Mt. Zirkel Wilderness Area
Reasonable Attribution Study of Visibility Impairment

Volume II: Results of Data Analysis and Modeling
Part 2 of 2 – Appendices to Final Report

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Mt. Zirkel Wilderness Area
Reasonable Attribution Study of Visibility Impairment

Volume II: Results of Data Analysis and Modeling
Final Report

July 1, 1996

APPENDIX A

MEASUREMENT EVALUATION

A.1 VISIBILITY MEASUREMENT EVALUATION

A.1.1 Total Particle Light Scattering Measurement

Continuous measurement of total particle light scattering is acquired with an OPTEC NGN-2 nephelometer at six receptor monitoring sites (Buffalo Pass, Gilpin Creek, Juniper Mountain, Baggs, Hayden VOR, and Hayden Waste Water). Table A.1.1 summarizes the sampling specifications for the nephelometer measurements. A Campbell 21X datalogger was used to collect serial and analog data. The serial data included status (ambient, clean air, span, lamp out, rain, chopper failure), raw scattered light (counts), lamp brightness (counts), normalized scattered light (counts), integration time (minutes), chamber temperature (°C), and clock time from the nephelometer, whereas the analog data includes normalized scattered light (1 mVDC = 1 count) in line 1, and status (1000 mVDC = code 1) in line 2. Data were downloaded daily via telephone modem, reviewed daily, and reduced quarterly. Figure A.1.1 presents a flowchart of the data acquisition, data reduction, and data validation procedures.

Table A.1.1
Sampling Specifications for OPTEC NGN-2 Nephelometer

Parameter	Units and Range	Sample Frequency	Notes
Nephelometer Raw Readings	32768 counts (24.00 km^{-1})	One 2-minute average per repeating 5-minute interval	Analog and serial data both logged
Nephelometer Clean Air Calibrations	32768 counts (24.00 km^{-1})	One 10-minute average per repeating 6-hour interval	Automatically initiated by nephelometer; Timing is not exactly 6 hours
Nephelometer Upscale Span Calibrations	32768 counts (24.00 km^{-1})	One 10-minute average at weekly intervals	Operator initiated during weekly site visit.
Nephelometer Chamber Temperature	-30 °C to +50 °C	Concurrent with nephelometer readings	Serial data only

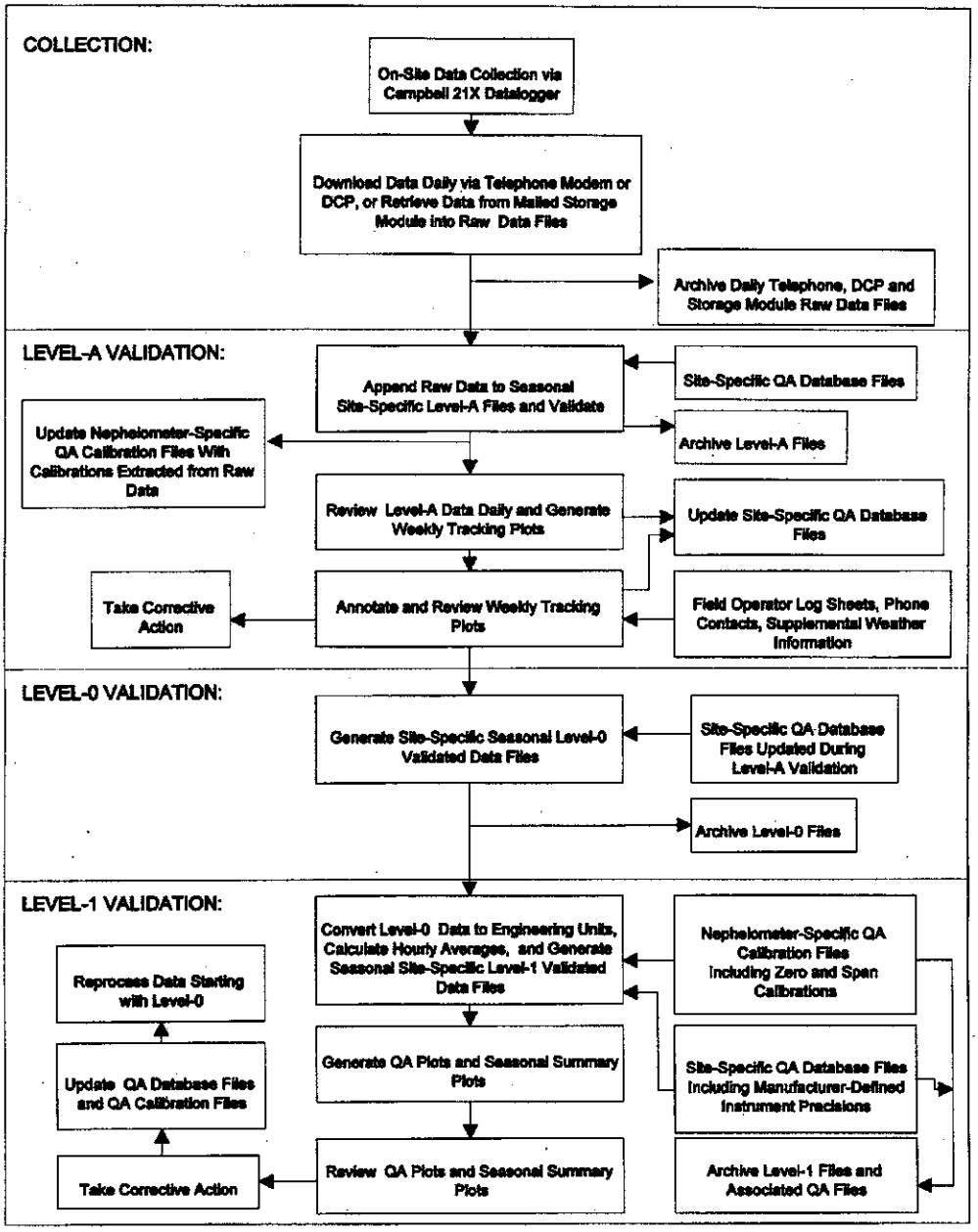


Figure A.1-1. Flowchart for the Optec NGN-2 Nephelometer and surface meteorology data handling.

A.1.1.1 Data Reduction and Validation

The following data reduction and validation steps were applied to OPTEC nephelometer measurements:

- Extract five-minute nephelometer, ambient temperature, and relative humidity data from the raw data and append to site-specific continuous data files. Nephelometer and datalogger-generated status codes are appended along with the data. Data too large or too small to occupy data fields are set to -99.
- Extract zero and span calibrations and enter into the quality assurance (QA) calibration database.
- Plot data weekly. Note comments regarding the operation of the nephelometer on the plots. Examples of a Level-A validated nephelometer data file/plot and the associated validity codes for the parameters are specified in the standard operating procedures.
- Verify operator log sheets against data collected via telephone modem to identify inconsistencies and errors.
- Identify additional invalid data caused by burned out lamps, power failures, water contamination, meteorological sensor failures, and other failures that were not known for Level 1A. Periods of invalid data or data affected by meteorology are identified by examining videos and photographs.
- Invalidate light scattering readings with:
  1) raw nephelometer readings below 0 counts or above 9,999 counts;
  2) ambient temperature readings below -30 °C or above 50 °C;
  3) ambient temperature data whose rate of change between successive readings exceeds 10 °C;
  4) relative humidity data below 1% or above 100%; and
  5) relative humidity data whose rate of change between successive readings exceeds 25%.
- Convert raw data to engineering units. The nephelometer scattering coefficient (b_{scat}) is calculated by determining a calibration curve for each data point as follows:
  1) the ***zero*** is determined by interpolating (in time) between the valid clean air calibrations prior to and following the data point;
  2) the ***initial span*** is determined from the initial calibration of the instrument upon installation (i.e., initial span = initial span gas calibration – initial clean air calibration);

3) the ***Rayleigh*** coefficient is the site-specific altitude-dependent scattering of particle-free air;

4) the ***designated span*** is determined by the span gas (SUVA [HFC-134 from Dupont]) used during the initial calibration and the Rayleigh coefficient (i.e., designated span = 7.1 × Rayleigh coefficient);

5) the slope and intercept of the calibration curve is calculated as:
slope = (designated span – Rayleigh) / initial span
and intercept = Rayleigh – (slope × zero); and

6) nephelometer scattering is calculated as:

b_{scat} = (slope × raw nephelometer value) + intercept.

- Perform Level-1 range checks by flagging b_{scat} data less than 80% of Rayleigh scattering as "suspect".

- Identify data affected by meteorological events. The b_{scat} values are coded as "filtered" when:

1) the rate of change between nephelometer hourly b_{scat} data exceeds 0.05 km^{-1};

2) the hourly b_{scat} data exceeds the maximum threshold of 1.0 km^{-1};

3) the relative humidity exceeds 95%; or

4) the standard deviation (σ) of the hourly raw nephelometer data divided by the mean (μ) of the hourly raw nephelometer data (i.e., σ/μ) exceeds 10%.

A.1.1.2 Precision Estimates

The precision of nephelometer data, or the relative error (uncertainty) in scattering due to drift of the slope of the calibration curve, was evaluated based on the instrument-specific zero and span checks performed manually. Precision estimates based on calibrations performed were calculated as follows:

$$m = \frac{(b_{scat,s} - b_{scat,o})}{(V_s - V_o)} \qquad \text{(A.1-1)}$$

where:

m = slope of the calibration curve used to calculate the theoretical scattering coefficient $b_{scat}(t)$

$b_{scat,s}$ = b_{scat} scattering coefficient for SUVA 134a

$b_{scat,o}$ = b_{scat} scattering coefficient for clean air

V_s = average normalized SUVA 134a reading

V_o = average normalized clean air reading

Given a normalized nephelometer reading *V(t)*, the theoretical b_{scat} at time *t* is:

$$b_{scat}(t) = b_{scat,o} + m(V(t) - V_o(t)) \qquad \text{(A.1-2)}$$

where:

$b_{scat}(t)$ = theoretical scattering coefficient at time t

$V(t)$ = Normalized nephelometer reading at time t

$V_o(t)$ = Normalized clean air reading at time t

Equation A.1-2 assumes $V_o(t)$ and $V(t)$ are known without error. As shown in Equation A.1-1, the slope of the calibration curve changes (drifts) with time. Figure A.1.2 illustrates the drift in the clean air and span values with time, whereas Figure A.1.3 illustrates how drifting values change calibration slopes. The actual slope of the calibration curve at time *t* is:

$$m(t) = (b_{scat,s} - b_{scat,o}) / (V_s(t) - V_o(t)) \qquad \text{(A.1-3)}$$

where:

$V_s(t)$ = Normalized SUVA 134a reading at time t.

The actual b_{scat} (denoted b'_{scat}), given a nephelometer reading *V(t)*, is:

$$b'_{scat}(t) = b_{scat,o} + m(t)\,[V(t) - V_o(t)] \qquad \text{(A.1-4)}$$

The relative error between the theoretical b_{scat} and actual b'_{scat} is:

$$\text{relative error} = \frac{b_{scat}(t) - b'_{scat}(t)}{b_{scat}(t)}$$

$$= \frac{[(m - m(t)]\,[V(t) - V_o(t)]}{b_{scat,o} + m[V(t) - V_o(t)]}$$

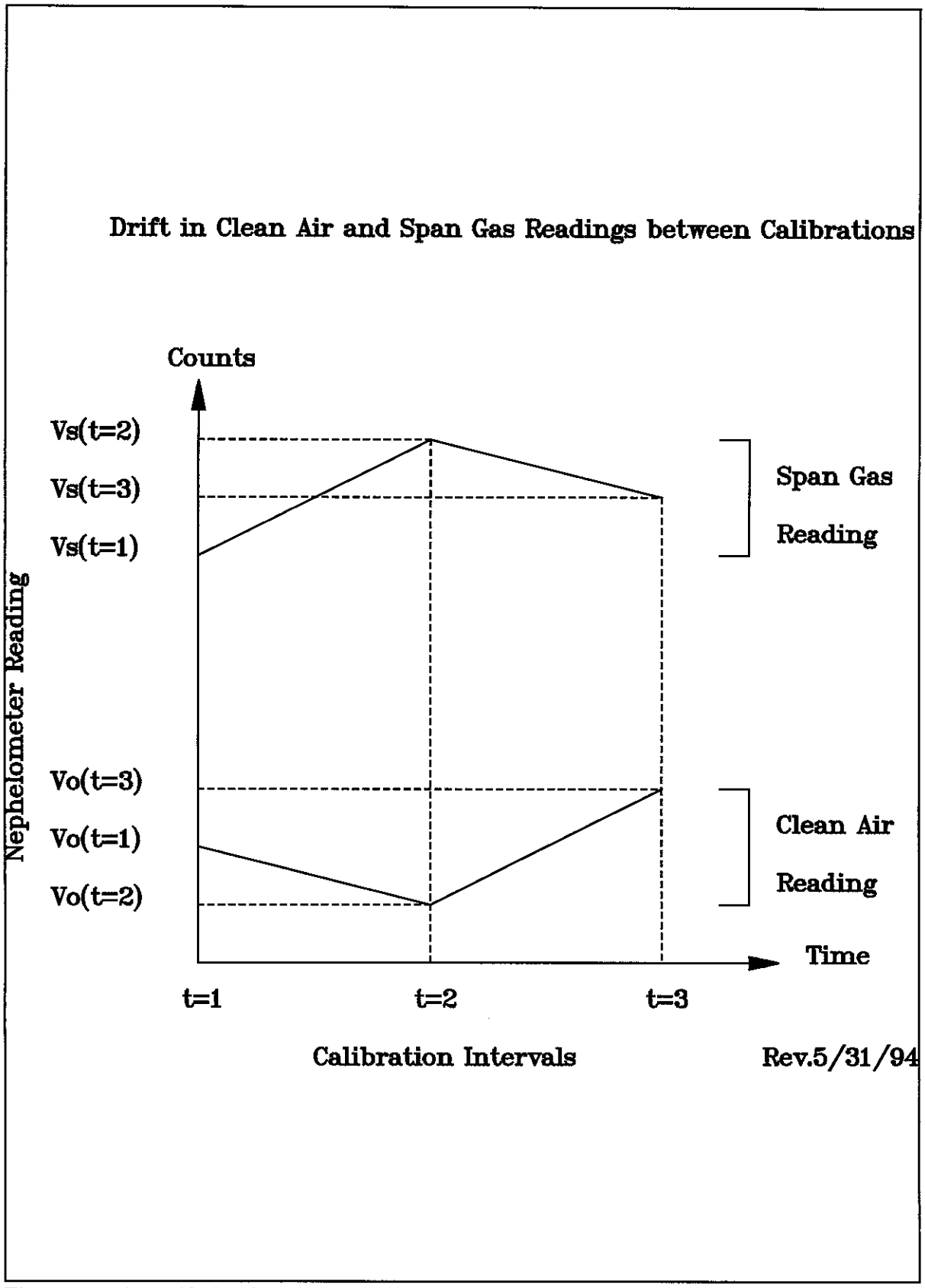


Figure A.1-2. Drift in the Optec NGN-2 Nephelometer clean air and span values as a function of time.

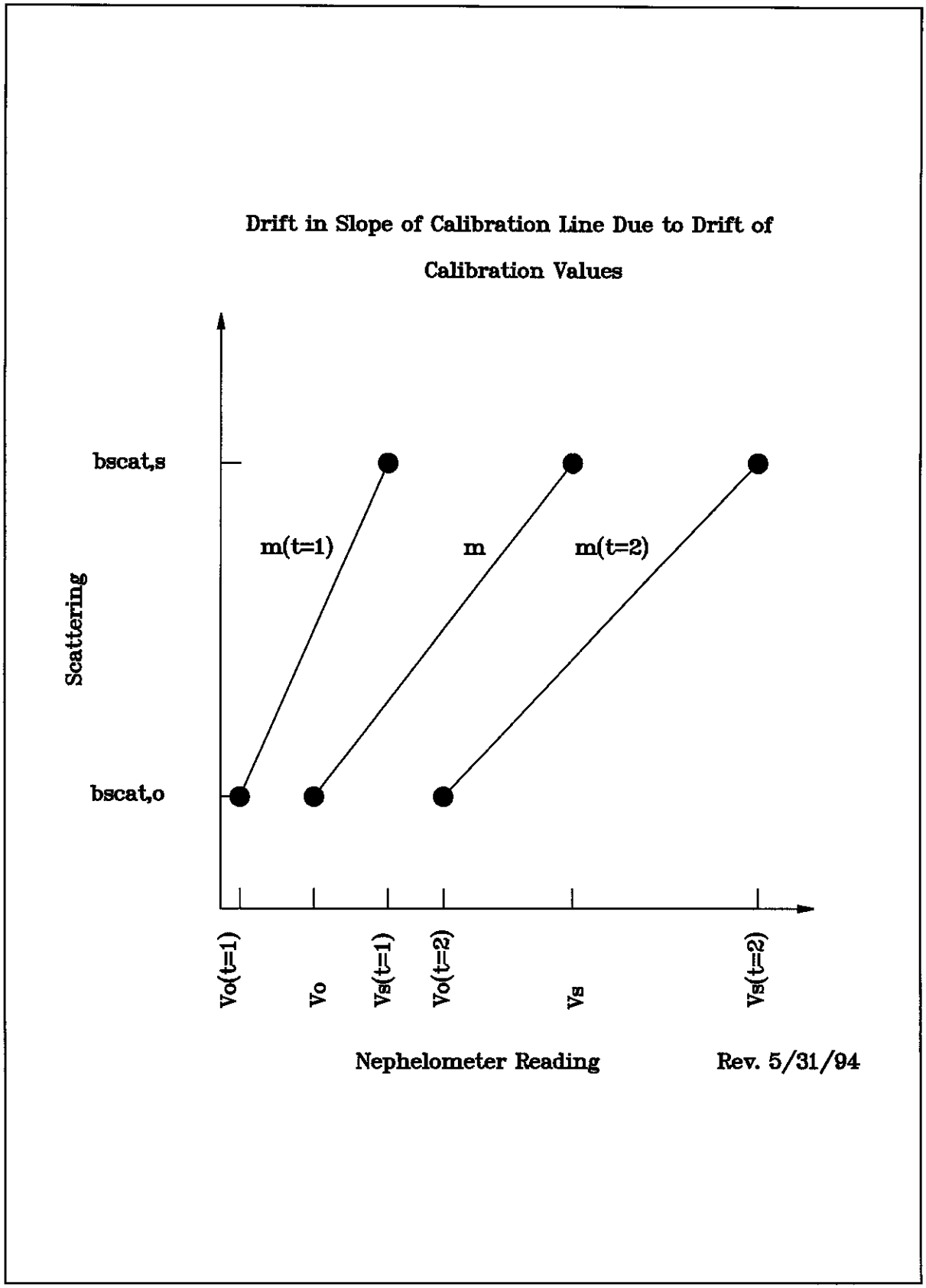


Figure A.1-3. Drift in slope of Optec NGN-2 Nephelometer calibration line due to drift of calibration values.

$$= [m - m(t)] \Big/ \left[\frac{b_{scat,o}}{V(t) - V_o(t)} + m \right] \qquad \text{(A.1-5)}$$

The magnitude of the relative error is:

$$| \text{relative error} | = \left| \frac{b_{scat}(t) - b'_{scat}(t)}{b_{scat}(t)} \right|$$

$$= \left| [m - m(t)] \Big/ \left[\frac{b_{scat,o}}{V(t) - V_o(t)} + m \right] \right| \qquad \text{(A.1-6)}$$

The magnitude of the relative error is bounded by the slopes such that:

$$| \text{relative error} | \leq \left| \frac{m - m(t)}{m} \right| \qquad \text{(A.1-7)}$$

Assuming that the calculated slopes, *m(t)*, of the calibration curves are normally distributed about the average slope *m* with a standard deviation *s*, then for a probability (confidence level) of 95%:

$$| m - m(t) | \leq 2s \qquad \text{(A.1-8)}$$

so that:

$$\left| \frac{b_{scat}(t) - b'_{scat}(t)}{b_{scat}(t)} \right| \leq \left| \frac{2s}{m} \right| \qquad \text{(A.1-9)}$$

Assuming that s is estimated by s_m with k degrees of freedom, based on k+1 sample values of $m(t)$, and using the two-tailed t distribution, the relative error at a 95% confidence level with a two-tailed t distribution as follows:

$$\left| \text{relative error} \right| \leq t_{k,\,0.025} \times \frac{s_m}{m} \qquad \text{(A.1-10)}$$

A.1.1.3 Nephelometer Interferences

This section evaluates the potential sources of interference with regard to: 1) Heating of the aerosol sample in the nephelometer measuring chamber; 2) changes in ambient temperature; and 3) coarse particle scattering caused by angular truncation of the scattering geometry.

A.1.1.3a Heating of the Aerosol Sample

Experimental testing shows that the nephelometer heats the sample aerosol less than 0.3 °C. This low heating can be attributed to the following aspects of the nephelometer design:

- Sampling at high flow rate (greater than 250 L/min);
- Laminar flow is used through the measuring chamber with no restrictions to the sample flow;
- Lamp heat is sinked into the exhaust sample air which is away from the measuring chamber;
- Measuring chamber is insulated from other parts of the instrument; and
- Instrument is operated in a cycled mode: lamp is on 2 minutes out of each 5-minute period, with sample fan operating continuously to vent heat from the instrument.

Table A.1.2 summarizes differences between the measured nephelometer chamber temperature and ambient temperature during the study. These data confirm that there was minimal heating of the aerosol sample. Heating of the aerosol sample by 0.5 °C would cause a reduction in measurement chamber relative humidity (RH) of less than 1% when the ambient RH is 10%, and less than 5% when the ambient RH is 100%. Table A.1.3 gives

Table A.1.2
Extent of Aerosol Heating in the OPTEC NGN-2 Nephelometer Chamber during the Mt. Zirkel Visibility Study[a]

	$T_{difference}$[b]			
Monitoring Site	Average (°C)		Standard Deviation (°C)	No. of Samples
Buffalo Pass	+0.29	±	1.95	3,661
Gilpin Creek	+0.79	±	0.76	2,497
Juniper Mountain	+0.12	±	0.83	4,636
Baggs	-0.85	±	1.78	5,749
Hayden VOR	+0.04	±	0.52	5,112
Hayden Waste Water	-0.03	±	0.60	4,732
All Sites	+0.06	±	1.07	

[a] The ambient temperature was measured with an aspirated Rotronic air temperature and relative humidity sensor adjacent to the nephelometer. The nephelometer chamber temperature was measured with a potted solid state sensor in the nephelometer sample chamber (this is a low precision sensor with a relatively long response time as compared to the Rotronic's sensor, since the nephelometer sensor is designed to be a diagnostic tool and was never intended to yield precise, high resolution measurements of the sample temperature). All precision temperature tests performed in nephelometer evaluation experiments were performed with matched thermistors or thermocouples.

[b] Temperature difference is the difference between nephelometer chamber temperature and ambient temperature.

$T_{difference} = T_{measurement} - T_{ambient}$

Table A.1.3
Estimation of Maximum Light Scattering Error due to Aerosol Heating
in OPTEC NGN-2 Nephelometer Chamber

Assumption[a]	Error in b_{scat} Measurement[b]	Frequency of Occurrence[b]
$PM_{2.5}$ mass contains 50% sulfate	Less than 5%	68%
$PM_{2.5}$ mass contains 50% sulfate	Less than 10%	78%
$PM_{2.5}$ mass contains 50% sulfate	Less than 15%	85%

[a] Worst case scenario.

[b] All six Mt. Zirkel sites combined, 0.5 °C heating assumed.

estimates in b_{scat} measurements by assuming a worst case scenario (i.e., 50% of the measured $PM_{2.5}$ mass is hygroscopic sulfate). With this worst case assumption, 68% of the data collected in the study would have less than 5% error in b_{scat}, 78% of the data would have less than 10% error in b_{scat}, and 85% of the data would have less than 15% error in b_{scat} due to the heating of hygroscopic sulfate aerosols.

A.1.1.3b Biases Caused by Ambient Temperature Dependence

Automatic zero calibrations were performed on the nephelometer at six-hour intervals during the study. Analysis of the zero calibrations indicate:

- The raw zero calibration data increased gradually over time as particles accumulated on the surface of the chamber.
- The temperature dependence of the zero calibrations was insignificant.

Manual span gas and zero calibrations were performed weekly. Analysis of the slopes of the calibration curves (calculated from the span and zero calibrations and Rayleigh coefficient) indicate that unadjusted calibration slopes increased with temperature due to

decreases in the density of the zero air and span gas. When the calibration slopes were adjusted for ambient temperature, however, these slopes showed less temperature dependence than the unadjusted slopes. Laboratory studies indicate an error of less than ±5% for temperatures between –20 °C and +40 °C in the calibration slope.

Uncertainty estimates reported for nephelometer data in this study were calculated using Rayleigh scattering for a standard atmosphere at each site elevation. Actual uncertainty estimates for the nephelometer data calculated using Rayleigh scattering corrected for temperature are summarized in Table A.1.4 for comparison. Note the uncertainty estimates can be reduced by 1% to 5% as temperature correction is applied on the calibration slope.

Table A.1.4
Summary of Scattering Uncertainty with OPTEC NGN-2 Nephelometer[a]

Site	Average Nephelometer Uncertainty (Uncorrected for Temperature)	Average Nephelometer Uncertainty (Corrected for Temperature)
Buffalo Pass	11.1%	6.65%
Gilpin Creek	11.0%	6.9%
Juniper Mountain	8.2%	7.78%
Baggs	8.0%	7.95%
Hayden VOR	10.5%	9.84%
Hayden Waste Water	9.6%	10.8%

[a] Based on manual calibrations.

A.1.1.3c Biases Caused by Angular Truncation Geometry

The OPTEC nephelometer integrates the scattering measurement from 5 to 175 degrees. Therefore, there is angular truncation in the extreme backward (0-5 degrees) and forward (175-180 degrees) directions. Table A.1.5 summarizes the effect of angular truncation on the scattering measurement which varies from 5% to 50% depending on particle size. Figure A.1.4 illustrates the truncation angle of the OPTEC and TSI nephelometers with respect to the mass mean diameter of particles. Because the percent of coarse particles present in the study region is small, the effect of angular truncation on measurements is expected to be small.

A.1.2 Fine Particle Light Scattering Measurement

Continuous measurements of light scattering by fine particles (i.e., $PM_{2.5}$) were made at the Buffalo Pass site with a TSI, Inc. Model 3563 Three-Color Integrating Nephelometer. The instrument was installed in late July, 1995, and valid data were recorded from the beginning of the summer intensive on 08/03/95 through the morning of 11/09/95.

The TSI Three-Color Integrating Nephelometer has an enclosed design and is vacuum tight. This permits drawing sample air through a particle-size-fractionating inlet. The sample chamber is illuminated by a tungsten lamp, and dichroic filters are used to separate the scattered light into three wavelength ranges with nominal values of 450 nm (blue), 550 nm (green), and 700 nm (red). The scattered light is detected by photomultipliers and photon-counting electronics. Measurements are made at three different wavelength ranges to acquire information about the particle-size distribution of the aerosol in the scattering chamber.

Table A.1.5
Effect of Angular Truncation on OPTEC NGN-2 Nephelometer Measurements

Particle Size (Volume Geometric Mean Diameter)	Error in Light Scattering Measurement
Fine Particles (mean size = 1.25 μm)	less than 5%
Coarse Particles (mean size = 10 μm)	approaching 50%

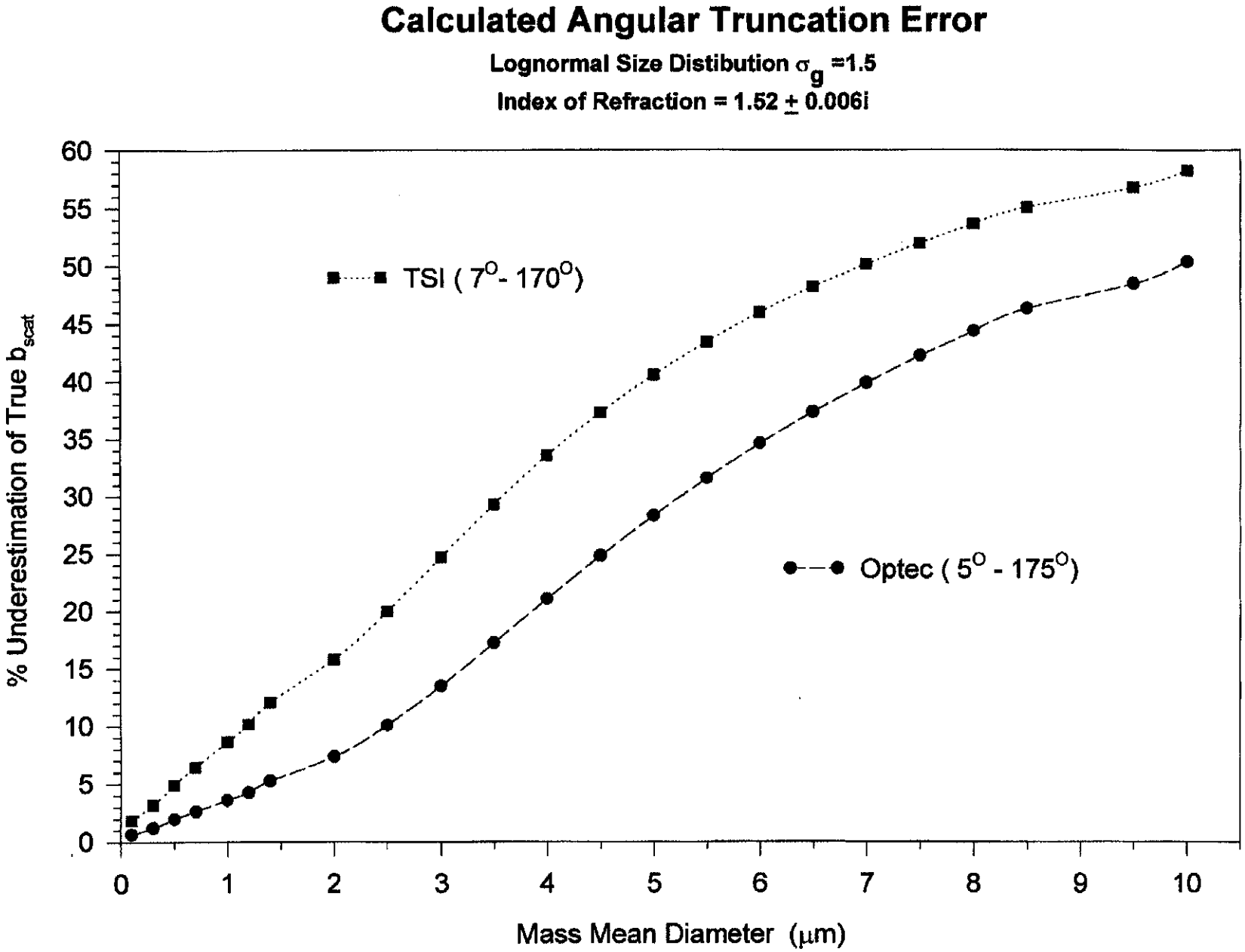


Figure A.1-4. Calculated angular truncation error for the Optec NGN-2 Nephelometer.

The TSI Three-Color Integrating Nephelometer was operated in a shelter with an external pump and flow control system. A Sensidyne Model 240 cyclone was installed at the entrance of the sampling tube which removes particles larger than 2.5 μm in aerodynamic diameter at a flow rate of 113 L/min (Chan and Lippmann, 1977). The air passing through the cyclone is at ambient temperature and relative humidity. The purpose of this cutpoint was to exclude cloud or fog droplets, drizzle, and other coarse particles from the sample flow. This permitted quantifying light scattering by fine particles during times when meteorological effects were significant. In dense clouds, the TSI Three-Color Integrating Nephelometer readings were very low because only the interstitial aerosol (i.e., the fine particles) between the cloud droplets was sampled. Concentrations of interstitial aerosol are low most of the time in dense clouds because most particles have served as nuclei for the condensation of cloud droplets and thereby have been incorporated into the droplets. During cold snowstorms, some flakes penetrate the cyclone and can affect the nephelometer readings.

During the initial phase of the monitoring between 08/03/95 and 09/10/95, the tungsten light of the TSI Three-Color Integrating Nephelometer was operated at a power of 10 watts to minimize the heating of the sample air in the scattering chamber. A review of the first month's data indicated that the relative humidity in the scattering chamber was typically below 70% even when the ambient relative humidity was near 100%. This is attributed mainly to heating in the shelter rather than heating by the lamp. Therefore, the lamp power was increased to 75 watts (the manufacturer's recommended value) from 09/10/95 to 11/09/95. The increased illumination decreased the noise in the 5-minute average data.

The data acquisition system recorded 5-minute averaged light scattering data in engineering units, along with instrument status and operation parameters. The light scattering values include total scattering and backscattering at the blue, green, and red wavelengths. The TSI Three-Color Integrating Nephelometer also outputs analog voltages which are recorded by a Campbell CR-10 datalogger for 5-minute time resolutions. These are logarithmically scaled values of the scattering coefficients.

A.1.2.1 TSI Three-Color Integrating Nephelometer Calibration

The TSI Three-Color Integrating Nephelometer is chopper stabilized and stores calibration data internally. The initial instrument calibration is provided by the manufacturer. The nephelometer contains a high-efficiency filter which is used to determine the instrument zero. The instrument was set to automatically perform a clean air calibration every six hours. The measured temperature, pressure, and relative humidity of the air in the scattering chamber was used to calculate the scattering coefficient of this air. This was subtracted from the instrument reading to determine the contribution of the chamber walls to the instrument signal. During measurements, light scattering by both the chamber walls and clean air were subtracted from the instrument signal to calculate the light scattering by fine particles in the sampling chamber.

The TSI Three-Color Integrating Nephelometer was calibrated with freon calibration gas. The instrument reading as well as the calibration gas temperature and pressure were corrected to standard temperature and pressure and compared with literature values for the scattering coefficient of the calibration gas (Bodhaine, 1979; Bucholtz, 1995; Ruby and Waggoner, 1981; Tree, 1995). The results are summarized in Table A.1.6.

These calibration data show that the instrument readings were highly stable and were close to the literature values. On average, the green scattering coefficient was about 3% higher than the literature value and the standard deviation shows a variation of less than ±2%.

The TSI Three-Color Integrating Nephelometer has been calibrated to determine the angular distribution of illumination produced by the opal glass, the response as a function of wavelength for the blue, green, and red wavelength ranges, and the angles near 0 degrees and 180 degrees where the baffles in the scattering chamber blind the instrument response. These data were used to determine the response of the TSI Three-Color Integrating Nephelometer to log-normal size distributions of aerosol. Mie-scattering calculations were performed for non-absorbing aerosol with an index of refraction of 1.45, a log-normal sigma of 2, and geometric mean diameters ranging from nearly zero to 1 μm. Similar calculations were performed to determine the response of the nephelometer to calibration gases.

These calculations were then combined to determine the nephelometer response to aerosol when the instrument was calibrated in order to obtain the correct value for the calibration gases. In addition, calibration curves were generated showing the ratios of the blue to green and the green to red nephelometer signals as a function of the aerosol geometric mean diameter. These calibration curves were used to infer information about the aerosol particle size distribution from the measured ratios of the nephelometer signals.

A.1.2.2 TSI Three-Color Integrating Nephelometer Data Reduction and Data Validation

Because of the agreement between the instrument readings and the literature values of the calibration gases in Table A.1.6, no calibration adjustment was applied to the data. The data in engineering units were edited to:

- Replace numbers affected by calibrations and other instrument maintenance by a missing data code.
- Review and incorporate the comments recorded in the field log sheets to ensure that all events that might affect the data were addressed.
- Fill missing data code for time period with a power outage.
- Apply missing data codes to time periods when data recorded during the periodic zero air cycles were not properly flagged by the automatic data recording.

Table A.1.6
TSI Three-Color Integrating Nephelometer Calibration Data

Time Interval Averaged[a]	Calibration Gas	Sample Pressure (mb)	Sample Temp (°K)	Average Readings (Mm^{-1})[b] Blue (450 nm)	Green (550 nm)	Red (700 nm)	Average Readings (Mm^{-1})[c] At 1013.25 mb & 288.15 K Blue (450 nm)	Green (550 nm)	Red (700 nm)	Measured/Literature Value[d] Blue (450 nm)	Green (550 nm)	Red (700 nm)
08/01/95 1344 to 1455 MST	Freon 12	695.5	299.4	243.48	106.99	39.90	368.57	161.96	60.40	0.981	0.986	0.980
08/01/95 1320 to 1328 MST	Freon 22	695.3	299.0	110.13	47.27	17.56	166.54	71.48	26.55	0.948	0.930	0.921
08/01/95 1233 to 1243 MST	SUVA134a[f]	695.4	297.3	104.00	46.06	17.37	156.34	69.24	26.11	0.976	0.988	0.993
08/12/95 1105 to 1120 MST	SUVA134a	694.4	295.5	108.90	48.36	18.28	162.97	72.37	27.35	1.017	1.033	1.040
08/14/95 1115 to 1120 MST	SUVA134a	692.3	692.3	109.10	48.95	18.86	162.09	72.72	28.02	1.012	1.037	1.066
08/24/95 1225 to 1315 MST[e]	SUVA134a	693.8	693.8	108.44	48.93	18.51	163.00	73.54	27.82	1.018	1.049	1.058
08/24/95 1730 to 1740 MST	SUVA134a	693.5	693.5	107.07	48.37	18.33	160.85	72.67	27.54	1.004	1.037	1.047
08/30/95 1230 to 1250 MST	SUVA134a	695.4	695.4	105.80	47.55	17.97	160.69	72.21	27.29	1.003	1.030	1.038
08/31/95 1810 to 1820 MST	SUVA134a	697.1	697.1	104.87	46.33	17.54	159.04	70.26	26.60	0.993	1.002	1.012
09/07/95 1705 MST	SUVA134a	692.9	692.9	102.00	46.54	17.78	152.13	69.42	26.52	0.950	0.990	1.009
09/13/95 1705 to 1715 MST	SUVA134a	696.2	696.2	105.57	47.61	17.90	160.39	72.33	27.20	1.001	1.032	1.034
09/28/95 0940 to 1000 MST	SUVA134a	688.9	688.9	108.24	48.84	18.39	161.44	72.84	27.43	1.008	1.039	1.043
10/06/95 1715 to 1730 MST	SUVA134a	686.5	686.5	108.83	48.82	18.43	162.20	72.77	27.47	1.013	1.038	1.045
10/14/95 1125 to 1140 MST	SUVA134a	695.0	695.0	110.85	49.66	18.73	162.26	72.69	27.41	1.013	1.037	1.043
10/19/95 1650 to 1700 MST	SUVA134a	695.5	695.5	109.37	49.28	18.63	161.42	72.74	27.50	1.008	1.038	1.046
10/26/95 1640 MST	SUVA134a	678.9	678.9	110.50	49.72	18.72	162.09	72.93	27.46	1.012	1.041	1.044
						Mean ratio for SUVA calibrations				1.002	1.028	1.037
						Standard deviation for SUVA calibrations				0.018	0.019	0.019

[a] Time interval during which the calibration readings were averaged.

[b] Instrument reading during calibration.

[c] Scattering coefficients after conversion to standard conditions.

[d] Scattering coefficients at standard conditions divided by the literature value (Bodhaine, 1979; Bucholtz, 1995; Ruby and Waggoner, 1981) for the calibration gas.

[e] Audit.

[f] SUVA tetrafluoroethane gas.

- Compute every-second data to 5-minute averages for a few days when the nephelometer was set up incorrectly.

- Retrieve data from backup data logger during time period that the data were not recorded correctly. The calibration constants for these data were determined by comparison of data logger voltages with properly recorded data during other times, and these calibration constants were used to convert data logger voltages into engineering units.

- Estimate the uncertainties of the light scattering data from the calibration data and instrument noise. Report the light scattering data as both 5-minute and hourly averages in the final database.

The TSI Three-Color Integrating Nephelometer is a stable instrument and is not subject to interferences that need to be addressed during data validation. Therefore, no data values, data flags, or data uncertainties were modified through data validation procedures.

A.1.2.3 TSI Three-Color Integrating Nephelometer Data Evaluation

The TSI data were evaluated by comparison with the collocated OPTEC data. Time series plots of the hourly data were generated for examining the temporal variations of light scattering between the two instruments since the designs of the two instruments are quite different.

Figures A.1.5 and A.1.6 show comparisons of the TSI and OPTEC data as a function of the ambient relative humidity. The OPTEC acquires data with very little sample heating, whereas the TSI heats the sample by a few degrees Celsius. This heating tends to evaporate absorbed water from the sampled aerosol, and possibly evaporates volatile species such as ammonium nitrate, thereby decreasing the light scattering by the particles. This water evaporation is expected to be greatest at high relative humidities, which cause the ambient particles to contain more water than at lower relative humidities.

Figure A.1.5 shows the ratio of the two nephelometer readings for all hours that the TSI reading was equal to or greater than 5 Mm^{-1} and the OPTEC data were flagged as valid. The following two adjustments were made on the OPTEC data for this comparison:

- The ambient temperature and pressure were used to calculate the value of light scattering by particle-free air and subtract it from the reported OPTEC light scattering value.

- A threshold relative humidity of 95% was used instead of the 90% threshold used to edit the IMPROVE data (Air Resource Specialists, 1994; Mercer, 1995).

The effect of sample heating is apparent. Figure A.1.5 shows that the ratio of the OPTEC reading to the TSI reading increases with increasing relative humidity, especially at relative humidities near or above 90%. A number of outlying data points that occurred at

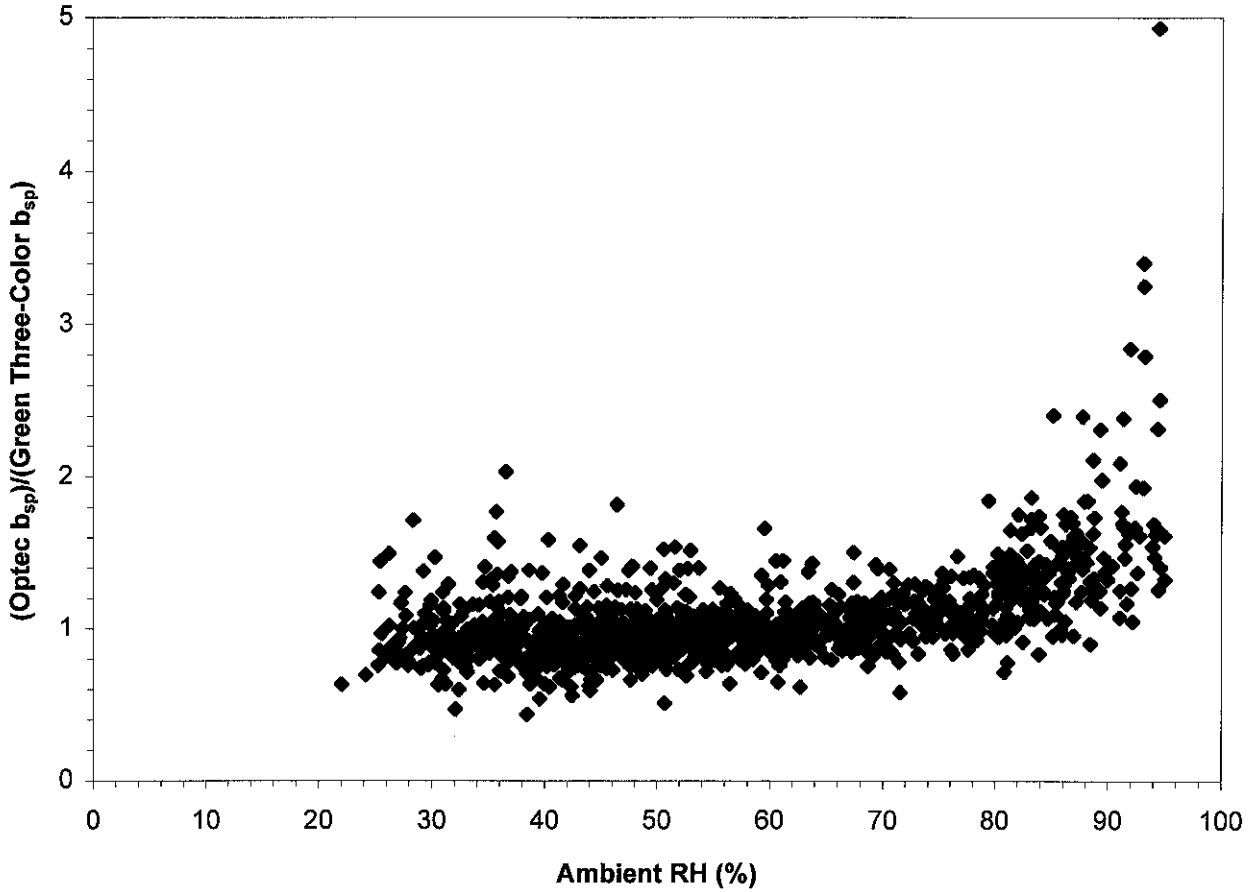


Figure A.1-5. Scatter plot of the ratios of OPTEC NGN-2 to green TSI Three-Color Nephelometer reading as a function of ambient relative humidity for the TSI Three-Color Nephelometer reading equal to or greater than 5 Mm^{-1}.

