequoia, "TEH" = Tehachapi.
- [b] Sampling periods: 0000 - 0700, 0701 - 1200, 1201 - 1700, 1701 - 2400 (PDT).