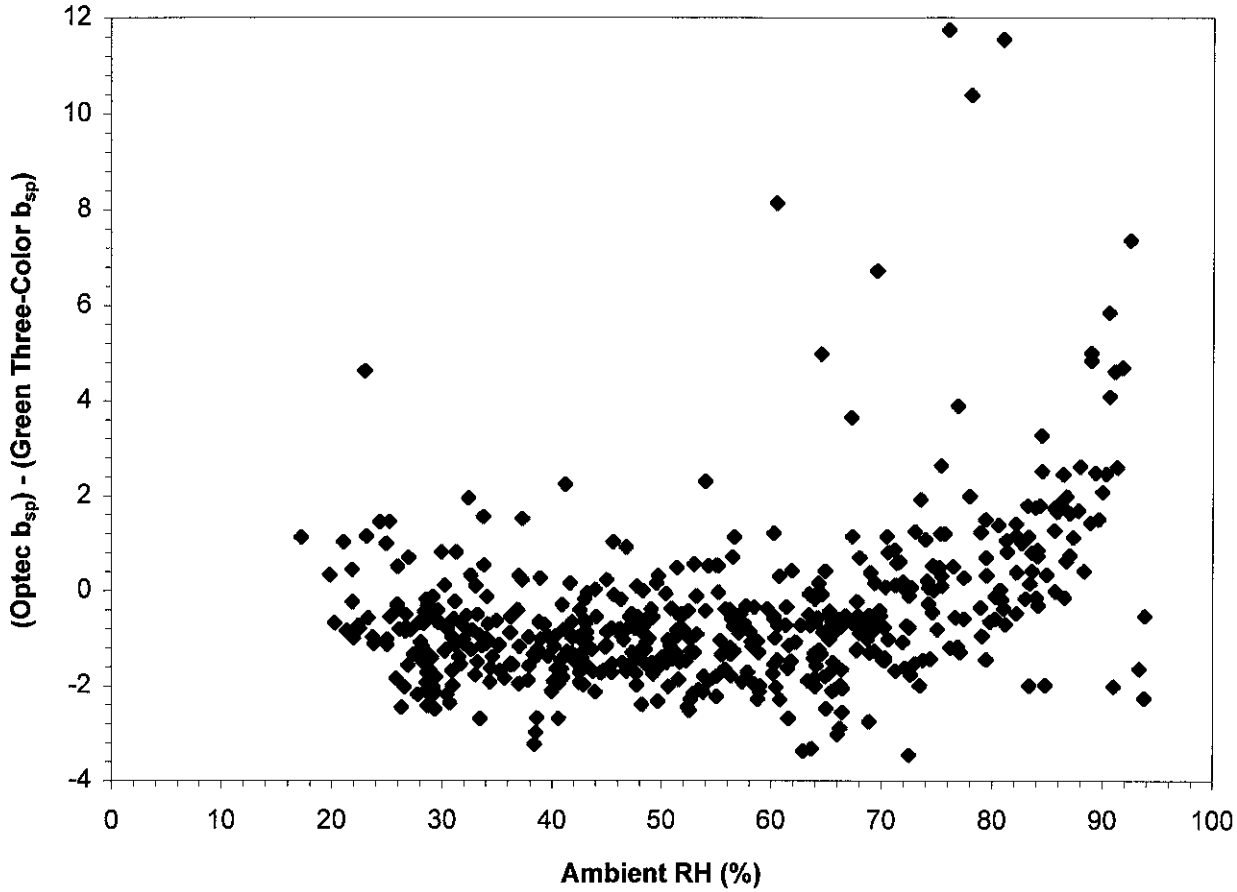


Figure A.1-6. Scatter plot of the difference of OPTEC NGN-2 and green TSI Three-Color Nephelometer reading as a function of relative humidity for the TSI Three-Color Nephelometer reading less than 5 Mm^{-1}.

lower humidities were examined, and it was found that they almost always occurred between an hour before and an hour after the OPTEC data were flagged as being subject to meteorological effects. Meteorological effects may have resulted in these outliers.

Figure A.1.6 shows the difference between the two nephelometer readings for all hours that the TSI reading was less than 5 Mm^{-1} and the OPTEC data were flagged as valid. A difference instead of a ratio was used for this comparison because ratios do not properly compare data close to zero. Accounting for the effects of relative humidity, most data differ by less than 1 Mm^{-1}, which is one-tenth of the value of light scattering by clean air.

The comparisons in Figures A.1.5 and A.1.6 provide confidence that both types of nephelometers were highly stable instruments and the readings were relatively free of noise. These comparisons also show that, with the exception of relatively few outliers, the reading of one instrument could be reliably predicted from a reading by the other at relative humidities below 70%. The fact that the OPTEC readings were typically lower than the TSI readings at relative humidities below 70% indicates that light scattering by particles larger than 2.5 μm was insignificant except when clouds or other meteorological effects were present.

At times, the 5-minute average nephelometer data showed large fluctuations from one reading to the next, which sometimes continued for more than a day. Since such fluctuations occurred concurrently on both types of nephelometers, it is unlikely the fluctuations were caused by instrument noise. It is suspected that traffic on a nearby dirt road during the construction of a dam contributed to these fluctuations, and that most of the response derived from the $PM_{2.5}$. fraction of this suspended dust that remains suspended over reasonable distances from its source.

A.1.2.4 TSI Three-Color Integrating Nephelometer Data Interferences

The major interference in the TSI nephelometer data is that the sampled aerosol contains an uncertain amount of liquid water present in the ambient aerosol due to heating in the shelter. With the high sampling flow rate of 113 L/min, the sampled aerosol may not have time to equilibrate to the relative humidity in the measuring chamber. This would especially be true when the ambient aerosol was a liquid droplet, so crystal nucleation must occur for the aerosol to equilibrate. The data in Figures A.1.5 and A.1.6 show that the partial drying of the aerosol in the TSI nephelometer has a minor effect on the data recorded at relative humidities below 70%, and can be accounted for by a "calibration" curve at higher relative humidities. However, the data recorded at the Buffalo Pass site may not be representative of data recorded in other locations, so a calibration curve determined from the data presented here may not be universally applicable.

The truncation error in the TSI nephelometer is not important because of the 2.5 μm particle-size cutpoint on the sampling inlet. The ratios of the scattering coefficients at the three colors show that the sampled aerosol typically had a small enough diameter that the truncation error could be neglected.

The TSI nephelometer is chopper stabilized, and interference by the walls of the scattering chamber was determined automatically every six hours and subtracted from the data. Therefore, variations in the lamp brightness, photomultiplier gain, as well as dust collected in the scattering chamber have negligible effects on the data.

A.1.3 Particle Light Absorption Measurement

Continuous measurement of particle light absorption was acquired with an aethalometer at the Buffalo Pass site. The optics and electronics of the aethalometer allow the instrument to operate in the range of 1 ng/cm^2 to a maximum of 8 $\mu g/cm^2$ of black carbon on the filter. The minimum time resolution of the instrument is the time required to collect 1 ng/cm^2. At a standard sample flow rate of 5 L/min and a mean concentration of 1 $\mu g/m^3$, the minimum time resolution is on the order of a fraction of a minute. An internal calibration coefficient converts the light attenuation measurement to units of $\mu g/m^3$. An approximation of the b_{abs} (Mm^{-1}) for each measurement interval can be obtained by multiplying the mass concentration ($\mu g/m^3$) by the mass absorption coefficient for black carbon (Clark *et al.*, 1987) which is reported as approximately 10 m^2/g. However, it must be noted that a given mass of elemental carbon (EC) aerosol can yield significantly different optical properties depending on the geometric mass mean diameter, the shape of the particles, the complex refractive index, and the presence of particle coatings or condensates (Clark *et al.*, 1987). Liousse *et al.* (1993) report a range of between 5 to 20 m^2/g for the specific attenuation coefficient which they related to differences in the nature of the combustion source and the aging of the particles during transport. This factor also depends on the sampling media, which is cellulose fiber for the aethalometer. An absorption coefficient of 19.2 m^2/g was used as a conversion factor to report BC concentrations in $\mu g/m^3$.

The initial operational settings of the aethalometer deployed at the Buffalo Pass site were:

- Ten-minute averaging time.
- Set black carbon (BC) scaling factor of 10 volts equal to 10 $\mu g/m^3$;.
- Advance the filter tape to a new position either as light attenuation accumulated up to 25% loading (compared to initial unexposed filter reading) or as sampling duration reached 24 hours.

These settings apply for the time period from 02/16/95 through 05/31/95. To achieve adequate lower quantifiable limits (LQL), ambient BC concentrations must exceed 0.02 $\mu g/m^3$ for 10-minute averaging times and 0.013 $\mu g/m^3$ for 15-minute averaging times. Upon examination of the first-quarter data, it was found that ambient light absorption levels at the Buffalo Pass site were too low to achieve adequate LQLs. The time resolution was increased to 15-minute averages between 06/01/95 and 10/25/95 to minimize negative values for each averaging-time interval.

A.1.3.1 Aethalometer Data Reduction and Data Validation

Continuous particle light absorption data was downloaded via telephone modem on a daily basis to minimize instrument malfunction. Final data were retrieved from the internal storage diskettes.

The following procedures were undertaken to validate the data to a Level 1B as defined in the program plan (Watson *et al.*, 1995):

- Time series plots of BC were generated and examined each day, and anomalous data points were identified. Anomalous data included missing data points from instrument error (instrument off-line), negative values, and zero values;
- For each identified anomaly, the record was checked in the data base and subsequently flagged. Missing data were flagged invalid and replaced with –99;
- Zero values occurring after a filter advancement (by time step or attenuation) were flagged invalid and replaced with –99 (they do not represent periods where ambient air was sampled). Zero values within an averaging interval were left as zeroes; and
- All negative values were flagged as suspect (Level 1B).

A.1.3.2 Precision, Accuracy, and Lower Quantifiable Limits of Aethalometer Measurements

No calibration standards are available to verify the accuracy of the aethalometer. The validity of the measurement depends on air flow rate, filtration efficiency, and the optical system. A system audit was conducted to verify the aethalometer's operational settings for the study. A sampling flow rate of 5 L/min was confirmed with a certified reference-standard flow monitor during the field performance audits. An average flow difference of 1.7% was reported (Andersen *et al.*, 1995a; 1995b).

According to Liousse *et al.* (1993), if filter attenuation is confined to less than 150 (dimensionless value of delta light attenuation) which corresponds to 8 μg of BC collected on the filter, the maximum attenuation error may be estimated as 0.1% and the black carbon content (BC) is given with an accuracy of 0.003 μg. The optical path is obtained from the ratio of the filtered air volume to the sampled filter area. The measurement error in the optical path is primarily due to volume uncertainty and is estimated to be of the order of 0.5% (Liousse *et al.*, 1993). This uncertainty results in an error in the calculation of b_{abs} of approximately 0.6% using the Beer-Lambert law.

As shown in Table A.1.7, an average of 75% to 80% of data capture was achieved during the study. Changing the averaging time from 10 to 15 minutes reduced the negative values by ~5%. The major cause of data loss was instrument malfunction due to extreme weather conditions.

Table A.1.7
Data Capture for Aethalometer Measurements at the Buffalo Pass Site

Sampling Period	Averaging Time	Percentage of Data Captured			Total No. of Data Points
		Valid	Suspect	Invalidated	
02/16/95 to 05/31/95	10 minutes	70.6%	9.1%	20.3%	7,248[a]
06/01/95 to 10/25/95	15 minutes	72.8%	3.8%	23.4%	10,146[b]

[a] With 10-minute time resolution
[b] With 15-minute time resolution.

A.2 AEROSOL MEASUREMENT EVALUATION

Every measurement consists of four attributes: 1) a value; 2) a precision; 3) an accuracy; and 4) a validity (Hidy, 1985; Watson *et al.*, 1989). The measurement methods described by Watson *et al.* (1995) are used to obtain the value. Performance testing via regular submission of standards, blank analysis, and replicate analysis are used to estimate precision. These precisions are reported in the data files so that they can be propagated through air quality models and used to evaluate how well different values compare with one another. The submission and evaluation of independent standards through quality audits are used to estimate accuracy. Validity applies both to the measurement method and to each measurement taken with that method. The validity of each measurement is indicated by appropriate flagging within the data base, while the validity of the methods has been evaluated in this study by a number of tests.

The precision, accuracy, and validity of the Mt. Zirkel Visibility Study aerosol measurements are defined as follows:

- A ***measurement*** is an observation at a specific time and place which possesses four attributes: 1) value—the center of the measurement interval; 2) precision—the width of the measurement interval; 3) accuracy—the difference between measured and reference values; and 4) validity—the compliance with assumptions made in the measurement method.

- A ***measurement method*** is the combination of equipment, reagents, and procedures which provide the value of a measurement. The full description of the measurement method requires substantial documentation. For example, two methods may use the same sampling systems and the same analysis systems. These are not identical methods, however, if one performs acceptance testing on filter media and the other does not. Seemingly minor differences between methods can result in major differences between measurement values.

- ***Measurement method validity*** is the identification of measurement method assumptions, the quantification of effects of deviations from those assumptions, the evaluation that deviations are within reasonable tolerances for the specific application, and the creation of procedures to quantify and minimize those deviations during a specific application. A substantial effort was expended in this study to establish the validity of measurement methods, especially for the measurements of particulate ammonium and nitrate.

- ***Sample validation*** is accomplished by procedures which identify deviations from measurement assumptions and the assignment of flags to individual measurements for potential deviations from assumptions.

- The ***comparability and equivalence*** of sampling and analysis methods are established by the comparison of values and precisions for the same measurement obtained by different measurement methods. Interlaboratory and intralaboratory

comparisons are usually made to establish this comparability. Simultaneous measurements of the same observable are considered equivalent when more than 90% of the values differ by no more than the sum of two one-sigma precision intervals for each measurement.

- ***Completeness*** measures how many environmental measurements with specified values, precisions, accuracies, and validities were obtained out of the total number attainable. It measures the practicability of applying the selected measurement processes throughout the measurement period. Data bases which have excellent precision, accuracy, and validity may be of little use if they contain so many missing values that data interpretation is impossible.

Approximately 1,600 $PM_{2.5}$ and gaseous sample sets were acquired from the field study. Selected samples were submitted for comprehensive chemical analyses which resulted in nearly 30,000 data points.

A data base with numerous data points, such as the one used in this study, requires detailed documentation of precision, accuracy, and validity of the measurements. This section addresses the procedures followed to define these quantities and presents the results of those procedures.

A.2.1 Precision

Measurement precisions reported in the Mt. Zirkel Visibility Study filter-based measurement data bases are propagated from precisions of the volumetric measurements, the chemical composition measurements, and the field blank variability using the methods of Bevington (1969). The following equations are used to calculate the precision associated with filter-based measurements:

$$C_i = (M_i - B_i)/V \quad \text{(A.2-1)}$$

$$V = F \times t \quad \text{(A.2-2)}$$

$$\overline{B_i} = \frac{1}{n}\sum_{j=1}^{n} B_{ij} \quad \text{(A.2-3)}$$

$$STD_{Bi} = \left[\frac{1}{n-1}\sum_{j=1}^{n}(B_{ij} - \overline{B_i})^2\right]^{1/2} \quad \text{(A.2-4)}$$

$$SIG_{Bi} = \left[\frac{1}{n}\sum_{j=1}^{n}(\sigma_{Bij})^2\right]^{1/2} \quad \text{(A.2-5)}$$

Case 1 . . . If $\overline{B_i} < SIG_{Bi}$
then $\overline{B_i} = 0$ and $\sigma_{\overline{Bi}} = 0$ (A.2-6)

Case 2 . . . If $\overline{B_i} > SIG_{Bi}$ and $\overline{B_i} < STD_{Bi}$
then $\overline{B_i} = 0$ and $\sigma_{\overline{Bi}} = STD_{Bi}$ (A.2-7)

Case 3 . . . If $\overline{B_i} > SIG_{Bi}$ and $\overline{B_i} > STD_{Bi}$
then $\overline{B_i} = \overline{B_i}$ and $\sigma_{\overline{Bi}} = STD_{Bi}$ (A.2-8)

$$\sigma_{Ci} = \left[\frac{\sigma_{Mi}^2 + \sigma_{Bi}^2}{V^2} + \frac{\sigma_V^2 (M_i - B_i)^2}{V^4}\right]^{1/2} \quad \text{(A.2-9)}$$

$$\sigma_{RMS_i} = \left(\frac{1}{n}\sum_{j=1}^{n}\sigma_{Ci}^2\right)^{1/2} \quad \text{(A.2-10)}$$

$$\sigma_V/V = 0.05 \quad \text{(A.2-11)}$$

where:

$\overline{B_i}$ = average amount of species i on field blanks

B_{ij} = the amount of species i found on field blank j

C_i = the ambient concentration of species i

F = flow rate throughout sampling period

M_i = amount of species i on the substrate

M_{ijf} = amount of species i on sample j from original analysis

M_{ijr} = amount of species i on sample j from replicate analysis

n = total number of samples in the sum

SIG_{Bi} = the root mean square error (RMSE), the square root of the averaged sum of the squares of σ_{Bij}.

STD_{Bi} = standard deviation of the blank

$\sigma_{\overline{Bi}}$ = blank precision for species i

σ_{Bij} = precision of the species i found on field blank j

σ_{Ci} = propagated precision for the concentration of species i

σ_{Mi} = precision of amount of species i on the substrate

σ_{RMS_i} = root mean square precision for species i

σ_V = precision of sample volume

t = sample duration

V = volume of air sampled

Dynamic field blanks were periodically placed in each sampling system without air being drawn through them to estimate the magnitude of passive deposition for the period of time which filter packs remained in a sampler (typically three to four days). Approximately 10% of the samples taken at each site on each measurement system were field blanks, and these were acquired throughout the measurement period. Inter-site differences in field blank concentrations were found among sites for some species even after removal of outliers (i.e., concentration exceeding three times the standard deviations of the field blanks). The average field blank concentrations (with outliers removed) were calculated for each species on each substrate (e.g., Teflon-membrane, quartz-fiber, impregnated-cellulose-fiber) for each site.

Dynamic field blank concentrations are given in Tables A.2.1 to A.2.6 for aerosol samples in μg/filter collected at each of the six sampling sites. Average blank value ($\overline{B_i}$) and blank precision ($\sigma_{\overline{Bi}}$) for each species were determined by comparing $\overline{B_i}$ with SIG_{Bi} (the square root of the average squared uncertainties of the blank concentrations, σ_{Bij}), and with STD_{Bi} (the standard deviation of the blank measurements) in one of the three cases shown in Equations A.2-6 to A.2-8. Both the average blank for a species ($\overline{B_i}$) and the blank precision ($\sigma_{\overline{Bi}}$) were set to zero when the average blank value ($\overline{B_i}$) was less than its propagated root mean square error (SIG_{Bi}) (Case 1, Equation A.2-6). When the average blank for a species ($\overline{B_i}$) exceeded its root mean square error (SIG_{Bi}) but was less than its standard deviation (STD_{Bi}), the blank was set to zero and the blank precision ($\sigma_{\overline{Bi}}$) was set equal to STD_{Bi} (Case 2, Equation A.2-7). Average field blank ($\overline{B_i}$) was subtracted from the measurement (M_i) and blank precision ($\sigma_{\overline{Bi}}$) was set equal to STD_{Bi} only if average field blank ($\overline{B_i}$) is greater than both SIG_{Bi} and STD_{Bi} (Case 3, Equation A.2-8).

The precisions (σ_{Mi}) for x-ray fluorescence analysis were determined from counting statistics unique to each sample. Hence, the σ_{Mi} is a function of the energy-specific peak area, the background, and the area under the baseline.

As shown in Tables A.2.1 to A.2.6, the root mean square errors (SIG_{Bi}), in general, are higher than the corresponding average field blanks and/or the standard deviation of the field blanks (STD_{Bi}) for this study. Average field blanks were subtracted and field blank uncertainties were propagated (i.e., Case 3, Equation A.2-8) at all sites to determine concentrations of organic carbon (OC) and elemental carbon (EC) (in both front and backup quartz-fiber filters), ammonium (NH_4^+), total ammonia (NH_3 and NH_4^+), and sulfur dioxide (SO_2). Field blank levels for aluminum (Al), silicon (Si), phosphate (P), sulfur (S),

Table A.2.1
Field Blank Concentrations and Precisions (μg/filter) at the Buffalo Pass Site

Species	Blank Subtracted (B_i)	Blank Subtracted Precision (σ_{Bi})	Average Field Blank	Field Blank Std. Dev. (STD_{Bi})	Root Mean Squared Blank Precision (SIG_{Bi})	Total No. of Blanks in Average
Mass	0.00000	0.00000	6.80000	10.60000	8.50000	16
b_{abs} (Mm^{-1})	0.00000	0.00000	0.00190	0.01471	0.00870	16
Cl^-	0.88500	0.43917	0.88500	0.43917	0.50000	6
NO_3^-	0.00000	0.00000	0.16500	0.25579	0.50000	6
$SO_4^=$	0.00000	0.00000	0.39000	0.39890	0.50000	6
K^+	0.00000	0.15739	0.13596	0.15739	0.05755	10
NH_4^+	0.66150	0.09596	0.66150	0.09596	0.50005	6
Total Ammonia (NH_3+NH_4^+)	3.14714	0.94288	3.14714	0.94288	0.37555	7
Denuded NH_4^+	2.07511	0.41817	2.07511	0.41817	0.38140	9
OC	36.66667	3.99032	36.66667	3.99032	5.19294	6
EC	1.36667	1.17587	1.36667	1.17587	1.01653	6
Backup OC	25.06000	10.13129	25.06000	10.13129	4.42425	5
Backup EC	0.00000	3.37713	2.10000	3.37713	1.06583	5
Na	0.00000	0.00000	0.05456	0.06284	0.29576	7
Mg	0.00000	0.00000	0.03780	0.04836	0.12951	7
Al	0.00000	0.00000	0.04351	0.07187	0.05864	7
Si	0.09101	0.03781	0.09101	0.03781	0.01402	7
P	0.00000	0.00000	0.01074	0.01010	0.02910	7
S	0.02501	0.02058	0.02501	0.02058	0.01932	7
Cl	0.00000	0.00000	0.02737	0.03960	0.03955	7
K	0.00000	0.00000	0.01524	0.02772	0.03531	7
Ca	0.00000	0.00000	0.02387	0.02241	0.03598	7
Ti	0.00000	0.00000	0.00527	0.00822	0.15937	7
V	0.00000	0.00000	0.00274	0.00359	0.07318	7
Cr	0.00000	0.00000	0.00459	0.00535	0.01970	7
Mn	0.00000	0.00000	0.00206	0.00235	0.01146	7
Fe	0.03754	0.01742	0.03754	0.01742	0.00324	7
Co	0.00000	0.00000	0.00080	0.00142	0.00673	7
Ni	0.00000	0.00000	0.00147	0.00116	0.00700	7
Cu	0.00000	0.02957	0.01660	0.02957	0.00584	7
Zn	0.00000	0.04096	0.03351	0.04096	0.00379	7
Ga	0.00000	0.00000	0.00041	0.00110	0.00809	7
As	0.00000	0.00000	0.00020	0.00035	0.00855	7
Se	0.00000	0.00000	0.00073	0.00103	0.00417	7
Br	0.00000	0.00000	0.00000	0.00000	0.00393	7
Rb	0.00000	0.00000	0.00029	0.00054	0.00355	7
Sr	0.00000	0.00000	0.00049	0.00076	0.00388	7
Yt	0.00000	0.00000	0.00026	0.00044	0.00471	7
Zr	0.00000	0.00000	0.00187	0.00245	0.00518	7
Mo	0.00000	0.00000	0.00064	0.00170	0.01017	7
Pd	0.00000	0.00000	0.00093	0.00246	0.06099	7
Ag	0.00000	0.00000	0.01459	0.01775	0.07078	7
Cd	0.00000	0.00000	0.02150	0.02295	0.07172	7
In	0.00000	0.00000	0.00796	0.01759	0.08658	7
Sn	0.00000	0.00000	0.01787	0.02234	0.10714	7
Sb	0.00000	0.00000	0.01759	0.03031	0.12765	7
Ba	0.00000	0.00000	0.08221	0.12535	0.45968	7
La	0.00000	0.00000	0.15391	0.13513	0.60255	7
Au	0.00000	0.00000	0.00104	0.00276	0.01175	7
Hg	0.00000	0.00000	0.00170	0.00262	0.00904	7
Tl	0.00000	0.00000	0.00026	0.00068	0.00928	7
Pb	0.00000	0.00000	0.00870	0.00869	0.01080	7
U	0.00000	0.00000	0.00103	0.00137	0.00858	7
SO_2	4.35556	2.44699	4.35556	2.44699	0.67313	9
Total Nitrate (HNO_3+NO_3^-)	0.00000	0.00000	0.00000	0.00000	0.00000	7
Denuded NO_3^-	0.00000	0.00000	0.00000	0.00000	0.00000	8
Volatilized NO_3^-	0.00000	0.00000	0.24000	0.32863	0.33386	5

Table A.2.2
Field Blank Concentrations and Precisions (μg/filter) at the Gilpin Creek Site

Species	Blank Subtracted (B_i)	Blank Subtracted Precision (σ_{Bi})	Average Field Blank	Field Blank Std. Dev. (STD_{Bi})	Root Mean Squared Blank Precision (SIG_{Bi})	Total No. of Blanks in Average
Mass	0.00000	0.00000	0.00000	10.00000	8.50000	9
b_{abs} (Mm^{-1})	0.00000	0.00000	0.00000	0.01528	0.00870	7
Cl^-	0.95400	0.09813	0.95400	0.09813	0.50000	5
NO_3^-	0.00000	0.00000	0.42000	0.51439	0.50000	5
$SO_4^=$	0.00000	0.00000	0.06600	0.14758	0.50000	5
K^+	0.22688	0.16894	0.22688	0.16894	0.05965	4
NH_4^+	0.75600	0.29698	0.75600	0.29698	0.50075	2
Total Ammonia (NH_3+NH_4^+)	0.00000	0.00000	0.00000	0.00000	0.00000	0
Denuded NH_4^+	0.00000	0.00000	0.00000	0.00000	0.00000	0
OC	37.10000	6.56404	37.10000	6.56404	4.05621	7
EC	0.00000	1.22940	1.11429	1.22940	0.87994	7
Backup OC	36.71250	11.38601	36.71250	11.38601	4.26541	8
Backup EC	1.25000	1.10970	1.25000	1.10970	1.01057	8
Na	0.00000	0.00000	0.07420	0.14840	0.30239	4
Mg	0.00000	0.00000	0.01298	0.02595	0.13749	4
Al	0.00000	0.00000	0.02530	0.02921	0.06846	4
Si	0.03525	0.02496	0.03525	0.02496	0.03141	4
P	0.02328	0.02022	0.02328	0.02022	0.02174	4
S	0.00000	0.00000	0.01013	0.01868	0.02464	4
Cl	0.05153	0.03799	0.05153	0.03799	0.03389	4
K	0.00000	0.00000	0.01635	0.02674	0.03107	4
Ca	0.00000	0.00000	0.01873	0.03745	0.03738	4
Ti	0.00000	0.00000	0.00000	0.00000	0.16760	4
V	0.00000	0.00000	0.00015	0.00030	0.08127	4
Cr	0.00000	0.00000	0.00055	0.00110	0.02323	4
Mn	0.00000	0.00000	0.00030	0.00060	0.01268	4
Fe	0.00000	0.00000	0.00583	0.00513	0.00890	4
Co	0.00000	0.00000	0.00000	0.00000	0.00716	4
Ni	0.00000	0.00000	0.00000	0.00000	0.00749	4
Cu	0.00000	0.00000	0.00065	0.00077	0.00716	4
Zn	0.00000	0.00000	0.00018	0.00035	0.00791	4
Ga	0.00000	0.00000	0.00023	0.00045	0.00689	4
As	0.00000	0.00000	0.00000	0.00000	0.00834	4
Se	0.00000	0.00000	0.00040	0.00080	0.00416	4
Br	0.00000	0.00000	0.00050	0.00058	0.00383	4
Rb	0.00000	0.00000	0.00028	0.00055	0.00363	4
Sr	0.00000	0.00000	0.00043	0.00085	0.00406	4
Yt	0.00000	0.00000	0.00000	0.00000	0.00494	4
Zr	0.00000	0.00000	0.00058	0.00072	0.00576	4
Mo	0.00000	0.00000	0.00000	0.00000	0.01045	4
Pd	0.00000	0.00000	0.02180	0.00784	0.06306	4
Ag	0.00000	0.00000	0.00168	0.00335	0.07363	4
Cd	0.00000	0.00000	0.00533	0.01065	0.07457	4
In	0.00000	0.00000	0.01815	0.01217	0.08933	4
Sn	0.00000	0.00000	0.02533	0.03144	0.10957	4
Sb	0.00000	0.00000	0.06693	0.04668	0.13077	4
Ba	0.00000	0.00000	0.25888	0.19947	0.47304	4
La	0.00000	0.00000	0.10360	0.20203	0.62215	4
Au	0.00000	0.00000	0.00000	0.00000	0.01107	4
Hg	0.00000	0.00000	0.00068	0.00135	0.00932	4
Tl	0.00000	0.00000	0.00055	0.00110	0.00900	4
Pb	0.00000	0.00000	0.00000	0.00000	0.01200	4
U	0.00000	0.00000	0.00000	0.00000	0.00897	4
SO_2	5.68000	1.14794	5.68000	1.14794	0.67030	6
Total Nitrate (HNO_3+NO_3^+)	0.00000	0.00000	0.00000	0.00000	0.00000	0
Denuded NO_3^-	0.00000	0.00000	0.00000	0.00000	0.00000	0
Volatilized NO_3^-	0.00000	0.00000	0.00000	0.00000	0.00000	0

Table A.2.3
Field Blank Concentrations and Precisions (μg/filter) at the Juniper Mountain Site

Species	Blank Subtracted (B_i)	Blank Subtracted Precision (σ_{Bi})	Average Field Blank	Field Blank Std. Dev. (STD_{Bi})	Root Mean Squared Blank Precision (SIG_{Bi})	Total No. of Blanks in Average
Mass	0.00000	0.00000	0.10000	12.20000	8.50000	11
b_{abs} (Mm^{-1})	0.00000	0.00000	0.00000	0.00934	0.00870	11
Cl^-	0.78857	0.27913	0.78857	0.27913	0.50000	7
NO_3^-	0.00000	0.00000	0.38571	0.28430	0.50000	7
$SO_4^=$	0.00000	0.00000	0.27000	0.28036	0.50000	7
K^+	0.00000	0.16337	0.12283	0.16337	0.05869	9
NH_4^+	0.87540	0.19954	0.87540	0.19954	0.50006	5
Total Ammonia (NH_3+NH_4^+)	3.22200	1.30755	3.22200	1.30755	0.49487	8
Denuded NH_4^+	2.49200	0.98166	2.49200	0.98166	0.42389	8
OC	33.07500	1.34505	33.07500	1.34505	5.22111	4
EC	0.00000	0.00000	0.40000	0.80000	0.92601	4
Backup OC	32.06667	2.77549	32.06667	2.77549	5.30252	3
Backup EC	0.00000	0.00000	0.26667	0.46188	0.93452	3
Na	0.00000	0.00000	0.00000	0.00000	0.30960	6
Mg	0.00000	0.00000	0.01477	0.02168	0.13364	6
Al	0.18942	0.13592	0.18942	0.13592	0.04437	6
Si	0.00000	0.54946	0.40213	0.54946	0.01717	6
P	0.00000	0.00000	0.00850	0.01629	0.02834	6
S	0.00000	0.00000	0.02117	0.01475	0.02567	6
Cl	0.00000	0.19289	0.14035	0.19289	0.02902	6
K	0.00000	0.10734	0.08977	0.10734	0.02344	6
Ca	0.00000	0.17379	0.11665	0.17379	0.03069	6
Ti	0.00000	0.00000	0.01305	0.02762	0.16312	6
V	0.00000	0.00000	0.00095	0.00153	0.07602	6
Cr	0.00000	0.00000	0.00302	0.00507	0.02088	6
Mn	0.00000	0.00000	0.00215	0.00353	0.01196	6
Fe	0.00000	0.15495	0.10813	0.15495	0.00540	6
Co	0.00000	0.00000	0.00107	0.00165	0.00756	6
Ni	0.00000	0.00000	0.00095	0.00209	0.00722	6
Cu	0.00000	0.00000	0.00573	0.00852	0.00587	6
Zn	0.00000	0.05549	0.04692	0.05549	0.00494	6
Ga	0.00000	0.00000	0.00027	0.00065	0.00805	6
As	0.00000	0.00000	0.00017	0.00027	0.00865	6
Se	0.00000	0.00000	0.00090	0.00140	0.00423	6
Br	0.00000	0.00000	0.00040	0.00079	0.00392	6
Rb	0.00000	0.00000	0.00047	0.00079	0.00366	6
Sr	0.00000	0.00000	0.00145	0.00175	0.00404	6
Yt	0.00000	0.00000	0.00047	0.00092	0.00488	6
Zr	0.00000	0.00000	0.00160	0.00328	0.00520	6
Mo	0.00000	0.00000	0.00038	0.00094	0.01042	6
Pd	0.00000	0.00000	0.00282	0.00690	0.06242	6
Ag	0.00000	0.00000	0.01065	0.01209	0.07222	6
Cd	0.00000	0.00000	0.01213	0.02287	0.07340	6
In	0.00000	0.00000	0.00678	0.01209	0.08852	6
Sn	0.00000	0.00000	0.02827	0.03017	0.10895	6
Sb	0.00000	0.00000	0.03665	0.03878	0.13012	6
Ba	0.00000	0.00000	0.04028	0.05650	0.47086	6
La	0.00000	0.00000	0.07890	0.10050	0.61654	6
Au	0.00000	0.00000	0.00000	0.00000	0.01205	6
Hg	0.00000	0.00000	0.00115	0.00224	0.00930	6
Tl	0.00000	0.00000	0.00000	0.00000	0.00921	6
Pb	0.00000	0.00000	0.00642	0.00969	0.01079	6
U	0.00000	0.00000	0.00043	0.00088	0.00888	6
SO_2	5.01143	2.80825	5.01143	2.80825	0.67915	7
Total Nitrate (HNO_3+NO_3^-)	0.00000	0.00000	0.06286	0.16630	0.33334	7
Denuded NO_3^-	0.46857	0.44089	0.46857	0.44089	0.33356	7
Volatilized NO_3^-	0.00000	0.00000	0.09200	0.20572	0.33348	5

Table A.2.4
Field Blank Concentrations and Precisions (μg/filter) at the Baggs/Baker Site

Species	Blank Subtracted (B_j)	Blank Subtracted Precision (σ_{Bi})	Average Field Blank	Field Blank Std. Dev. (STD_{Bi})	Root Mean Squared Blank Precision (SIG_{Bi})	Total No. of Blanks in Average
Mass	0.00000	0.00000	0.40000	10.20000	8.50000	14
b_{abs} (Mm^{-1})	0.00000	0.00000	0.00000	0.00793	0.00870	12
Cl^-	0.68400	0.26015	0.68400	0.26015	0.50000	5
NO_3^-	0.00000	0.00000	0.09000	0.20125	0.50000	5
$SO_4^=$	0.00000	0.00000	0.06000	0.13416	0.50000	5
K^+	0.00000	0.27144	0.17396	0.27144	0.07222	7
NH_4^+	0.63000	0.13290	0.63000	0.13290	0.50002	5
Total Ammonia (NH_3+NH_4^+)	0.00000	0.00000	0.00000	0.00000	0.00000	0
Denuded NH_4^+	0.00000	0.00000	0.00000	0.00000	0.00000	0
OC	38.40000	7.11084	38.40000	7.11084	5.19695	6
EC	1.01667	0.67355	1.01667	0.67355	0.90000	6
Backup OC	41.38333	7.11573	41.38333	7.11573	5.41372	6
Backup EC	4.00000	2.45764	4.00000	2.45764	2.48730	6
Na	0.00000	0.00000	0.28220	0.15968	0.55841	7
Mg	0.00000	0.00000	0.09216	0.10502	0.25107	7
Al	0.00000	0.35492	0.32417	0.35492	0.06691	7
Si	0.00000	1.16552	0.76771	1.16552	0.05452	7
P	0.05389	0.03450	0.05389	0.03450	0.04651	7
S	0.08210	0.06676	0.08210	0.06676	0.03947	7
Cl	0.00000	0.25989	0.15019	0.25989	0.07407	7
K	0.00000	0.25105	0.16501	0.25105	0.06661	7
Ca	0.00000	0.29321	0.18877	0.29321	0.07181	7
Ti	0.00000	0.00000	0.02640	0.04334	0.31556	7
V	0.00000	0.00000	0.00593	0.00764	0.13008	7
Cr	0.00000	0.00000	0.01024	0.01534	0.02899	7
Mn	0.00000	0.00000	0.00537	0.00547	0.02221	7
Fe	0.00000	0.35725	0.22337	0.35725	0.01317	7
Co	0.00000	0.00000	0.00159	0.00197	0.01530	7
Ni	0.00000	0.00000	0.00540	0.00669	0.01334	7
Cu	0.00000	0.04280	0.02191	0.04280	0.01183	7
Zn	0.00000	0.19839	0.11799	0.19839	0.01238	7
Ga	0.00000	0.00000	0.00376	0.00569	0.02643	7
As	0.00000	0.00000	0.00264	0.00348	0.03038	7
Se	0.00000	0.00000	0.00169	0.00325	0.01581	7
Br	0.00000	0.00000	0.00286	0.00361	0.01449	7
Rb	0.00000	0.00000	0.00146	0.00204	0.01406	7
Sr	0.00000	0.00000	0.00134	0.00230	0.01552	7
Yt	0.00000	0.00000	0.00119	0.00180	0.01889	7
Zr	0.00000	0.00000	0.00544	0.00487	0.02184	7
Mo	0.00000	0.00000	0.00027	0.00072	0.03969	7
Pd	0.00000	0.00000	0.01457	0.02926	0.12264	7
Ag	0.00000	0.00000	0.04637	0.03973	0.14200	7
Cd	0.00000	0.00000	0.02009	0.03004	0.14384	7
In	0.00000	0.00000	0.03091	0.04923	0.17341	7
Sn	0.00000	0.00000	0.02403	0.04013	0.21457	7
Sb	0.00000	0.00000	0.03206	0.05822	0.25476	7
Ba	0.00000	0.00000	0.03804	0.10065	0.92320	7
La	0.00000	0.00000	0.04329	0.11452	1.20624	7
Au	0.00000	0.00000	0.00437	0.00752	0.04337	7
Hg	0.00000	0.00000	0.00224	0.00348	0.03566	7
Tl	0.00000	0.00000	0.00040	0.00085	0.03440	7
Pb	0.00000	0.00000	0.00274	0.00726	0.04595	7
U	0.00000	0.00000	0.00799	0.00692	0.03419	7
SO_2	5.33333	1.89140	5.33333	1.89140	0.69882	6
Total Nitrate (HNO_3+NO_3^+)	0.00000	0.00000	0.00000	0.00000	0.33330	0
Denuded NO_3^-	0.00000	0.00000	0.04750	0.13435	0.33333	0
Volatilized NO_3^-	0.00000	0.00000	0.16000	0.24819	0.33362	6

Table A.2.5
Field Blank Concentrations and Precisions (μg/filter) at the Hayden VOR Site

Species	Blank Subtracted (B_i)	Blank Subtracted Precision (σ_{Bi})	Average Field Blank	Field Blank Std. Dev. (STD_{Bi})	Root Mean Squared Blank Precision (SIG_{Bi})	Total No. of Blanks in Average
Mass	0.00000	0.00000	0.00000	9.00000	8.50000	9
b_{abs} (Mm^{-1})	0.00000	0.00000	0.00000	0.01054	0.00870	9
Cl^-	0.84000	0.37374	0.84000	0.37374	0.50000	6
NO_3^-	0.00000	0.00000	0.25500	0.40417	0.50000	6
$SO_4^=$	0.72500	0.64158	0.72500	0.64158	0.50000	6
K^+	0.00000	0.13886	0.10271	0.13886	0.05581	8
NH_4^+	0.80040	0.15225	0.80040	0.15225	0.50004	5
Total Ammonia (NH_3+NH_4^+)	10.07022	5.49460	10.07022	5.49460	0.52458	9
Denuded NH_4^+	6.64175	3.54838	6.64175	3.54838	0.56468	8
OC	38.86000	8.73659	38.86000	8.73659	5.35966	5
EC	0.00000	1.16103	1.04000	1.16103	0.94128	5
Backup OC	37.04000	4.47471	37.04000	4.47471	5.27219	5
Backup EC	0.00000	2.00375	1.60000	2.00375	1.48862	5
Na	0.00000	0.00000	0.00000	0.00000	0.54526	6
Mg	0.00000	0.00000	0.08592	0.05357	0.24494	6
Al	0.00000	0.00000	0.06693	0.06353	0.11621	6
Si	0.10230	0.04405	0.10230	0.04405	0.04030	6
P	0.08530	0.04808	0.08530	0.04808	0.02920	6
S	0.00000	0.00000	0.03075	0.02435	0.05554	6
Cl	0.00000	0.00000	0.00000	0.00000	0.08534	6
K	0.00000	0.00000	0.01092	0.01547	0.06795	6
Ca	0.00000	0.00000	0.02592	0.02678	0.08128	6
Ti	0.00000	0.00000	0.00032	0.00078	0.31564	6
V	0.00000	0.00000	0.00210	0.00354	0.14574	6
Cr	0.00000	0.00000	0.00168	0.00310	0.03971	6
Mn	0.00000	0.00000	0.00525	0.00513	0.02305	6
Fe	0.03928	0.01976	0.03928	0.01976	0.00946	6
Co	0.00000	0.00000	0.00147	0.00159	0.01326	6
Ni	0.00000	0.00000	0.00145	0.00229	0.01382	6
Cu	0.00000	0.00000	0.00208	0.00327	0.01344	6
Zn	0.00000	0.03372	0.02393	0.03372	0.01129	6
Ga	0.00000	0.00000	0.00342	0.00483	0.02580	6
As	0.00000	0.00000	0.00260	0.00466	0.02972	6
Se	0.00000	0.00000	0.00263	0.00232	0.01551	6
Br	0.00000	0.00000	0.00163	0.00106	0.01416	6
Rb	0.00000	0.00000	0.00233	0.00305	0.01371	6
Sr	0.00000	0.00000	0.00100	0.00160	0.01518	6
Yt	0.00000	0.00000	0.00078	0.00156	0.01845	6
Zr	0.00000	0.00000	0.00570	0.00783	0.02137	6
Mo	0.00000	0.00000	0.00680	0.00879	0.03889	6
Pd	0.00000	0.00000	0.00000	0.00000	0.12125	6
Ag	0.00000	0.00000	0.02490	0.02420	0.13985	6
Cd	0.00000	0.00000	0.01488	0.02331	0.14226	6
In	0.00000	0.00000	0.00943	0.01062	0.16999	6
Sn	0.00000	0.00000	0.00912	0.01937	0.21091	6
Sb	0.00000	0.00000	0.00848	0.01497	0.24996	6
Ba	0.00000	0.00000	0.06305	0.08788	0.91390	6
La	0.00000	0.00000	0.18422	0.24708	1.19574	6
Au	0.00000	0.00000	0.00872	0.01073	0.04158	6
Hg	0.00000	0.00000	0.00000	0.00000	0.03464	6
Tl	0.00000	0.00000	0.00050	0.00122	0.03384	6
Pb	0.00000	0.00000	0.00390	0.00605	0.04473	6
U	0.00000	0.00000	0.00397	0.00550	0.03334	6
SO_2	4.32800	1.49463	4.32800	1.49463	0.68788	5
Total Nitrate (HNO_3+NO_3^+)	0.00000	0.00000	0.11143	0.29481	0.33337	7
Denuded NO_3^-	0.00000	0.00000	0.08500	0.24042	0.33330	8
Volatilized NO_3^-	0.00000	0.00000	0.24400	0.23681	0.33372	5

Table A.2.6
Field Blank Concentrations and Precisions (μg/filter) at the Hayden Waste Water Site

Species	Blank Subtracted (B_i)	Blank Subtracted Precision (σ_{Bi})	Average Field Blank	Field Blank Std. Dev. (STD_{Bi})	Root Mean Squared Blank Precision (SIG_{Bi})	Total No. of Blanks in Average
Mass	0.00000	0.00000	0.00000	9.80000	8.50000	12
b_{abs} (Mm^{-1})	0.00000	0.00000	0.00000	0.00707	0.00870	10
Cl^-	0.71500	0.37490	0.71500	0.37490	0.50000	6
NO_3^-	0.00000	0.00000	0.34500	0.39470	0.50000	6
$SO_4^=$	1.62500	1.20694	1.62500	1.20694	0.50000	6
K^+	0.00000	0.17926	0.14703	0.17926	0.05502	9
NH_4^+	0.63240	0.06316	0.63240	0.06316	0.50016	6
Total Ammonia (NH_3+NH_4^+)	0.00000	0.00000	0.00000	0.00000	0.00000	0
Denuded NH_4^+	0.00000	0.00000	0.00000	0.00000	0.00000	0
OC	34.78000	7.48913	34.78000	7.48913	5.12660	5
EC	1.50000	1.19373	1.50000	1.19373	1.00598	5
Backup OC	36.92000	8.41885	36.92000	8.41885	5.20519	5
Backup EC	2.32000	1.35904	2.32000	1.35904	1.28297	5
Na	0.00000	0.00000	0.34070	0.46855	0.52237	6
Mg	0.00000	0.00000	0.04930	0.05941	0.24783	6
Al	0.09553	0.08705	0.09553	0.08705	0.09531	6
Si	0.09162	0.06160	0.09162	0.06160	0.06132	6
P	0.05450	0.02831	0.05450	0.02831	0.04279	6
S	0.00000	0.00000	0.03047	0.03272	0.05261	6
Cl	0.00000	0.00000	0.02048	0.02684	0.08768	6
K	0.00000	0.00000	0.02590	0.02362	0.08291	6
Ca	0.00000	0.00000	0.01635	0.01934	0.08358	6
Ti	0.00000	0.00000	0.00088	0.00216	0.32405	6
V	0.00000	0.00000	0.00093	0.00153	0.14940	6
Cr	0.00000	0.00000	0.00023	0.00057	0.04075	6
Mn	0.00000	0.00000	0.00253	0.00244	0.02384	6
Fe	0.00000	0.00000	0.01380	0.00947	0.01417	6
Co	0.00000	0.00000	0.00235	0.00230	0.01377	6
Ni	0.00000	0.00000	0.00000	0.00000	0.01435	6
Cu	0.00000	0.00000	0.00230	0.00262	0.01393	6
Zn	0.00000	0.00000	0.00315	0.00324	0.01521	6
Ga	0.00000	0.00000	0.00158	0.00221	0.02673	6
As	0.00000	0.00000	0.00000	0.00000	0.03070	6
Se	0.00000	0.00000	0.00372	0.00399	0.01600	6
Br	0.00000	0.00000	0.00097	0.00195	0.01531	6
Rb	0.00000	0.00000	0.00265	0.00275	0.01401	6
Sr	0.00000	0.00000	0.00088	0.00102	0.01569	6
Yt	0.00000	0.00000	0.00108	0.00143	0.01911	6
Zr	0.00000	0.00000	0.00405	0.00472	0.02205	6
Mo	0.00000	0.00000	0.00270	0.00661	0.04026	6
Pd	0.00000	0.00000	0.00068	0.00125	0.12457	6
Ag	0.00000	0.00000	0.01415	0.01575	0.14321	6
Cd	0.00000	0.00000	0.01073	0.02316	0.14597	6
In	0.00000	0.00000	0.03262	0.02977	0.17501	6
Sn	0.00000	0.00000	0.00170	0.00416	0.21647	6
Sb	0.00000	0.00000	0.01722	0.04217	0.25679	6
Ba	0.00000	0.00000	0.05080	0.12443	0.93662	6
La	0.00000	0.00000	0.11067	0.16069	1.22636	6
Au	0.00000	0.00000	0.00037	0.00090	0.04263	6
Hg	0.00000	0.00000	0.00412	0.00725	0.03607	6
Tl	0.00000	0.00000	0.00145	0.00266	0.03470	6
Pb	0.00000	0.00000	0.00372	0.00910	0.04641	6
U	0.00000	0.00000	0.00273	0.00423	0.03436	6
SO_2	4.42286	2.21412	4.42286	2.21412	0.68483	7
Total Nitrate (HNO_3+NO_3^+)	0.00000	0.00000	0.00000	0.00000	0.00000	0
Denuded NO_3^-	0.00000	0.00000	0.00000	0.00000	0.00000	0
Volatilized NO_3^-	0.00000	0.00000	0.18800	0.26518	0.33364	5

chlorine(Cl), iron (Fe), chloride (Cl^-), nitrate (NO_3^-), and sulfate ($SO_4^=$) were often significant at several sites. Examining the individual field blanks shows that these values were within the minimum detection limits of the measurements specified in the program plan (Watson *et al.*, 1995). The largest variations were found for OC from the backup quartz filters, ranging from 25.1 ± 10.1 μg/filter at the Buffalo Pass site to 41.4 ± 7.1 μg/filter at the Baggs site. Average OC filter blanks for the front quartz filters were similar at all sites, ranging from 33.1 ± 1.4 μg/filter at the Juniper Mountain site to 38.9 ± 8.7 μg/filter at the Hayden VOR site.

Significant variations among total ammonia blanks were found, with 3.1 ± 0.94 μg/filter and 3.2 ± 1.3 μg/filter at the Buffalo Pass and Juniper Mountain sites, respectively, and 10.1 ± 5.5 μg/filter at the Hayden VOR site. Large field blank variations were also found for NH_4^+, preceded by the ammonia denuder (i.e., denuded NH_4^+) with 2.1 ± 0.42 μg/filter and 2.5 ± 0.98 μg/filter at the Buffalo Pass and Juniper Mountain sites, respectively, and 6.6 ± 3.5 μg/filter at the Hayden VOR site.

Table A.2.7 summarizes the analytical specifications for aerosol measurements. The lower quantifiable limits (LQL), expressed in terms of mass per cubic meter, are determined by: 1) the root mean squared precision for observations (C_i) equal to or less than their propagated uncertainties (σ_{Ci}) (i.e., $C_i \leq \sigma_{Ci}$), or 2) the standard deviation of the field blanks divided by nominal sampling volume for observations exceeding their propagated uncertainties (i.e., $C_i > \sigma_{Ci}$). Actual volumes varied from sample to sample, typically within ±5% of the preset volume. The LQLs should always be equal to or greater than the analytical minimum detection limits (MDL) reported in the program plan (Watson *et al.*, 1995) because they include the variation of the field blanks and flow rate precision (Watson *et al.*, 1989).

The number of reported (non-void, non-missing) concentrations for each species and the number of reported concentrations greater than the LQLs are also summarized in Table A.2.7. Sulfur dioxide (SO_2) as well as $PM_{2.5}$ mass, NO_3^-, $SO_4^=$, Al, Si, S, K, and Br were detected on over 80% of the samples. Other major chemical components such as mass, NH_4^+, K^+, OC, EC, Ca, Mn, Fe, Cu, and Sr were also detected on over 60% of the samples. Selenium (Se) concentrations exceeded the LQL of 0.0025 $\mu g/m^3$ on over 43% of the samples, whereas V, Ni, and As were found on ~25% of the samples.. Most rare earth elements (e.g., Ga, Yt, Mo, Pd, In, Sn, Sb, La, Tl, Ur) acquired by XRF analysis were detected between 10% and 20% of all cases.

Examining the individual sites showed that the Gilpin Creek site reported similar percentages (±15%) of values above the LQLs as compared to the other sites, even though the sample volumes were an order of magnitude lower than the volumes obtained at the other sites.

These analytical specifications imply that six- and twelve-hour filter pack samples acquired in this study possess adequate sample loadings for various chemical analyses. In addition, the minimum detection limits of the selected chemical analysis methods were sufficiently low to establish a valid measurement with associated uncertainties.

Table A.2.7

Analytical Specifications of 24-Hour PM_{10} Measurements for the Mt. Zirkel Visibility Study

Species	Analysis Method[a]	LQL[b] [µg/m^3]	No.[d] Values	No. > LQL
Mass	Gravimetry	0.10257	453	351
b_{abs} (Mm^{-1})	Densitometry	0.80089	453	264
Cl^-	IC	0.00972	453	110
NO_3^-	IC	0.00109	453	367
$SO_4^=$	IC	0.79821[c]	453	324
K^+	AAS	0.00438	453	311
NH_4^+	AC	0.00606	453	281
Total Ammonia (NH_3+NH_4^+)	AC	0.04098	453	151
Denuded NH_4^+	AC	0.01663	453	142
OC	TOR	0.13942	453	345
EC	TOR	0.03142	453	361
Backup OC	TOR	0.27103	453	192
Backup EC	TOR	0.04695	453	161
Na	XRF	0.02090	453	165
Mg	XRF	0.00764	453	217
Al	XRF	0.00276	453	387
Si	XRF	0.00867	453	394
P	XRF	0.00148	453	37
S	XRF	0.00073	453	395
Cl	XRF	0.00190	453	81
K	XRF	0.00401	453	385
Ca	XRF	0.01248	453	325
Ti	XRF	0.00432	453	131
V	XRF	0.00074	453	108
Cr	XRF	0.00072	453	64
Mn	XRF	0.00048	453	273
Fe	XRF	0.01041	453	351
Co	XRF	0.00022	453	51
Ni	XRF	0.00026	453	119
Cu	XRF	0.00050	453	296
Zn	XRF	0.00321	453	244
Ga	XRF	0.00037	453	63
As	XRF	0.00034	453	109
Se	XRF	0.00025	453	193
Br	XRF	0.00022	453	381
Rb	XRF	0.00016	453	136
Sr	XRF	0.00026	453	270
Yt	XRF	0.00014	453	77

continued . . .

Table A.2.7 (cont.)
Analytical Specification of 24-Hour PM_{10} Measurements for the Mt. Zirkel Visibility Study

Species	Analysis Method[a]	LQL[b] [µg/m^3]	No.[d] Values	No. > LQL
Zr	XRF	0.00036	453	129
Mo	XRF	0.00039	453	63
Pd	XRF	0.00197	453	61
Ag	XRF	0.00165	453	84
Cd	XRF	0.00196	453	54
In	XRF	0.00252	453	72
Sn	XRF	0.00354	453	101
Sb	XRF	0.00321	453	78
Ba	XRF	0.01590	453	69
La	XRF	0.01527	453	63
Au	XRF	0.00092	453	30
Hg	XRF	0.00028	453	81
Tl	XRF	0.00027	453	49
Pb	XRF	0.00076	453	186
U	XRF	0.00027	453	86
SO_2	AAS	0.01692[c]	453	368
Total Nitrate (HNO_3+NO_3^+)	IC	0.07531	453	147
Denuded NO_3^-	IC	0.00029	453	143
Volatilized NO_3^-	IC	0.00160	453	304

[a] IC: Ion Chromatography
AC: Automated Colorimetry
AAS: Atomic Absorption Spectrophotometry
TOR: Thermal/Optical Reflectance
XRF: X-Ray Fluorescence
TIMS: Thermal Ionization Mass Spectrometry

[b] LQL or lower quantifiable limit is equal to the root mean squared precision for observations (C_i) equal to or less than their propagated uncertainties (σ_{Ci}) (i.e., $C_i \leq \sigma_{Ci}$).

[c] The standard deviation of the field blanks divided by nominal sampling volume for observations exceeding their propagated uncertainties (σ_{Ci}) (i.e., $C_i > \sigma_{Ci}$).

[d] Number of non-voided (with -99) values reported.

A.2.2 Quality Assurance

One system and two performance audits were performed during field measurements. Auditors acquired and reviewed standard operating procedures and examined all phases of measurement activities to assure that procedures were being followed and that operators were properly trained. The procedures reviewed by the auditors were acceptable and proved to be adequate for the study. The following subsections summarize the results from the field flow audits, laboratory standard audits, and laboratory intercomparisons as part of the quality assurance of this study.

A.2.2.1 Sampling System Flow Variation

For the aerosol sampling systems, performance audits establish whether or not predetermined specifications are being achieved in practice. Two field performance audits were conducted: 1) between 02/20/95 and 02/23/95 for the winter period; and 2) between 08/21/95 and 08/24/95 for the summer period. Independent flow meters traceable to a primary calibrator were used to verify the flow rates for each of the sampling systems. The results of this performance audit are summarized by Andersen (1995a; 1995b). This audit report shows that sampling flow rates on average varied by ±0.1% to ±8.7% for sequential gas/aerosol sampling systems and by –2.9% to –10% for mini-vol $PM_{2.5}$ samplers (with one exception of –25%), as compared to the independent audit flow meter. Corrective actions were taken for those flow rates deviating by more than ±5% after the field audits.

A.2.2.2 Thin-Film Standards Comparisons for Elements

Table A.2.8 summarizes the audit results for the 20 thin-film standards obtained by the auditor from MicroMatter Company (Deer Harbor, WA). The samples flagged "x" (i.e., S127, S139, and S142) are those which MicroMatter Co. specified as having "variable stoichiometry" with deposit concentrations certified for the sum of both elements, but not for each individual element. Therefore, only the sum of the elemental concentrations are used to compare with these standards.

The manufacturer's accuracy specifications for these thin-film standards are ±5% at best. Table A.2.8 shows that over 90% of the comparisons are within ±15% of the standard value, with 64% of the elemental analyses reporting percent differences within ±10%. This yielded an overall average difference of -9%.

Poor comparisons were found for titanium (Ti) (-20.5%), vanadium (V) (-19.8%), sulfur (S) (-19.0%), and copper (Cu) (15.5%). Past experience in analyzing different batches of MicroMatter standards indicates substantial variability among individual standards for given elements. Figure A.2-1 gives an example of a recent calibration in which sulfur concentrations varied by up to 160% (based on manufacturer's specifications) for the twelve MicroMatter sulfur standards. Multiple standards for each element are used in the normal XRF calibration process.

Table A.2.8
X-Ray Fluorescence Audit Results

(concentrations in $\mu g/cm^2$)

ID	Flag[a]	Element	Standard Concentration	Measured Concentration[b]	Absolute Difference[c]	% Difference[d]
S125		Al	42.60	40.39 ± 0.11	-2.21	-5.19
S126		Si	33.70	31.03 ± 0.07	-2.67	-7.92
S127	f3,x	P	n/a	10.92 ± 0.03	n/a	n/a
S127	f3,x	Ga	n/a	32.15 ± 0.03	n/a	n/a
S127		Sum of P and GA	48.50	43.07 ± 0.03	-5.43	-11.20
S128		S	17.80	14.42 ± 0.03	-3.38	-18.99
S128		Cu	42.40	35.83 ± 0.02	-6.57	-15.50
S129		Cl	21.66	19.75 ± 0.09	-1.91	-8.82
S129		K	23.84	22.28 ± 0.05	-1.56	-6.54
S130		Ca	23.24	20.72 ± 0.04	-2.52	-10.84
S131		Ti	48.40	38.46 ± 0.05	-9.94	-20.54
S132		V	46.60	37.39 ± 0.04	-9.21	-19.76
S133		Cr	47.00	45.27 ± 0.04	-1.73	-3.68
S134		Mn	45.80	40.40 ± 0.04	-5.4	-11.79
S135	n9	Fe	46.80	41.72 ± 0.03	-5.08	-10.85
S136		Ni	44.50	48.11 ± 0.03	3.61	8.11
S137		Cu	43.90	41.40 ± 0.02	-2.5	-5.69
S138	i	Zn	30.00	29.80 ± 0.02	-0.2	-0.67
S139	x	Ga	n/a	9.88 ± 0.02	n/a	n/a
S139	x	As	n/a	34.43 ± 0.04	n/a	n/a
S139		Sum of Ga and As	47.80	44.31 ± 0.03	-3.49	-7.30
S140		Se	40.80	37.66 ± 0.03	-3.14	-7.70
S141		Br	17.29	17.18 ± 0.02	-0.11	-0.64
S142	x	Se	n/a	17.73 ± 0.02	n/a	n/a
S142	x	Cd	n/a	24.07 ± 0.06	n/a	n/a
S142		Sum of Se and Cd	46.70	41.80 ± 0.04	-4.9	-10.49
S143		Ba	38.29	37.71 ± 0.15	-0.58	-1.51
S144		Pb	49.20	46.96 ± 0.05	-2.24	-4.55

[a] f3 = Filter wrinkled.
i = Inhomogeneous sample deposit.
n9 = Discoloration on deposit.
x = Non-stoichiometric standard.

[b] Based on counting statistics from the x-ray fluorescence analysis.

[c] Absolute difference = Measured concentration - Standard concentration.

[d] % difference =
[(Measured concentration - Standard concentration) * 100] / Standard concentration.

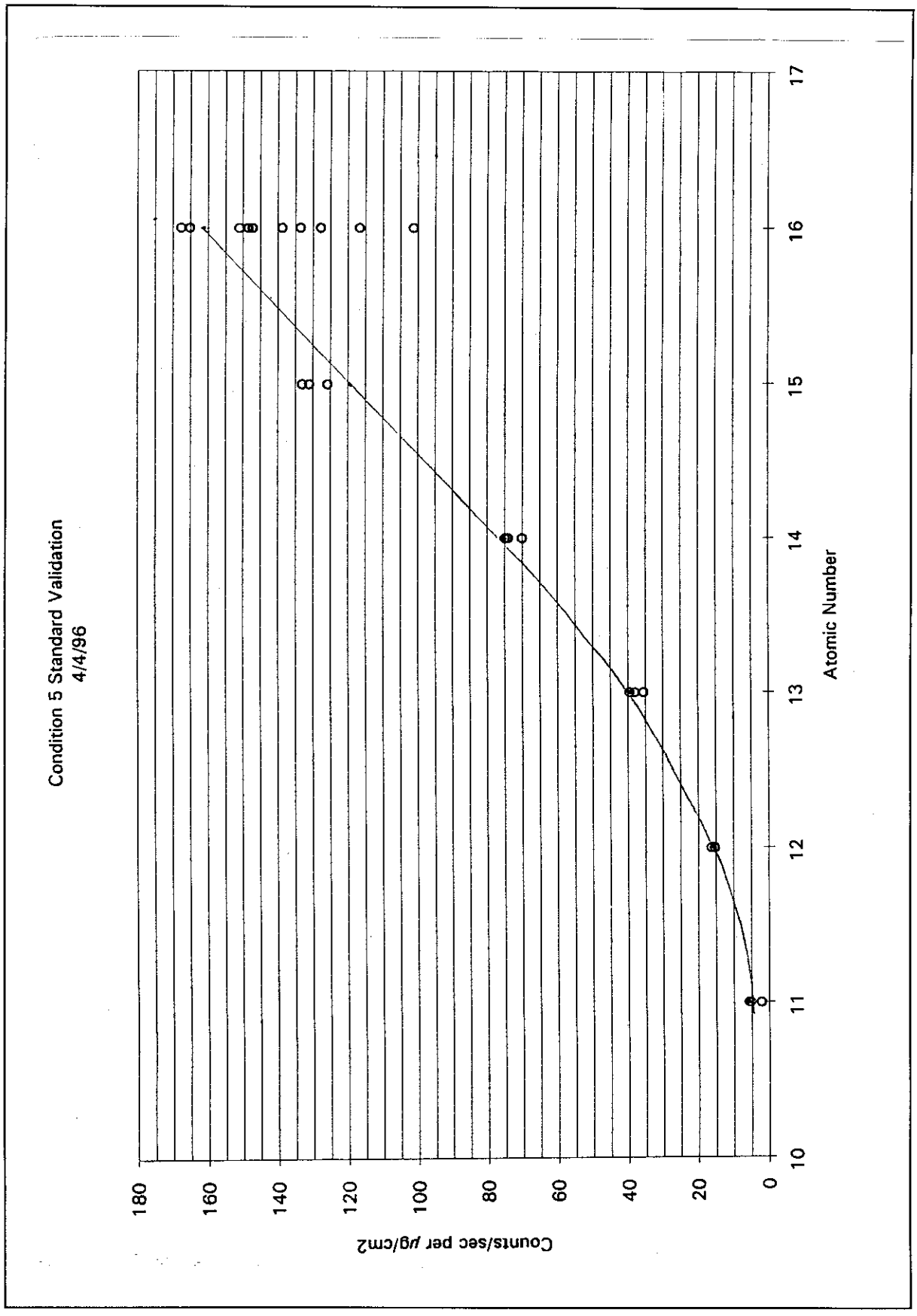


Figure A.2-1 Instrument responses from calibrating twelve MicroMatter thin-film sulfur standards.

Table A.2.9 summarizes the comparisons of recent (04/04/96) XRF standard calibrations with the National Institute of Standards and Technology (NIST) thin-film XRF standards. These comparisons report 1.0 ± 10.2% and 5.2 ± 11.1% differences for vanadium (V), 0 ± 14.4% and -1.3 ± 14.3% differences for titanium (Ti), and 4.7 ± 8.0%, -4.3 ± 8.0%, 7 ± 6.8%, and -5.0 ± 6.8% differences for copper (Cu). The standard deviation associated with the "percent difference" is propagated with XRF counting errors as well as the standard deviation of the NIST standard value. Standard deviations exceed the differences between measurements and standards most of the time in these comparisons, indicating that the average percent error is not significantly difference from zero. These values show that comparisons with NIST standards result in 10% to 15% fewer discrepancies than comparisons with MicroMatter standards.

A.2.2.3 Laboratory Audit and Intercomparison for Carbon

Known amounts of aqueous potassium hydrogen phthalate (KHP) solution were deposited on nine pre-fired, acceptance-tested, quartz-fiber filter punches (each with a disc area of 0.536 cm^2) with a microsyringe (accuracy ±0.54%) to obtain audit standards. These spiked samples along with three method blanks were submitted to the thermal/optical reflectance carbon analysis method..

Table A.2.10 summarizes the performance of carbon analysis on the spiked samples. More than 50% of the samples differed by more than 5% from the spiked concentrations. The average difference was 10% of the amount present. The largest percent variations of 25.9% (sample C5) and 18.9% (sample C4) were found on the lowest-concentration (1.43 μg/punch) samples, though the absolute differences were no more than those found for the higher concentrations; the maximum absolute difference was 0.37 μg/punch of organic carbon (sample C5) for these samples.

The largest absolute difference was 0.58 μg/punch (sample C3), equivalent to 0.75 $\mu g/m^3$ of organic carbon with nominal six-hour samples. Audit results with spiked samples reported by Chow *et al.* (1993) showed an absolute difference of 1.1 to 5.3 μg/punch and an average ±7% relative difference, which is comparable to the findings in this study.

Method blanks (samples C2, C8, and C11) reported an average of 0.2 ± 0.3 μg/punch organic carbon and zero elemental carbon. These values indicated minimal contamination of these spiked samples during standard preparation, sample shipping, and refrigerator storage.

For the samples acquired during the Mt. Zirkel Visibility Study, a laboratory intercomparison was conducted by analyzing separate, identically-prepared punches of each of the 20 samples in the laboratories at DRI and the South Coast Air Quality Management District (SCAQMD). Table A.2.11 summarizes the results of these analyses. In these comparisons, 50% of the samples reported less than ±10% variations and 75% of the samples reporting less than ±20% variations. The correlation coefficients were 0.84 for organic or total carbon. For elemental carbon, the correlation coefficient is 0.43. The absolute differences in measured elemental carbon concentrations range from -6.1 to +10.9 μg/filter

Table A.2.9
Verification of XRF Calibration with NIST Thin-Film Standards

Element	Nominal µg/cm²	Excitation Condition	True Concentration at Surface (µg/cm²)	04/04/96 Calibration Measured Results	% Error
SRM 1832					
S044					
Na[a]	11.50	5	7.1639	7.5149 ± 0.1799	4.9 ± 2.5
Al	15.20 ± 1.00	5	11.4931 ± 0.7561	11.4326 ± 0.0692	-0.5 ± 6.6
Al	15.20 ± 1.00	4	12.3853 ± 0.8148	12.3573 ± 0.1920	-0.2 ± 6.8
Si	36.20 ± 1.20	5	28.1082 ± 0.9318	30.2542 ± 0.0680	7.6 ± 3.3
Si	36.20 ± 1.20	4	30.3141 ± 1.0049	31.6614 ± 0.1501	4.4 ± 3.4
Ca	21.50 ± 1.40	4	20.2162 ± 1.3164	22.3008 ± 0.0421	10.3 ± 6.5
Ca	21.50 ± 1.40	3	20.7131 ± 1.3488	22.7814 ± 0.0507	10.0 ± 6.5
V	4.90 ± 0.50	3	4.7683 ± 0.4866	4.8166 ± 0.0166	1.0 ± 10.2
Mn	4.90 ± 0.50	3	4.8018 ± 0.4900	5.1587 ± 0.0138	7.4 ± 10.2
Co	1.08 ± 0.07	3	1.0630 ± 0.0689	1.1919 ± 0.0058	12.1 ± 6.6
Co	1.08 ± 0.07	2	1.0671 ± 0.0692	1.0860 ± 0.0085	1.8 ± 6.5
Cu	2.50 ± 0.20	3	2.4693 ± 0.1975	2.5853 ± 0.0065	4.7 ± 8.0
Cu	2.50 ± 0.20	2	2.4786 ± 0.1983	2.3728 ± 0.0095	-4.3 ± 8.0
SRM 1833					
S043					
Si	32.40 ± 2.10	5	25.6435 ± 1.6621	28.2156 ± 0.0854	10.0 ± 6.5
Si	32.40 ± 2.10	4	27.7375 ± 1.7978	30.6059 ± 0.2035	10.3 ± 6.6
K	16.90 ± 1.70	4	15.5479 ± 1.5640	16.4669 ± 0.0422	5.9 ± 10.1
K	16.90 ± 1.70	3	15.9516 ± 1.6046	17.4583 ± 0.0547	9.4 ± 10.1
Ti	12.50 ± 1.80	3	12.0087 ± 1.7292	12.0109 ± 0.0314	0.0 ± 14.4
Fe	14.10 ± 0.45	3	13.7809 ± 0.4398	14.9435 ± 0.0205	8.4 ± 3.2
Fe	14.10 ± 0.45	2	13.8439 ± 0.4418	14.3133 ± 0.0344	3.4 ± 3.2
Zn	3.80 ± 0.30	3	3.7385 ± 0.2951	4.1755 ± 0.0076	11.7 ± 8.0
Zn	3.80 ± 0.30	2	3.7556 ± 0.2965	3.5830 ± 0.0120	-4.6 ± 7.9
Pb	15.90 ± 0.80	2	15.8039 ± 0.7952	16.6711 ± 0.0286	5.5 ± 5.0
SRM 1832					
S112					
Na[a]	11.40	5	7.1653 ±	7.5013 ± 0.1821	4.7 ± 2.5
Al	14.90 ± 1.00	5	11.3160 ± 0.7595	11.9361 ± 0.0696	5.5 ± 6.7
Al	14.90 ± 1.00	4	12.1957 ± 0.8185	12.8174 ± 0.1971	5.1 ± 6.9
Si	36.60 ± 1.20	5	28.5268 ± 0.9353	30.4367 ± 0.0680	6.7 ± 3.3
Si	36.60 ± 1.20	4	30.7682 ± 1.0088	33.0386 ± 0.1530	7.4 ± 3.3
Ca	20.00 ± 1.30	4	18.8282 ± 1.2238	21.5239 ± 0.0413	14.3 ± 6.6
Ca	20.00 ± 1.30	3	19.2787 ± 1.2531	21.8541 ± 0.0496	13.4 ± 6.6
V	4.53 ± 0.50	3	4.4125 ± 0.4870	4.6407 ± 0.0163	5.2 ± 11.1
Mn	4.53 ± 0.50	3	4.4429 ± 0.4904	4.9242 ± 0.0135	10.8 ± 11.1
Co	0.99 ± 0.07	3	0.9752 ± 0.0660	1.1422 ± 0.0056	17.1 ± 6.9
Co	0.99 ± 0.07	2	0.9786 ± 0.0662	1.0057 ± 0.0081	2.8 ± 6.8
Cu	2.52 ± 0.17	3	2.4908 ± 0.1680	2.6656 ± 0.0066	7.0 ± 6.8
Cu	2.52 ± 0.17	2	2.4997 ± 0.1686	2.3745 ± 0.0095	-5.0 ± 6.8
SRM 1833					
S113					
Si	32.60 ± 2.20	5	25.7073 ± 1.7349	28.3727 ± 0.0861	10.4 ± 6.8
Si	32.60 ± 2.20	4	27.8422 ± 1.8789	30.5942 ± 0.2052	9.9 ± 6.8
K	16.80 ± 1.70	4	15.4368 ± 1.5621	16.2967 ± 0.0421	5.6 ± 10.1
K	16.80 ± 1.70	3	15.8429 ± 1.6032	17.3085 ± 0.0546	9.3 ± 10.2
Ti	12.60 ± 1.80	3	12.0992 ± 1.7285	11.9445 ± 0.0315	-1.3 ± 14.3
Fe	14.00 ± 0.46	3	13.6800 ± 0.4495	14.8728 ± 0.0205	8.7 ± 3.3
Fe	14.00 ± 0.46	2	13.7428 ± 0.4515	14.2539 ± 0.0344	3.7 ± 3.3
Zn	3.85 ± 0.31	3	3.7872 ± 0.3049	4.2160 ± 0.0077	11.3 ± 8.1
Zn	3.85 ± 0.31	2	3.8046 ± 0.3063	3.6231 ± 0.0121	-4.8 ± 8.1
Pb	16.30 ± 0.77	2	16.2003 ± 0.7653	16.9506 ± 0.0288	4.6 ± 4.7

[a] Uncertified value.

Table A.2.10
Carbon Audit Results of Laboratory-Spiked Samples

(carbon concentrations in µg/punch[a])

ID	Flag	Spike Value	Measured Organic Carbon	Spike Value	Measured Elemental Carbon	Absolute Difference[c] (µg/punch)	% Difference[d]
C1		2.69	2.4 ± 0.3 [b]	0.0	0.0 ± 0.1	-0.29	-10.78
C2		0.00	0.1 ± 0.3	0.0	0.0 ± 0.1	0.10	n/a[e]
C3		4.48	3.9 ± 0.3	0.0	0.0 ± 0.1	-0.58	-12.95
C4		1.43	1.7 ± 0.3	0.0	0.0 ± 0.1	0.27	18.88
C5		1.43	1.8 ± 0.3	0.0	0.0 ± 0.1	0.37	25.87
C6		2.69	2.8 ± 0.3	0.0	0.0 ± 0.1	0.11	4.09
C7		1.43	1.5 ± 0.3	0.0	0.1 ± 0.1	0.07	4.90
C8		0.00	0.2 ± 0.3	0.0	0.0 ± 0.1	0.20	n/a[e]
C9		4.48	4.4 ± 0.3	0.0	0.1 ± 0.1	-0.08	-1.79
C10		2.69	2.7 ± 0.3	0.0	0.0 ± 0.1	0.01	0.37
C11		0.00	0.3 ± 0.3	0.0	0.0 ± 0.1	0.30	n/a[e]
C12		4.48	4.4 ± 0.3	0.0	0.0 ± 0.1	-0.08	-1.79

[a] Punch size is 0.536 cm^2.
[b] Uncertainty estimates are based on the instrument detection limits.
[c] Absolute difference = Measured value - Spike value.
[d] % difference = [(Measured value - Spike value) * 100] / Spike value.
[e] Not applicable.

Table A.2.11
Results of the DRI / SCAQMD Laboratory Intercomparison for Thermal/Optical Reflectance Carbon Analysis

I.D. #	DRI Organic Carbon Mean ± Unc (µg/filter)	SCAQMD Organic Carbon Mean ± Unc (µg/filter)	Absolute[a] Difference (µg/filter)	Average Percent[b] Difference	DRI Elemental Carbon Mean ± Unc (µg/filter)	SCAQMD Elemental Carbon Mean ± Unc (µg/filter)	Absolute[a] Difference (µg/filter)	Average Percent[b] Difference	DRI Total Carbon Mean ± Unc (µg/filter)	SCAQMD Total Carbon Mean ± Unc (µg/filter)	Absolute[a] Difference (µg/filter)	Average Percent[b] Difference
BBFQ153	103.5 ± 8.3	96.75 ± 9.783	6.75	6.74	8.8 ± 1.6	11 ± 6.534	-2.20	-22.22	112.3 ± 9.7	108.65 ± 5.882	3.65	3.30
BBFQ154	81.7 ± 7.0	94.35 ± 9.359	-12.65	-14.37	11.1 ± 1.9	8.65 ± 6.292	2.45	24.81	92.8 ± 8.4	103.45 ± 5.639	-10.65	-10.85
BPFQ228	90.9 ± 7.5	111.95 ± 10.18	-21.05	-20.75	13.2 ± 2.2	11.95 ± 6.365	1.25	9.94	104.1 ± 9.1	123.45 ± 6.004	-19.35	-17.01
BPFQ281	71.2 ± 6.3	85.3 ± 9.338	-14.10	-18.02	4.3 ± 1.1	5.95 ± 6.188	-1.65	-32.20	75.5 ± 7.2	91.5 ± 5.601	-16.00	-19.16
BPFQ348	45.8 ± 5.0	43.3 ± 7.579	2.50	5.61	4.4 ± 1.1	6.05 ± 6.323	-1.65	-31.58	50.2 ± 5.8	48.3 ± 4.935	1.90	3.86
BPFQ384	62.1 ± 10.4	48.9 ± 8.529	13.20	23.78	12.3 ± 9.9	5.05 ± 6.266	7.25	83.57	74.4 ± 6.2	53.1 ± 5.292	21.30	33.41
BPFQ391	46.5 ± 8.2	43.25 ± 7.717	3.25	7.24	12.3 ± 9.9	10.5 ± 6.71	1.80	15.79	58.8 ± 5.6	56.85 ± 5.113	1.95	3.37
HSFQ104	62.4 ± 5.8	65.1 ± 8.914	-2.70	-4.24	16.3 ± 2.6	6.5 ± 6.162	9.80	85.96	78.7 ± 7.4	71.7 ± 5.418	7.00	9.31
HSFQ130	80.3 ± 6.9	80.25 ± 9.591	0.05	0.06	8.7 ± 1.6	6.2 ± 6.243	2.50	33.56	88.9 ± 8.1	86.95 ± 5.722	1.95	2.22
HSFQ153	59.8 ± 5.7	71.9 ± 8.762	-12.10	-18.38	0.2 ± 0.9	6.25 ± 6.301	-6.05	-187.60	60.0 ± 6.3	77.3 ± 5.396	-17.30	-25.20
HSFQ182	65.0 ± 8.6	62.7 ± 8.404	2.30	3.60	12.0 ± 4.4	5.95 ± 6.228	6.05	67.41	77.0 ± 10.5	68.2 ± 5.230	8.80	12.12
HSFQ184	45.2 ± 5.0	56.35 ± 8.683	-11.15	-21.96	4.2 ± 1.1	6.7 ± 6.376	-2.50	-45.87	49.4 ± 5.7	64.35 ± 5.386	-14.95	-26.29
HVFQ129	118.1 ± 9.3	93.9 ± 9.489	24.20	22.83	10.2 ± 1.8	7.75 ± 6.271	2.45	27.30	128.4 ± 10.8	102.1 ± 5.687	26.30	22.82
HVFQ152	112.2 ± 8.9	87.8 ± 9.102	24.40	24.40	6.1 ± 1.3	7 ± 6.198	-0.90	-13.74	118.4 ± 10.1	94.6 ± 5.506	23.80	22.35
HVFQ161	62.2 ± 5.8	67.45 ± 8.688	-5.25	-8.10	9.3 ± 1.7	4.55 ± 6.156	4.75	68.59	71.5 ± 7.0	71.75 ± 5.324	-0.25	-0.35
HVFQ174	97.4 ± 7.9	89.55 ± 9.62	7.85	8.40	21.1 ± 3.3	10.2 ± 6.265	10.90	69.65	118.5 ± 10.1	99.95 ± 5.740	18.55	16.98
HVFQ181	74.6 ± 9.6	76.8 ± 8.895	-2.20	-2.91	10.2 ± 3.8	4.05 ± 6.123	6.15	86.32	84.8 ± 11.4	81 ± 5.399	3.80	4.58
HVFQ198	72.4 ± 9.3	62.95 ± 8.422	9.45	13.96	4.2 ± 1.8	6.45 ± 6.258	-2.25	-42.25	76.5 ± 10.5	69.95 ± 5.246	6.55	8.95
JUFQ345	46.4 ± 6.7	47.9 ± 8.519	-1.50	-3.18	5.0 ± 2.0	5.9 ± 6.253	-0.90	-16.51	51.4 ± 7.7	54.4 ± 5.284	-3.00	-5.67
JUFQ361	45.4 ± 6.6	47.45 ± 7.827	-2.05	-4.42	3.5 ± 1.5	5.5 ± 6.188	-2.00	-44.44	49.0 ± 7.5	53.25 ± 4.989	-4.25	-8.31
Average	72.2 ± 22.7	71.7 ± 20.3	0.46	0.64	8.9 ± 5.0	7.1 ± 2.2	1.76	22.06	81.0 ± 24.9	79.0 ± 21.5	1.99	2.49

[a] Absolute difference = DRI minus SCAQMD measured concentration.

[b] Average percent difference = DRI minus SCAQMD, divided by their average, times 100%.

with large (~22%) average percent differences. Since the average elemental carbon concentrations are at or below three times the minimum detection level of 8.3 μg/filter, large uncertainties are not unusual for these comparisons.

A.2.2.4 Laboratory Audit and Intercomparison for Ions

Known amounts of aqueous chloride, nitrate, sulfate, and ammonium solution were deposited on nine acceptance-tested quartz-fiber filters with a microsyringe (accuracy ±0.54%). These triplicate spiked samples, at three different concentration levels, along with three method blanks, were submitted for ion chromatography (IC) analysis of chloride, nitrate, and sulfate, and for automated colorimetry (AC) analysis of ammonium.

Table A.2.12 summarizes the performance of the IC and AC analyses. The best comparisons were found for sulfate, with a percent difference of less than ±3% for the spiked samples and zero (0 ± 0.25 μg/filter) for the filter blanks.

The percent differences for nitrate range from 0.9% to 7.8% with measured concentrations exceeding the spiked concentration by 0.07 to 0.58 μg/filter. This positive bias can be attributed to the slightly elevated blank values which averaged 0.52 ± 0.02 μg/filter. This positive bias has a negligible effect (less than 0.03 μg/m3 of nitrate) on the nitrate concentrations in the data base.

Chloride comparisons are generally within ±10% of the spiked amount, except for the lowest concentration level (0.86 μg/filter) where DRI's measurement shows a positive bias of 0.09 and 0.16 μg/filter. DRI's measurements on the blank filters also showed similar positive biases of 0.09 to 0.15 μg/filter. It is suspected that a slight baseline shift occurred during IC analysis which resulted in this positive bias for chloride and nitrate concentrations.

Table A.2.12 shows positive ammonium biases of 0.27 to 0.56 μg/filter for blank filters and negative biases of 0.36 to 3.96 μg/filter were found for spiked filters, resulting in average percent differences -7.7% to -13.4% at three concentration levels. It is suspected that ammonia was liberated from the basic extraction solution due to vigorous shaking and sonicating procedures. This phenomenon is not expected to occur on the ambient samples, however, since the aerosols in the study region are expected to be either neutral or acidic, rather than basic as is the case for the spiked samples.

A set of 20 half-filters were sent to SCAQMD's laboratory for anion and cation analyses by ion chromatography. Since samples commonly acquired in Southern California contain high concentrations, the calibration curve was established with standard concentrations of 1, 3, 5, and 10 ppm. These calibration ranges are factors of 10 to 100 higher than those found in the Mt. Zirkel Visibility Study. As a result, adequate comparisons cannot be established for chloride and nitrate analyses. Table A.2.13 reports the results of the DRI/SCAQMD laboratory intercomparison of 14 sulfate and 18 ammonium measurements. The absolute differences ranged from -16.6 to +4.0 μg/filter with average percent differences

Table A.2.12
Ion Analysis Results for Laboratory Spiked Samples

(concentrations in µg/filter)

ID	Element	Standard[a] Concentration	Measured[b] Concentration	Absolute Difference[e]	% Difference[f]
1	Cl-	Filter blank	0.15 ± 0.25	0.15	n/a
2	Cl-	Filter blank	0.09 ± 0.25	0.09	n/a
3	Cl-	Filter blank	0.11 ± 0.25	0.11	n/a
Average[c]	Cl-	Filter blank	0.12 ± 0.03	0.12	n/a
6	Cl-	0.86 ± 0.04	1.02 ± 0.26	0.16	18.60
8	Cl-	0.86 ± 0.04	0.95 ± 0.26	0.09	10.47
10	Cl-	0.86 ± 0.04	0.93 ± 0.26	0.07	8.14
Average	Cl-		0.97 ± 0.05	0.11	12.40
Analyzed[d]	Cl-	0.92			
5	Cl-	1.43 ± 0.07	1.44 ± 0.27	0.01	0.70
9	Cl-	1.43 ± 0.07	1.55 ± 0.27	0.12	8.39
12	Cl-	1.43 ± 0.07	1.50 ± 0.27	0.07	4.90
Average	Cl-		1.50 ± 0.06	0.07	4.66
Analyzed[d]	Cl-	1.46			
4	Cl-	2.58 ± 0.13	2.78 ± 0.31	0.20	7.75
7	Cl-	2.58 ± 0.13	2.63 ± 0.30	0.05	1.94
11	Cl-	2.58 ± 0.13	2.64 ± 0.30	0.06	2.33
Average	Cl-		2.68 ± 0.08	0.10	4.01
Analyzed[d]	Cl-	2.51			
1	NO3-	Filter blank	0.50 ± 0.25	0.50	n/a
2	NO3-	Filter blank	0.51 ± 0.25	0.51	n/a
3	NO3-	Filter blank	0.54 ± 0.25	0.54	n/a
Average[c]	NO3-	Filter blank	0.52 ± 0.02	0.52	n/a
6	NO3-	4.64 ± 0.23	4.94 ± 0.27	0.30	6.47
8	NO3-	4.64 ± 0.23	4.94 ± 0.27	0.30	6.47
10	NO3-	4.64 ± 0.23	5.00 ± 0.27	0.36	7.76
Average	NO3-		4.96 ± 0.03	0.32	6.90
Analyzed[d]	NO3-	4.64			
5	NO3-	7.73 ± 0.39	7.80 ± 0.31	0.07	0.91
9	NO3-	7.73 ± 0.39	8.21 ± 0.31	0.48	6.21
12	NO3-	7.73 ± 0.39	8.19 ± 0.31	0.46	5.95
Average	NO3-		8.07 ± 0.23	0.34	4.36
Analyzed[d]	NO3-	7.63			
4	NO3-	13.91 ± 0.70	14.40 ± 0.41	0.49	3.52
7	NO3-	13.91 ± 0.70	14.37 ± 0.41	0.46	3.31
11	NO3-	13.91 ± 0.70	14.49 ± 0.41	0.58	4.17
Average	NO3-		14.42 ± 0.06	0.51	3.67
Analyzed[d]	NO3-	13.90			

Table A.2.12 (continued)
Ion Analysis Results for Laboratory Spiked Samples

(concentrations in μg/filter)

ID	Element	Standard[a] Concentration	Measured[b] Concentration	Absolute Difference[e]	% Difference[f]
1	SO4=	Filter blank	0.00 ± 0.25	0.00	n/a
2	SO4=	Filter blank	0.00 ± 0.25	0.00	n/a
3	SO4=	Filter blank	0.00 ± 0.25	0.00	n/a
Average[c]	SO4=	Filter blank	0.00 ± 0.00	0.00	n/a
6	SO4=	34.31 ± 1.72	35.10 ± 0.80	0.79	2.30
8	SO4=	34.31 ± 1.72	34.38 ± 0.79	0.07	0.20
10	SO4=	34.31 ± 1.72	34.74 ± 0.79	0.43	1.25
Average	SO4=		34.74 ± 0.36	0.43	1.25
Analyzed[d]	SO4=	33.87			
5	SO4=	57.18 ± 2.86	55.50 ± 1.32	-1.68	-2.94
9	SO4=	57.18 ± 2.86	57.90 ± 1.32	0.72	1.26
12	SO4=	57.18 ± 2.86	58.20 ± 1.33	1.02	1.78
Average	SO4=		57.20 ± 1.48	0.02	0.03
Analyzed[d]	SO4=	56.49			
4	SO4=	102.90 ± 5.15	104.70 ± 2.62	1.80	1.75
7	SO4=	102.90 ± 5.15	105.30 ± 2.62	2.40	2.33
11	SO4=	102.90 ± 5.15	104.10 ± 2.62	1.20	1.17
Average	SO4=		104.70 ± 0.60	1.80	1.75
Analyzed[d]	SO4=	101.51			
1	NH4+	Filter blank	0.27 ± 0.25	0.27	n/a
2	NH4+	Filter blank	0.44 ± 0.25	0.44	n/a
3	NH4+	Filter blank	0.56 ± 0.25	0.56	n/a
Average[c]	NH4+	Filter blank	0.42 ± 0.15	0.42	n/a
6	NH4+	5.57 ± 0.28	5.06 ± 0.26	-0.51	-9.16
8	NH4+	5.57 ± 0.28	5.16 ± 0.26	-0.41	-7.36
10	NH4+	5.57 ± 0.28	5.21 ± 0.26	-0.36	-6.46
Average	NH4+		5.14 ± 0.08	-0.43	-7.66
Analyzed[d]	NH4+	5.49			
5	NH4+	16.70 ± 0.84	13.56 ± 0.30	-3.14	-18.80
9	NH4+	16.70 ± 0.84	14.69 ± 0.30	-2.01	-12.04
12	NH4+	16.70 ± 0.84	15.16 ± 0.31	-1.54	-9.22
Average	NH4+		14.47 ± 0.82	-2.23	-13.35
Analyzed[d]	NH4+	15.57			
4	NH4+	27.83 ± 1.39	23.87 ± 0.37	-3.96	-14.23
7	NH4+	27.83 ± 1.39	25.14 ± 0.39	-2.69	-9.67
11	NH4+	27.83 ± 1.39	24.67 ± 0.38	-3.16	-11.35
Average	NH4+		24.56 ± 0.64	-3.27	-11.75
Analyzed[d]	NH4+	26.80			

[a] Spike values from AtmAA.

[b] As measured by DRI.

[c] Average of the triplicate spike samples.

[d] As measured by Global Labs, an independent laboratory.

[e] Absolute difference = Measured concentration - Standard concentration.

[f] % difference = [(Measured concentration - Standard concentration) * 100] / Standard concentration.

Table A.2.13
Results of DRI / SCAQMD Laboratory Intercomparison for Ion Analysis

I.D. #	DRI[a] S4IC (µg/filter)	DRI[a] S4IU (µg/filter)	SCAQMD[a] SO4= (µg/filter)	SCAQMD[a] Unc. (µg/filter)	Absolute[d] Difference (µg/filter)	Average Percent[e] Difference	DRI[b] N4CC (µg/filter)	DRI[b] N4CU (µg/filter)	SCAQMD[c] NH4+ (µg/filter)	SCAQMD[c] Unc (µg/filter)	Absolute[d] Difference (µg/filter)	Average Percent[e] Difference
BBFQ182	13.4700	0.5000	12.86	2.43	0.61	4.6	4.3830	0.5000	5.98	2.34	-1.60	-30.9
BBFQ183	6.2100	0.5000	NA[f]				2.5050	0.5000	3.19	1.76	-0.68	-24.0
BPFQ319	5.9400	0.5029	NA[f]				3.1710	0.5015	2.75	1.43	0.42	14.1
BPFQ345	15.4500	0.5000	18.37	7.99	-2.92	-17.3	5.4540	0.5000	7.85	2.70	-2.40	-36.0
BPFQ387	45.9600	0.6509	52.89	29.69	-6.93	-14.0	15.1950	0.5330	19.78	3.08	-4.58	-26.2
GCFQ183	6.2400	0.5032	5.83	0.64	0.41	6.7	3.4140	0.5178	4.81	1.47	-1.40	-34.0
GCFQ215	5.4300	0.5024	NA[f]				3.3090	0.5168	4.01	2.21	-0.70	-19.2
GCFQ259	4.2900	0.5000	NA[f]				2.3520	0.5000	3.08	1.41	-0.73	-26.8
HSFQ132	25.0500	0.5492	31.38	3.19	-6.33	-22.4	10.3170	0.5155	14.29	2.92	-3.97	-32.3
HSFQ154	40.1700	0.6186	56.75	6.73	-16.58	-34.2	13.7310	0.5271	23.38	4.34	-9.64	-52.0
HSFQ159	28.3200	0.5621	33.83	0.00	-5.51	-17.7	9.5460	0.5133	10.82	3.39	-1.27	-12.5
HSFQ206	13.2300	0.5000	10.17	3.10	3.06	26.2	4.2780	0.5000	5.31	2.80	-1.03	-21.6
HSFQ208	30.7200	0.5000	32.59	12.88	-1.87	-5.9	10.7220	0.6311	11.73	4.86	-1.01	-9.0
HVFQ132	25.2000	0.5498	34.91	2.76	-9.71	-32.3	9.4980	0.5132	12.36	3.42	-2.86	-26.2
HVFQ160	13.2000	0.5141	17.98	6.39	-4.78	-30.6	5.1360	0.5039	7.52	2.09	-2.39	-37.7
HVFQ173	26.5500	0.5550	35.45	26.77	-8.90	-28.7	9.7350	0.5138	13.75	3.62	-4.01	-34.2
HVFQ184	11.4900	0.5107	7.52	0.77	3.97	41.7	5.1960	0.5040	6.18	1.88	-0.98	-17.3
JUFQ356	28.3200	0.5000	32.18	4.57	-3.86	-12.8	10.5210	0.6192	12.60	4.73	-2.08	-18.0
Average	19.1800	12.5594	27.34	15.88	-8.16	-35.1	7.1368	4.0287	9.41	5.89	-2.27	-27.5

[a] Ion chromatographic analysis of anions.

[b] Automated colorimetric analysis of cations.

[c] Ion chromatographic analysis of cations.

[d] Absolute difference = DRI minus SCAQMD measured concentrations.

[e] Average percent difference = DRI minus SCAQMD, divided by their average, times 100%.

[f] Information not available due to different calibration concentration ranges.

of -34% to +42%. Only 20% of the samples reported variations within ±10%, and 50% of the samples reported variations within ±20%.

Ammonium was analyzed by automated colorimetry at the DRI laboratory and by ion chromatography at the SCAQMD laboratory. Similar discrepancies were found on the ammonium measurements due to the differences in calibration ranges and minimum detection limits. The absolute differences ranged from -9.6 to +0.4 μg/filter with average percent differences of -5.2% to +14%. Only 6% of the samples reported variations within ±10% and 28% of the samples reported variations within ±20%. On average, DRI's laboratory reported a 2.2 μg/filter lower concentration as compared to the SCAQMD measurements, which is equivalent to an underestimation of 0.11 μg/m3 ammonium for a nominal six-hour sample.

Even though the measured concentrations differ in these comparisons, the correlations between the two laboratories are excellent, being 0.97 for the 14 sulfate measurements and 0.96 for the 18 ammonium measurements. These high correlations give confidence to the precision of the two laboratories' measurements. The SCAQMD measurements should be expected to have high uncertainty intervals since most of the concentrations were close to their detection limits.

A.2.3 Data Validation of Filter Pack Measurements

Figures A.2-2 to A.2-7 present the flow diagrams of gaseous/aerosol filter pack measurements with different types of aerosol samplers. Level 1 data validation flags and comments are included with each data record in the Mt. Zirkel data base. Level 2 data validation tests and results are described in the following subsections.

Level 2 tests evaluate the chemical data for internal consistency. For the aerosol data base, Level 2 data validations were made for the following tests:

- Comparison of collocated precisions for SO_2, $SO_4^=$, and light absorption measurements between the continuous and filter pack sampling systems;
- Adsorption of gaseous organic carbon;
- Sum of chemical species versus $PM_{2.5}$ mass;
- Physical and chemical consistency of different sampling and chemical analysis methods;
- Cation and anion balance;
- Nitrate volatilization;
- Estimation of coarse particle nitrate;
- Validity of denuder difference measurements; and

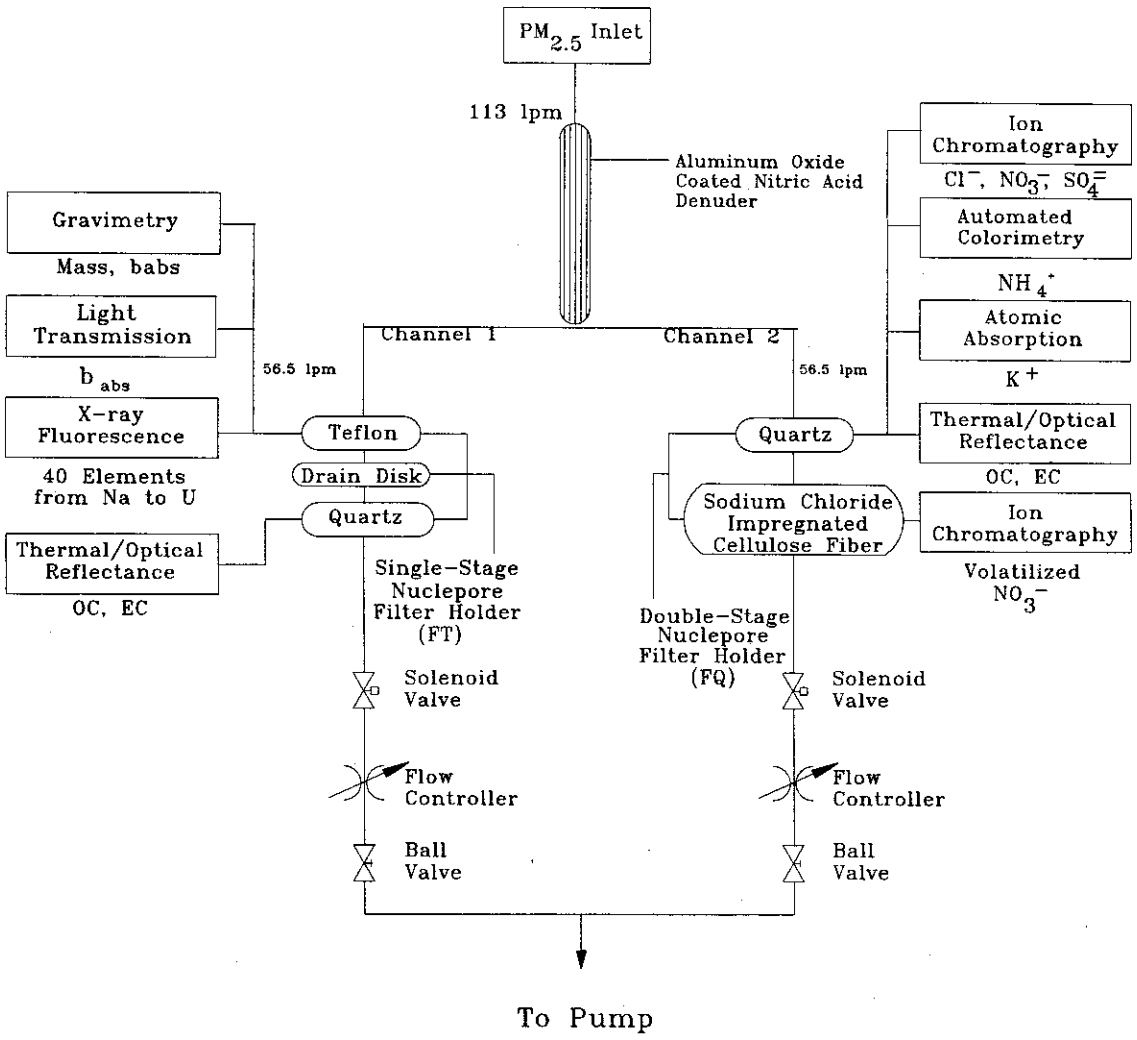


Figure A.2-2 Flow diagram of the sequential filter sampler for $PM_{2.5}$ mass, light absorption, elements, ions, and carbon measurements.

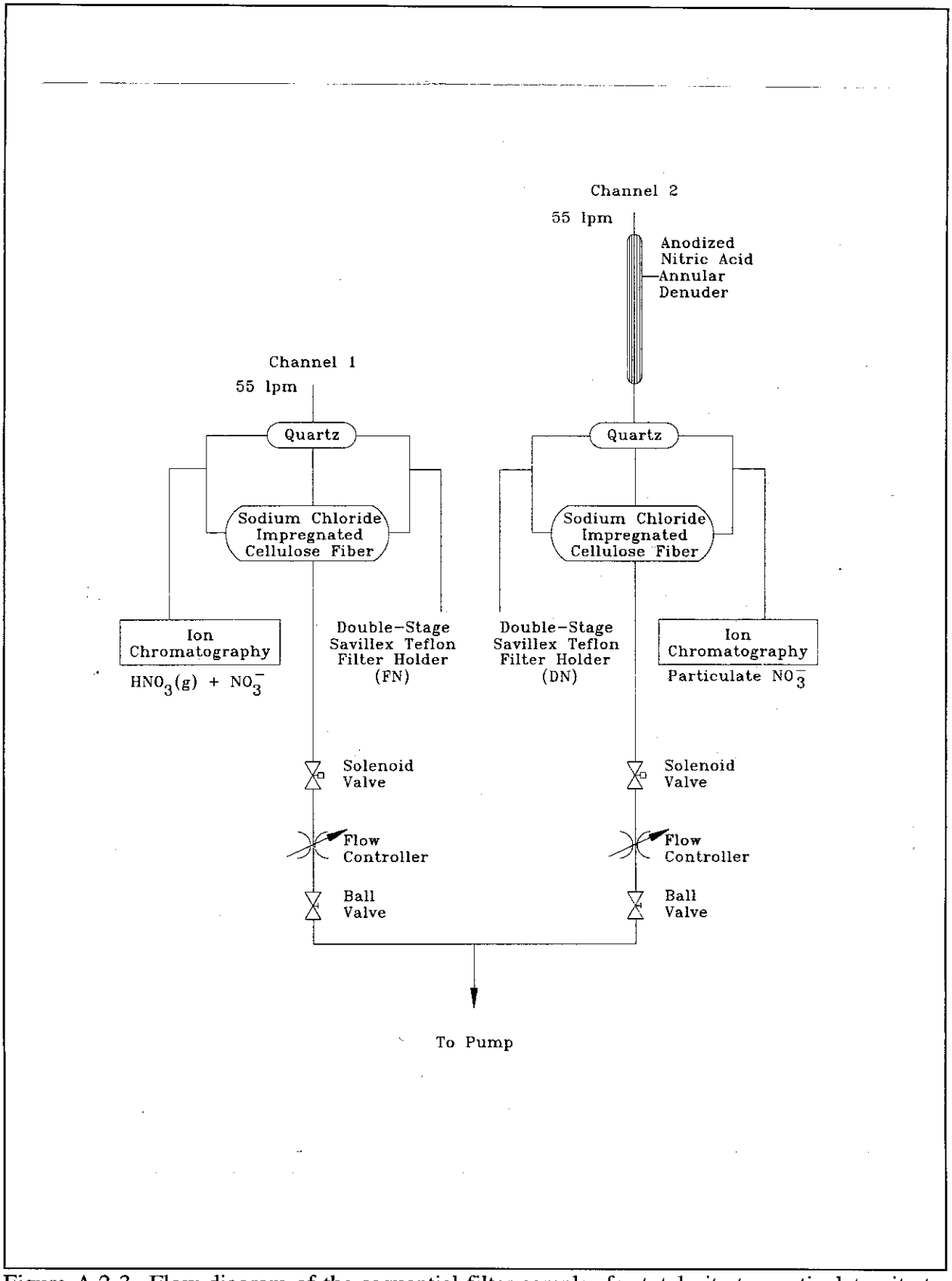


Figure A.2-3 Flow diagram of the sequential filter sampler for total nitrate, particulate nitrate, and gaseous nitric acid measurements.

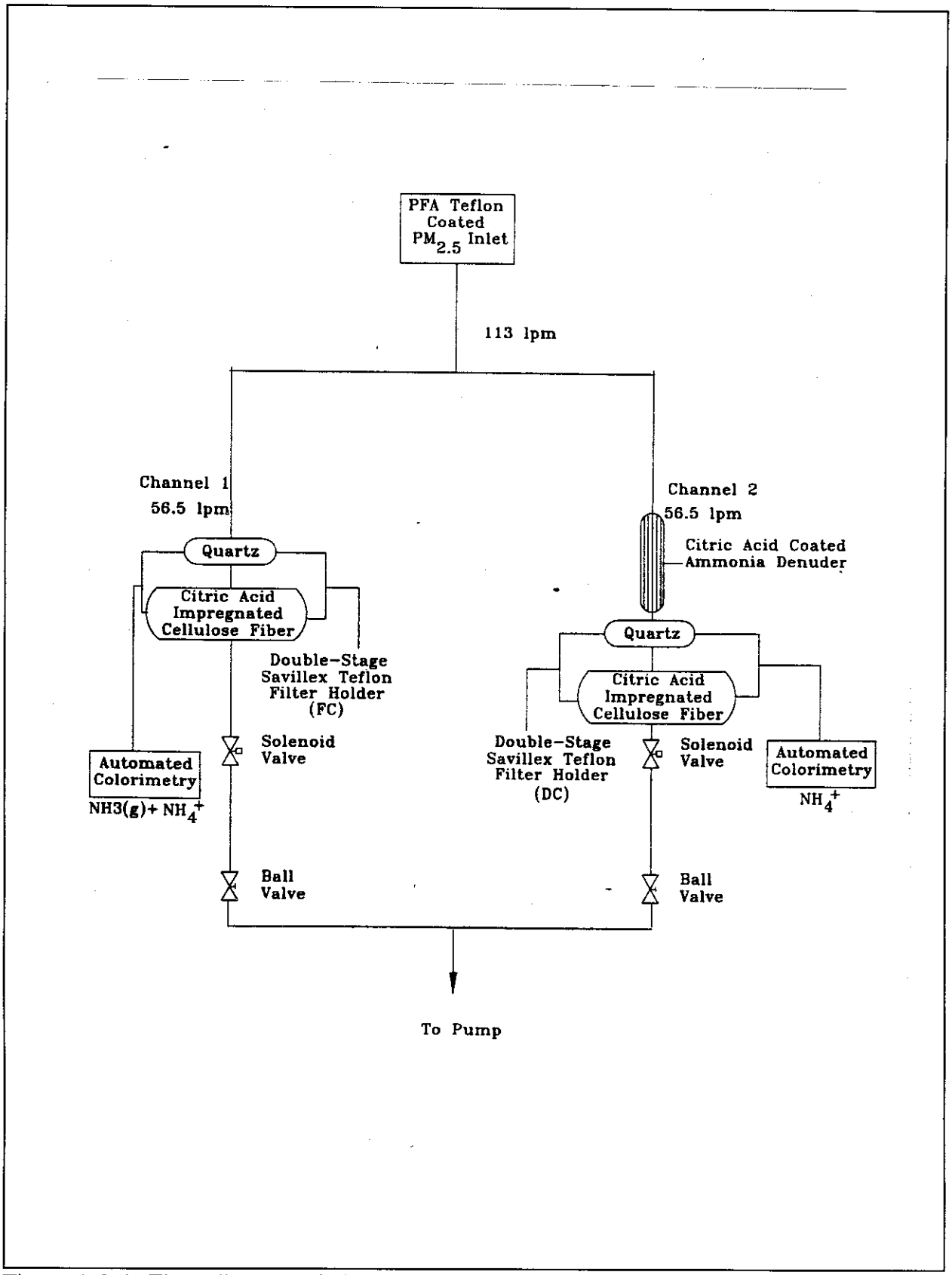


Figure A.2-4 Flow diagram of the sequential filter sampler for total ammonia, particulate, ammonium, and gaseous ammonia measurements.

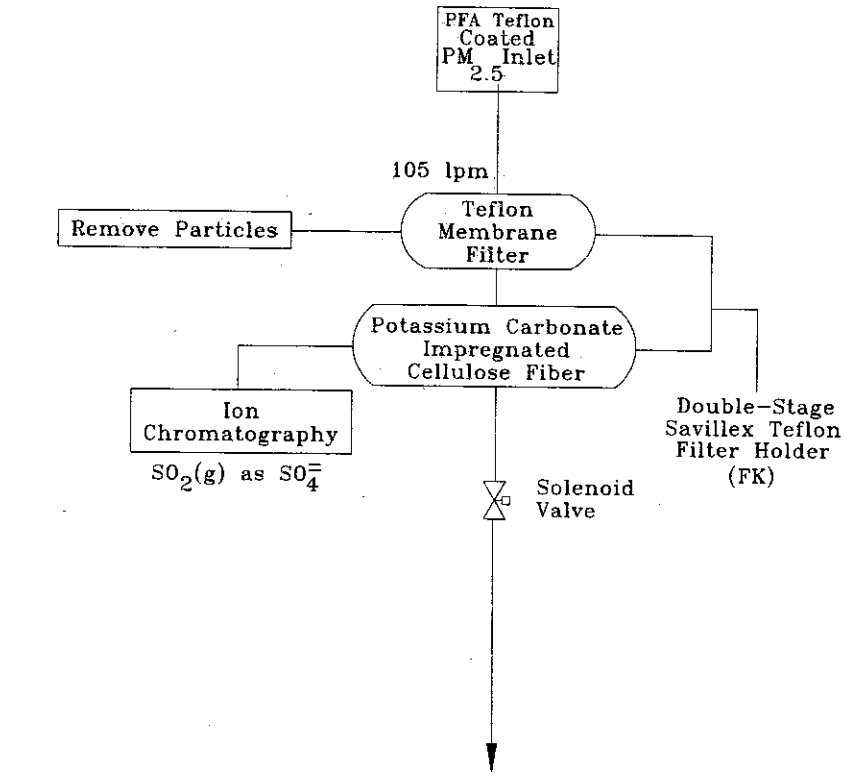


Figure A.2-5 Flow diagram of the sequential filter sampler for gaseous sulfur dioxide measurements.

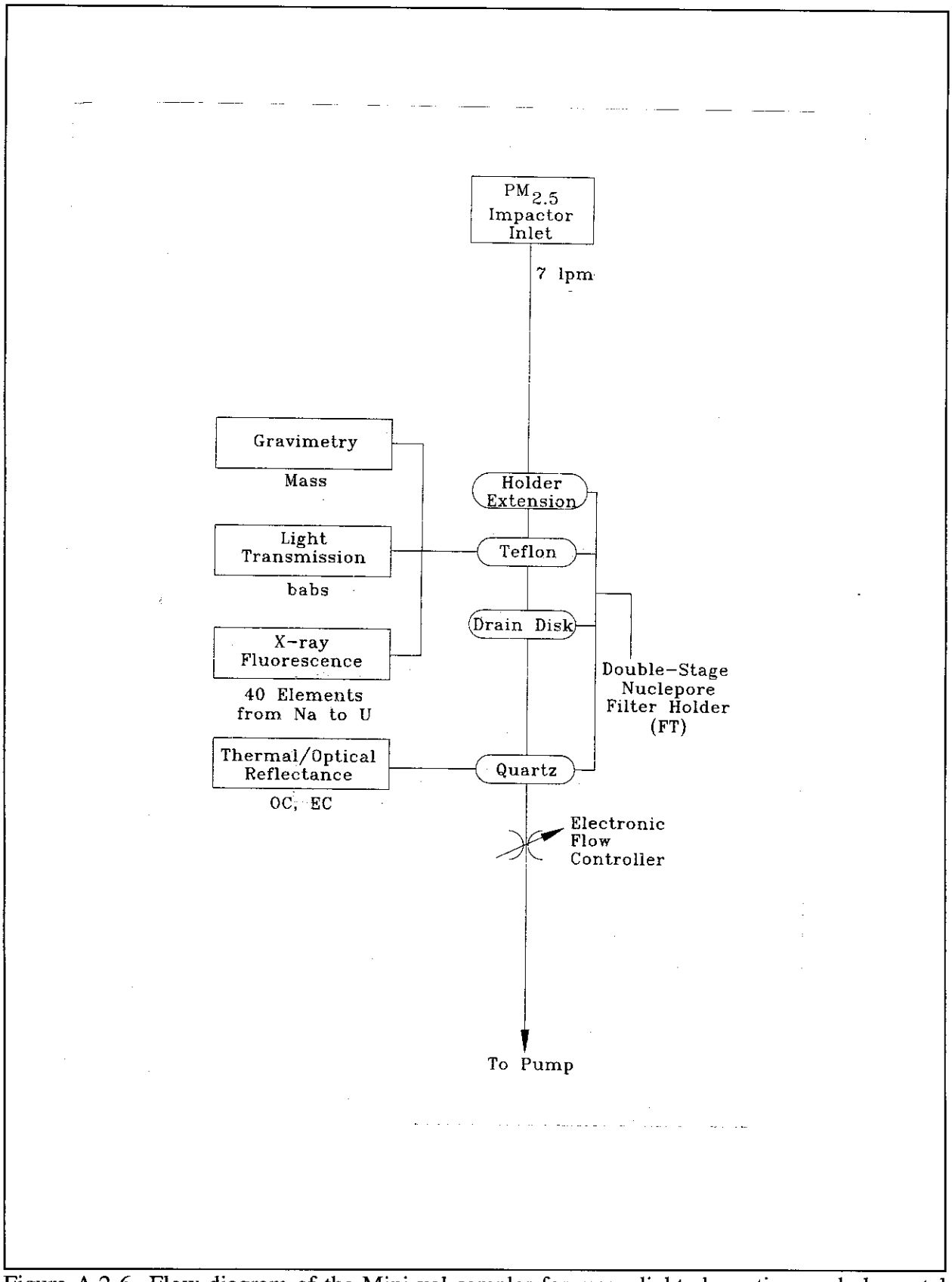


Figure A.2-6 Flow diagram of the Mini-vol sampler for mass, light absorption, and elemental measurements.

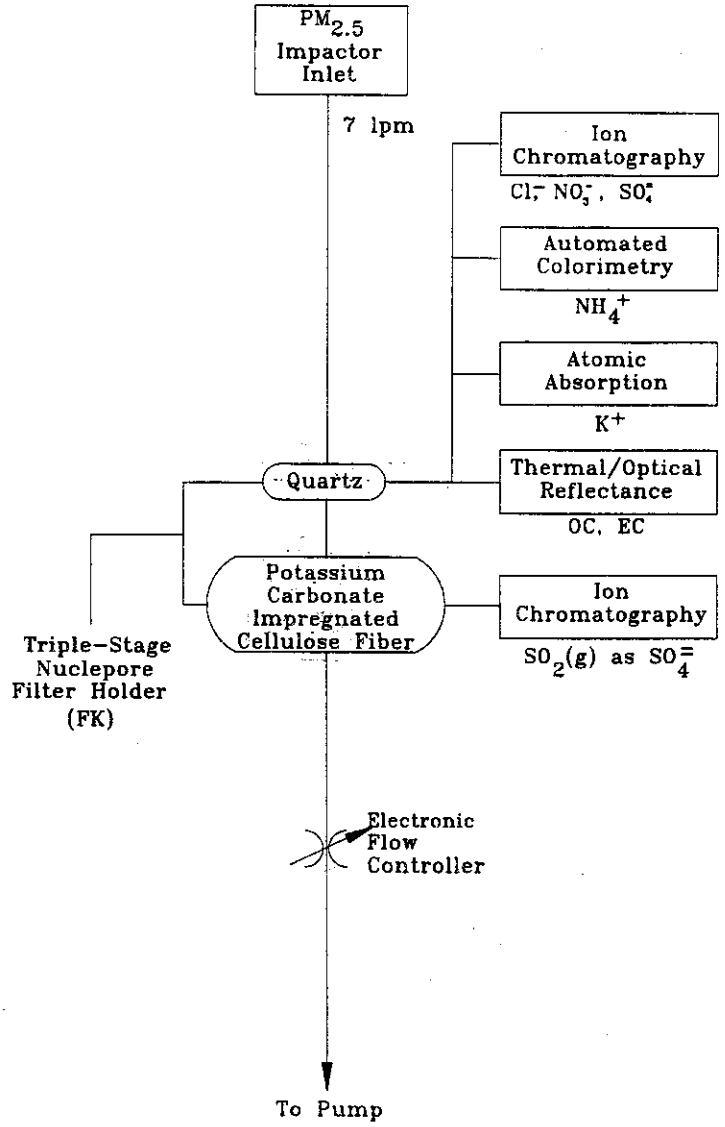


Figure A.2-7 Flow diagram of the Mini-vol sampler for ion and carbon measurements.

- Validity of ammonium measurements.

Correlations and linear regression statistics were computed and scatter plots were prepared to examine the data. Suspect data were flagged.

A.2.3.1 Collocated Precisions between Continuous and Filter Pack Measurements

The validity of filter pack measurements with the sequential filter sampling system can be verified by the collocated continuous instruments operated at the Buffalo Pass site during the summer and fall seasons. The collocated measurements include:

- Hourly SO_2 measurements of DRI High Sensitivity Sulfur Analyzer with TECO 43 sulfur dioxide analyzer between 08/02/95 and 10/24/95.

- Six- and twelve-hour SO_2 filter pack measurements (Figure A.2-5) with DRI high sensitivity sulfur analyzer and TECO 43 analyzer between 08/07/95 and 10/24/95.

- Six- and twelve- hour sulfate filter pack measurements (Figure A.2-2) with DRI analyzer between 08/07/95 and 10/24/95.

- Six- and twelve-hour light absorption (b_{abs}) and elemental carbon filter pack measurements (Figure A.2-2) with Magee Scientific aethalometer measurements between 08/07/95 and 10/25/95.

Comparisons were done on a pairwise basis. All concurrent samples for each pair of samplers were used in the comparisons. Several empirical and statistical approaches may be used to make these comparisons, although conclusions about sampler equivalence are ultimately subjective. The results of intersampler comparisons are summarized in Table A.2.12. For each of the six pairwise comparisons, one sampler is designated as the X sampler and the other as the Y sampler.

Linear regression can be used to infer equivalence between the X and Y samplers as well as predictability of one sampler's measurement from that of another sampler (King, 1977). Regression slope and intercept for each sample pair, along with their standard errors, are given in Table A.2.14. For each comparison, the X-sampler measurement was the independent variable and the Y-sampler measurement was the dependent variable. When the slope equals unity within three standard errors, the intercept equals zero within three standard errors, and the correlation coefficient is equal to or greater than 0.9, the selection of independent and dependent variables is often considered to be equivalent (Berkson, 1950; Madansky, 1959; Kendall, 1951). If the correlation coefficient is greater than 0.9 but the slope and intercept criteria are not met, the compared measurements are said to be predictable from the independent variable.

Table A.2.14 also presents the average ratios and standard deviation of "Y to X" and the percent distribution of the data pairs whose difference (X minus Y) is less than 1σ, 2σ, and 3σ of their precision intervals. Here, σ is based on the measurement uncertainty of "X"

Table A.2.14
Collocated Comparisons Among Different Instruments at the Buffalo Pass Site

Sampler Y	Sampler X	Parameter Y	Parameter X	Slope	Intercept	Correlation Coefficient	No. of Pairs	Average Ratio[e]	% Distribution[f] ≤1σ	≤2σ	≤3σ
TECO 43A[a]	DRI HS[b]	SO_2	SO_2	0.86 ± 0.02	0.12 ± 0.01 ppb	0.79	1,587	0.81 ± 2.59	54	82	93
TECO 43A	Filter Pack[c]	SO_2	SO_2	0.85 ± 0.05	0.049 ± 0.039 ppb	0.90	68	1.17 ± 1.36	60	90	97
DRI HS[b]	Filter Pack[c]	SO_2	SO_2	0.71 ± 0.10	0.10 ± 0.08 $\mu g/m^3$	0.68	59	1.17 ± 1.54	17	47	71
DRI HS[b]	Filter Pack[c]	$SO_4^=$	$SO_4^=$	0.09 ± 0.04	0.52 ± 0.12 $\mu g/m^3$	0.10	61	2.90 ± 2.60	7	16	36
Aethalometer[d]	Filter Pack[c]	b_{abs}	b_{abs}	0.37 ± 0.06	1.30 ± 0.20 $\mu g/m^3$	0.56	71	0.76 ± 1.71	68	97	99
Aethalometer[d]	Filter Pack[c]	BC	EC	0.08 ± 0.03	0.07 ± 0.01 $\mu g/m^3$	0.28	72	2.72 ± 14.56	40	88	97

[a] TECO 43A Sulfur Dioxide Analyzer.
[b] DRI High Sensitivity Sulfur Dioxide Analyzer.
[c] DRI sequential filter pack sampling system.
[d] Magee Scientific Aethalometer.
[e] Average ratio of Y/X and standard deviation of this ratio.
[f] Percentage of data pairs falling into the specified precision intervals, where each precision interval is equal to root mean square (RMS) of the sum of the squared precisions of the X and Y samplers.

and "Y", which is the square root of the sum of the squared uncertainties ($\sigma^2_x+\sigma^2_y$), where σ_x and σ_y are the measurement uncertainties for the X or Y samplers. The individual measurement uncertainties were estimated from replicate analyses of samples collected by that sampler.

Figure A.2-8a shows that reasonable agreement was achieved for hourly SO_2 measurements between the DRI and TECO analyzers, with a slope of 0.86 ± 0.02. The pairwise comparisons in Table A.2.14 show that, in all cases, over 90% of the paired comparisons lie within ±3σ. An average ratio of 0.81 ± 2.59 implied that SO_2 is, on average, 20% higher with the DRI analyzer as compared to the TECO analyzer. The large standard deviation associated with the average ratio indicated the variations among sample pairs. The hourly SO_2 concentrations are generally low, with over 90% of the data points below 0.1 ppb. The correlation coefficients were slightly improved (from 0.79 to 0.82) as comparisons were made for the 108 data pairs with hourly SO_2 concentrations above 1 ppb, as shown in Figure A.2-8b.

Hourly SO_2 measurements from the continuous instruments were averaged to correspond to the 6- and 12-hour filter pack measurements of SO_2 at the Buffalo Pass site. These samples were acquired with potassium-carbonate-impregnated cellulose-fiber filters followed by ion chromatographic (IC) analysis. Excellent agreement was found between the TECO 43 and filter pack measurements of SO_2. As shown in Figure A.2-9, the correlation coefficient is 0.90 with a low intercept for the 68 data pairs acquired at the Buffalo Pass site. Since the slope (0.85 ± 0.05) equals unity within three standard errors, the intercept (0.049 ± 0.039 ppb) equals zero within three standard errors, and the correlation coefficient is equal to or greater than 0.90, this comparison shows that the two samplers (i.e., TECO 43 and filter pack) are considered to make equivalent SO_2 measurements (Berkson, 1950; Madansky, 1959; Kendall, 1951).

The results of a similar comparison of SO_2 measurements between filter packs and DRI's High Sensitivity Sulfur Analyzer exhibit greater data scattering. As shown in Figure A.2-8b, the correlation coefficient is much lower (r = 0.68) than the TECO 43A Sulfur Dioxide Analyzer versus filter pack comparison (r = 0.90). Table A.2.14 shows that nearly 30% of the pair comparisons exceeded ±3σ.

Figure A.2-10 shows a negligible correlations (r = 0.1) between sulfate measurements taken with the DRI analyzer and those on the filter packs. Since the sulfate measurements on the quartz-fiber filters by ion chromatographic analysis agreed well with the sulfur measurements on the Teflon-membrane filters by x-ray fluorescence analysis (Section A.2.3.4a), the anion and cation balances are consistent (Section A.2.3.5), and sulfate concentrations on audit samples (Section A.2.2.4) are reproduced, the filter pack data are probably accurate and the continuous sulfate data are not. The continuous sulfate data are considered invalid, and were not used in further analyses.

To compare Six- and twelve-hour light absorption (b_{abs}) measurements on Teflon-membrane filters with continuous measurement of light absorption by aethalometer,

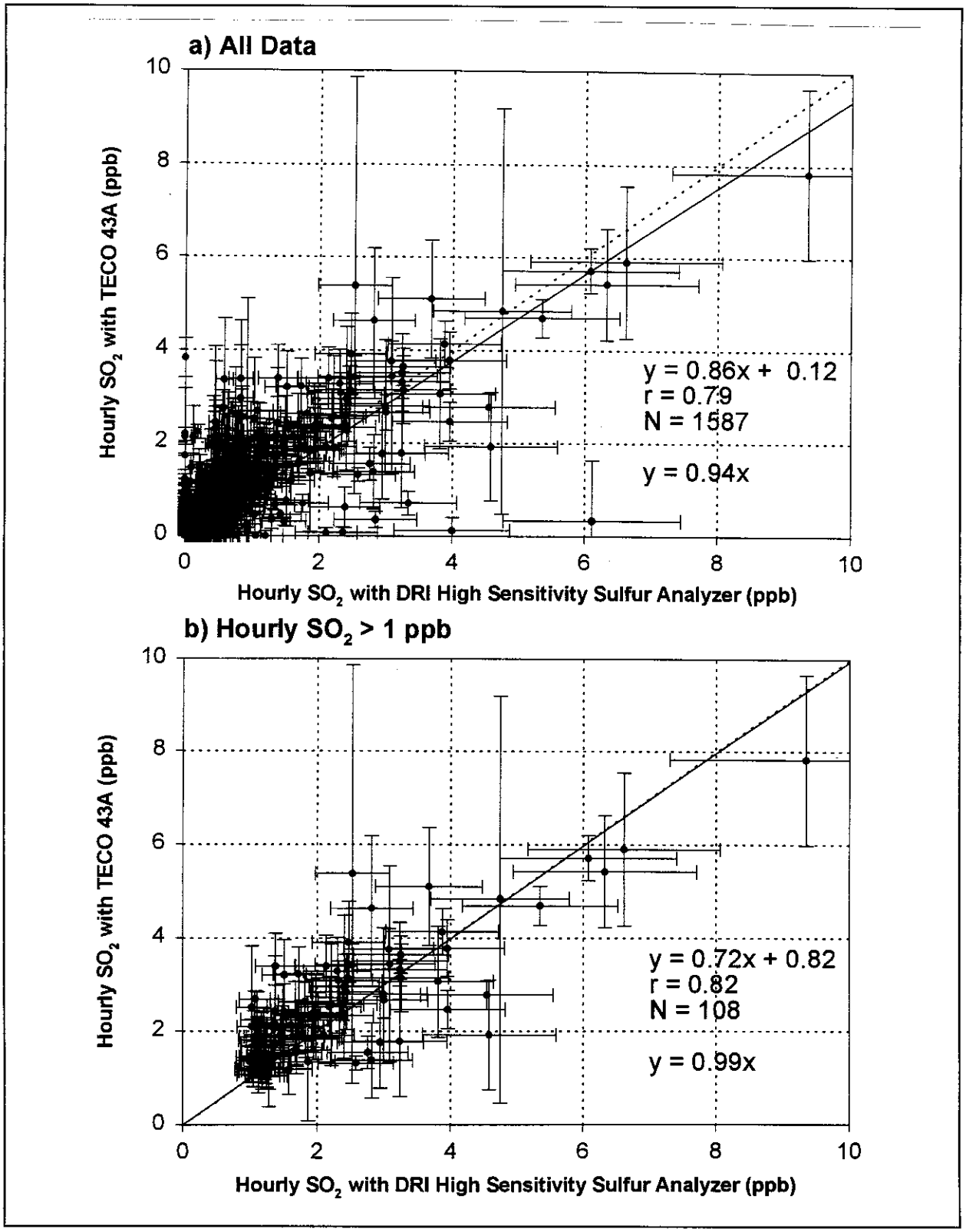


Figure A.2-8 Collocated comparison of hourly sulfur dioxide measurements between the TECO 43A Sulfur Dioxide Analyzer and the DRI High Sensitivity Sulfur Analyzer between 08/02/95 and 10/24/95 at the Buffalo Pass site for: a) all data, and b) hourly sulfur dioxide concentrations which exceed 1 ppb.

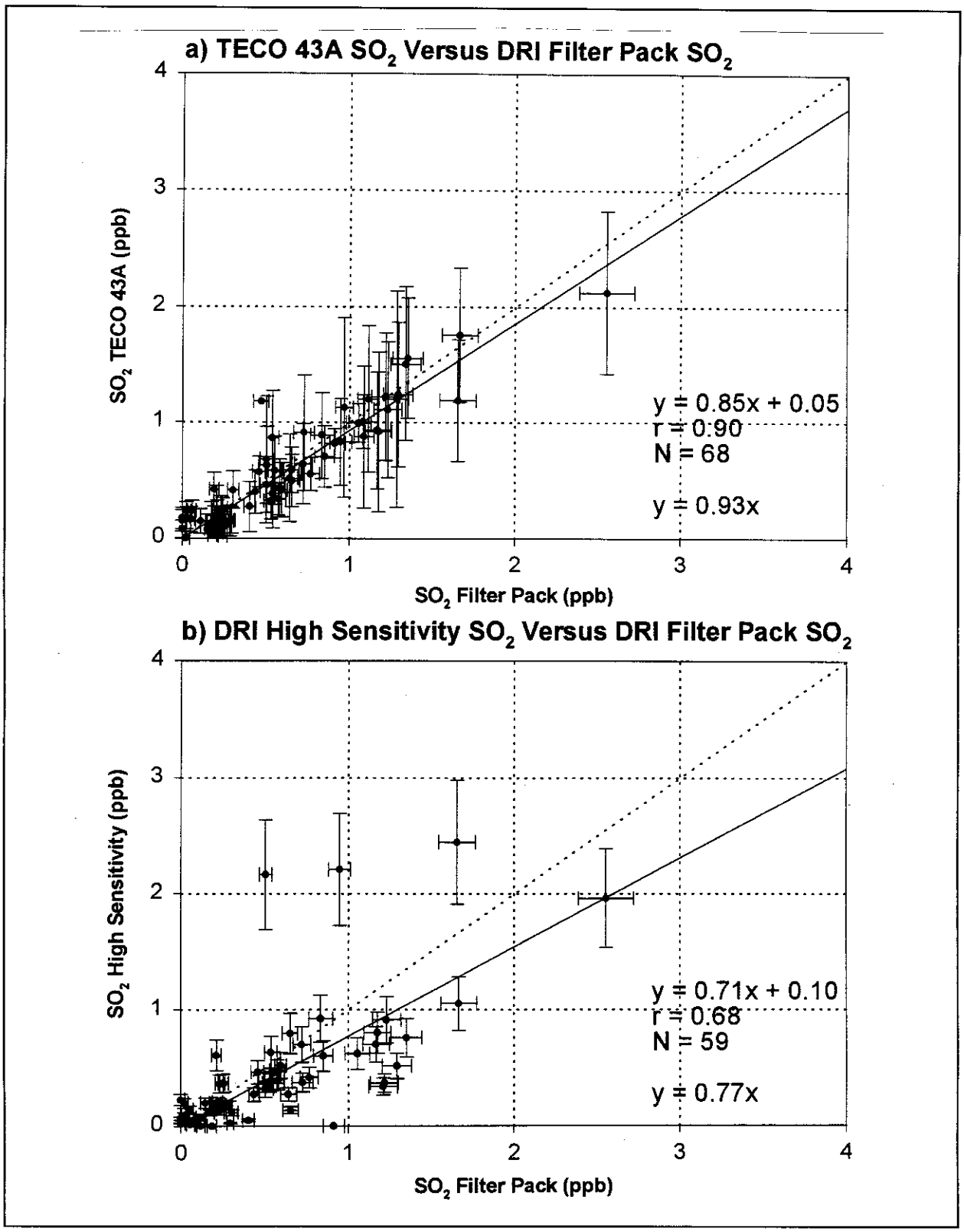


Figure A.2-9 Collocated comparison of six- and twelve-hour filter pack sulfur dioxide measurements with: a) the TECO 43A Sulfur Dioxide Analyzer, and b) the DRI High Sensitivity Sulfur Analyzer between 08/02/95 and 10/24/95 at the Buffalo Pass site.

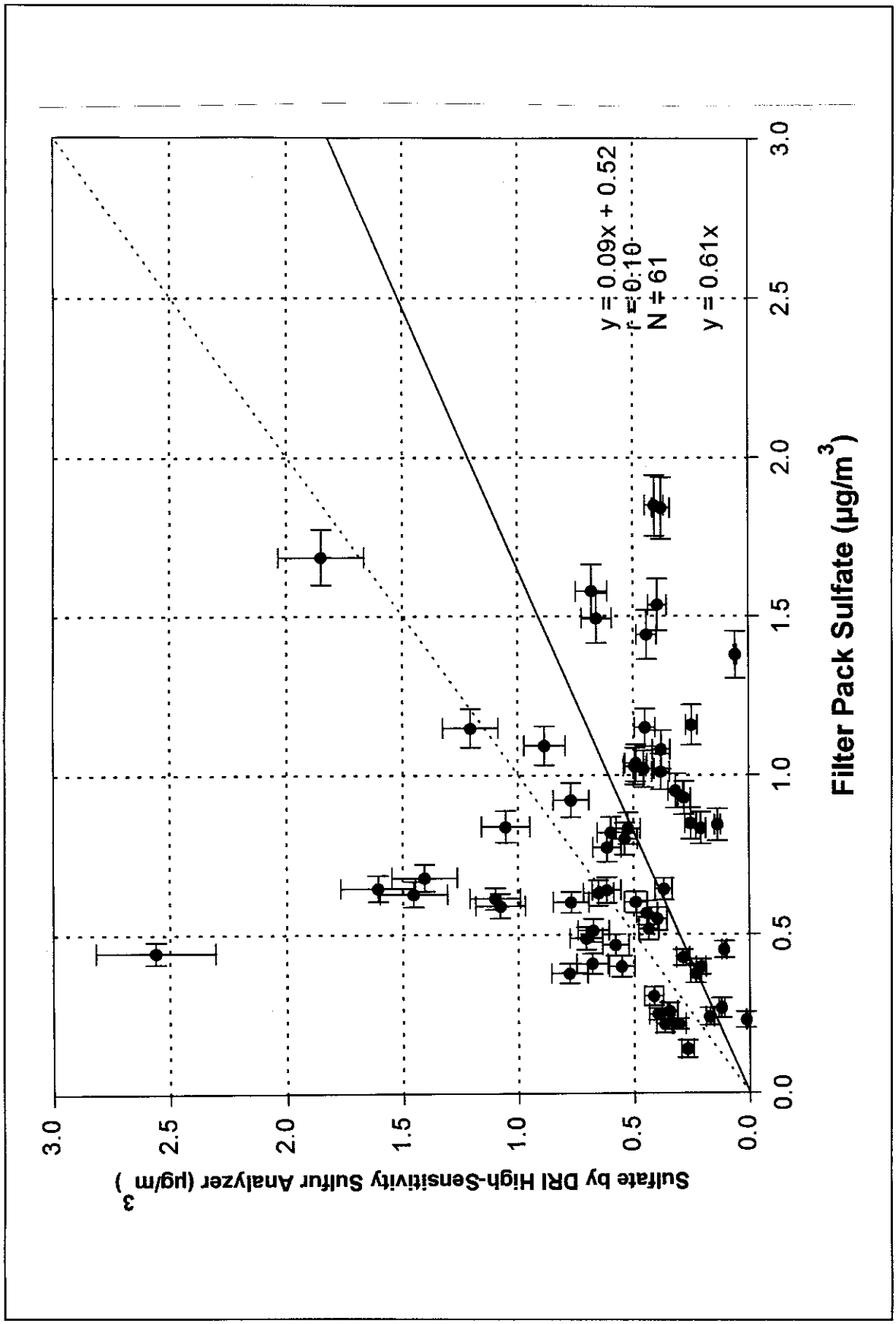


Figure A.2-10 Collocated comparison of six- and twelve-hour filter pack sulfate measurements with the DRI High Sensitivity Sulfur Analyzer between 08/02/95 and 10/24/95 at the Buffalo Pass site.

aethalometer black carbon concentrations in $\mu g/m^3$ were multiplied by the absorption coefficient of 19.2 m^2/g (specified by the manufacturer) to obtain light absorption measurements in Mm^{-1}. Figure A.2-11a shows the results of this comparison. Data points lying on the y-axis imply that aethalometer measurements exhibited much better sensitivity than those of filter b_{abs} measurements. Large uncertainty intervals associated with filter b_{abs} measurements indicate that these light absorption values were low most of the time at the Buffalo Pass site. Even though the slope of aethalometer over filter b_{abs} measurements (0.37 $\pm$ 0.06) differed from unity and the correlation coefficient (r = 0.56) was low, over 95% of the measurements were within $\pm 2\sigma$ of each other. Figure A.2-11b shows that the removal of b_{abs} measurements less than 2 Mm^{-1} (approximately three times the lower quantifiable limits) did not improve the correlations.

A comparison between the aethalometer black carbon (BC) and filter pack elemental carbon (i.e., light absorbing carbon) acquired from the thermal/optical reflectance carbon analysis on the front quartz-fiber filter was also made. The correlations (r = 0.28) are low with large measurement uncertainties, as shown in Figure A.2-12. This comparison shows that the light absorbing carbon concentrations at the Buffalo Pass site were too low to provide a good tests of measurement equivalence.

A.2.3.2 Adsorption of Gaseous Organic Carbon on Quartz-Fiber Filters

Certain organic compounds in suspended particles maintain a gas/particle equilibrium with their environments similar to the situation for ammonium nitrate (Watson *et al.*, 1994). Previous studies have found that either some volatile organic compounds evaporate from a filter (negative artifact) during sampling or that some gaseous organic species are adsorbed (positive artifact) on quartz-fiber filters (Eatough *et al.*, 1990; McDow and Huntzicker, 1990; Tang *et al.*, 1994; Turpin *et al.*, 1994). Several denuding and backup filter sampling systems have been applied to evaluate these artifacts, but they were too costly and inconclusive to justify their use during this study. Eatough *et al.* (1990) and Tang *et al.* (1994) concluded that desorption of organic gases from particles on the front quartz filter was the dominant sampling artifact (negative artifact), while Turpin *et al.* (1994) concluded that adsorption of organic gases by the front quartz-fiber filter was the dominant sampling artifact (positive artifact) for organic carbon. Turpin *et al.* (1994) recommended that a backup quartz-fiber filter behind the front Teflon-membrane filter (as shown in Figures A.2-2 and A.2-6) be used to estimate the amount of organic gases which might absorb onto quartz-fiber filters in the absence of particles. Since secondary organic aerosol material is condensed almost exclusively on the submicron aerosol (Pandis *et al.*, 1993), it is assumed that gaseous artifacts on these samples are not particle-size-dependent.

Figure A.2-13 compares the organic carbon measured on the backup quartz-fiber filter behind the front Teflon-membrane filter with the $PM_{2.5}$ particulate organic carbon measured on the front quartz-fiber filter which sampled alongside this filter pack. These plots show that at all sites the organic carbon concentrations on the backup filters were frequently 60% or more of the front quartz-fiber filter concentrations. The relationship between backup and

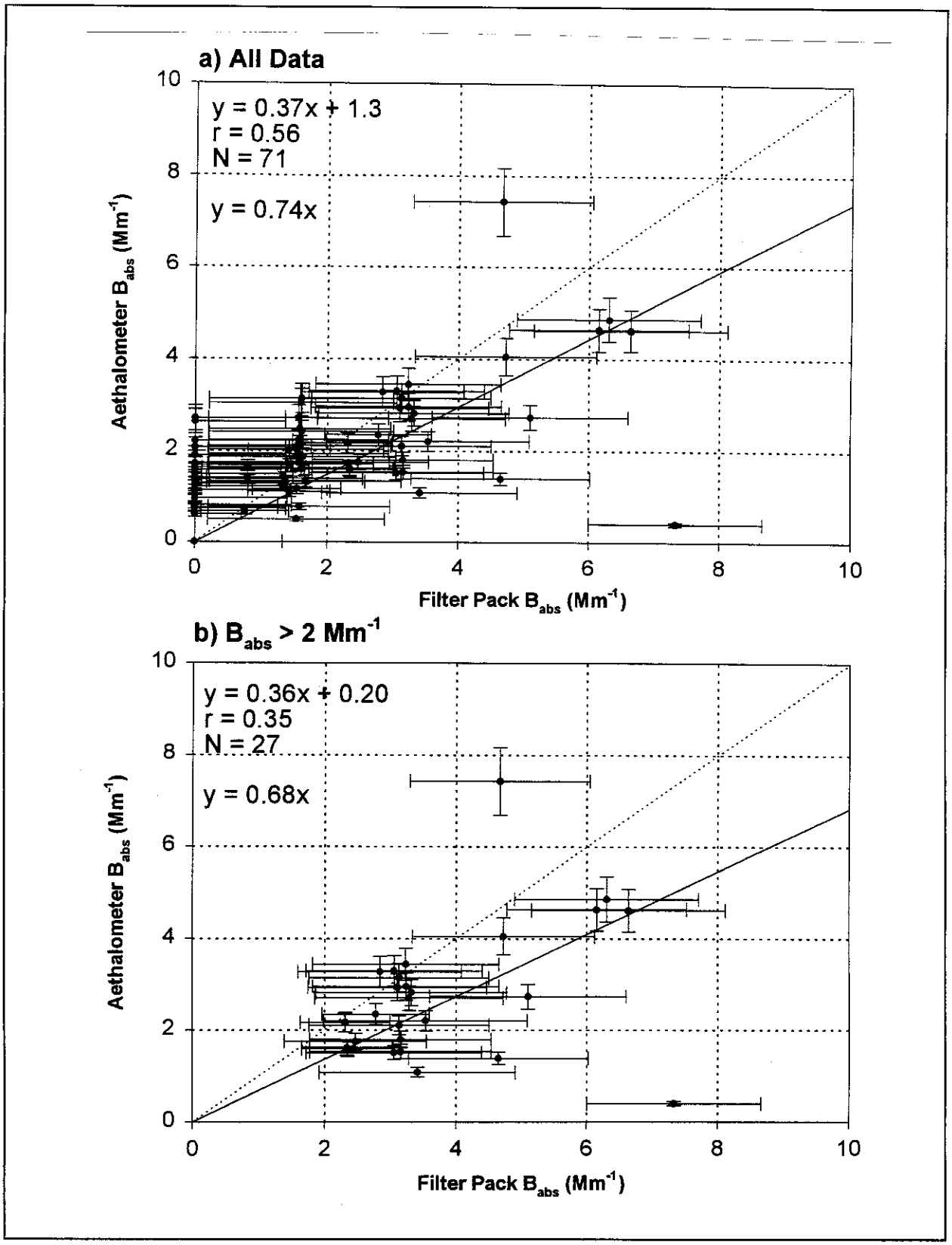


Figure A.2-11 Collocated comparison of six- and twelve-hour filter b_{abs} measurements with aethalometer measurements between 08/07/95 and 10/25/95 at the Buffalo Pass site for: a) all data, and b) b_{abs} measurements greater than 2 Mm^{-1}.

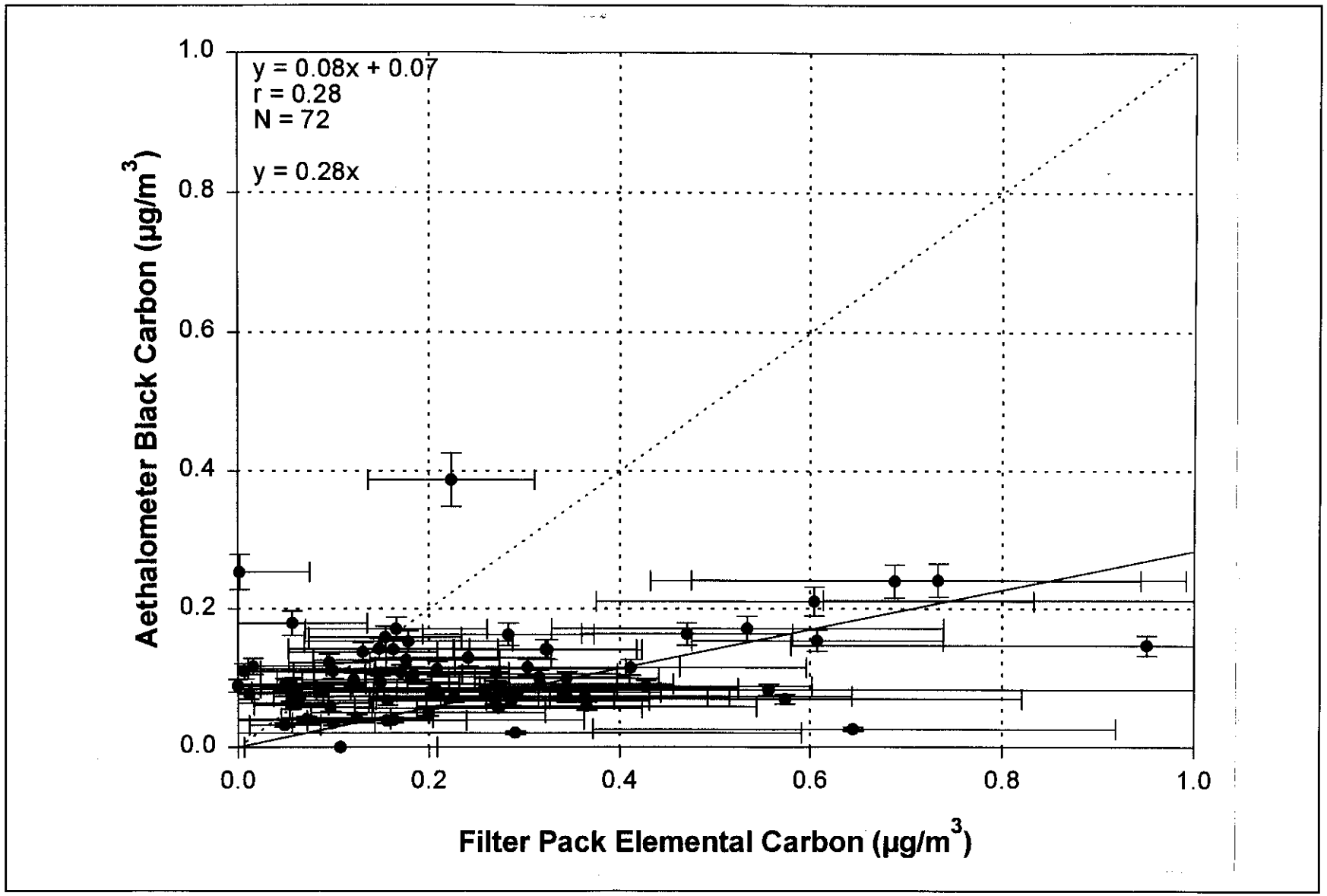


Figure A.2-12 Collocated comparison of six- and twelve-hour filter elemental carbon measurements with aethalometer black carbon measurements between 08/07/95 and 10/25/95 at the Buffalo Pass site.

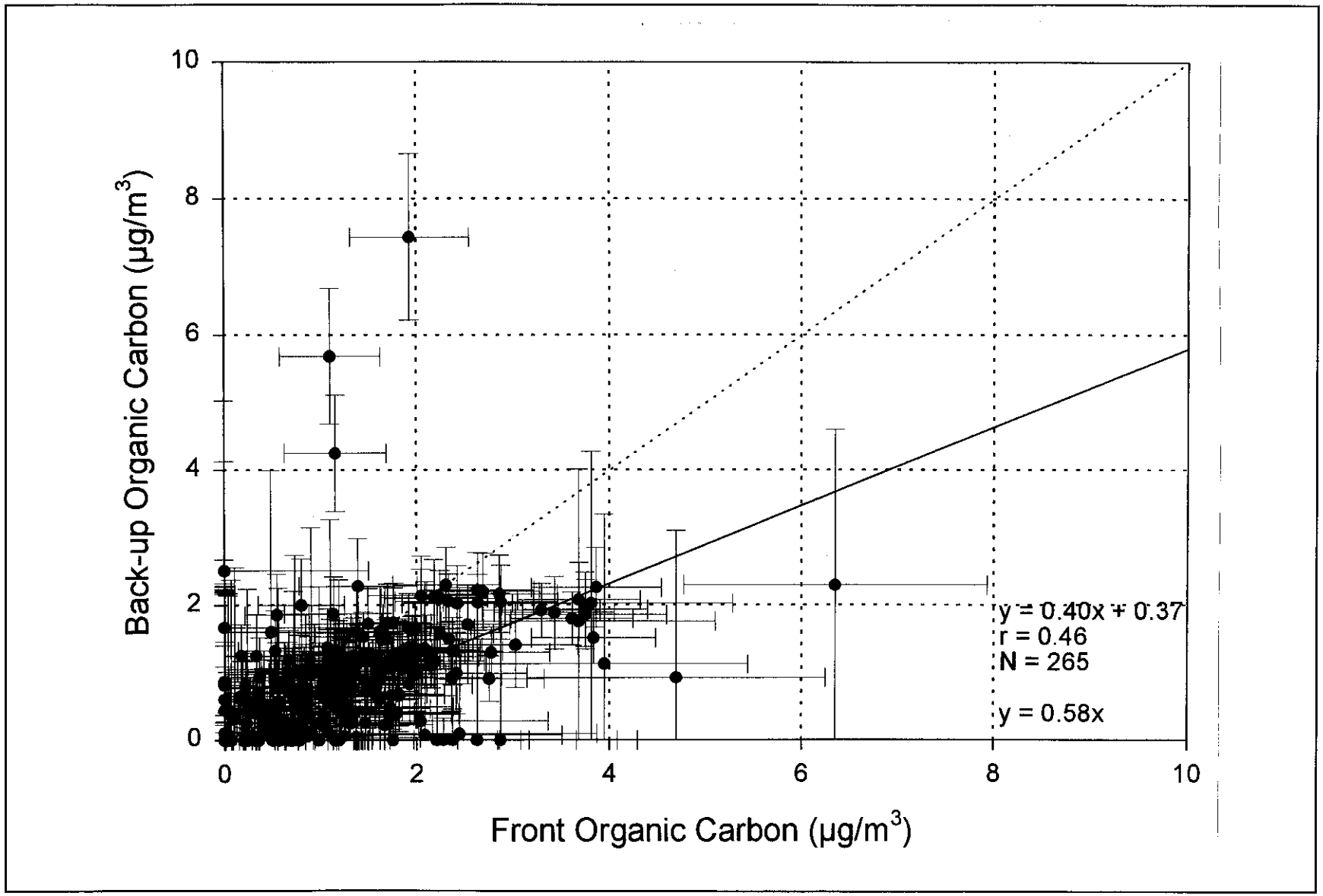


Figure A.2-13 Comparison between $PM_{2.5}$ particulate organic carbon and gaseous organic carbon artifacts for all six sites during the Mt. Zirkel Visibility Study.

front filter organic carbon concentrations varied at all concentration levels with a low correlation coefficient of 0.46.

The relationship between the ratio of backup to front filter organic carbon as a function of $PM_{2.5}$ mass is displayed in Figure A.2-14. The ratio is fairly constant for $PM_{2.5}$ concentrations greater than 7 or 8 $\mu g/m^3$, but is variable and frequently higher at lower $PM_{2.5}$ concentrations. Relatively larger organic vapor artifacts at lower $PM_{2.5}$ concentrations suggest that particles provide additional absorption sites on the front filter, especially in a relatively clean environment. This observation is consistent with data acquired in Yosemite and Sequoia National Parks (Chow *et al.*, 1996).

A.2.3.3 Sum of Chemical Species versus Mass

The sum of the individual chemical concentrations for $PM_{2.5}$ should be less than or equal to the corresponding gravimetrically measured mass concentrations. This sum includes chemicals quantified on the front Teflon-membrane and front quartz-fiber filters. Total sulfur (S), soluble chloride (Cl^-), and soluble potassium (K^+) were excluded from the sum to avoid double counting since sulfate ($SO_4^=$), chlorine (Cl), and total potassium (K) are included in the calculation. Measured concentrations do not account for unmeasured metal oxides in crustal material, unmeasured cations, or hydrogen and oxygen associated with the organic carbon. Figure A.2-15a shows scatter plots of the $PM_{2.5}$ sum of species versus mass at the six monitoring sites. Each plot contains a solid line indicating the slope with a zero intercept and a dashed one-to-one line. Measurement uncertainties associated with the x- and y-axes are shown for comparison. Regression statistics with mass as the independent variable (X) and sum of species as the dependent variable (Y) are also calculated. The average ratio of Y over X is also shown for comparison. As intercepts are low compared to the measured concentrations, the slope closely represents the ratio of Y over X. Suspect data were examined and removed from future statistical analysis if sampling or analytical anomalies were identified. As shown in Figure A.2-15a, the majority of the data points are below the one-to-one line within one standard deviation of the measurement uncertainties. Data points are quite scattered around the one-to-one line for $PM_{2.5}$ less than 5 $\mu g/m^3$.

Since organic carbon is a major component of $PM_{2.5}$, and organic artifacts become significant at low $PM_{2.5}$ mass concentrations, Figure A.2-15b presents the sum of species calculated without front-filter organic carbon. The sum of species is always less than the corresponding $PM_{2.5}$ mass within the measurement uncertainties as organic carbon is excluded from the sum of species. These figures show that the average ratio of the sum of species versus $PM_{2.5}$ decreased from 0.73 to 0.44 by removing organic carbon from the calculation. This decrease in slope implies that organic carbon accounts for approximately 30% of the $PM_{2.5}$ mass.

The ratios of sum of species (including and excluding front-filter organic carbon) to $PM_{2.5}$ mass are examined in Figures A.2-16a and A.2-16b as a function of $PM_{2.5}$ mass concentrations. Similar to the comparison shown in Figure A.2-14 for backup over front filter organic carbon, Figure A.2-16a shows that the ratios are below unity and relatively

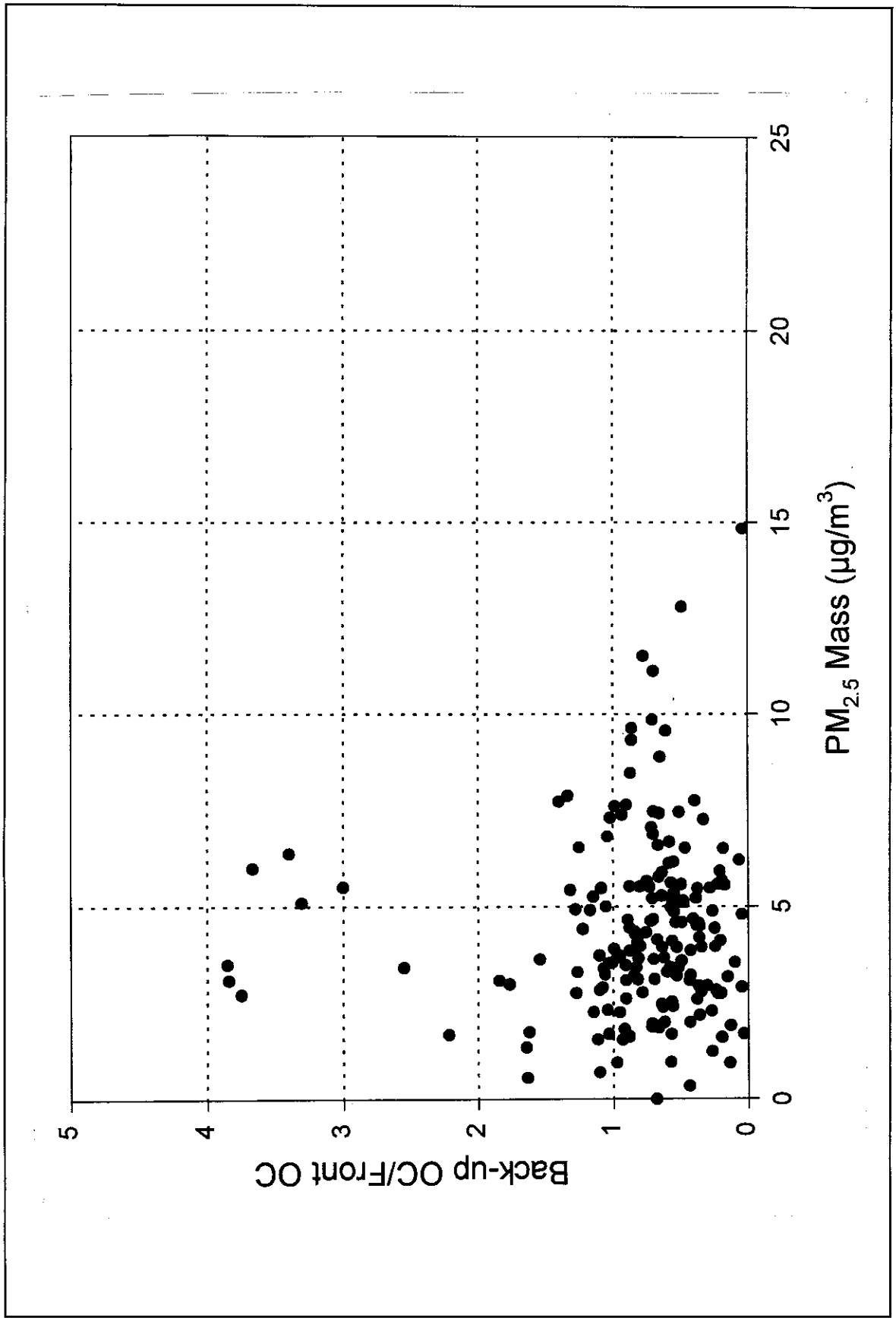


Figure A.2-14 Relationship between the ratio of backup to front filter organic carbon and $PM_{2.5}$ mass for all six sites during the Mt. Zirkel Visibility Study.

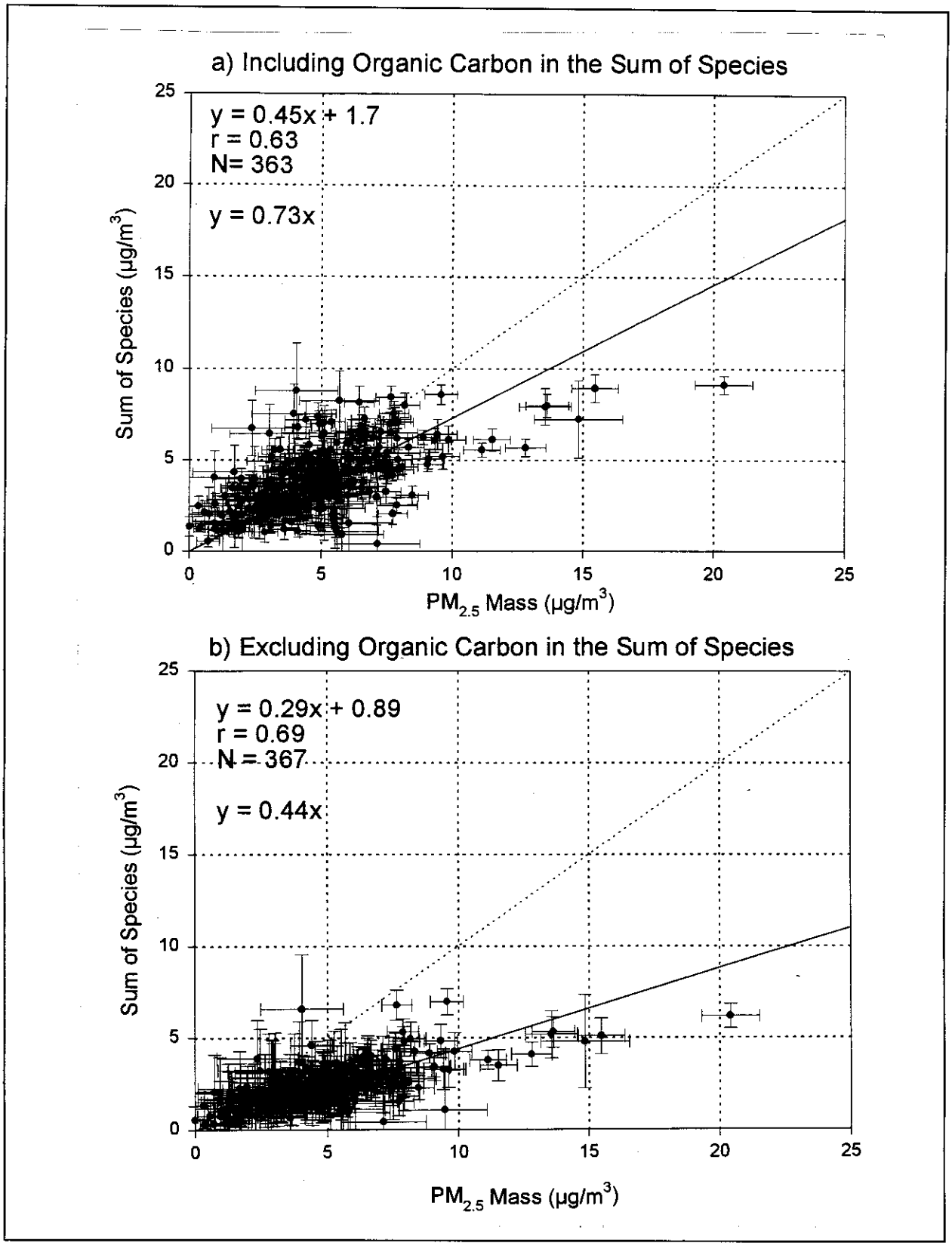


Figure A.2-15 Scatter plots of $PM_{2.5}$ sum of species versus $PM_{2.5}$ mass: a) including organic carbon, and b) excluding organic carbon, for all six sites during the Mt. Zirkel Visibility Study.

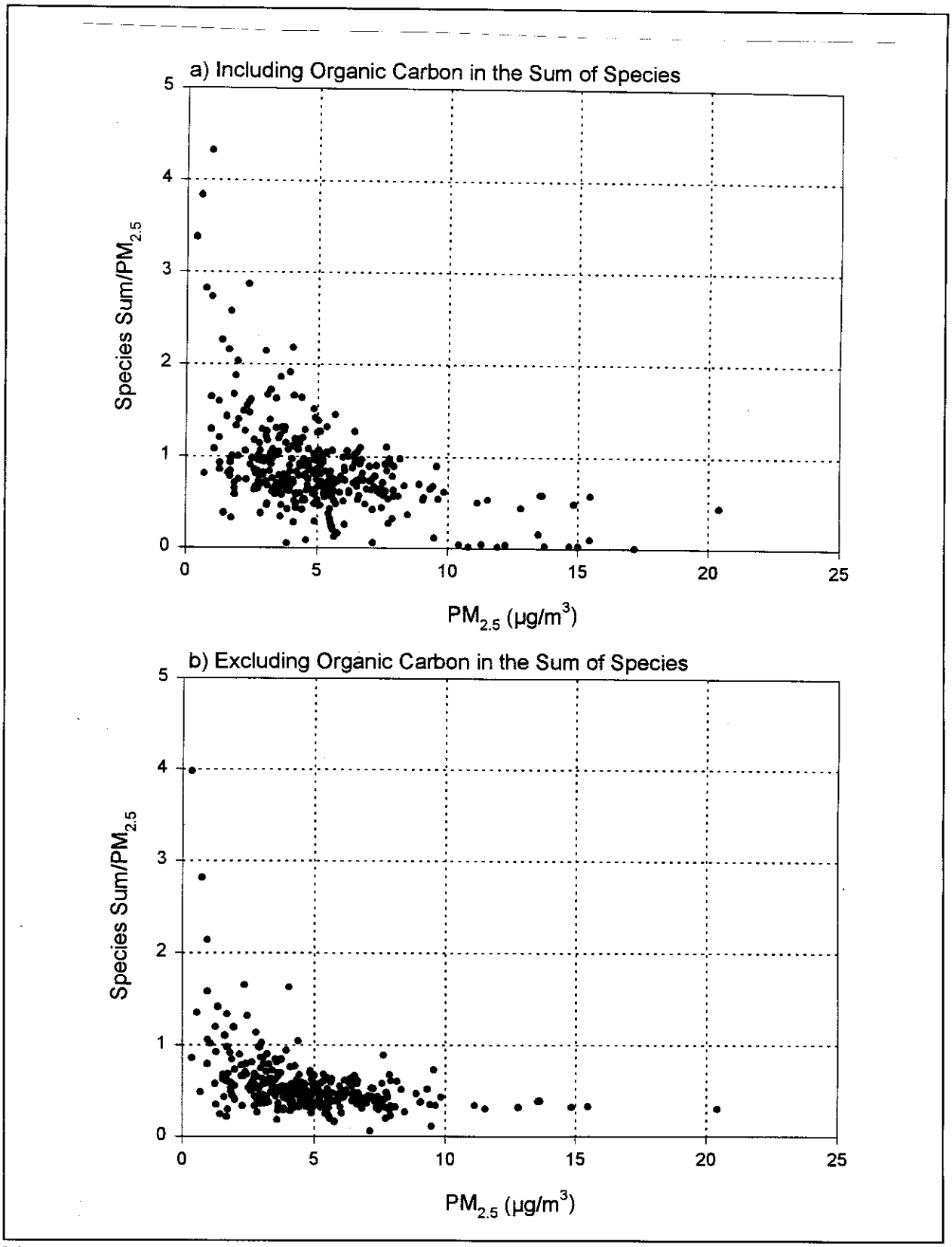


Figure A.2-16 Relationship between the ratio of sum of species versus $PM_{2.5}$ mass: a) including organic carbon, and b) excluding organic carbon, for all six sites during the Mt. Zirkel Visibility Study.

constant for $PM_{2.5}$ mass exceeding 7 or 8 $\mu g/m^3$, but the sum of species to $PM_{2.5}$ mass ratios increase below this level. Some of this increase is probably due to the organic carbon sampling artifact, as suggested by Figure A.2-13. Higher ratios of sum of species to $PM_{2.5}$ mass below 5 $\mu g/m^3$ are evident in Figure A.2-16b when organic carbon is omitted from the sum.

A.2.3.4 Physical Consistency

The composition of chemical species concentrations measured by different chemical analysis methods can be examined. Physical consistency was tested for: 1) sulfate versus total sulfur, 2) chloride versus chlorine, 3) soluble potassium versus total potassium, and 4) light absorption versus elemental carbon.

A.2.3.4a Sulfate versus Total Sulfur

Sulfate ($SO_4^=$) was acquired by ion chromatography (IC) analysis on quartz-fiber filters and total sulfur (S) was obtained by x-ray fluorescence (XRF) analysis on Teflon-membrane filters. The ratio of sulfate to total sulfur should equal "three" if all of the sulfur was present as soluble sulfate. Figure A.2-17 shows scatter plots of sulfate versus sulfur concentrations at the six receptor sites. Excellent correlations ($r = 0.96$) were found for these measurements with a slope of 2.7 ± 0.04 and an intercept of nearly zero (-0.01 ± 0.02 $\mu g/m^3$) for 365 measurement pairs. This observation supports the contention that over 90% of the sulfur was present as soluble sulfate in the atmosphere and both XRF and IC measurements are valid.

A.2.3.4b Chloride versus Chlorine

Chloride (Cl^-) was acquired by IC analysis on quartz-fiber filters and chlorine (Cl) was acquired by XRF analysis on Teflon-membrane filters. Since chloride is the water-soluble portion of chlorine, it is expected that the chloride-to-chlorine ratio should be less than unity. Figure A.2-18 shows that very low correlations ($r = 0.38$) were found between chloride and chlorine measurements with a slope of 0.67 and large intercept. Since a majority of the measurements are associated with large uncertainty intervals, and all the concentrations are below 0.1 $\mu g/m^3$, very little value can be gained from this comparison. The uncertainties of chloride measurement increase at low concentrations since chloride's elution peak in ion chromatographic analysis is too close to the distilled water dip which, in turn, shifts the baseline of the chromatogram.

A.2.3.4c Soluble Potassium versus Total Potassium

Soluble potassium (K^+) was acquired by atomic absorption spectrophotometry (AAS) analysis on quartz-fiber filters and total potassium (K) was acquired by XRF analysis on Teflon-membrane filters. Figure A.2-19 displays the scatter plot of soluble potassium versus total potassium concentrations.

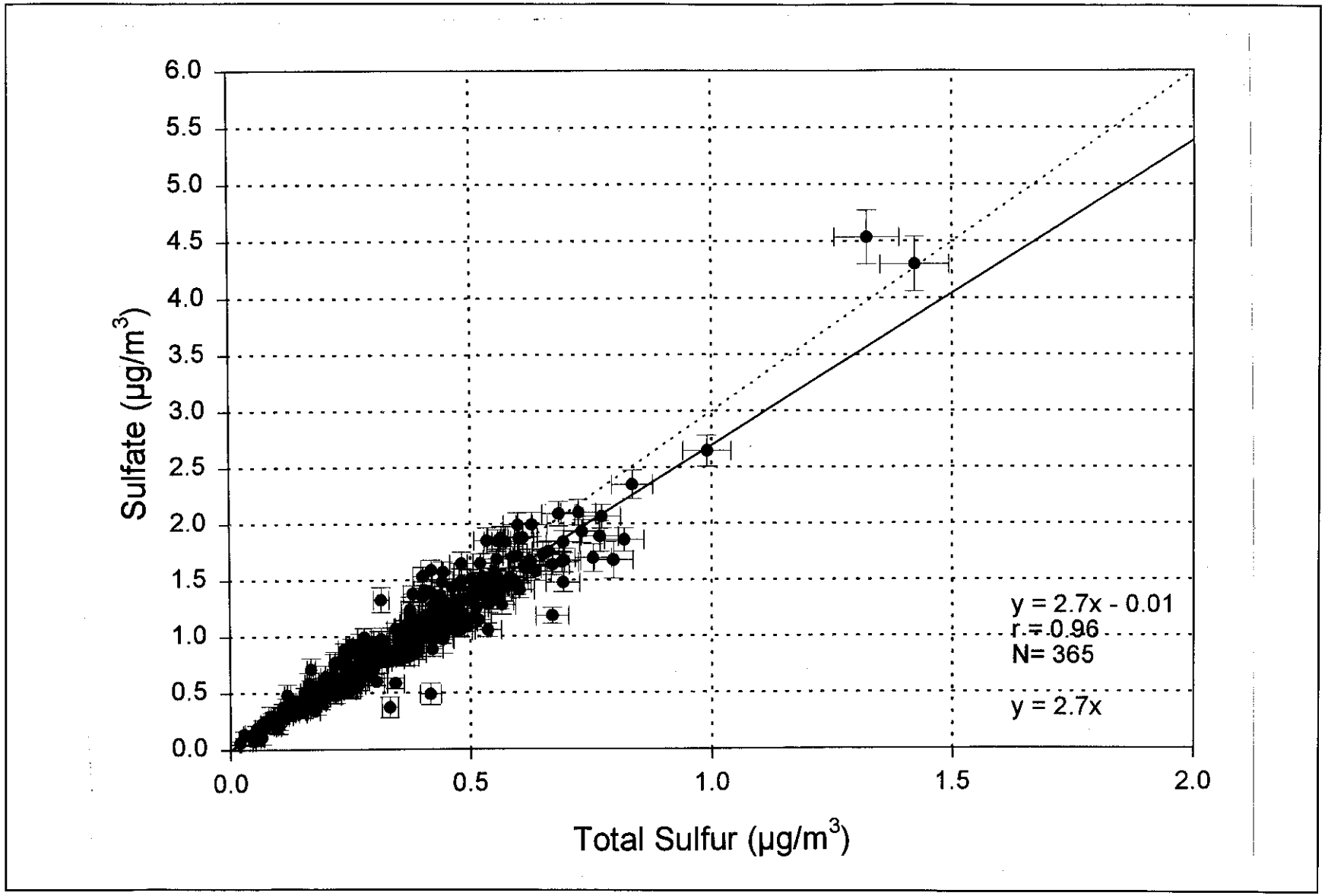


Figure A.2-17 Scatter plot of $PM_{2.5}$ sulfate versus $PM_{2.5}$ total sulfur for measurements collected at all six sites during the Mt. Zirkel Visibility Study.

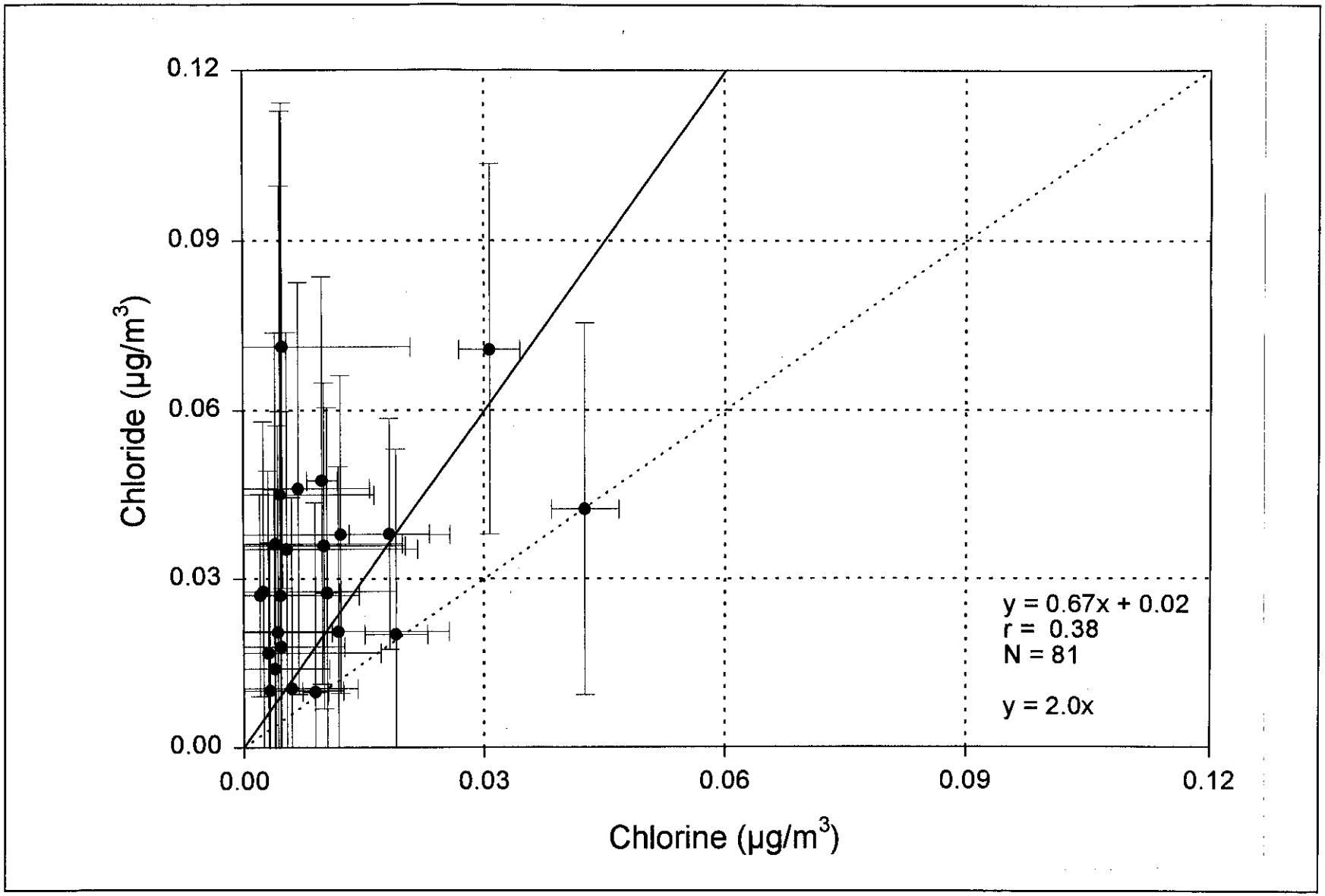


Figure A.2-18 Scatter plot of $PM_{2.5}$ chloride versus $PM_{2.5}$ chlorine for measurements collected at all six sites during the Mt. Zirkel Visibility Study.

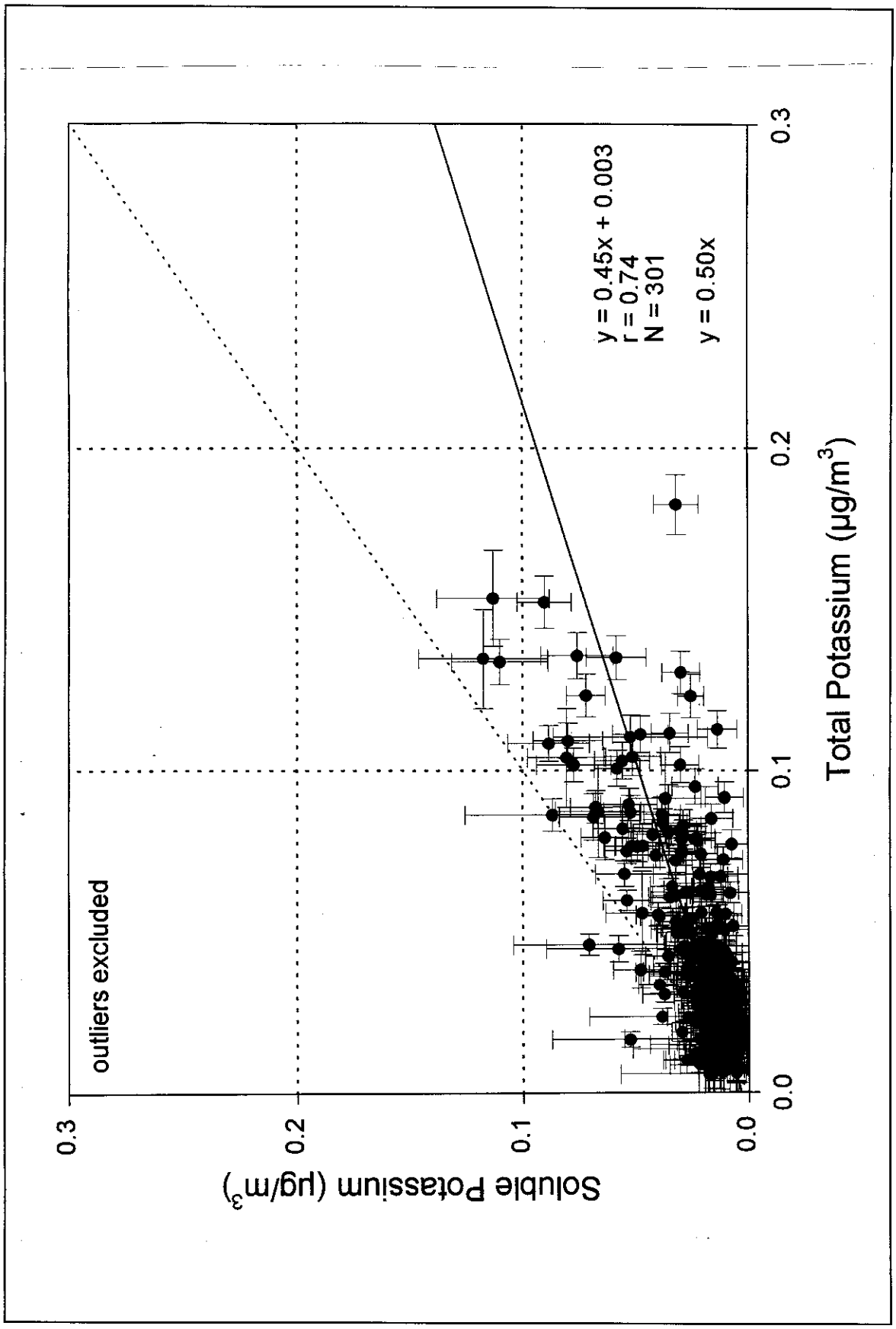


Figure A.2-19 Scatter plot of $PM_{2.5}$ soluble potassium versus $PM_{2.5}$ total potassium for measurements above the detection limits at all six sites during the Mt. Zirkel Visibility Study.

The data pairs are scattered at low concentrations, but they are well within the measurement uncertainties. The regression statistics reported a correlation coefficient of 0.74 and insignificant intercept (0.003 $\mu g/m^3$). It is apparent that some of the K^+/K ratios are quite low, especially when potassium concentrations are below 0.05 $\mu g/m^3$. Forcing zero intercepts gives a K^+/K slope of 0.50. This figure shows that K^+/K ratios increase with total potassium concentrations. At high (> 0.1 $\mu g/m^3$) K concentrations, the K^+/K ratios increase from an average of 0.5 to 0.8 or 0.9.

A.2.3.4d Light Absorption versus Elemental Carbon

Teflon-membrane filters from $PM_{2.5}$ samples were submitted to light absorption (b_{abs}) measurement before and after sampling using a densitometer. The b_{abs} measurement on the Teflon-membrane filters is compared with elemental carbon (EC), measured with thermal/optical reflectance (TOR) analysis (Chow *et al.*, 1993) on the quartz-fiber filter for each sample.

Figure A.2-20 illustrates the relationships between b_{abs} and elemental carbon at each of the six sites. Data points are quite scattered at each site with large measurement uncertainties and very low correlations. This is mainly due to the low light absorption values observed in the study region. Table A.2-15 summarizes the regression statistics for these comparisons. Since the intercepts are large, ranging from 3 to 4 Mm^{-1}, the slopes are not representative of the absorption coefficients. The average ratios of b_{abs} versus elemental carbon also show large standard deviations. The average ratios are highest at the Wilderness sites (18.8 ± 5.3 m^2/g at the Gilpin Creek site and 16.7 ± 20.3 m^2/g at the Buffalo Pass site), and lowest at the valley site (9.2 ± 6.7 m^2/g at the Hayden VOR site) with 11 to 12 m^2/g at the other sites. These values are in the same range of the absorption coefficients of 10 to 20 m^2/g derived in most urban and non-urban areas.

A.2.3.5 Anion and Cation Balance

Ammonium sulfate ($(NH_4)_2SO_4$), ammonium bisulfate (NH_4HSO_4), and ammonium nitrate (NH_4NO_3) are the most common water-soluble compounds that are usually found in continental air. The ammonium concentrations can be calculated based on the sulfate and nitrate measurements by assuming that all the particulate nitrate is in the form of ammonium nitrate and all the particulate sulfate is either in the form of ammonium sulfate (i.e., calculated ammonium = 0.38 × sulfate + 0.29 × nitrate) or in the form of ammonium bisulfate (i.e., calculated ammonium = 0.192 × sulfate + 0.29 × nitrate). Measured ammonium concentrations should equal those calculated from ammonium nitrate and ammonium sulfate or ammonium bisulfate on a mole-to-mole basis. These comparisons assume that nitrate lost by volatilization of ammonium nitrate from the front quartz-fiber filters depletes both particulate nitrate and ammonium.

Scatter plots of calculated versus measured ammonium in Figure A.2-21 show that the majority of ammonium sulfate points are on the one-to-one line with reasonably good correlation (r = 0.81). This suggests that ammonium sulfate, rather than ammonium

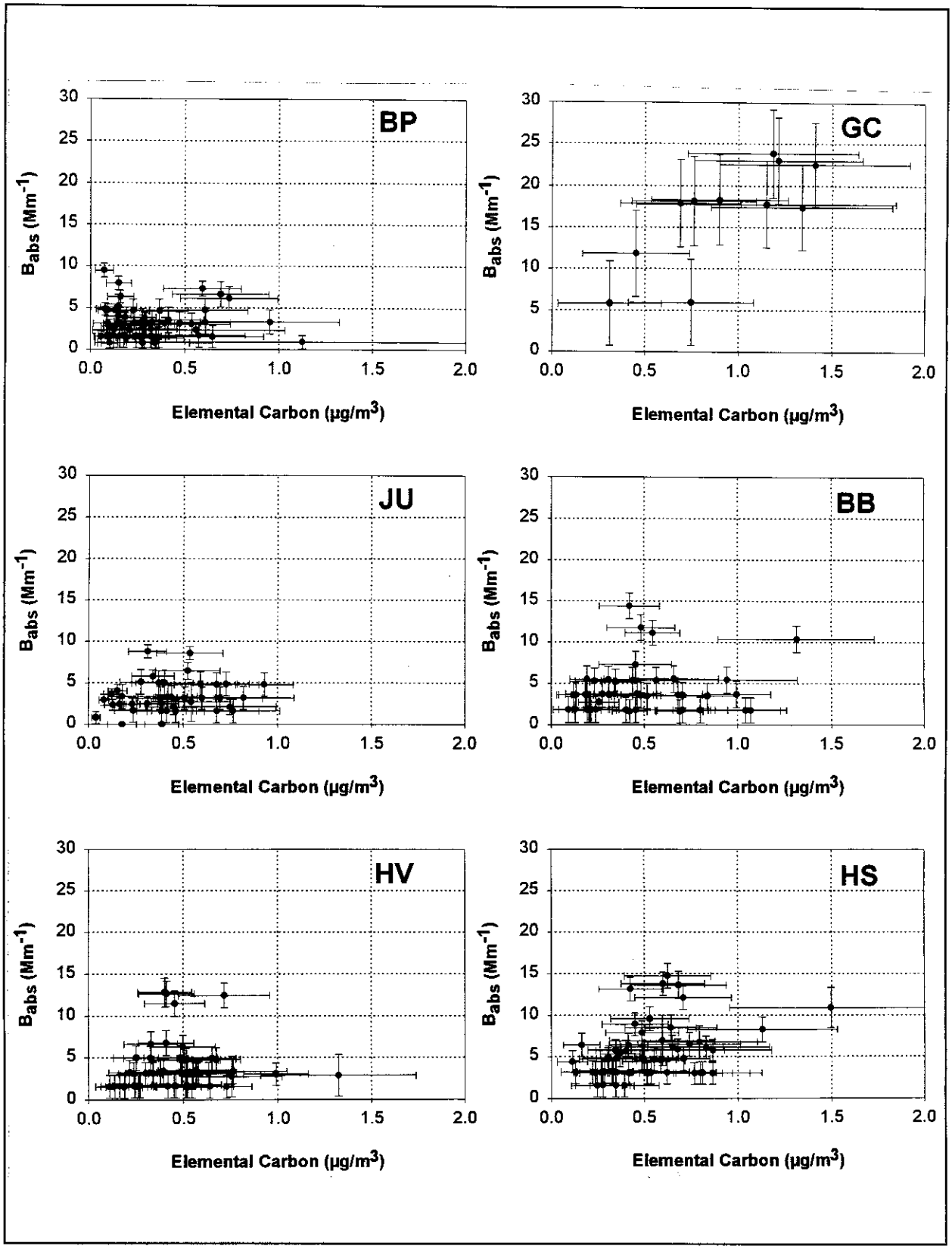


Figure A.2-20 Scatter plots of light absorption b_{abs} versus elemental carbon at Buffalo Pass (BP), Gilpin Creek (GC), Juniper Mountain (JU), Baggs/Baker (BB), Hayden VOR (HV), and Hayden Waste Water (HS) sites.

Table A.2.15

Summary of Regression Statistics between the Filter Light Absorption (b_{abs}) and Elemental Carbon Measurements

Sampling Site	Y (Mm^{-1})	X ($\mu g/m^3$)	Average Ratio (m^2/g)[a]	No. of Observations[a]	Average Ratio (m^2/g)[b]	No. of Observations[b]	Slope (g/m^2)	Intercept (Mm^{-1})	Correlation Coefficient
Buffalo Pass	b_{abs}	EC	60.5 ± 390	90	16.7 ± 20.3	59	0.058 ± 1.12	3.1 ± 0.4	0
Gilpin Creek	b_{abs}	EC	7.6 ± 12.4	40	18.8 ± 5.3	11	13.1 ± 3.4	4.5 ± 3.6	0.76
Juniper Mountain	b_{abs}	EC	9.2 ± 8.9	45	11.2 ± 8.6	37	0.9 ± 1.4	3.1 ± 0.7	0.11
Baggs/Baker	b_{abs}	EC	10.8 ± 11.5	53	11.7 ± 8.3	43	1.6 ± 1.5	3.4 ± 0.8	0.16
Hayden VOR	b_{abs}	EC	7.8 ± 7.0	62	9.2 ± 6.7	53	1.4 ± 1.8	3.1 ± 0.9	0.11
Hayden Waste Water	b_{abs}	EC	17.6 ± 42	64	12.3 ± 7.8	55	5.1 ± 1.6	2.9 ± 1.0	0.39

[a] Includes all data points.

[b] Includes data points with concentrations greater than their associated measurement uncertainties.

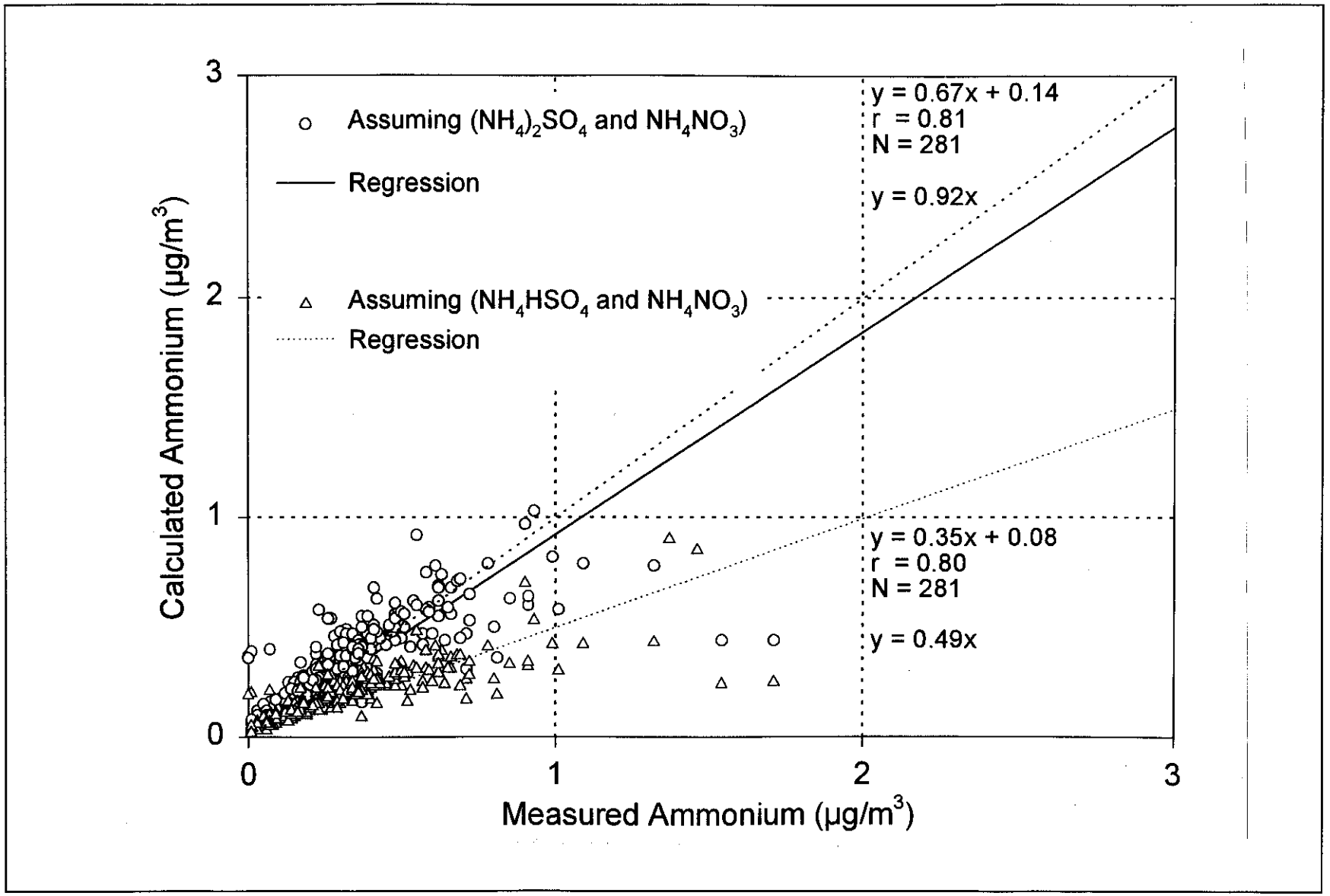


Figure A.2-21 Scatter plot of $PM_{2.5}$ calculated ammonium versus $PM_{2.5}$ measured ammonium at all six sites during the Mt. Zirkel Visibility Study.

bisulfate, is the dominant species in the study region. Concentrations of sodium sulfate (Na_2SO_4) and sodium nitrate ($NaNO_3$) are assumed to be insignificant. Potassium chloride (KCl) and sodium chloride (NaCl) may also be present in the study region, but probably not in significant quantities due to the low chlorine and soluble potassium concentrations shown in Figures A.2-18 and A.2-19, respectively.

The anion and cation balance in Figure A.2-22 demonstrates that these ionic measurements are highly correlated (r = 0.86), with most of the data points falling within one standard deviation of the one-to-one line. Most of the cations can be balanced with the anions on a molar equivalent basis, with an average ratio of 0.98.

A.2.3.6 Nitrate Volatilization

The "FQ" filter pack (Figure A.2-2), preceded by an anodized aluminum nitric acid denuder, measures $PM_{2.5}$ nitrate (i.e., non-volatilized nitrate) from the front quartz-fiber filter and captures the volatilized particulate nitrate dissociated from the front quartz-fiber filter with a backup sodium-chloride-impregnated cellulose-fiber filter. The sum of these two nitrate measurements in the "FQ" filter pack gives total $PM_{2.5}$ particulate nitrate. The nitric-acid-denuded total $PM_{2.5}$ particulate nitrate should be greater than or equal to the $PM_{2.5}$ non-volatilized nitrate, depending on the extent of volatilization.

Figure A.2-23 displays scatter plots of $PM_{2.5}$ non-volatilized particulate nitrate versus nitric-acid-denuded total $PM_{2.5}$ particulate nitrate for the warmer (May to August) and colder (February, March, September, and October) seasons. As discussed in Watson *et al.* (1994), secondary ammonium nitrate is not a stable compound. Its equilibrium with gaseous ammonia and nitric acid is strongly influenced by temperature and relative humidity. The dissociation of particulate nitrate from the front quartz-fiber filter is expected to be more prevalent during the months of May through August when temperatures are higher. Figure A.2-23 yield a slopes of 0.50 ± 0.04 for the warmer season and 0.75 ± 0.02 for the colder season with negligible intercepts. On average, approximately 46% of the particulate nitrate from the quartz-fiber filters volatilized during the warmer months. This volatilization decreased to 28% of particulate nitrate during the colder season when temperatures were lower. The variations in volatilization were greater in the warmer season (r = 0.73) as compared to the colder season (r = 0.95).

Similar calculations were performed by separating the site types into: 1) wilderness sites (i.e., Buffalo Pass and Gilpin Creek), 2) regional sites (i.e., Juniper Mountain and Baggs), and 3) valley sites (i.e., Hayden VOR and Hayden Waste Water). The extent of nitrate volatilization varied from 33% to 40% among different site types with an overall average ratio of 0.71 ± 0.01.

Major losses due to nitrate volatilization were also found in other studies (e.g., Chow *et al.*, 1994; Chow, 1995). Volatilized nitrate is not part of the measured $PM_{2.5}$ mass, so this loss does not show up in the sum of species comparison shown in Figure A.2-15. Without a backup absorbent filter, particulate nitrate would be greatly underestimated.

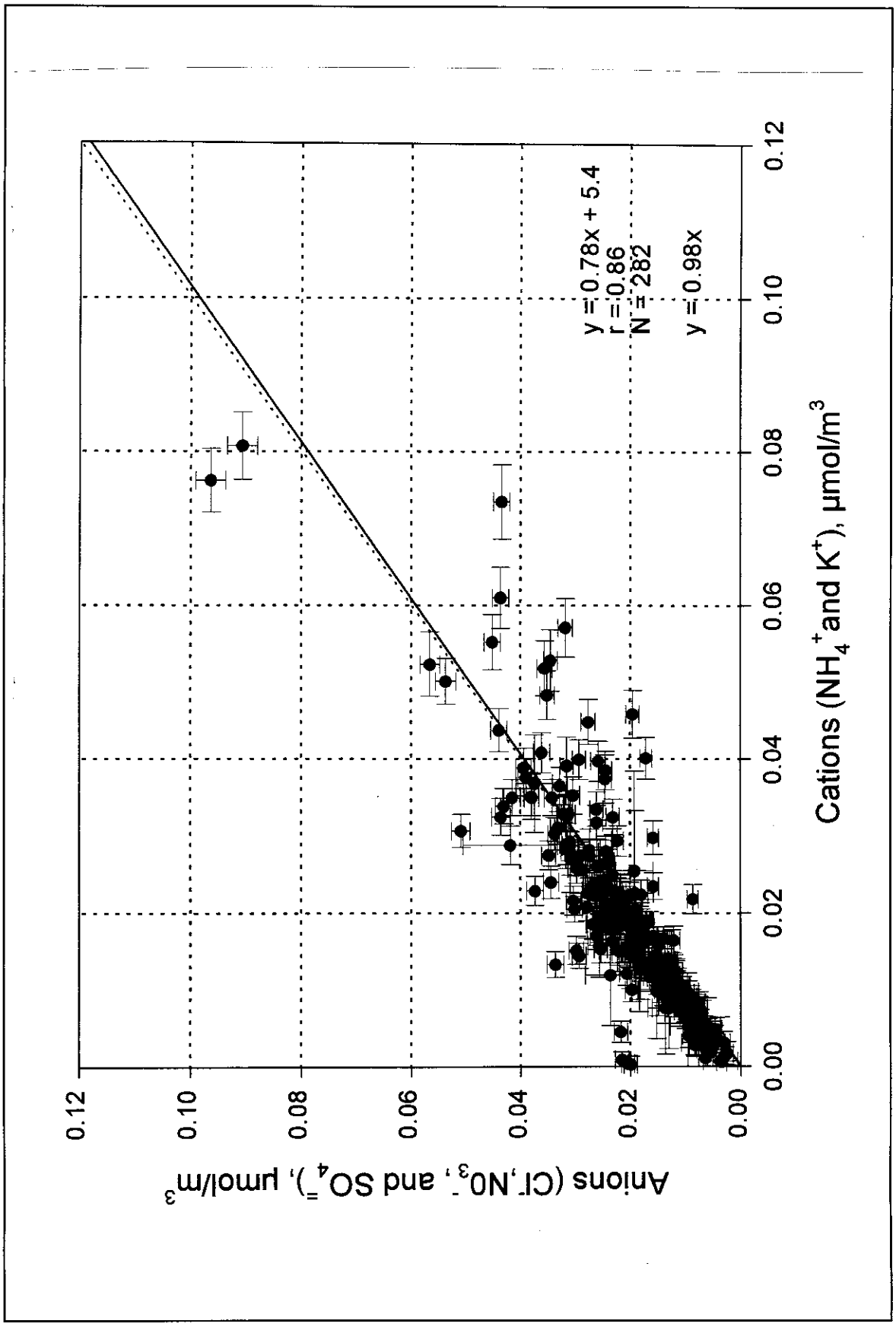


Figure A.2-22 Scatter plot of anions versus cations for $PM_{2.5}$ measurements collected at all six sites during the Mt. Zirkel Visibility Study.

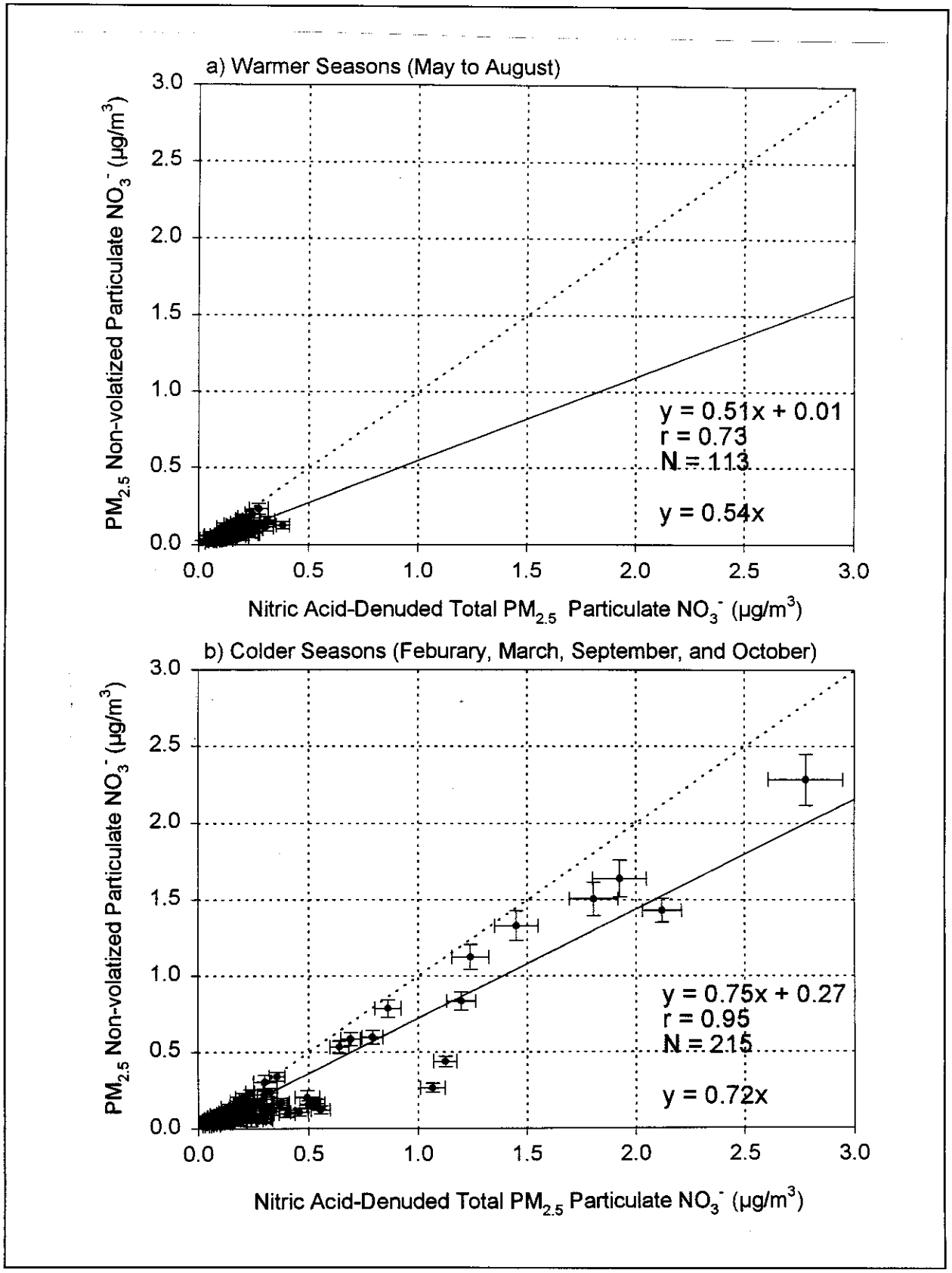


Figure A.2-23 Scatter plots of $PM_{2.5}$ non-volatilized particulate nitrate versus nitric-acid-denuded total $PM_{2.5}$ particulate nitrate during: a) warmer seasons, and b) colder seasons.

A.2.3.7 Coarse Particle Nitrate

Total particulate nitrate was acquired by the "DN" filter pack with the nitric acid/total nitrate sequential sampling system (Figure A.2-3). The "DN" filter pack, preceded by an anodized aluminum nitric acid denuder, contained a quartz-fiber front filter followed by a sodium-chloride-impregnated cellulose-fiber filter to collect total particle nitrate. The "DN" filter pack configuration in Figure A.2-3 is identical to the "FQ" filter pack configuration in Figure A.2-2, except that no size-selective inlet was fitted in the nitric acid/total nitrate sampling system to minimize nitric acid deposition.

Total particulate nitrate from the "DN" filter pack should be greater than or equal to the total $PM_{2.5}$ particulate nitrate from the "FQ" filter pack, with the difference being "coarse particle nitrate". Figure A.2-24 shows that coarse particle nitrate is insignificant since over 90% of the data points were found to overlap with the one-to-one line within three standard deviations of the measurement intervals. The correlation was reasonable ($r = 0.80$) with an intercept of 0.06 $\mu g/m^3$.

A.2.3.8 Validity of Denuder Difference Measurements

Nitric acid concentrations are determined by the differences between total nitrate (nitric acid plus particulate nitrate) and particulate nitrate using the nitric acid/total nitrate sequential sampling system (Figure A.2-3). Total nitrate should be greater than or equal to particulate nitrate as nitric acid is present in the atmosphere.

The scatter plot in Figure A.2-25 shows that approximately 80% of the total nitrate is in the form of gaseous nitric acid. This phenomenon is more pronounced when total nitrate concentrations exceed 1 $\mu g/m^3$. The low correlation ($r = 0.53$) indicates that nitrate compounds tend to vary between gaseous and particulate phases, and these variations are not in proportion to total nitrate concentrations.

Similar to the nitric acid measurements, ammonia was determined by the difference between total ammonia (ammonia plus particulate ammonium) and $PM_{2.5}$ particulate ammonium using the total ammonia sequential sampling system (Figure A.2-4). Total ammonia should be greater than or equal to $PM_{2.5}$ particulate ammonium concentrations, on a molar basis.

The correlation ($r = 0.71$) found between the $PM_{2.5}$ particulate ammonium and total ammonia comparison is higher than that of the particulate nitrate versus total nitrate comparison ($r = 0.53$). Figure A.2-26 demonstrates that all the data points are below the one-to-one line and approximately 50% of the total ammonia is in the form of gaseous ammonia. This percentage is even higher as total ammonia concentrations increase.

A.2.3.9 Validity of $PM_{2.5}$ Ammonium Measurements

$PM_{2.5}$ ammonium was acquired with a front quartz-fiber filter in the "FQ" filter pack preceded by an anodized aluminum denuder (see Figure A.2-2) and with a

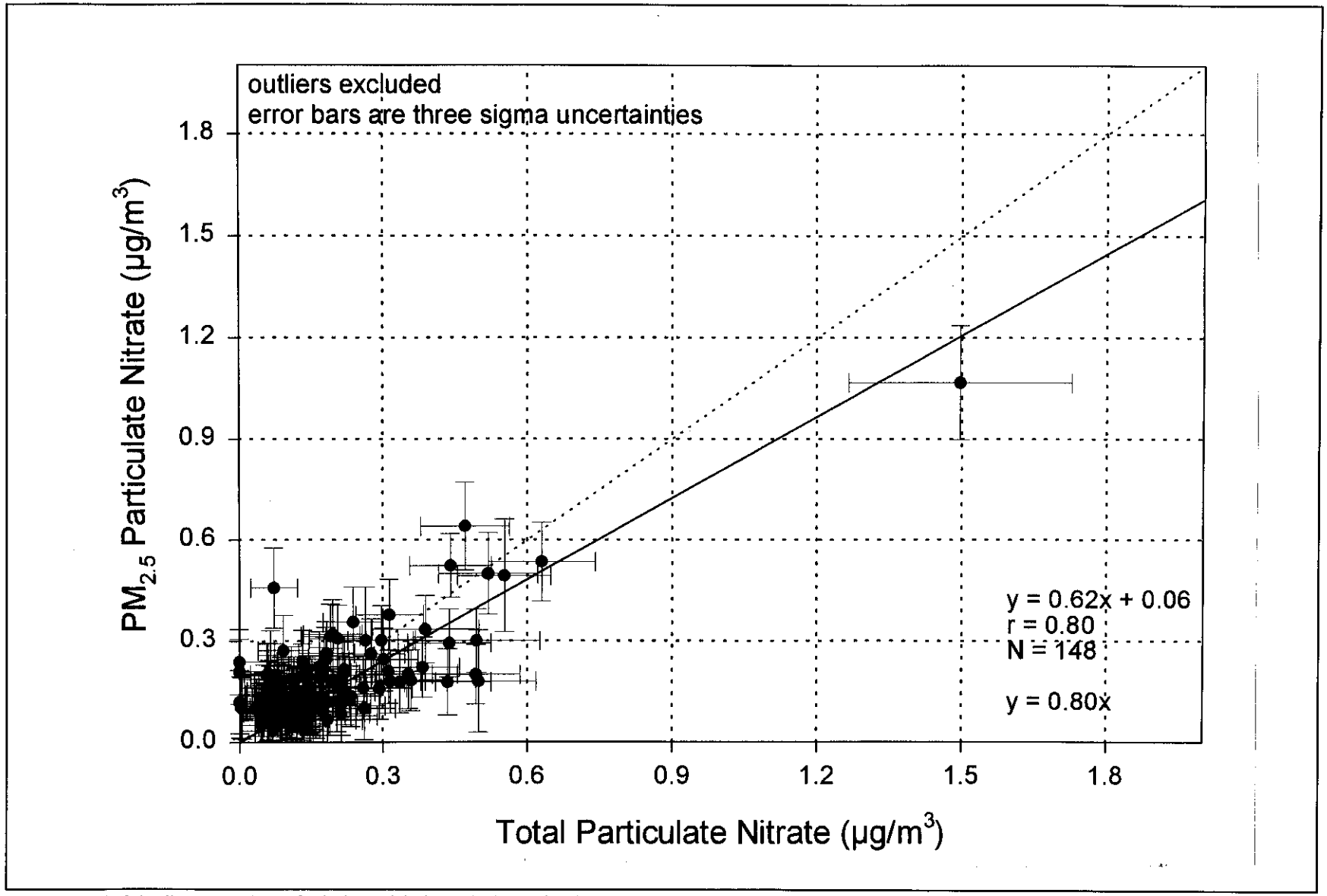


Figure A.2-24 Scatter plot of nitric-acid-denuded particulate nitrate versus total particulate nitrate for measurements collected at the Buffalo Pass, Juniper Mountain, and Hayden VOR sites.

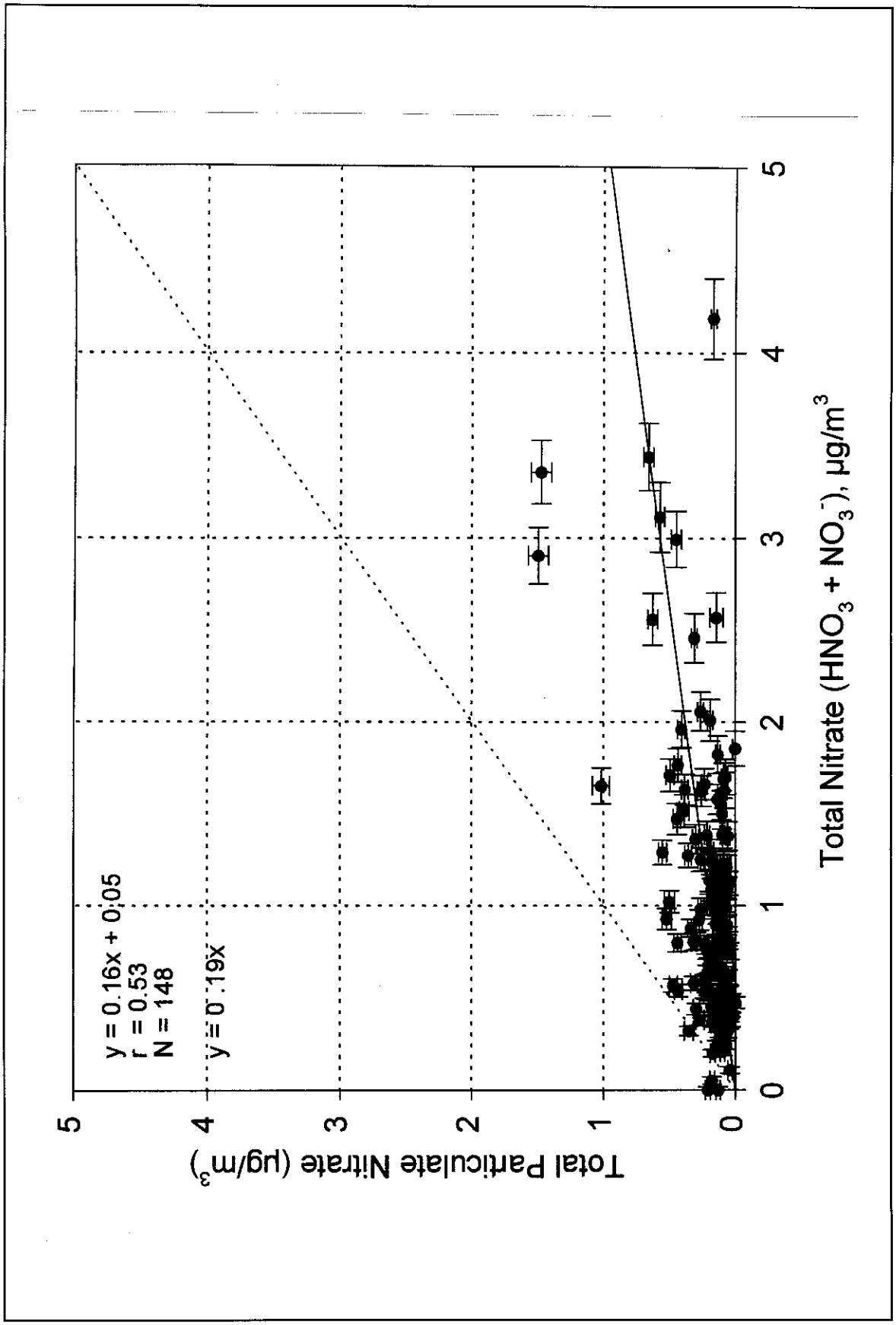


Figure A.2-25 Scatter plot of total particulate nitrate versus total nitrate for measurements collected at the Buffalo Pass, Juniper Mountain, and Hayden VOR sites.

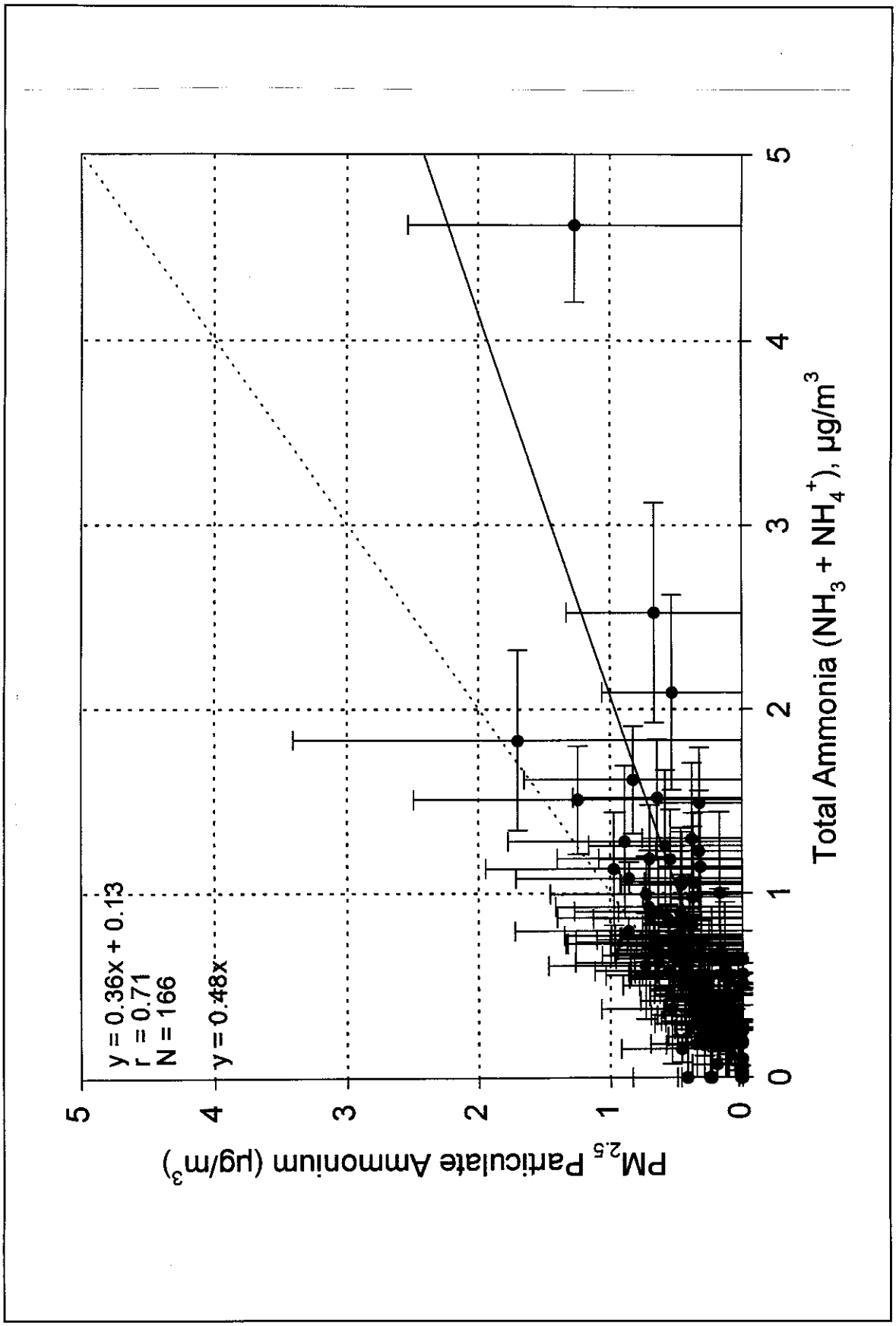


Figure A.2-26 Scatter plot of $PM_{2.5}$ particulate ammonium versus total ammonia for measurements collected at the Buffalo Pass, Juniper Mountain, and Hayden VOR sites.

quartz-fiber/citric-acid-impregnated cellulose-fiber "DC" filter pack preceded by a citric-acid-coated ammonia denuder (see Figure A.2-4).

Assuming that different preceding denuders will not affect the $PM_{2.5}$ ammonium measurements, the nitric-acid-denuded $PM_{2.5}$ ammonium should be identical to ammonia-denuded $PM_{2.5}$ ammonium. The comparison in Figure A.2-27a gives reasonable agreement between the two types of $PM_{2.5}$ ammonium measurements with a correlation of 0.78. The scatter plot shows that both types of $PM_{2.5}$ ammonium measurements are identical within two standard deviations of the measurement intervals.

Assuming nitrate lost by volatilization of ammonium nitrate from the front quartz-fiber filter in the "FQ" filter pack depletes both particulate nitrate and ammonium, the amount of ammonium in the backup sodium-chloride-impregnated cellulose-fiber filter can be calculated stoichiometrically (i.e., $NH_4^+ = 0.29 \times NO_3^-$ from the backup filter). Figure A.2-27b compares the ammonia-denuded $PM_{2.5}$ ammonium with the sum of the nitric-acid-denuded $PM_{2.5}$ non-volatilized and volatilized ammonium. Even though the slopes were reduced from 0.86 to 0.77 in this plot, the two measurements are still in good agreement within three standard deviations of the measurement intervals. This comparison, along with the ion balance presented in Section A.2.3.5, assures the validity of both types of ammonium measurements.

For this study, the ammonia-denuded $PM_{2.5}$ ammonium is used only to calculate the ammonia concentrations in the denuder difference method. The nitric-acid-denuded $PM_{2.5}$ ammonium along with $PM_{2.5}$ nitrate measurements acquired from the same quartz-fiber filter (Figure A.2-2) is used for further data analysis.

The comprehensive evaluation of accuracy, precision, and validity of filter-based aerosol measurements in Section A.2 provides confidence that data acquired in this study are adequate for data analysis and modeling studies.

A.2.4 Isotopic Analysis

The measurement of the S^{34}/S^{32} isotopic ratios consisted of three steps: 1) aqueous extraction of the sulfate collected on the air filters, 2) reduction of the sulfate sulfur to H_2S which was trapped in ammonia and then precipitated as As_2S_3, and 3) measurement of the S^{32}/S^{34} isotopic ratio as $As^{32}S^+/As^{34}S^+$ molecular ions in a thermal ionization mass spectrometer (TIMS). The aqueous extraction was performed using the standard DRI extraction techniques for sulfate. The National Institute of Standards and Technology performed the precipitation and TIMS steps.

As a check on the accuracy of the chemical reduction procedure, three samples were subjected to repeated chemical reductions. The results of this test are shown in Table A.2-16 and show variations in the S^{32}/S^{34} ratio due to the chemical reduction of $\pm$ 0.01 to 0.03. This corresponds to a variation in δ^{34} of $\pm$ 0.7 to 1.2.

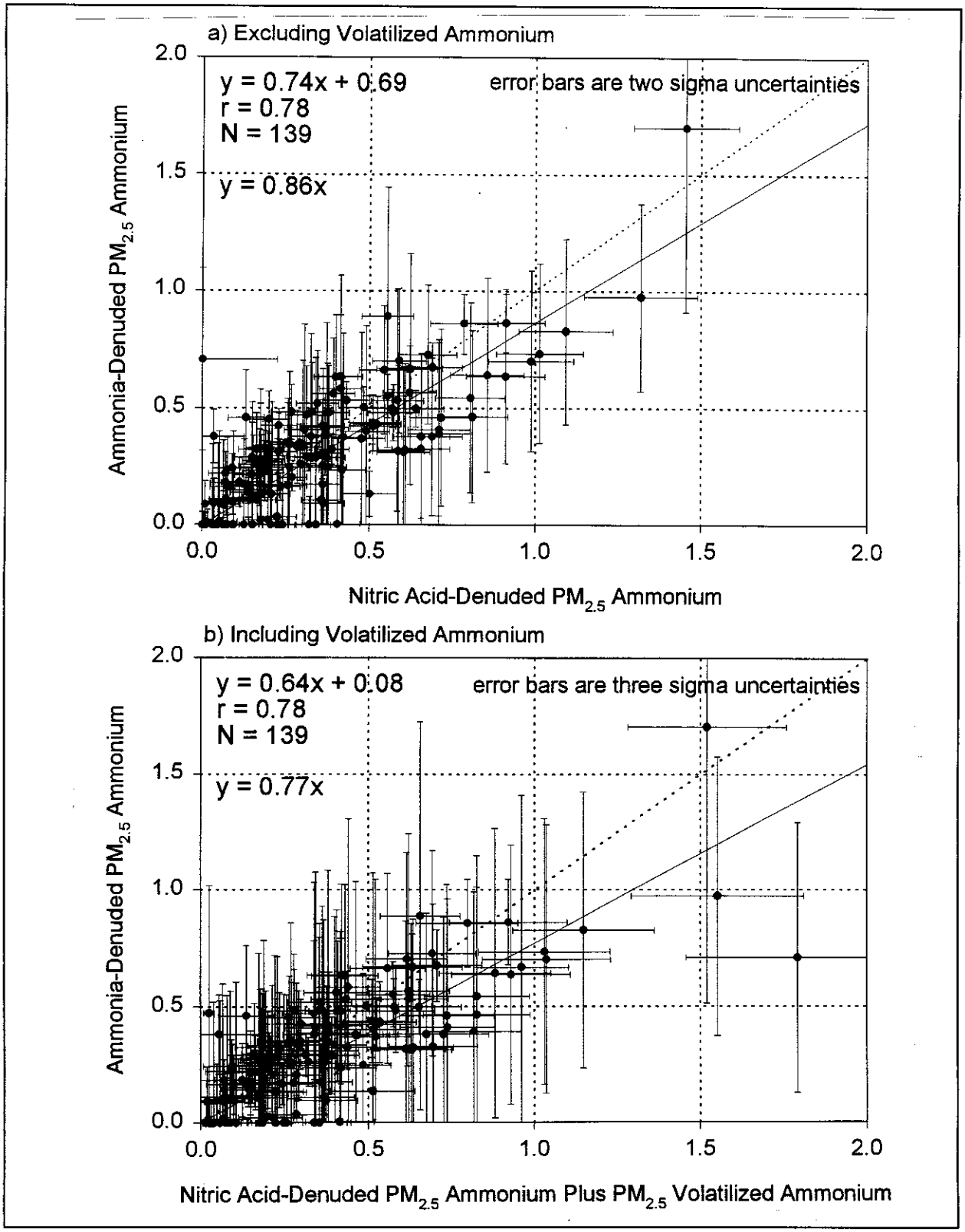


Figure A.2-27 Scatter plots of ammonia-denuded $PM_{2.5}$ ammonium versus nitric-acid-denuded $PM_{2.5}$ ammonium: a) excluding volatilized ammonium, and b) including volatilized ammonium. (Note: the measurement uncertainties are 2 and 3 sigma error estimates, respectively.)

Table A.2-16
Variations in S^{32}/S^{34} Ratios due to Chemical Reduction Procedure

Sample		S^{32}/S^{34}	RSD (%)	δ^{34}
GTGK002	Run 1	23.00	0.114	-16
	Run 2	23.02	0.152	-17
	average	23.01		-16.5
	stdev	0.01		0.7
EXGK007	Run 1	22.67	0.104	-2
	Run 2	22.70	0.124	-3
	average	22.69		-2.5
	stdev	0.02		0.7
EXGK009	Run 1	22.66	0.076	-1
	Run 2	22.69	0.181	-3
	Run 3	22.71	0.093	-3
	average	22.69		-2.3
	stdev	0.03		1.2

The S^{34}/S^{32} ratio for each sample was determined by repeated measurements of the TIMS as the sample was ionized. A curve was fit through the series of measurements and determined the relative standard deviation (RSD) for each sample. The observed RSDs for the samples ranged from 0.021% to 1.205% with an average of 0.138 ± 0.211%.

The standard used for the analysis was the NZ1 NIST standard. The NZ1 standard is almost identical (0.3 per mil difference) to the Canyon Diablo triolite standard used in previous studies. The Canyon Diablo standard was not used due to its decreased availability. Eight replicates of the NZ1 standard were performed throughout the period of the analyses. The standard runs are shown in Figure A.2-28 and Table A.2-17. The average of the standard runs was 22.6155 ± 0.0144 (i.e. RSD = 0.06%). The dotted lines in Figure A.2-28 correspond to ± 0.2% or ± 2 δ^{34} units.

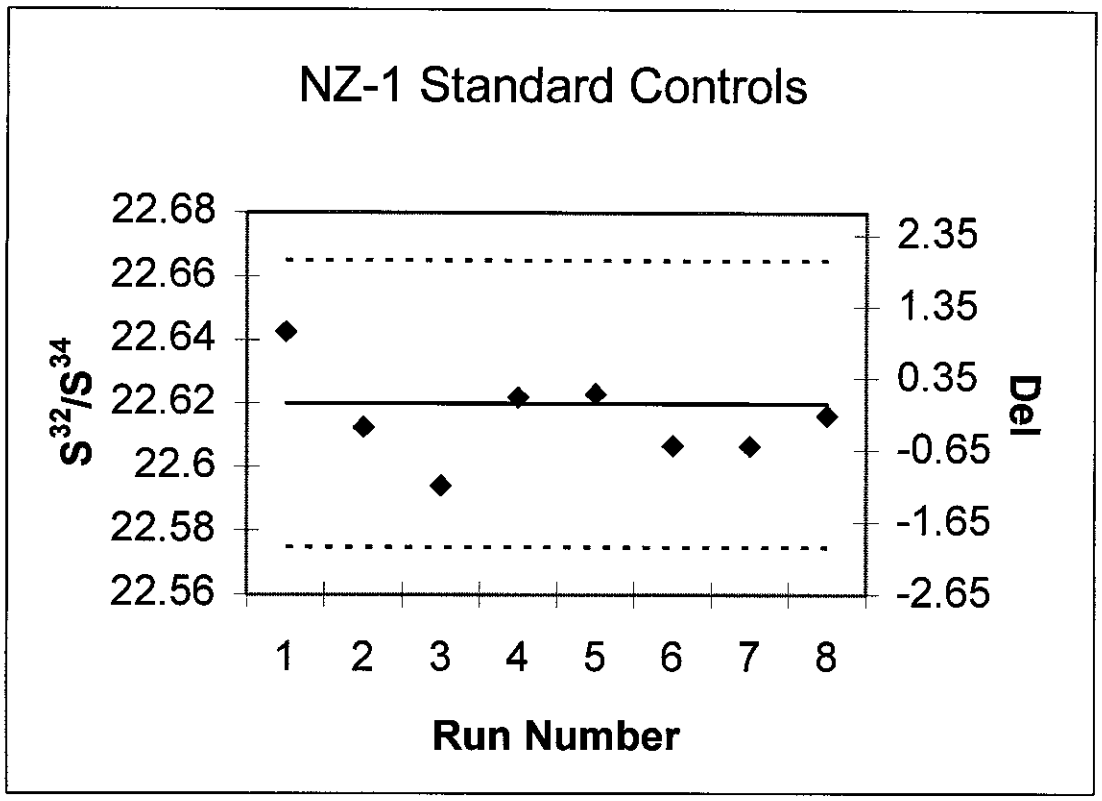


Figure A.2-28 Graph of results from replicate testing of the NZ1 standard.

Table A.2.17
Results from Replicate Testing of the NZ1 Standard

Run	NZ-1	Measurement Uncertainty
1	22.6426	0.10%
2	22.6126	0.20%
3	22.5941	0.04%
4	22.6219	0.13%
5	22.6230	0.04%
6	22.6068	0.07%
7	22.6067	0.06%
8	22.6163	0.07%
Average	22.6155	
SD	0.0144	
RSD	0.06%	

A.3 CONTINUOUS GASEOUS MEASUREMENT EVALUATION

A.3.1 Continuous Sulfur Dioxide (SO_2) and Ozone (O_3) Measurements

Continuous SO_2 measurements were taken with a TECO 43A sulfur dioxide analyzer at the Buffalo Pass site from 08/02/95 through 11/09/95. Continuous O_3 measurements were taken with a TECO 49 ozone analyzer at the Hayden VOR site from 08/09/95 through 11/08/95. Table A.3.1 summarizes the sensors and sampling specifications for these two measurements. At the Buffalo Pass site, a Campbell CR-10 data logger acquired five-minute average SO_2 (ppbv) concentrations. At the Hayden VOR site, a Campbell CR-21X data logger acquired 15-minute average O_3 (ppbv) concentrations. The data loggers at both sites also initiated zero and span performance tests at specific times every day. SO_2 and O_3 data were downloaded and reviewed daily. Figure A.3.1 is a flowchart of the data acquisition, reduction, and validation procedures.

A.3.1.1 Continuous SO_2 and O_3 Data Reduction and Data Validation

For Level 1 validation, the following tests were performed:

- Extract 5-minute average SO_2 and 15-minute average O_3 data from raw data and append to site-specific validated seasonal data files. Invalid measurements are set to –99.
- Plot data weekly. Note operational problems are noted on the plots.
- Extract zero, precision, and span results for precision estimation.
- Eliminate values during calibration events.
- Adjust measurements for offsets based on the most recent zero calibration performed.
- Compute hourly average concentrations from the 5-minute SO_2 and 15-minute O_3 data.
- Set negative hourly average data to zero.

Table A.3.1
Sampling Specifications for TECO 43A Sulfur Dioxide and TECO 49 Ozone Analyzers

Parameter	Sensor	Units and Range	Sample Frequency	Notes
Continuous SO_2 Ambient Measurement	TECO 43A	0-100 ppbv	1-second samples 5-minute averages	
Continuous SO_2 Zero Calibration	TECO 43A	0 ppbv	Daily 5-minute averages at 14:15 and 16:15	Operator also initiates weekly zeros
Continuous SO_2 Precision Check	TECO 43A	10 ppbv	Daily 5-minute average at 14:00	Operator also initiates weekly precisions
Continuous SO_2 Span Check	TECO 43A	30 ppbv	Daily 5-minute average at 16:00	Operator also initiates weekly spans
Continuous O_3 Ambient Measurement	TECO 49	0-500 ppbv (0-0.50 ppmv)	1-second samples 15-minute averages	
Continuous O_3 Zero Calibration	TECO 49	0 ppbv	Automatic 15-minute average from 23:45-0:00 daily	
Continuous O_3 Precision Check	TECO 49	90 ppbv (0.09 ppmv)	Manual 15-minute average at weekly intervals	Operator initiated during weekly site visit
Continuous O_3 Span Check	TECO 49	400 ppbv (0.40 ppmv)	Automatic 15-minute average from 0:00-0:15 daily	

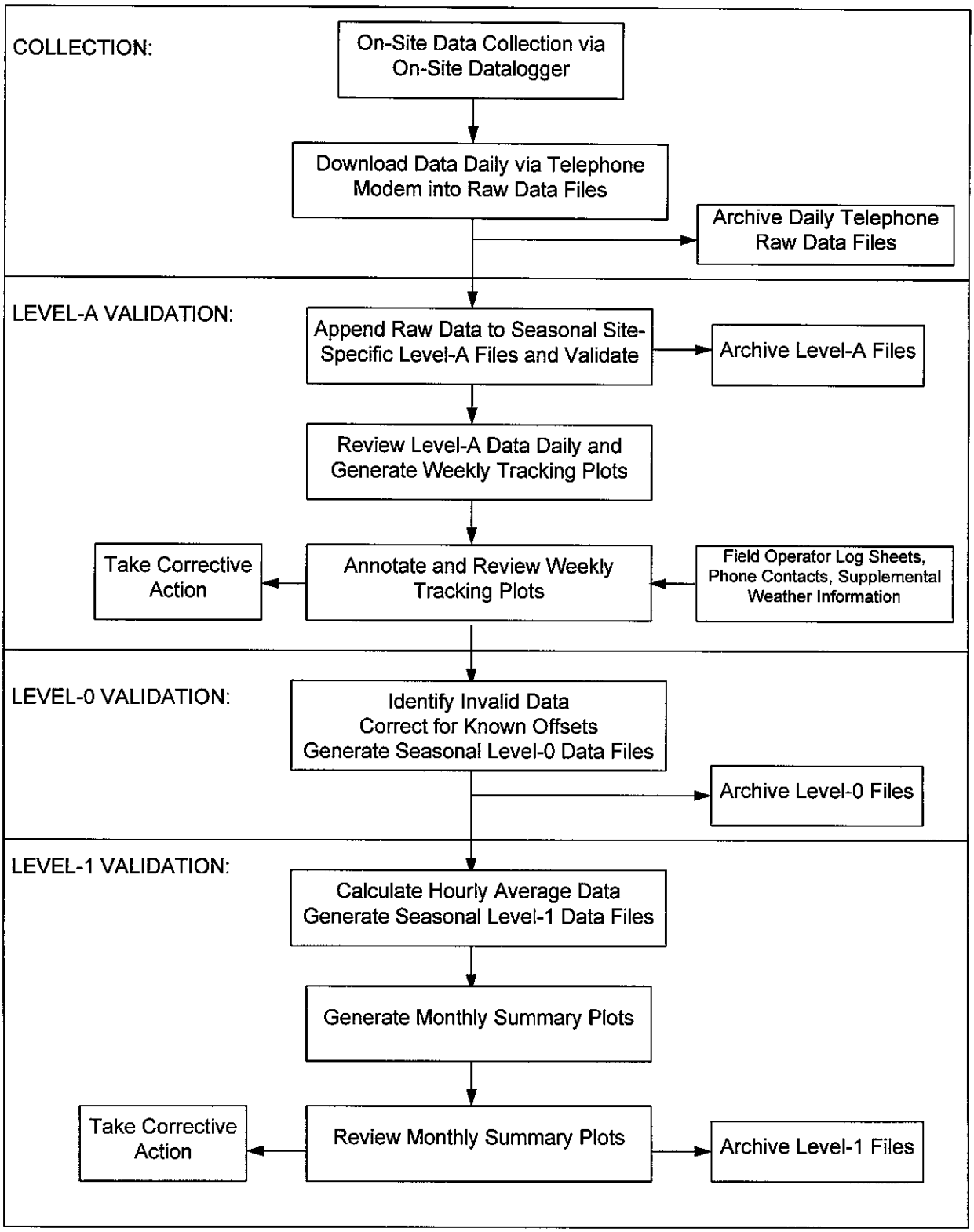


Figure A.3-1 Continuous sulfur dioxide and ozone data handling flowchart.

A.3.1.2 Continuous SO_2 and O_3 Data Precision Estimates

Precision estimates for TECO 43A SO_2 and TECO 49 O_3 data are computed by using the following EPA guidelines:

- For each span check, let X_i be the known concentration of the span gas and Y_i be the measured concentration from the i^{th} precision check. The percentage difference (d_i) for each span check is calculated as follows:

$$d_i = \left(\frac{Y_i + X_i}{X_i} \right) \times 100 \qquad \text{(A.3-1)}$$

- The quarterly average ($\bar{d}$) and standard deviation (σ) are calculated as follows:

$$\bar{d} = \frac{1}{n} \sum_{i=1}^{n} d_i \qquad \text{(A.3-2)}$$

$$\sigma = \left[\frac{\sum d_i^2 - \left(\sum d_i\right)^2 / n}{n-1} \right]^{1/2} \qquad \text{(A.3-3)}$$

A.3.2 High Sensitivity Sulfur Analyzer

The DRI high sensitivity sulfur analyzer was installed at the Buffalo Pass site to provide a real-time measurement of gaseous sulfur dioxide (SO_2) and particulate sulfur (reported as sulfate) during the Intensive Operating Periods (IOPs) from 02/17/95 to 04/18/95 and from 07/27/95 to 10/24/95.

This monitor uses a modified Sievers sulfur chemiluminescent detector (SCD) as a means to measure sulfur in the air sample. Sulfur compounds are reduced to sulfur monoxide by burning the air sample in a hydrogen/air flame. A quartz sample probe is positioned within the flame in the reaction zone where sulfur monoxide is produced to permit transfer of the reduced sample to a low pressure reaction cell (~5 torr). Ozone is added to react with the sulfur monoxide in the reaction cell and produce an excited state of SO_2 that rapidly stabilizes by the emission of a photon with a wavelength of ~ 350 nm. This chemiluminescence is detected by a cooled photomultiplier tube.

By altering the pathway of the sample to the SCD, both SO_2 and sulfate aerosol were measured. Two different techniques were used to separate the sulfur gas and sulfate aerosol during the winter and summer/fall IOPs.

During the winter IOP, gaseous and particulate sulfur were separated by using three pathways to the detector that were controlled by a data logger and two solenoid valves. The pathways are shown schematically in Figure A.3.2. The three modes of operation were:

- Total Sulfur Mode - control valve number one directed the air sample to the SCD. In this mode the SCD output was proportional to total sulfur, that is, sulfur gas plus sulfur aerosol. Total Mode sampling was done for 200 seconds.

- Gas Mode - control valve number one directed the sample through a quartz particle filter where particulate matter was removed from the sample stream. Control valve number two directed the sample to the SCD. In this mode the SCD output was proportional to the sulfur gas content of the sample. Gas Mode sampling was done for 200 seconds.

- Denuder Mode - control valve number one directed the sample through a quartz particle filter. Control valve number two directed the sample through an annular denuder that was coated with potassium carbonate in glycerin to remove SO_2. In this mode the SCD output was proportional to the non-SO_2 sulfur gas concentration of the sample. Denuder Mode sampling was done for 200 seconds.

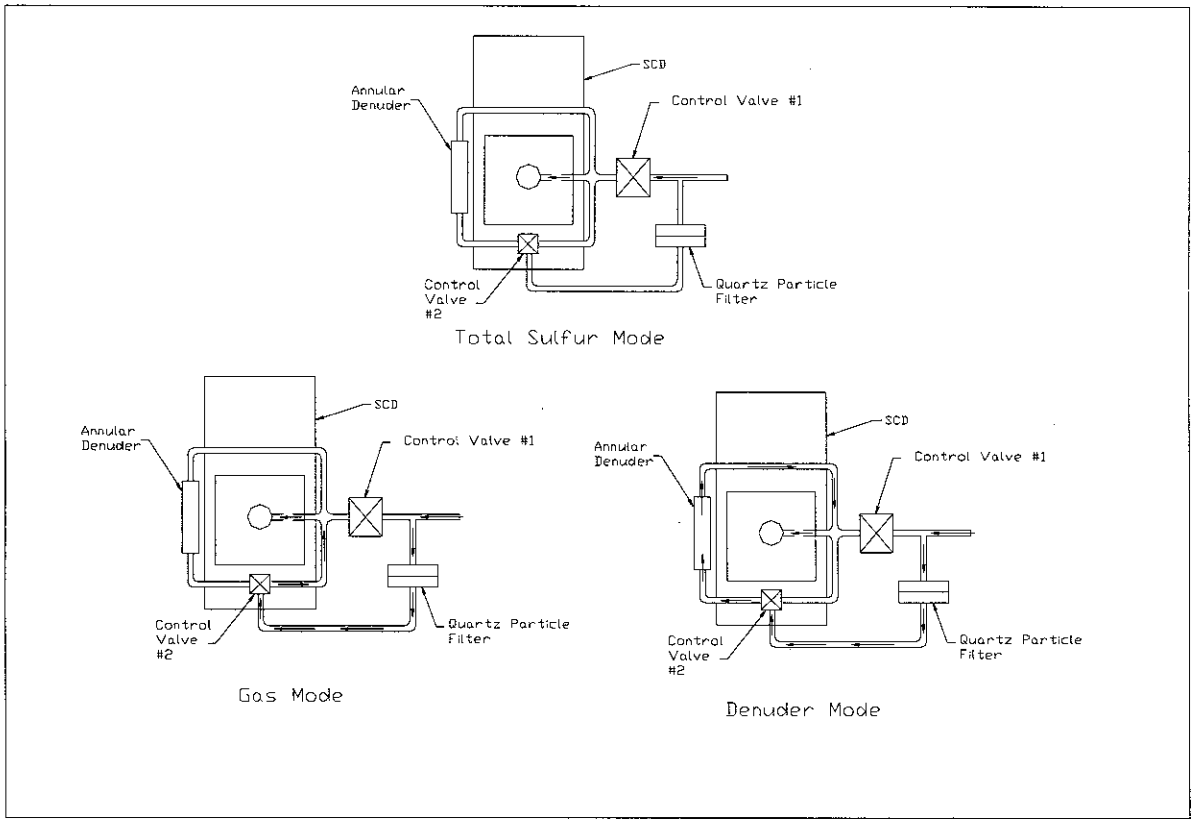


Figure A.3-2 Configuration for the DRI High Sensitivity Sulfur Analyzer during the winter intensive operating period.

This three-mode sequence (i.e., Total Sulfur Mode, Gas Mode, and Denuder Mode) was repeated very ten minutes (600 seconds). Sulfur aerosol was measured by computing the difference between average SCD output in the Total Mode and the Gas Mode. SO_2 was measured by computing the difference between the average SCD output in the Gas Mode and the Denuder Mode.

The baseline response of the SCD was measured by introducing zero air (air free of sulfur) to the sample manifold for twenty minutes every few days. This provided a dynamic check of out-gassing from the quartz filter and a measure of the baseline response of the SCD. These data were later used to interpolate a baseline response for each ten-minute period of data collection.

SCD signal processing was done in the following manner. At the beginning of each 200 second mode, 100 seconds of equilibration time was given before initiating the averaging process. During averaging, a running sum of the squares was tabulated on the output signal to yield information for a calculation of the standard deviation in SCD output. Data were sampled at a one-second rate. All averages were stored every ten minutes.

Prior to the summer/fall IOPs, the operating configuration was modified to provide better resolution of the sulfur aerosol component. Figure A.3.3 illustrates the schematic of the system. The four modes of operation were:

- Baseline Mode - valve number one directed the sample to the SCD through a gas diffusion denuder. A sample pump directed air through an absolute filter to present particle free air to the SCD. Since sulfur gases were removed by the diffusion denuder and no particles were present, this operation was considered a measurement of the SCD baseline response. This mode was maintained for 225 seconds.

- Aerosol Mode - valve number one opened and the zero aerosol pump was turned off. The SCD sampled sulfur aerosol only as sulfur gases were removed by the diffusion denuder. This mode was maintained for 225 seconds.

- Gas Mode - Ball valve number one was closed. Sample air was forced through a quartz filter to remove particles, then transferred through three-way valve number two to the SCD for measurement of the total sulfur gas response. This mode was maintained for 225 seconds.

- Denuder Mode - valve number one was closed. Sample air was forced through a quartz filter to remove particles, then transferred through three-way valve number two to an annular denuder coated with potassium carbonate in glycerin to remove SO_2. In this mode the SCD measured the non-SO_2 part of the gas-phase sulfur in the air sample. This mode was maintained for 225 seconds.

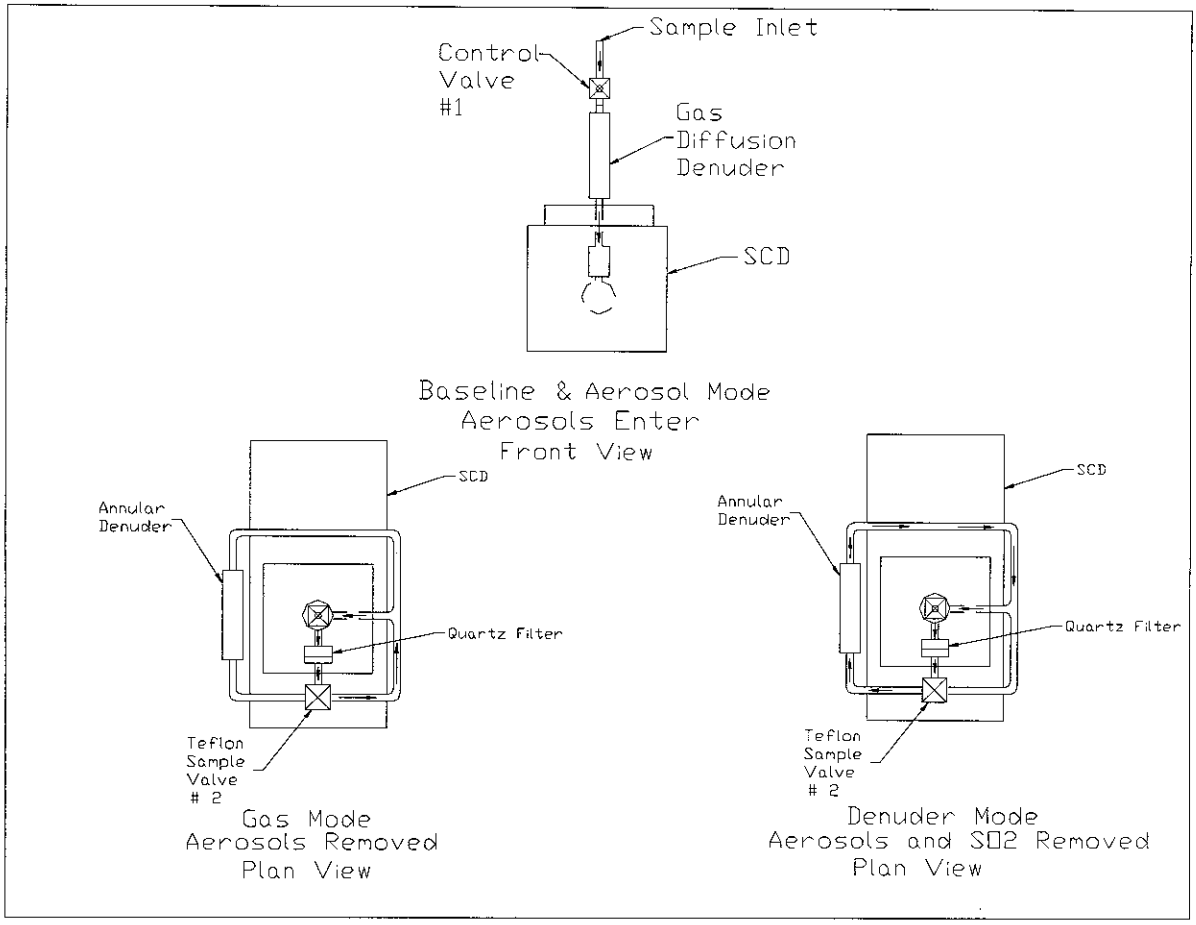


Figure A.3-3 Configuration for the DRI High Sensitivity Sulfur Analyzer during the summer/fall intensive operating periods.

This four-mode sequence was repeated every fifteen minutes (900 seconds). Sulfur aerosol was measured by computing the difference between average SCD output in the Sulfur Aerosol Mode and the SCD Baseline Mode. SO_2 was measured by computing the difference between the average SCD output in the Total Sulfur Gas Mode and the SO_2 Denuder Mode.

The aerosol zero response of the SCD was measured by introducing particle free air to the sample manifold for 450 seconds every six hours. This provided a dynamic check of the out gassing of the diffusion denuder. These data were later used to interpolate a baseline response for each ten minute period of data collection.

A.3.2.2 High Sensitivity Sulfur Data Validation

The following procedures were used to validate the DRI High Sensitivity Sulfur data for all measurement periods.

- Replace missing or invalid observations with -99.

- Check standard deviation in total sulfur, total gaseous sulfur and denuded sulfur averages. If standard deviation is > 20 mv, set flag as 7 to indicate a suspect result.

- Check tabulated values of SO_2 and sulfur aerosol. If they are less than the computed detection limit, set flag as 6 to indicate below detection limit.

- Check for negative values of SO_2 and sulfur aerosol. If not equal to -99, set to zero and flag as 6 to indicate below detection limit.

- Plot daily time series of hydrogen flow and reaction cell pressure to identify periods that are unstable. Set flag to 8 if instability is noted.

- Re-evaluate SO_2 and sulfur aerosol data and accompanying flag. If flag is equal to 2 (performance test), 8 (invalid), or 9 (missing), set SO_2 and sulfur aerosol data to -99.

- Generate daily time series of SO_2 and the SO_2 flag on screen. Look for inconsistencies.

A.3.2.3 Calibration, Precision, Accuracy, and Detection Limits

The sulfur analyzer was calibrated by mixing zero air with known amounts of an SO_2 standard. From 02/17/95 through 04/18/95, calibration was performed approximately once every three days. This calibration was performed manually with a telephone modem by activating the flow of calibration gas and zero air. Each calibration consisted of a purge with zero air followed by several single point spans at a concentration of 3.0 ppbv. Zero air was made at the site by pumping ambient air through activated charcoal to remove sulfur compounds and a desiccant to remove water vapor. The SO_2 standard used for this period was rated at 135 ppbv SO_2 in nitrogen. Dilutions were made by mixing SO_2 with zero air in a calibrator. The calibrator controlled the dilution flows by means of mass flow controllers.

From 07/27/95 to 10/24/95, calibration was done in two ways. Daily calibrations were activated by a TECO calibration system that was shared with the TECO 43A analyzer. In addition, remote spans similar to those implemented in the winter were performed every few days using the manual calibration system.

The TECO calibration system was active from 08/02/95. This system provided 10 ppbv of SO_2 for 15 minutes starting at 1345 MST everyday. This span was followed by 15 minutes of zero air. In addition, at 1545 MST the same calibrator provided 30 ppbv of SO_2 for 15 minutes followed by 15 minutes of zero air. Zero air was made by pumping ambient air through activated charcoal and a desiccant. The SO_2 standard was supplied by Air Resource Specialists and was nominally a 5.3 ppmv standard.

The DRI calibrator was used to deliver SO_2 at 6.0, 3.0, 1.5 and 0.75 ppbv about twice a week during the summer/fall measurement period. Zero air was supplied as compressed clean air from a cylinder. The SO_2 standard used during the summer/fall was the same 135 ppbv standard used during the winter.

The precision of the winter SO_2 measurements was computed by calculating the standard deviation of the sulfur analyzer response to the span concentration of 3.0 ppbv and to zero air. The measurement precision for SO_2 is determined to be 0.40 ppbv at 3.0 ppbv and 0.05 ppbv during zero air tests.

Table A.3.2 summarizes the audit results for SO_2 measurements. During the first audit, the sulfur analyzer flame was extinguished due to improper delivery of the span gas to the SCD. The analyzer was re-lit and tested shortly after the flame-out. As a result, large variations (-95% to +46%) were found during the first audit. As shown in Table A.3.2, the agreement was improved with a variation of –13% to +5% during the second audit.

The instrument detection limits for SO_2 and sulfate concentrations were computed as three times the standard deviation of the response of the analyzer to zero air during each measurement period. The SO_2 detection limits were found to be 0.14 ppbv for the winter intensive and 0.22 ppbv for the summer/fall IOP. The detection limit for sulfate was computed to be 0.67 $\mu g/m^3$ (0.17 ppbv) of sulfate for the winter intensive and 0.22 $\mu g/m^3$ (0.05 ppbv) of sulfate for the summer/fall IOP.

Table A.3.2
Summary of Field Audit Results on DRI High Sensitivity Sulfur Analyzer

Audit Span Concentration (ppbv)	DRI Analyzer Response (ppbv)	Percent Difference[a]
First SO_2 Audit Results (02/24/95)		
19.0	27.8	+46
19.0	27.3	+44
15.0	17.9	+19
15.0	15.3	+2
10.0	13.2	+32
10.0	7.1	-29
5.0	0.3	-93
5.0	0.3	-95
5.0	4.9	-3
Second SO_2 Audit Results (08/24/95)		
19.0	19.0	0
15.0	15.7	+4
15.0	15.8	+5
10.0	10.0	0
10.0	10.0	0
5.0	4.5	-10
5.0	4.4	-13
0	0.1	

[a] $\text{Percent difference} = \dfrac{\text{DRI analyzer response - Audit span concentration}}{\text{Audit span concentration}} \times 100.$

A.4 METEOROLOGICAL MEASUREMENT EVALUATION

Surface and upper-air data were collected from a variety of data sources between 12/01/94 and 11/30/95. These meteorological data were subjected to different levels of data validation which are documented in the following subsections.

A.4.1 Surface Meteorological Measurements

Surface meteorological measurements of ambient temperature (T), relative humidity (RH), wind speed (WS), and wind direction (WD) were acquired at the Buffalo Pass, Gilpin Creek, Juniper Mountain, Baggs, Hayden VOR, and Hayden Waste Water sites with 10 m towers. A tall tower acquired the same measurements at the Craig Tower site at levels of 6 and 50 m. Table A.4.1 summarizes the sensors and sampling specifications for these measurements. Campbell CR-21X dataloggers acquired 5-minute air temperature and relative humidity data along with hourly wind speed, wind direction, and sigma theta data. The 5-minute intervals for the air temperature and relative humidity measurements were consistent with the concurrent nephelometer measurements. Data collected at the Craig Tower were 15-minute and hourly averages of wind speed, wind direction, and sigma theta. Data were downloaded and reviewed daily to identify operational anomalies and to initiate corrective actions. Figure A.1.1 presents a flowchart of the data acquisition, reduction, and validation procedures for surface meteorological measurements.

Data acquisition and validation was accomplished by the following procedures at all sites except the Hayden Waste Water site:

- Extract hourly average ambient temperature, relative humidity, wind speed, wind direction, and wind direction, and sigma theta data from the raw data and append to site-specific Level-A validated seasonal data files.

- Verify operator log sheets against data collected via telephone modem to identify inconsistencies and errors and to enter into the QA database.

- Identify periods of invalid data and note on the weekly plots. Replace invalid data with –99.

- Examine videos and photographs taken during the monitoring period and note periods affected by significant precipitation (snow or rain) on the weekly plots.

- Convert wind speed measurements from miles per hour (MPH) to meters per second (m/s) and convert ambient temperature from Fahrenheit (°F) to Celsius (°C).

Surface meteorological data collected at the Hayden, CO, radar profiler site were subjected to the following processing and evaluation procedures:

Table A.4.1
Sensor and Sampling Specifications for Surface Meteorological Measurements

Parameter	Sensor	Units and Range	Sample Frequency	Notes
Ambient Air Temperature (receptor sites)	Rotronics MP-101A-C4	°C -30 to +50°C	1-second samples; 5-minute and hourly averages	Sensor in motor - aspirated radiation shield
Ambient Air Temperature (Craig Tower)	Climatronics 100093	°C -30 to +50°C	1-second samples; 15-minute and hourly averages	6 m: Climatronics TS-10 motor-aspirated radiation shield 60 m: RM Young 43404A Gill-aspirated radiation shield.
Ambient Relative Humidity (receptor sites)	Rotronics MP-101A-C4	% 0 to 100%	1-second samples; 5-minute and hourly averages	Sensor in motor-aspirated shield
Wind Speed and Direction (all 7 sites)	Climatronics F460	Mph and Degrees True 0 to 360 degrees	1-second samples; hourly average with 15-minute subintervals (900 samples per subinterval)	Nephelometer sites at 10m. Craig tower at 6m and 60m.
Wind Direction Sigma Theta (all 7 sites)	Climatronics F460	Degrees	1-second samples; hourly average with 15-minute subintervals (900 samples per subinterval)	Datalogger derived

- Determine the operational status of the sites; and identify periods of invalid data.

- Submit data for automatic, quantitative data screening, which compared the observations to expected values, ranges of values, and threshold values or performance criteria that were based on EPA guidance (U.S. EPA, 1987; 1989). The types of tests that were performed included: 1) comparing observations to expected minimum and maximum values; 2) checking that rates of change with time did not exceed expected conditions or instrument performance characteristics; and 3) comparing observations to climatological data.

- Review data manually which involved qualitative review of the observations and incorporation of the findings and/or corrections into the data base.

Additional meteorological data regarding the study region were acquired from the National Weather Service (NWS). Some of these stations were automated, while others consisted of both automated and human observations. In general, data quality was high and a sizable fraction of the data were collected by automated data collection systems with automated quality control (QC) checks. Some internal and climatological consistency checks were performed by the National Climatic Data Center before the data were sent to the Western Regional Climate Center. RAWS sites, operated by the U.S. Forest Service, also provided some automated QC checks performed as part of the data collection procedures.

Level 2 data validation was performed on all of the surface meteorological data to compare the data spatially among nearby stations and temporally from one hour to the next. This was performed by examining wind fields generated for each hour of the year by the CALMET model, which used all surface and upper-air data for input. Wind fields were displayed along with the actual winds at each station for each hour. Data were reviewed for each month by cycling through the data displays hour by hour on a workstation display. Each site was examined for general consistency with the overall wind fields. Winds from a specific site were also reviewed to ensure representativeness given the terrain and winds at surrounding sites.

In general, all sites were found to be reasonably consistent with each other with one exception (i.e., the NWS site at Craig, CO). Examination of the data records from that site showed winds were unrealistically high. All data from the Craig NWS site were flagged and omitted from further analyses.

A.4.2 Upper-Air Meteorological Measurements

Upper-air wind and temperature data were collected twice per day by the NWS at their rawinsonde sites at Denver, CO; Grand Junction, CO; and Laramie, WY. These data were obtained from the Western Regional Climate Center and have received QC screening by the NWS (Collins and Gandin, 1989; WMO, 1971). In addition, three 915-MHz radar wind profilers were used to measure hourly profiles of aloft winds up to about 3,000 m above ground level (AGL). At two of the sites, radio acoustic sounding systems (RASS) were used

to measure temperature up to about 900 m AGL. A radar profiler and RASS at Clark, CO, and a radar profiler at Baggs, WY, were operated by NOAA's Environmental Technology Laboratory (ETL). An additional profiler and RASS were installed for this study at Hayden, CO. Results from field audits on the three radar profilers were satisfactory, with no significant findings that affected data quality.

A.4.2.1 Upper-Air Meteorological Data Validation for Hayden Station

Data from the radar profiler and RASS were downloaded daily and reviewed to identify any problems. The data validation process includes:

- Level 0 validation: Download and review raw data daily.
- Level 0.5 validation: Subject data to automatic QC screening of the hourly wind and temperature profiles. The QC program uses a pattern recognition algorithm developed by NOAA (Weber *et al.*, 1993) to examine the continuity of the data in time and altitude and to identify possible data outliers. Dominant patterns are established that link consistent data in time and altitude. Data that vary from adjacent values by more than user-defined thresholds are flagged as suspect.
- Level 1.0 validation: Subject data to quantitative and qualitative reviews for accuracy, completeness, and internal consistency. Erroneous data (e.g., winds contaminated by ground clutter) are removed from the data base, and questionable data are flagged in the data base. Any changes to the data were documented in the final data base.

A.4.2.2 Upper-Air Meteorological Data Validation for Clark and Baggs Stations

The approach that NOAA/ETL used to process and validate the radar profiler wind and temperature data differed slightly from the procedures applied to the Hayden profiler data. The major difference with NOAA's approach is that quality control screening is applied to the sub-hourly data (instead of the hourly averaged data) prior to creating the hourly averages. These sub-hourly data are referred to as "moments" data, and consist of ~25-second samples of the wind velocity measured along each beam (i.e., radial velocity). The moments data were collected on-site and stored on optical disks, and then sent back to NOAA in Boulder, CO, for data processing which consisted of the following steps:

- Apply the Weber-Wuertz QC algorithm (Weber and Wuertz, 1991; Weber *et al.*, 1993) to a day's worth of ≈25-second radial velocities. Quality control screening is performed in one-hour blocks of data at a time. The algorithm screens radial velocities from each beam separately (i.e., vertical and two off-vertical beams) and identifies outliers and inconsistencies in the data.
- Remove any inconsistent radial velocities that were identified by the QC algorithm.

- Average all of the remaining radial velocities and compute hourly averaged wind and temperature data.

- Run the QC algorithm on hourly averaged data for each 24-hours of data and remove any outliers or inconsistent data that fail the QC checks.

NOAA staff performed reviews and spot checks on the hourly averaged data to ensure that the QC screening was working properly. With this approach, spurious or questionable data (i.e., outliers) were removed before the winds were computed; thus NOAA's data shows higher data capture rates. However, the audit results showed that the data quality from all three radar profilers was comparable.

A.4.2.3 Level 2 Data Validation of Upper-Air Meteorological Data

Level 2 data validation, performed to examine the spatial consistency and reasonableness of the upper-air meteorological data by conducting external comparisons to other data, includes:

- Qualitatively comparing winds from nearby upper-air sites for consistency at the upper altitudes. For example, NWS upper-air soundings were used to do "top-down" reasonableness checks, which consisted of comparing the profiler winds to the NWS soundings at upper levels (i.e., free atmosphere) where conditions were controlled mainly by synoptic processes and were expected to be more homogenous than in the lower levels (i.e., boundary layer).

- Qualitatively comparing the upper-air winds measured by the profilers during episode days to NWS upper-air and surface weather charts.

- Qualitatively comparing the Hayden site's profiler winds and temperatures in the first 300 m AGL to surface meteorological measurements made at 10 m AGL.

- Comparing wind roses computed from the wind data at the three radar profiler sites.

- Quantitatively evaluating the profiler winds by correlating the winds from a pair of upper-air sites. This was performed over an eight-month period from February to September by correlating the wind speeds and east-west and north-south components of the wind from two sites at each altitude. No problems or biases were found in the data from the three profiler sites. Results of this correlation showed that winds were highly correlated between 3,300 to 4,800 m MSL (mean sea level), due to the large-scale synoptic forcing affecting all three of these sites similarly. Below about 3,300 m MSL, the winds were influenced by the local terrain, and were not as highly correlated. Except for some decoding problems, no significant problems or biases were identified during these Level 2 comparisons.

A.5 DATA AVAILABILITY

The Mt. Zirkel Visibility Study (MZVS) database is presently maintained on the Internet server, freds.sage.dri.edu, at the Desert Research Institute, Reno, NV; the database will be maintained by the DRI until June 30, 1997. Persons desiring access should contact the database manager, Norm Robinson, 702-677-3133. The numerical data base is also available on a CD-ROM, which has the same organization as the internet server.

A.5.1 Directory Structure

Data and communications files are organized into several sub-directories within the MZVS database directory. Each of these contains additional sub-directories to further organize the information. All directories, with exception of the TEMP directory, have read-only privileges for most users to avoid the inadvertent erasure of information. The MZVS directories are:

- **TEMP**: This subdirectory with universal write priveleges is provided for the convenience of users. It is commonly used to hold a compressed copy of a database file prior to downloading. The server provides utilities compress, gzip, and zip (pkzip-compatible) for compressing files.

- **REPORTS**: This directory contains files related to project reports, memoranda, and minutes. Sub-directories are:
  - AUDIT for audit report files.
  - FINAL for the project final report files project final report.
  - PROGPLAN for program plan files.
  - SOURCE for the source testing report files.

- **EMISSIONS**: This directory contains data files for emissions information from Yampa Valley power stations, regional emissions inventories, and specific data acquisition during the study time period.

- **DBASE**: This directory contains validated data in xBase (*.DBF) formats that have been converted to common units and variable names. These conventions are described below. These files are organized according to their source:
  - MISC for data base documentation files described below.
  - AR for data acquired and validated by Air Resource Specialists.
  - CO for data obtained for the Colorado Department of Public Health.
  - CP for data obtained from the NOAA COOP network.
  - DR for data acquired and validated by the Desert Research Institute.
  - EM for emissions data obtained from RADIAN.

- NO for data acquired and validated by the National Oceanic and Atmospheric Administration.
- NW for data obtained from the National Weather Service.
- RA for data obtained from the Remote Automated Weather Station (RAWS) network.
- ST for data acquired and validated by Sonoma Technology Inc.
- UC for data obtained from the University of California at Davis

- **MODELS**: This directory includes the software for different modeling applications. Each type of modeling has its own sub-directory, with the further sub-directories SOFT for modeling software, INPUT for model input files, and OUTPUT for model output files. It includes the following sub-directories:
  - AEROSOL: Aerosol evolution modeling.
  - EXTINCT: Extinction efficiency modeling.
  - CMB: Chemical Mass Balance receptor modeling.
  - CAL1: Everyday CALMET plume modeling.
  - CAL2: Detailed CALMET/CALPUFF modeling.

Owing to the large size of input and output files for CALMET and CALPUFF modeling, these are retained on magnetic tape in the central data repository. Input and output files for aerosol evolution modeling, CMB modeling, and extinction efficiency models are contained with the model codes in the appropriate directory

A.5.2 Database Documentation

Numerical values acquired by field measurement methods are stored in xBase (*.DBF) data formats. This format, though somewhat dated, is almost universally accessible by most commonly used software packages. The \zirkel\dbase\misc directory contains the following informational files that document the numerical data base:

- **MZACTINF.DBF**: This file is used to document the conversion process and provided explanations of the action codes contained in MZACTION.DBF.

- **MZACTION.DBF**: This file is used by the conversion process. Its records define what conversions are to be made during the conversion process. Each record defines an action code (fieldname ACTION) operating on an input field (field name INFIELD) and producing an output field (field name OUTFIELD). Any parameters used by the conversion process are also defined in this file.

- **MZCHANGE.DBF**: This file records changes made to the database.

- **MZCONVRT.DBF**: This file documents the conversions made in integrating data into the database. If, for example, wind speed units are changed from miles per hour to meters per second, then the change is documented in the file.

- **MZFLAGS.DBF**: This file maps the common measurement flagging system used in the MZVS to specific flags associated with measurements from an individual measurement device and from individual networks. The common flags are defined in Table A.5.1, and are intended to guide the data user to seek greater detail in the individual network flags. The network flags are also included, where available, in the data files, but they are not generally carried when data from different networks are integrated for data analysis and modeling.

- **MZFILES.DBF:** This file lists file names, their location (i.e. directory path), and date of latest update. This file should be consulted to determine where data are located and to ascertain that the most recent data sets are being used.

- **MZFLDNAM.DBF:** This file contains variable names, units, field lengths, and decimal positions (precision) for each variable in every other file. All variables of a given type have been converted to common units, regardless of their original units, and these units are specified in this file. For example, National Weather Service wind speeds included in the data base are in meters/second, even though they were obtained from NWS in knots.

Table A.5.1
Common Data Flags

0	Valid data
1	Estimated Value
2	Calibration or instrument check
3	Instrument failure
4	Off-scale reading
5	Interpolated
6	Below detection limit
7	Suspect
8	Invalid
9	Missing
a	Hourly average, 45 min <= avg period < 60 min
b	Hourly average, avg period < 45 min
d	Averaged data
e	Zero mode
f	Blank sample

- **MZSITES.DBF**: This file contains monitoring site codes, site names, coordinates (in latitude and longitude and UTM Zone 13), elevations above mean sea level, and the types of measurements acquired at each site. A data quality designation is provided for sites that are operated by other agencies, such as the Remote Automated Weather Station (RAWS) monitoring network. This designation is drawn from each agency's data documentation to facilitate the selection of sites for use in data analysis and modeling. Subsequent fields identify the types of measurements available at each sampling site; these are defined in MZFLDNAM.DBF. For example, column headings PRX and RHX show that atmospheric pressure and relative humidity are measured at that site. A "nw" entry indicates that measurements are from the National Weather Service network, while a "ar" entry indicates that data are acquired as part of the Air Resources Specialists network. This file can be used to select data from specific sites or groups of sites as a function of variables measured, data quality, and spatial extent.

- **MZSITPAR.DBF**: This file is an information file provided to help in locating data. It contains a record for each site and measurement pair. It gives beginning and ending dates for the measurement period, the date of the first valid measurement, and the date of the last valid measurement.

A.5.3 Database Structure and File Naming Conventions

The database is organized by network with sub-directories for each data source. Files within these sub-directories are further organized by the type of measurement. For example, surface meteorological data are contained in one file, while surface light scattering data are contained in another file. One file contains data of the specified type for the entire measurement period and all sites in the specified network. The records in each file are ordered by site (alphabetically), date, and time.

Data file names are coded to indicate the type of data, the network from which they were derived, the measurement period covered, and the averaging time for each measurement. File names follow the pattern "SSDDVPXY", where SS is the network/investigator (data source) code, DD is the data type code, V is the averaging interval code, P is the data collection time period code, and X and Y allow further differentiation by the analyst. For example, ARSMHP.DBF, is the file name for hourly (H) surface meteorological (SM) data taken by Air Resource Specialists, Inc. (AR) for the entire study period (P). Table A.5.2 defines the codes used in this structure, and the full definitions of filenames are contained in the MZFILES.DBF file.

Table A.5.2
Mt. Zirkel Database File Naming Conventions

Data Source Codes:

AR	Air Resources Specialists
CO	Colorado Department of Public Health
DR	Desert Research Institute
EM	Emissions data (RADIAN)
NO	NOAA (Boulder, CO)
NW	National Weather Service
RA	RAWS Data Network
ST	Sonoma Technology, Inc.
UC	University of California, Davis

Data Type Codes:

EL	MZVS Annual Aerosol Chemical Data
AI	Improve Protocol Aerosol Data
BC	Aethelometer Data
CM	Continuous Emissions Monitor Data
CR	Criteria Data (includes surface meteorology data and compound measurements)
FI	Fires Emissions Data
HW	Radar Profiler, High Resolution Wind Data
LW	Radar Profiler, Low Resolution Wind Data
NP	Nephelometer Data
MS	Mass Data
O3	Ozone Data
PP	NOAA COOP data
PT	Particulate Data
PV	Radar Profiler, Virtual Temperature Data
PW	Radar Profiler, Combined Winds Data
SA	NWS Surface Airways Data
SM	Surface Meteorological Data
SO	Sulfur Dioxide Data
SP	MZVS Chemical Source Profile Data
TM	Tower Meteorological Data
UA	NWS Upper Air Mandatory Levels Data
US	NWS Upper Air Significant Levels Data
UX	NWS Upper Air Combined Levels Data

Table A.5.2 (continued)
Mt. Zirkel Database File Naming Conventions

Averaging Interval Codes:

6	6 hour samples
H	Hourly
P	Partial hour samples (< 60 min)
X	Not covered above

Time Period Codes:

P	Project Period
R	Partial Period

A.5.4 Data File Structure and Format Conventions

Each record in a data file provides the site code, measurement date, start hour, data values, validation level, and individual validation flags. Site codes are consistent with the codes in the MZSITES.DBF file. This allows the site documentation files to interact. For example, simple queries formulated by data management software allow site coordinates to be associated with any variable value for spatial plotting. All times are in Mountain Standard Time (MST), even when local times are in a different time zone or follow daylight savings conventions. These times are listed as the beginning of the averaging period with 0000 for midnight of the current date. Where averaging times are variable, a sample duration is included. All missing values are replaced by "-99" and flagged as invalid.

Each record includes a field (VAL) that shows the validation level for that record. The last field in each record (ZRFLG) contains the MZVS measurement validation flags. This field contains as many characters as there are data fields preceding the (ZRFLG) field, and the position of the flag corresponds to the sequential position of the field to which it applies. This allows a compact method for identifying and filtering data that are valid, suspect, or invalid.

Mt. Zirkel Wilderness Area
Reasonable Attribution Study of Visibility Impairment

Volume II: Results of Data Analysis and Modeling
Final Report

July 1, 1996

APPENDIX B

MODEL EVALUATION

B.1 EMISSIONS MODEL

Several emissions data bases (e.g., major point sources, ammonia sources, mobile sources, residential fuel combustion, geothermal springs, agricultural and ranching activities, and biogenic sources) were compiled in this study to estimate the relative magnitude as well as the spatial and temporal variations of primary particle and precursor gas emissions. Emission estimates were acquired, assembled, and/or formatted for the study region centered in northwest Colorado, and extending into Nebraska, Wyoming, Idaho, and Utah as shown in Figure B.1.1. Four types of emissions inventory files were created:

- Emissions foundation files, which include countywide annual emission estimates for: 1) individual point sources; 2) residential fuel combustion; 3) mobile sources; and 4) biogenic sources.

- Modeling inventory files, which contain gridded and speciated hourly point and area source emissions.

- Continuous emissions monitoring (CEM) data files, containing hourly emissions and stack parameter records for the two units at the Hayden Station and three units at the Craig Station.

- Fire data, which containing locations, magnitudes, sizes and durations of wildfires and prescribed fires that occurred within the MZVS domain during the monitoring period.

B.1.1 Foundation Files

Three existing emissions data bases were used to develop the foundation files:

- **The Grand Canyon Visibility Transport Commission (GCVTC) emissions inventory** (Dickson *et al.*, 1995). This emissions inventory includes data obtained from the states of California, Oregon, Washington, Idaho, Nevada, Arizona, New Mexico, Colorado, Utah, Montana, Nebraska, and Texas, plus southwestern Canada and northern Mexico. Table B.1.1 summarizes the source categories and pollutants as well as temporal/spatial resolutions of the inventory. Detailed data acquired for the GCVTC inventory is summarized in Table B.1.2. Sulfur dioxide (SO_2), volatile organic compounds (VOC), carbon monoxide (CO), and oxides of nitrogen (NO_x) emissions were taken from the U.S. EPA's Interim Inventory to fill in geographical gaps, whereas total suspended particles (TSP) and ammonia (NH_3) emissions were obtained from the 1985 National Acid Precipitation Assessment Program (NAPAP) inventory (U.S. EPA, 1989).

- **U.S. EPA Trends Inventory** (U.S. EPA, 1994). The PM_{10} emission estimates for paved and unpaved re-entrained road dust, wind blown dust, agricultural tilling, feedlots, and construction processes were obtained from the U.S. EPA Trends

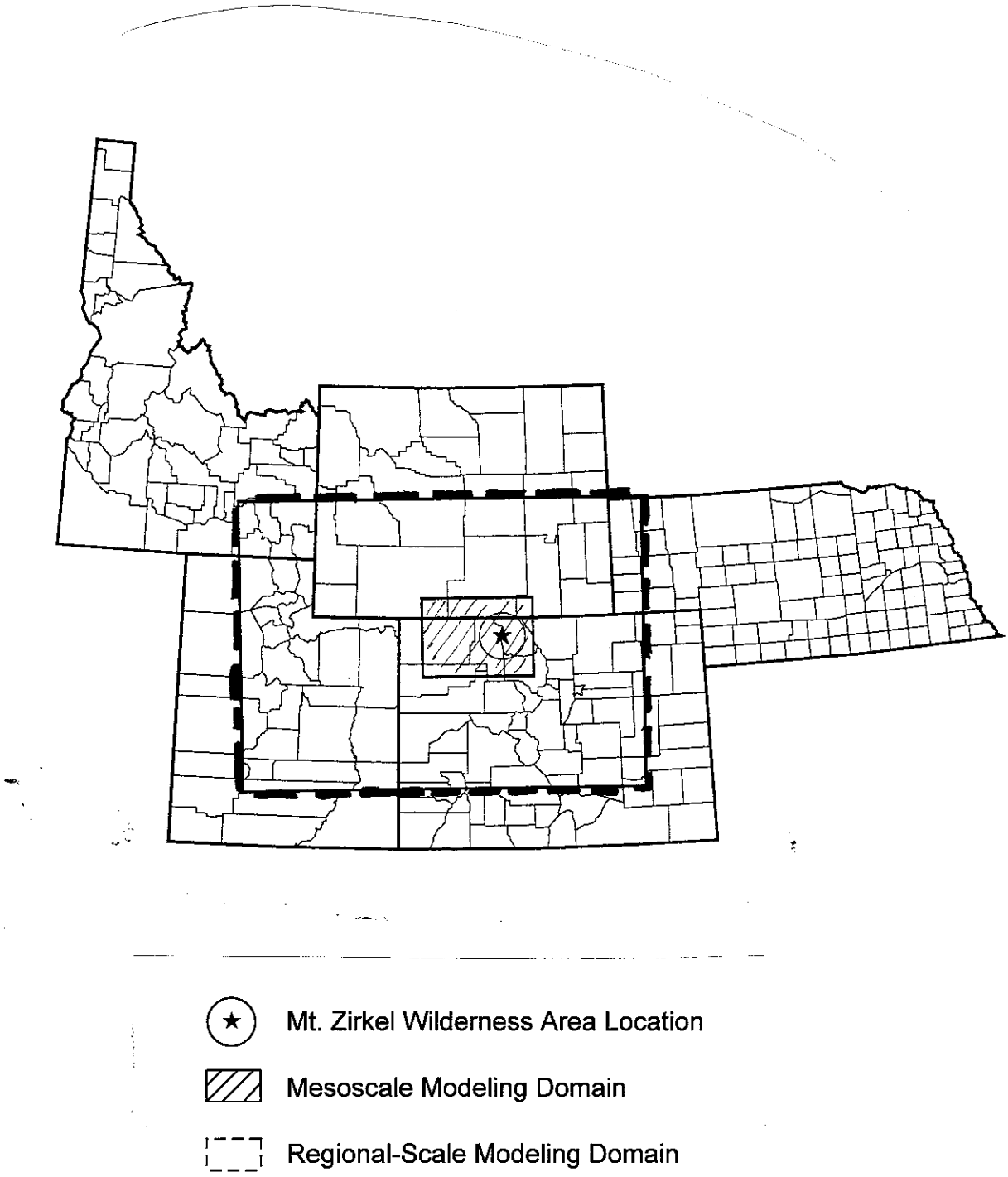


Figure B.1.1. Regional-scale and mesoscale emissions and air quality modeling domains for the Mt. Zirkel Visibility Study.

Table B.1.1
Summary of Grand Canyon Visibility Transport Commission (GCVTC)
Emissions Inventory Attributes

Attribute	Description
Base year	Generally 1990. All area and mobile source data have a base year of 1990. Some point source data reflect of 1991 and 1992 conditions.
Domain	11 western states, Texas, Southwestern Canada, and Northern Mexico.
Source categories	Anthropogenic point sources (e.g., smelters, generating stations, and refineries). Area sources (e.g., residential fuel combustion and agricultural-related activities including fertilizing and tilling operations). Mobile sources (on-road and off-road sources). Biogenic (urban, natural, and agricultural biomass). Forest fires, forest management, and other waste burning. Fugitive sources such as road dust and windblown dust.
Pollutant[a]	1. SO_2, VOC, EC/OC. 2. $PM_{2.5}$. 3. NO_x and NH_3.
Spatial coverage and resolution	Inventory domain extends from the Mississippi River to the Pacific Ocean in the east-west direction, and from southern Canada to northern Mexico in the north-south direction. Annual average inventory: county level area source emissions for 11 western states; source region area source emissions for other states, southern Canada, and northern Mexico; latitude/longitude coordinates for point sources. Modeling inventory: 50 km grid cells using polar stereographic map projection.
Temporal resolution	Annual average for base inventory. Hourly, seasonal weekday for modeling inventory.

[a] Listed in order of priority.

Table B.1.2
Database Acquired in the Grand Canyon Visibility Transport Commission (GCVTC) Emissions Inventory

Data Set	Attributes	Base Year	Pollutants Inventoried	Source[c]
Clark County, Nevada Ozone Modeling Inventory	Point and area source emission estimates formatted for use in the Emissions Preprocessor System. Emissions cover the Las Vegas valley only.	1990	VOC, NO_x, and CO	Clark County Department of Comprehensive Planning and Clark County Health District, Air Pollution Control Division
California Statewide Inventory	County-level area source and individual point source emission estimates for California.	1990	SO_x, NO_x, VOC, CO, and TSP	ARB
Oregon Statewide Inventory	County-level area source and individual point source emission estimates for Oregon.	1990	SO_x, NO_x, VOC, CO, and PM_{10}	DEQ
AIRS/AFS Point Source Data	Point source files for AZ, CO, MT, NM[a], NV[a], TX[a], UT, WA, and WY.	Varies between 1990 and 1992	SO_2, NO_x, VOC, CO, and PM/PM_{10}	U.S. EPA
Prescribed Fire Emission Estimates	County-level emission estimates for AZ, CA, CO, NM, NV, and UT. State-level emission estimates for ID, MT, OR, WA, and WY.	1989	VOC, NO_x, PM, $PM_{2.5}$, $EC_{2.5}$, and $OC_{2.5}$	U.S. Forest Service
Wildfire Emission Estimates	Emission estimates for each fire event greater than 100 acres. Database covers the 11 western states.	1986-1992	VOC, NO_x, TSP, PM_{10}, $PM_{2.5}$, $EC_{2.5}$, $OC_{2.5}$, and CO	U.S. Forest Service
1990 EPA Interim Inventory	County-level area source and individual point source emission estimates for the United States and Western Canada.	1990	SO_2, NO_x, VOC, and CO	U.S. EPA
NAPAP Annual Average Emission Estimates	County-level area source and individual point source emission estimates for the United States and Canada.	1985	SO_2, NO_x, VOC, CO, TSP, SO_4, and NH_3	U.S. EPA
NAPAP Natural Source Emission Estimates	County-level PM emission estimates for the United States and Canada. Source categories included in data set are windblown dust, entrained road dust for unpaved roads, and dust devils.	1985	TSP and alkaline particulates	NTIS
Biogenics Emission Estimates	County-level and seasonally adjusted emission estimates for natural, urban, and agricultural biomass.	NA[b]	Biogenic hydrocarbons	Washington State University

[a] U.S. EPA Aerometric Information Retrieval System/Aerometric Facility Subsystem (AIRS/AFS) data available only for certain counties. Point source data for Colorado represent 1991-1992 conditions, for Utah and Wyoming represent 1990-1991 conditions.
[b] Emission estimates for each season of the year were developed.
[c] ARB = California Air Resources Board.
DEQ = Oregon Department of Environmental Quality.
NTIS = National Technical Information Service.

Inventory. These estimates are based on updated activity data and the most recent emissions estimation techniques, were used for this study. The $PM_{2.5}$ emission estimates were made using revised particle size distribution data for several source categories (Cowherd, 1995).

- **PM_{10} Inventory for Steamboat Springs, Colorado, State Implementation Plan (SIP)** (Reddy and McGraw, 1995). Residential wood combustion data acquired in this inventory is based on a survey of 400 wood-burning residences conducted by the Colorado Department of Public Health and Environment during the spring and summer of 1993 (Reddy, 1995). This inventory covers a region of approximately 500 square kilometers in the Steamboat Springs area. The survey did not include woodburning emissions during ski season, but it did include emission estimates for seasonal condominiums and other rental units. The survey performed for this inventory also includes type of burning device (e.g., fireplace, wood stove), type of wood burned (e.g., pinion pine, juniper, aspen), and quantity of wood burned. These data were used extensively in the development of the foundation file.

B.1.2 Area Source Emission Estimates for the Yampa Valley

Area source emissions calculations were made for Routt and Moffat counties for the following:

- PM_{10}, $PM_{2.5}$, and sulfur oxides (SO_x) emissions from residential wood and coal combustion.
- SO_x emissions from mobile sources.
- Ammonia sources.
- Geothermal hot springs hydrogen sulfide (H_2S) emissions.

With the exception of the geothermal hot springs hydrogen sulfide emissions, these emissions calculations were integrated in the foundation files for this study.

B.1.2.1 Residential Coal Emissions

PM_{10}, $PM_{2.5}$, and SO_x emissions from residential coal combustion were calculated based on the coal-burning device population and annual coal consumption rate for each device in Routt and Moffat counties.

The coal-burning-device population was determined from the 1990 U.S. Census. Census data contained the number of households that used coal as the primary source of heating by individual Block Numbering Area (BNA) (it was assumed that households using other fuels as the primary source of heating would not use any coal). The BNA coal-burning-device populations were summed for each county. The annual coal consumption rate for

each residential coal-burning device was calculated as a function of heating degree days (U.S. EPA, 1981):

$$F_e = 0.003874 \times e^{\left(7.6414 - \frac{1000}{D}\right)} \quad \text{(B.1-1)}$$

where:

F_e = per device coal consumption (tons/yr)
D = heating degree days

Table B.1.3 summarizes the attributes acquired for calculating residential coal combustion rates. The coal consumption rates of 7.26 and 7.14 tons/year/device were estimated for Routt and Moffat counties, respectively. These estimates were of the same magnitude as: 1) 10 tons/year/device estimated by the Routt county Department of Health (Zopf, 1995), and 2) 4 to 5 tons/year/device estimated by local coal store vendors (Bavelas, 1995; Masek, 1995). For both Routt and Moffat counties, this approach yielded emission estimates of 19.7 tons/year of PM_{10}, 6.9 tons/year of $PM_{2.5}$, and 52.9 tons/year of SO_x for residential coal combustion.

B.1.2.2 Residential Wood Combustion Emissions

Similar to residential coal emissions, PM_{10}, $PM_{2.5}$, and SO_x emissions from residential wood combustion in Routt and Moffat counties were also calculated based on the wood-burning device population and annual wood consumption rate for each device.

The wood-burning device population is categorized into two groups: 1) devices used as a household's primary heating source, and 2) devices used for aesthetic purposes. The number of households using woodburning devices as primary heating sources was derived from 1990 U.S. Census data (which was not classified as fireplaces, wood stoves, or pellet stoves), whereas the number of aesthetic devices was estimated using the following equation:

$$N_{aes} = (N_{tot} \times K) - N_{heat} \quad \text{(B.1-2)}$$

where:

N_{aes} = number of housing units that use wood for aesthetic purposes;
N_{tot} = total number of housing units;
K = percentage of housing units that have a woodburning device as determined by local realtor data (K=0.506 for Routt county and K=0.324 for Moffat county); and
N_{heat} = number of housing units that use wood for heating purposes.

Table B.1.3
Data Sources for Estimating Yampa Valley Residential Coal Combustion Emissions

	Routt County	Moffat County
Block Numbering Area (BNA)	6	4
No. of Coal-Burning Devices	613	266
Annual Heating Degree Days	9,472 (in Steamboat Springs, CO)	8,211 (in Craig, CO)
Coal Consumption Rate (tons/year/device)	7.26	7.14
Total Residential Coal Consumption (tons/year)	4,450	1,899
Coal Sulfur Content (%)	0.43[a]	0.385[b]
PM_{10} Emissions Rate (tons/year)	13.8[c]	5.9[c]
$PM_{2.5}$ Emissions Rate (tons/year)	4.8	2.1
SO_x Emissions Rate (tons/year)	38.3	14.6

[a] Pietrick (1995).
[b] Lewis (1995).
[c] From Table 1.1-3 of AP-42 (U.S. EPA, 1993) with an emissions factor of 6.2 lbs. of PM_{10} per ton of coal combustion.

The annual wood consumption rate for each device was calculated based on a survey conducted in the Steamboat Springs area in 1993 (Reddy, 1995). Table B.1.4 summarizes the wood fuel distribution and their estimated annual consumption rates.

Weighted emission factors for residential wood combustion were calculated for device populations and emission factors taken from the Steamboat Springs woodburning survey (Reddy, 1995). The distribution of woodburning devices in Steamboat Springs along with PM_{10} emission factors (Reddy, 1995) is summarized in Table B.1.5. As a result, weighted emission factors were 13.24 grams PM_{10} per kilogram of wood combusted for primary heating devices and 13.26 grams PM_{10} per kilogram of wood combusted for aesthetic devices. Table B.1.6 shows that, for both Routt and Moffat counties, this approach yielded emission estimates of 171.1 tons/year of PM_{10} and $PM_{2.5}$ and 2.6 tons/year of SO_x for residential wood combustion.

B.1.2.3 Sulfur Dioxide Emissions from Mobile Sources

Fuel distribution information in Routt and Moffat counties was used to estimate SO_x emissions from mobile sources. As shown in Table B.1.7, the 1995 fuel consumption rates were assembled from: 1) coal mining diesel sales (used in coal mining equipment); 2) generating station diesel sales (used as a secondary fuel source); 3) railroad diesel sales; and 4) on-road diesel sales. Only the coal mining and on-road diesel sales data were included in the emission estimates for this study.

SO_x emissions were estimated by applying the sulfur content of each fuel to total fuel consumption (Westen, 1995). This estimation method assumes that all sulfur present in the fuel is emitted as SO_x. The gasoline survey conducted in the Denver metropolitan area in December, 1993, reported a weighted market-share average sulfur content of 188 ppm (or 0.0188%) (Livo, 1995). This survey included 70 samples of regular, mid-grade, and premium unleaded gasolines taken at various gasoline stations. Since a large portion of the gasoline distributed in Routt and Moffat counties comes from the Denver area, this sulfur content of 188 ppm was used to calculate SO_x emissions from gasoline-fueled motor vehicles. The small fraction of the gasoline that comes from Grand Junction, CO, and Salt Lake City, UT, though containing a slightly higher sulfur content, is considered to be insignificant.

The 1994 annual diesel survey, using refinery data, reported an average diesel sulfur content of 408 ppm for the Rocky Mountain region (including Colorado) (Dickson and Sturm, 1994). This value, rather than the federally mandated maximum sulfur content in diesel fuel of 500 ppm, was used to calculate SO_x emissions from diesel-fueled vehicles and equipment.

B.1.2.4 Ammonia Emissions

Major ammonia (NH_3) sources in the study region include: 1) livestock; 2) soil ammonia; 3) fertilizer application; and 4) waste water treatment plants. Emissions from

Table B.1.4
Estimated Wood Fuel Distribution in Steamboat Springs, CO[a]

Type of Wood	Estimated Percent Distribution	Dry Density of Wood (lbs/ft^3)
Pine	54%	22.3
Quaking Aspen	21%	21.1
Pinion Pine	12%	22.3
Gambel's Oak	8%	37.8
Cottonwood	4%	20.0

[a] The annual wood consumption rate is estimated to be 2,161 kilograms (kg) of wood (~2.57 cords of wood per year) for wood stove and fireplace inserts, 1,648 kg of wood (~1.96 cords of wood per year) for fireplaces, and 2,268 kg of pellets for pellet stoves (Reddy, 1995).

Table B.1.5
Summary of Woodburning Device Distributions and Emission Factors
Derived from Steamboat Springs Woodburning Survey

Device Type	Percent of Heating Device Population	Percent of Aesthetic Device Population[a]	PM_{10} Emission Factor (g/kg wood)
Conventional Fireplace	34.2%	70.1%	14.0
Conventional Insert	5.3%	10.8%	15.3
Colorado Phase I Insert	0.7%	1.5%	12.5
Colorado Phase II Insert	6.3%	13.0%	9.6
Colorado Phase III Insert	2.2%	4.6%	7.7
Conventional Woodstove	34.0%	—	15.3
Colorado Phase I Woodstove	2.5%	—	12.5
Colorado Phase II Woodstove	9.6%	—	9.6
Colorado Phase III Woodstove	4.3%	—	7.7
Pellet Stove	0.9%	—	2.1

[a] It is assumed that aesthetic devices are limited to fireplaces and fireplace inserts.

Table B.1.6
Data Sources for Estimating Yampa Valley Residential Wood Combustion Emissions

	Routt County	Moffat County
No. of Households with Primary Wood Heating Devices	892[a]	270[a]
No. of Households with Aesthetic Wood Heating Devices	3,790[b]	1,426[b]
PM_{10} and $PM_{2.5}$ Emission Rates (tons/year)	125.7[c]	45.4[c]
SO_x Emission Rates (tons/year)	1.9[d]	0.7[d]

[a] From 1990 U.S. Census Data.
[b] From Routt county and Moffat county realtor's property listing data base (Love, 1995; Bennett, 1995).
[c] Reddy (1995).
[d] Emission factor of 0.2 grams SO_x per kilogram of wood combusted was applied to all types of woodburning devices (Table 1.9-2 and 1.10-2 of AP-42, U.S. EPA, 1993).

Table B.1.7
Fuel Sales Estimates for Routt and Moffat Counties (gallons)[a]

Type of Fuel Sales	Routt County	Moffat County
Mining Equipment Diesel Sales	1,000,000	1,000,000
Generating station Diesel Sales[b]	300,000	400,000
Railroad Diesel Sales[b]	250,000	250,000
On-Road Diesel Sales	2,950,000	3,850,000
Total Diesel Sales	4,500,000	5,500,000
Total Gasoline Sales	9,500,000	7,500,000

[a] Specific gravities of 0.84 for diesel fuel and 0.74 for gasoline fuel were used to convert gallons to pounds in emission estimates.

[b] Emissions estimates for these categories are already present in the existing inventory, so these sales data are not used to calculate emissions.

domestic sources (e.g., human respiration and perspiration, household ammonia use, pets) were determined to be insignificant and were excluded from the inventory. Emissions from ammonia injection at the Hayden facility were not incorporated into the inventory since these are intermittent and relatively small compared with other emitters.

Information on livestock population was obtained from the Colorado Agricultural Statistics Department (Sakry, 1995). Additional information regarding local conditions and seasonal migrations was obtained from the county Cooperative Extension Service (Brown, 1995; Mucklow, 1995). These livestock populations were used to estimate ammonia emissions based on per head ammonia emission factors listed in Table B.1.8.

Annual ammonia emission estimates were calculated using year-round livestock populations that account for animals transported to market or "wintered" outside of each county. Horses are not considered to be livestock and therefore were not included in any of the livestock statistics. These estimates of livestock ammonia emissions were augmented by estimates of ammonia emissions of horses from E.H. Pechan & Associates (1994).

Sadeghi *et al.* (1991) indicates that ammonia emissions from livestock located along the Colorado Front Range are affected by various meteorological conditions. Freezing temperatures reduce the conversion of urea to ammonia. Lower wintertime wind speeds also decrease the formation and volatilization of ammonium. These conditions can result in up to a 40% reduction in ammonia emissions with respect to commonly used emissions factors. In order to account for these meteorological effects, the Yampa Valley emissions were modified with the assumption that there is a 20% ammonia emissions reduction in November and March and a 40% ammonia emissions reduction from December through February. The adjusted monthly emissions were then summed together to obtain adjusted annual emissions. These annual ammonia emissions were then divided into the four seasons in order to calculate a seasonal temporal profile.

To estimate ammonia emissions from soils, land-use within Routt and Moffat counties was classified into three categories (i.e., agricultural land, forest land, and other land). Various agricultural land crop acreages (mainly grains) were acquired from the Colorado Agricultural Statistics Department (Sakry, 1995). The fraction of county area that was designated as national forest in U.S. Geological Survey maps was used to estimate the forest land coverage. The remaining non-agricultural, non-forest lands were classified as "other land" area. The following ammonia emission factors were applied (Dickson *et al.*, 1991): 1) 3.7 kg/km^2-day for agricultural land; 2) 1.0 kg/km^2-day for forest land; and 3) 1.0 kg/km^2-day for other land.

Table B.1.8
Summary of Ammonia Emission Factors for Livestock[a]

Type of Livestock[b]	Ammonia Emissions Factor
Dairy Cattle	88 lbs/yr-head
Feedlot/Range Cattle	102 lbs/yr-head
Sheep	8.8 lbs/yr-head
Hogs	15 lbs/yr-head
Broiler Chickens	0.79 lbs/yr-head
Laying Chickens	1.6 lbs/yr-head
Turkeys	1.9 lbs/yr-head

[a] Dickson *et al.* (1991).

[b] Horses are not considered to be livestock and therefore were not included in any of the livestock statistics.

Soil ammonia emissions vary with temperature, soil moisture, soil pH, and snow cover. Monthly soil ammonia emission estimates (using average monthly temperature at Craig, CO) were made based on the assumptions that: 1) no ammonia emissions occur when temperature ≤ 0 °C; 2) a linear relationship exists between soil ammonia emissions and temperature for $0\ °C < T < 20\ °C$; and 3) no adjustment is made for temperature ≥ 20 °C (Sadeghi *et al.*, 1991). Seasonal soil ammonia emissions were computed based on the monthly average estimates, as shown in Table B.1.9. Ammonia emissions of 2,928 tons/year were calculated for the two counties.

Fertilizer application was not a major source of ammonia emissions during the short growing season in the study region. Fertilizer is applied in May for spring wheat, barley, and oats; in June for alfalfa and grass hay; and in September for winter wheat (Sakry, 1995). Estimates of ammonia emissions from fertilizer application are taken from E.H. Pechan & Associates (1994). These data are based on county-level data from the National Fertilizer Research Center and were divided into categories depending on the form of application. Because of the small magnitude of ammonia emissions from fertilizer application, an annual emissions rate equally divided into four seasons was used for the MZVS inventory.

The largest waste water treatment facilities in Routt and Moffat counties are Steamboat Springs with 2.2 million gallons per day (MGD) of influent and Craig with 1.05 MGD. Additional waste water treatment plants operate in Hayden, Maybell (central Moffat county), and possibly other locations with smaller influent flow. Ammonia emissions from wastewater treatment are taken from E.H. Pechan & Associates (1994). Although there may be seasonal differences due to spring runoff, annual emissions rates were evenly divided among each season.

B.1.2.5 Geothermal Springs Emissions

The Colorado Geological Survey (Cappa and Hemborg, 1995) defines a geothermal area as a "well" or "spring" that has a temperature greater than 20 °C. Flow rates as well as anion/cation concentrations for each spring are also documented in this data base. As shown in Figure B.1.2, there are nine geothermal areas (i.e., representing one or more wells or springs) in the mesoscale modeling domain containing the Yampa Valley. Even though there are several springs in the vicinity of the town of Steamboat Springs, CO, this is not considered to be a geothermal resource because it has a temperature that ranges from 14 °C to 19 °C. Only the Heart Spring has been used as a commercial resource for the following emissions estimation.

The odor threshold for H_2S is approximately 2 ppb. For this analysis, it is assumed that the concentration immediately above the geothermal spring surface was 5 ppm and that

Table B.1.9
Seasonal Soil Ammonia Emissions in Routt and Moffat Counties

Season	Inclusive Month	Percent of Annual Emissions[a]
Spring	March, April, May	18%
Summer	June, July, August	59%
Fall	September, October, November	23%
Winter	December, January, February	0%

[a] Annual soil ammonia emissions is 2,928 tons in Routt and Moffat counties (Dickson *et al.*, 1991).

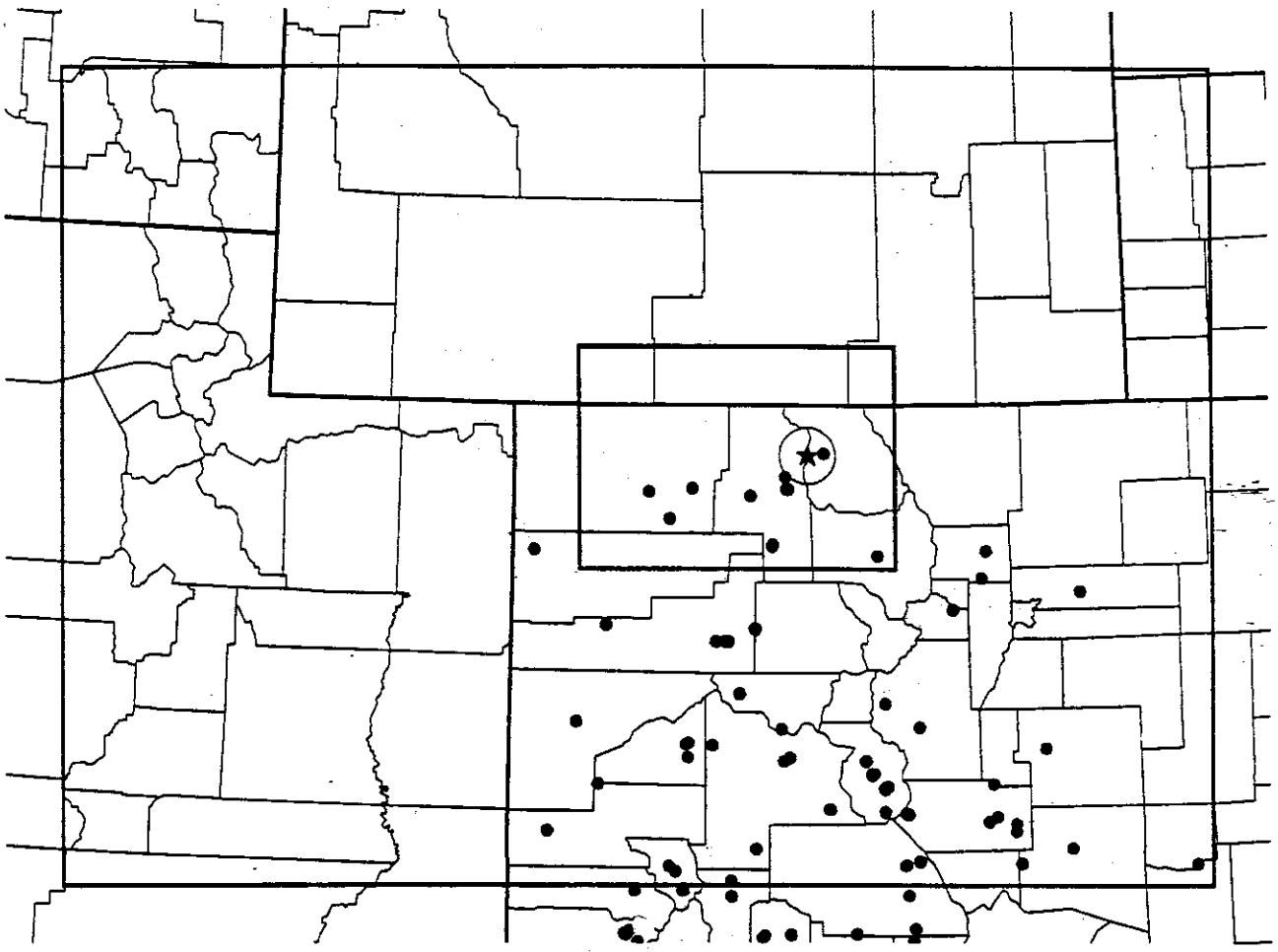


Figure B.1.2. Locations of geothermal springs in the regional-scale and mesoscale modeling domain.

all of the H_2S in the geothermal spring water was emitted to the atmosphere (this is approximately the concentration at which H_2S causes nausea). The H_2S concentration of the geothermal spring water was then calculated using Henry's law. With a flow rate of 750 L/min in the Heart Spring, an upper bound emission estimate of 15 lb/year of H_2S was calculated.

This analysis shows that sulfur emissions from geothermal springs account for less than 1% of the anthropogenic sulfur emissions in the study domain. This is not of enough significance to be incorporated into the inventory.

B.1.3 Spatial and Temporal Allocation of Emission Estimates

Eight air quality modeling inventories, consisting of gridded, hourly, and speciated emission estimates in regional-scale and mesoscale domains, were compiled. For each domain shown in Figure B.1.1, the modeling inventories of point and area source emissions were prepared for average summer and winter weekdays. This section describes the spatially and temporally allocated emission estimates.

B.1.3.1 Spatial Allocation of Emissions

For use in air quality modeling, area source emissions were resolved in a 2 km grid system (108 x 76 array) using a Lambert Conformal map projection for mesoscale domain, and in an 8 km grid system (98 x 70 array) for regional-scale domains. County-level area sources were apportioned to individual grid cells by the gridding parameters shown in Table B.1.10. For example, if 10% of the population of a county resides in one grid cell, that grid cell was allocated 10% of the emissions of source types with population surrogates (e.g., dry cleaning, personal care products). Ratios of the amount of a surrogate in a grid cell to the total amount of a surrogate in a county were developed using the ARC/INFO® geographic information system (GIS).

Point sources were assigned to the appropriate grid cell using the stack coordinates. The coordinates were converted from latitude/longitude to a Lambert Conformal coordinates for use in the emissions modeling software.

B.1.3.2 Temporal Allocation of Emissions

Point source emission estimates were disaggregated to create season-specific hourly estimates using the operating schedules contained in the base emission files. Area source emission estimates were disaggregated using assigned profiles that describe the relative activity of each area source according to season, day of the week, and hour of the day. Temporal profiles for approximately 160 area source types were examined and adjusted to make them consistent with the available region-specific data. For example, local heating degree days were used to compute seasonal profiles for residential wood and coal emissions, whereas lawn and garden equipment emissions were set to zero for the winter period.

Figures B.1.3 and B.1.4 illustrate the relationship between the winter and summer weekday emissions in the regional-scale and mesoscale modeling domains, respectively. In

Table B.1.10
Gridding Parameters for Mesoscale Area Sources

Spatial Surrogate	Regional Domain	Mesoscale Domain	Routt and Moffat Counties
County Area	◆	◆	◆
Population		◆	◆
Housing		◆	◆
Urban		◆	◆
Rural		◆	◆
Roads		◆	◆
Residential Coal Combustion			◆
Residential Wood Combustion			◆

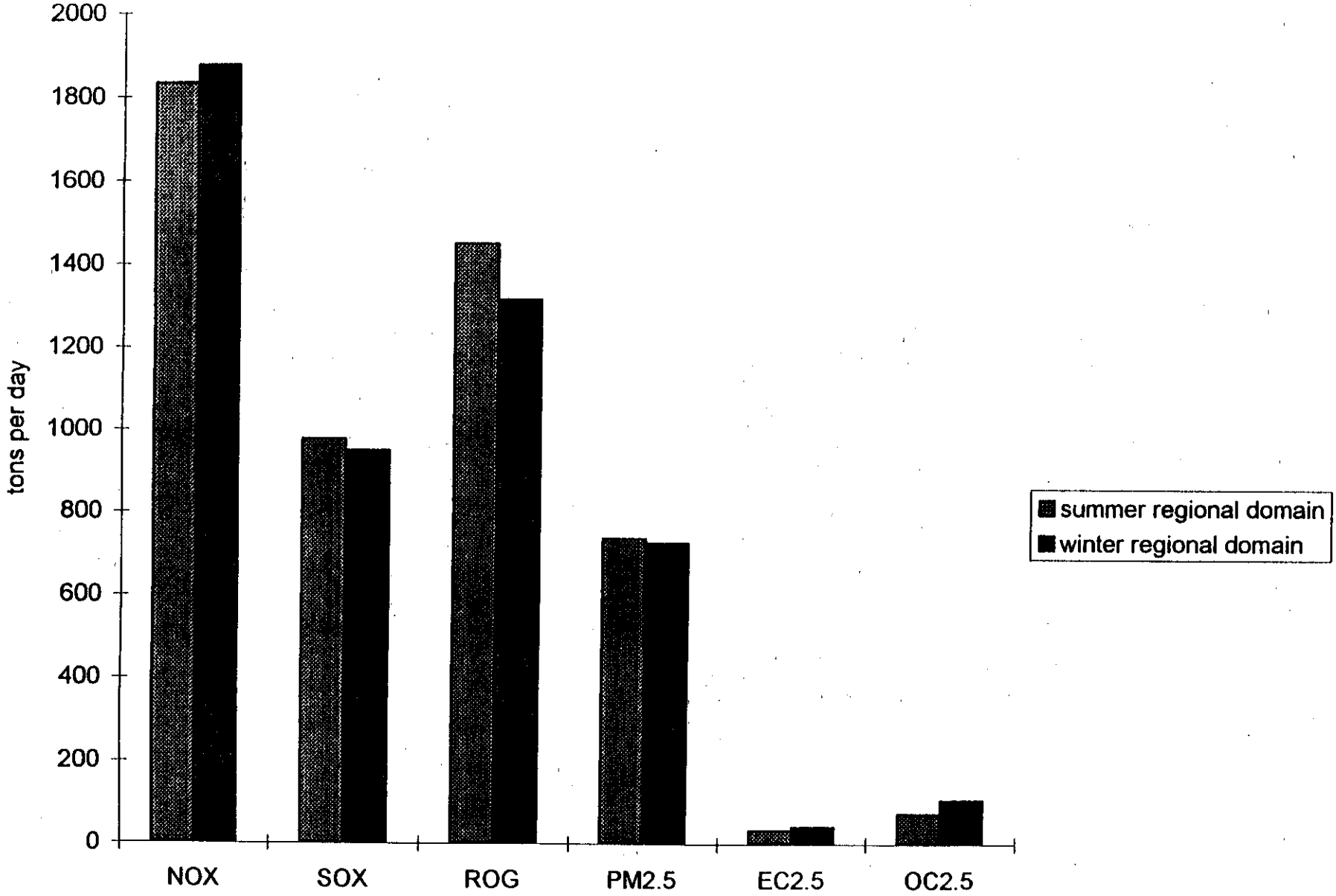


Figure B.1.3. Estimated summer and winter emission rates in the regional-scale modeling domain.

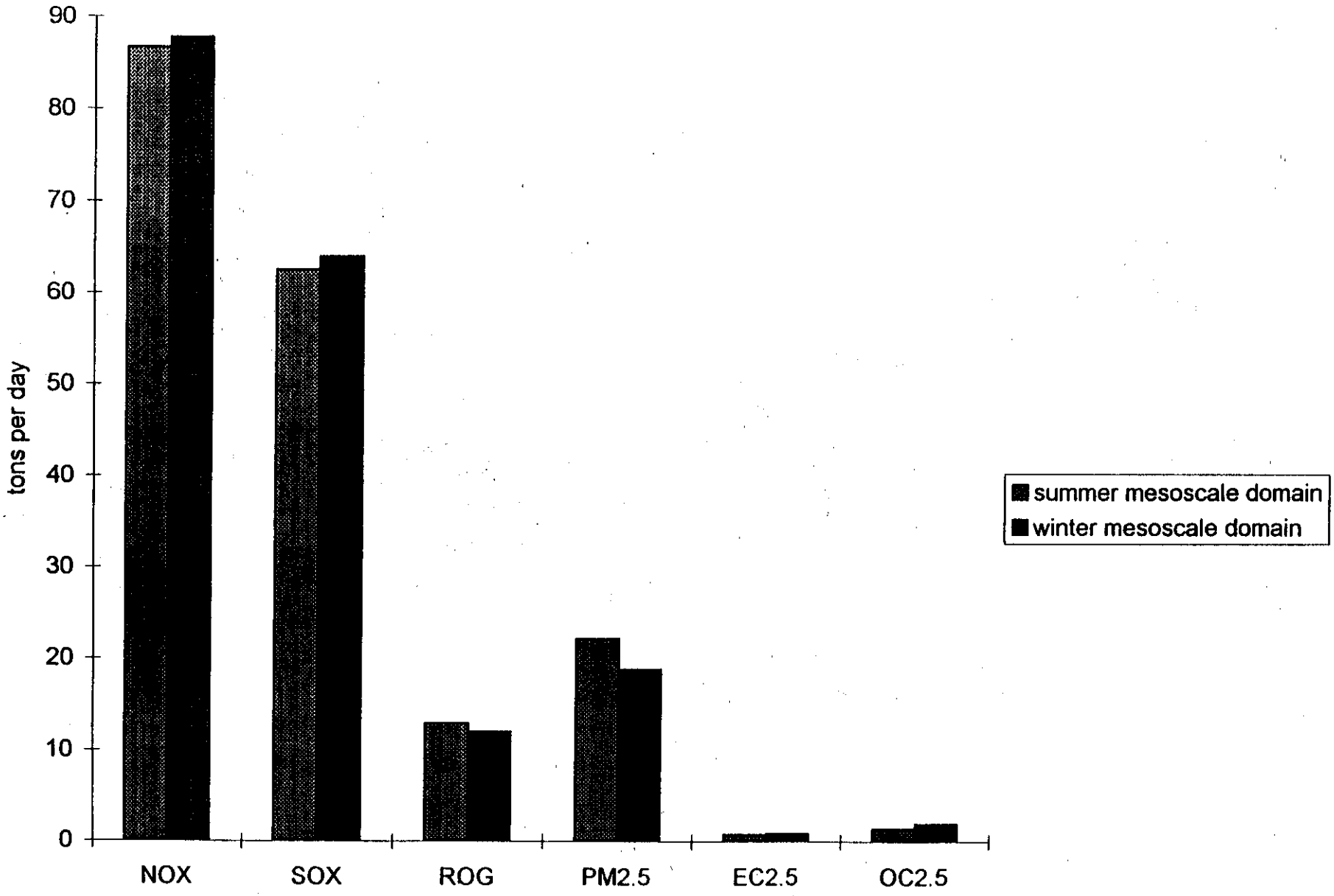


Figure B.1.4. Estimated summer and winter emission rates in the mesoscale modeling domain.

general, there is little difference between the winter and summer point source emissions. Area source emissions such as residential fuel combustion, lawn and garden equipment operations, asphalt paving, and farming activities show significant seasonal variability.

B.1.4 Continuous Emissions from Yampa Valley Generating Stations

Continuous emissions monitoring (CEM) data were acquired from the Hayden and Craig facilities starting 01/01/95. The CEM data are reported to the U.S. EPA's emission data base on a quarterly basis in specified formats required under 40 CFR Part 75. Table B.1.11 summarizes the monitoring data compiled for air quality modeling.

Time series plots are shown in Attachment A of Appendix B.1. Where available, the plots also show the "average-day" emission estimates for these two facilities obtained from the 1991-1992 Colorado point source inventory (labeled as "Em Inv"). Average-day is defined as the annual emissions divided by 365. This comparison shows that the average-day SO_2 emissions developed from the CEM data are about 40% higher for the Hayden facility and about 10% lower for the Craig facility as compared to the emissions estimates in the foundation files. There is significant (i.e., on the order of 20%) variability in day-to-day emissions.

Various operating problems were encountered with the new CEM systems during the first quarter of 1995, and the precision of some of the data does not correspond to what is normally expected from this technology. Suspect data (i.e., on the order of few days) were flagged; missing values were filled in using long-term averages for exhaust gas flow rate, temperature, and velocity; and poor quality data were invalidated in the data base. In addition, where the actual flow and emissions were missing, first order approximations were made. The mass emission rates and flow rates were plotted against the power consumption (i.e., megawatt) data to remove outliers prior to calculating an average "emission factor" for each unit.

Sulfur dioxide emissions are more closely correlated with scrubber operations than with unit load. An inverse relationship with the unit load and percent opacity for the Craig facility was found through visual inspection of the data. When the boilers are not operating at full temperature, the air pollution control equipment is not fully operational, leading to "spikes" in opacity. These spikes are typically within state regulatory limits that allow these excursions during periods when a boiler is either being brought off- or on-line, however.

To further illustrate the variability of the CEM data, a listing of outages was developed as shown in Tables B.1.12 and B.1.13 for the Hayden and Craig generating stations, respectively. The unit operating time per hour in the report submitted to the U.S. EPA is used to construct the outage report. If a unit was reported to be operating less than one hour (reported as 0.5), it was assumed that unit operated the first part of the hour and was down the second part of the hour. Neither facility experienced any significant outages during any of the selected episodes.

Table B.1.11
Summary of Hayden and Craig Continuous Emissions Monitoring (CEM)
Data Parameters Applied for Mt. Zirkel Visibility Study

	Data Source	
Parameter	Tri-State Craig Facility	PSCo Hayden Facility
CO	N/A	N/A
CO_2	As pounds per hour.	As pounds per hour.
NO_x	As pounds per hour.	As pounds per hour.
SO_2	As pounds per hour.	As pounds per hour.
Particulate Matter	As percent opacity.	N/A
Exhaust Gas Flow Rate	As actual and standard actual cubic feet per minute.	As standard cubic feet per hour.
Exhaust Gas Temperature	As degrees Fahrenheit.	As degrees Fahrenheit.
Velocity	Calculated from the diameter and actual flow rate.	As feet per second.
Unit Load	As megawatts.	As megawatts.

Table B.1.12
Periods of No-Load at the Hayden Station

Unit	Start Date	Start Time	End Date	End Time
1	04/16/95	12:30	04/23/95	12:30
1	04/24/95	02:30	04/24/95	03:15
1	04/24/95	04:00	04/24/95	04:15
1	04/24/95	05:00	04/24/95	05:30
1	04/24/95	06:00	04/24/95	06:15
1	08/16/95	14:30	08/17/95	07:15
1	08/31/95	16:15	09/03/95	17:15
1	10/06/95	22:15	10/11/95	13:45
1	10/11/95	14:00	10/11/95	14:15
1	10/11/95	19:15	10/11/95	23:00
1	11/17/95	22:15	11/18/95	12:15
1	11/18/95	18:45	11/18/95	19:30
1	11/18/95	20:00	11/18/95	20:15
1	11/18/95	21:00	11/18/95	21:15
1	11/18/95	22:00	11/18/95	22:30
1	11/18/95	23:00	11/18/95	23:45
1	11/19/95	02:45	11/19/95	03:00
1	12/04/95	14:30	12/04/95	15:45
2	04/28/95	21:45	04/28/95	22:00
2	04/28/95	22:15	05/04/95	20:15
2	05/04/95	22:45	05/04/95	23:30
2	05/05/95	00:00	05/05/95	00:30
2	05/05/95	01:00	05/05/95	01:15
2	05/09/95	10:15	05/10/95	03:30
2	05/17/95	02:15	05/18/95	11:15
2	06/03/95	00:00	06/04/95	04:15
2	06/20/95	23:15	06/21/95	12:45
2	08/12/95	01:00	08/13/95	14:15
2	08/13/95	22:45	08/13/95	23:00
2	09/20/95	06:45	09/20/95	07:00
2	10/17/95	01:45	10/17/95	02:00
2	10/17/95	02:15	10/21/95	20:15
2	11/02/95	00:15	11/02/95	09:00
2	11/02/95	10:15	11/02/95	15:45
2	12/04/95	13:30	12/04/95	14:00
2	12/04/95	15:45	11/02/95	16:15
2	12/16/95	20:45	12/18/95	23:15

Table B.1.13
Periods of No-Load at the Craig Station

Unit	Start Date	Start Time	End Date	End Time
1	03/16/95	19:00	03/17/95	03:15
1	03/17/95	11:00	03/19/95	19:30
1	07/12/95	07:45	07/12/95	08:00
1	11/11/95	02:30	11/16/95	05:00
2	04/01/95	15:45	04/05/95	08:00
2	04/05/95	08:15	04/07/95	14:00
2	04/07/95	14:15	04/11/95	14:00
2	04/11/95	14:15	05/07/95	01:15
2	05/07/95	20:30	05/08/95	07:00
2	05/19/95	02:45	05/19/95	23:45
2	05/22/95	21:30	05/23/95	09:00
2	05/26/95	08:00	05/26/95	12:15
2	05/26/95	21:00	05/26/95	23:45
2	06/24/95	04:15	05/26/95	23:00
2	07/04/95	07:45	07/10/95	23:00
2	07/22/95	09:45	07/22/95	10:00
2	08/09/95	23:30	08/12/95	13:45
2	12/16/95	03:30	12/18/95	07:45
2	12/18/95	09:45	12/18/95	10:00
2	12/18/95	11:30	12/18/95	12:00
2	12/18/95	12:00	12/18/95	12:45
2	12/23/95	02:30	12/23/95	15:30
3	01/06/95	08:00	01/06/95	09:15
3	01/21/95	23:15	01/22/95	20:45
3	03/01/95	20:00	03/02/95	03:00
3	03/02/95	08:00	03/02/95	09:00
3	06/17/95	12:15	06/18/95	06:30
3	06/18/95	09:00	06/19/95	01:45
3	06/19/95	03:30	06/19/95	06:30
3	06/26/95	07:45	06/26/95	08:00
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3	06/26/95	09:00	06/26/95	09:15
3	07/30/95	00:45	07/30/95	01:00
3	08/01/95	20:45	08/02/95	01:45
3	08/02/95	02:30	08/03/95	00:45
3	09/30/95	05:00	10/14/95	00:15
3	10/19/95	03:45	10/19/95	04:00
3	10/20/95	08:45	10/21/95	18:30
3	12/02/95	01:45	12/02/95	23:45

B.1.5 Compilation and Evaluation of Regional Burning Events

Wildfire data were obtained from the National Interagency Fire Center (NIFC) located in Boise, ID, for the period of 12/01/94 to 10/31/95. NIFC maintains wildfire data for the National Park Service (NPS), Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), and Fish and Wildlife Service (FWS). The data base does not contain emission estimates, but data elements include date, location, size, and vegetation characteristics of every fire that occurred on federal lands.

Wildfire data for Forest Service (FS) lands are maintained in Kansas City, MO, and hardcopy data were obtained directly from the local Forest Service stations. As air masses approach the western slope of the Rocky Mountains where the Forest Service land is generally located, the air masses deposit large quantities of moisture as they are lifted, mitigating against fire activity. During the study period, there were few fires on Forest Service land. There were, however, a large number of thunderstorms west of the Rocky Mountains, resulting in a large number of fires on BLM lands in western Colorado. Little fire activity is assumed for the remaining land (i.e., private and state, based on a telephone survey in 1995).

Prescribed fire data for 1995 in hardcopy form were also obtained from the Colorado Department of Public Health and Environment. Data associated with prescribed burns on federal and state lands in Routt, Moffat, and Rio Blanco counties were included. Most of the prescribed burn activity occurs in the fall with a minor amount in the spring.

B.1.5.1 Winter Wildfires

As shown in Table B.1.14, four wildfire events occurred on federal lands during the winter (12/01/94 to 03/15/95). Intense prescribed burning occurred on 03/07/95 and 03/08/95. During this period, four prescribed burns were performed, totaling 1,640 acres.

B.1.5.2 Spring and Summer Wildfires

During the spring and summer periods (03/16/95 to 08/31/95), the largest reported wildfire covered 90,470 acres. Spatial plots in Attachment B of Appendix B.1 illustrate this and other major fire events that occurred on aerosol analysis days. Each fire is illustrated by a dot, with fire locations scaled to size within regional-scale and mesoscale modeling domains. Each marker is indicative of the relative size of the fire and does not represent the actual size of the fire. Most of the summer fire activity was located to the southwest of the Wilderness, with intense fire activity in the southwest corner of the mesoscale modeling domain.

Table B.1.15 summarizes wildfire activity for this period in the regional-scale and mesoscale modeling domains. Figure B.1.5 presents time series plots which illustrate the average acres burned per day in the regional-scale and mesoscale modeling domains. The acreages of each fire over the duration of the fire (i.e., from when the fire was detected to when it was extinguished) were evenly distributed in these plots to illustrate the temporal

Table B.1.14
Wildfire Activity between 12/01/94 and 03/15/95 in Regional-Scale Modeling Domain

Land Manager	Number of Fires	Acres Burned
Forest Service	0	0
Bureau of Indian Affairs	1	1
Bureau of Land Management	3	7
Fish and Wildlife Service	0	0
National Park Service	0	0
TOTAL	4	8

Table B.1.15
Wildfire Activity between 03/16/95 and 08/31/95
in Regional-Scale and Mesoscale Modeling Domains

Jurisdiction	Number of Fires[a]	Acres Burned
Regional Domain		
Bureau of Indian Affairs	2	15
Bureau of Land Management	387	179,873
Fish and Wildlife Service	2	4,877
National Park Service	3	6,202
TOTAL	394	190,967
Mesoscale Domain		
Bureau of Land Management	41	5,271

[a] Includes all fires regardless of size.

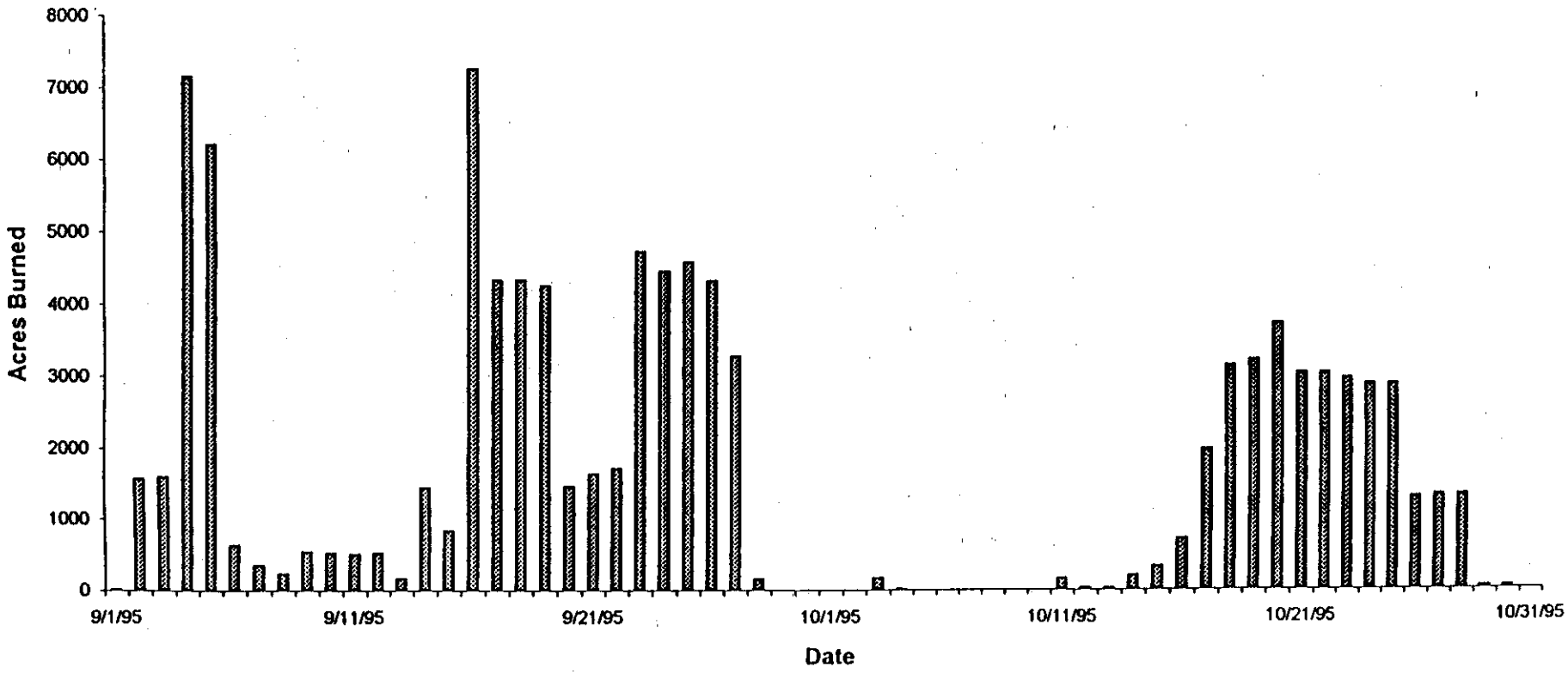


Figure B.1.5. Temporal distribution of wildfires in the regional-scale modeling domain between 09/01/95 and 10/31/95.

distribution of the fires. The actual number of acres burned on those days with wildfire activity could be significantly higher or lower than what is shown.

For the regional-scale modeling domain, a total of four periods, from mid-June through the end of August, 1995, reported over 5,000 acres of average wildfire activity per day. For the mesoscale modeling domain, there was significant (i.e., ~450 acres per day) fire activity during the 11-day period from the end of July to the first week of August, 1995. Three small prescribed burns (less than 30 acres) occurred on federal and state lands in Routt, Moffat, and Rio Blanco counties during this period.

B.1.5.3 Fall Wildfires

Table B.1.16 reports wildfire activity that occurred during the fall (09/01/95 to 10/31/95). Most of the fire activity during this period was located to the west of the Wilderness, with a strong concentration of fires near the western edge of the mesoscale modeling domain.

There were more than 4,000 acres of average wildfire activity per day during the first, third, and fourth weeks of September and the third and fourth weeks of October, 1995, in the regional-scale modeling domain. For the mesoscale modeling domain, there was significant fire activity on 09/16/95 with over 3,000 acres being burned.

Table B.1.17 shows the prescribed burn activity during the third events period for the two modeling domains. These fires occurred on federal and state lands in Routt, Moffat, and Rio Blanco counties. Note that the data do not represent all fires within the modeling domains, but only those reported to the Colorado Department of Public Health and Environment for the three counties. During 1995, most of the prescribed fire activity occurred during the fall, which is typical of other years.

Table B.1.16
Wildfire Activity between 09/01/95 and 10/31/95
in Regional-Scale and Mesoscale Modeling Domains

Jurisdiction	Number of Fires[a]	Acres Burned
Regional-Scale Domain		
Forest Service	n/a[b]	n/a[b]
Bureau of Indian Affairs	9	52
Bureau of Land Management	272	94,567
Fish and Wildlife Service	4	164
National Park Service	13	22
TOTAL	298	94,805
Mesoscale Domain		
Forest Service	n/a[b]	n/a[b]
Bureau of Indian Affairs	n/a[b]	n/a[b]
Bureau of Land Management	57	2,481
Fish and Wildlife Service	1	40
National Park Service	1	1
TOTAL	59	2,522

[a] Includes all fires regardless of size.
[b] Information not available.

Table B.1.17
Prescribed Burn Activity between 09/01/95 and 10/31/95

Modeling Domain	Number of Fires	Acres Burned
Regional-Scale	20	5,997
Mesoscale	14	4,310

Mt. Zirkel Wilderness Area
Reasonable Attribution Study of Visibility Impairment

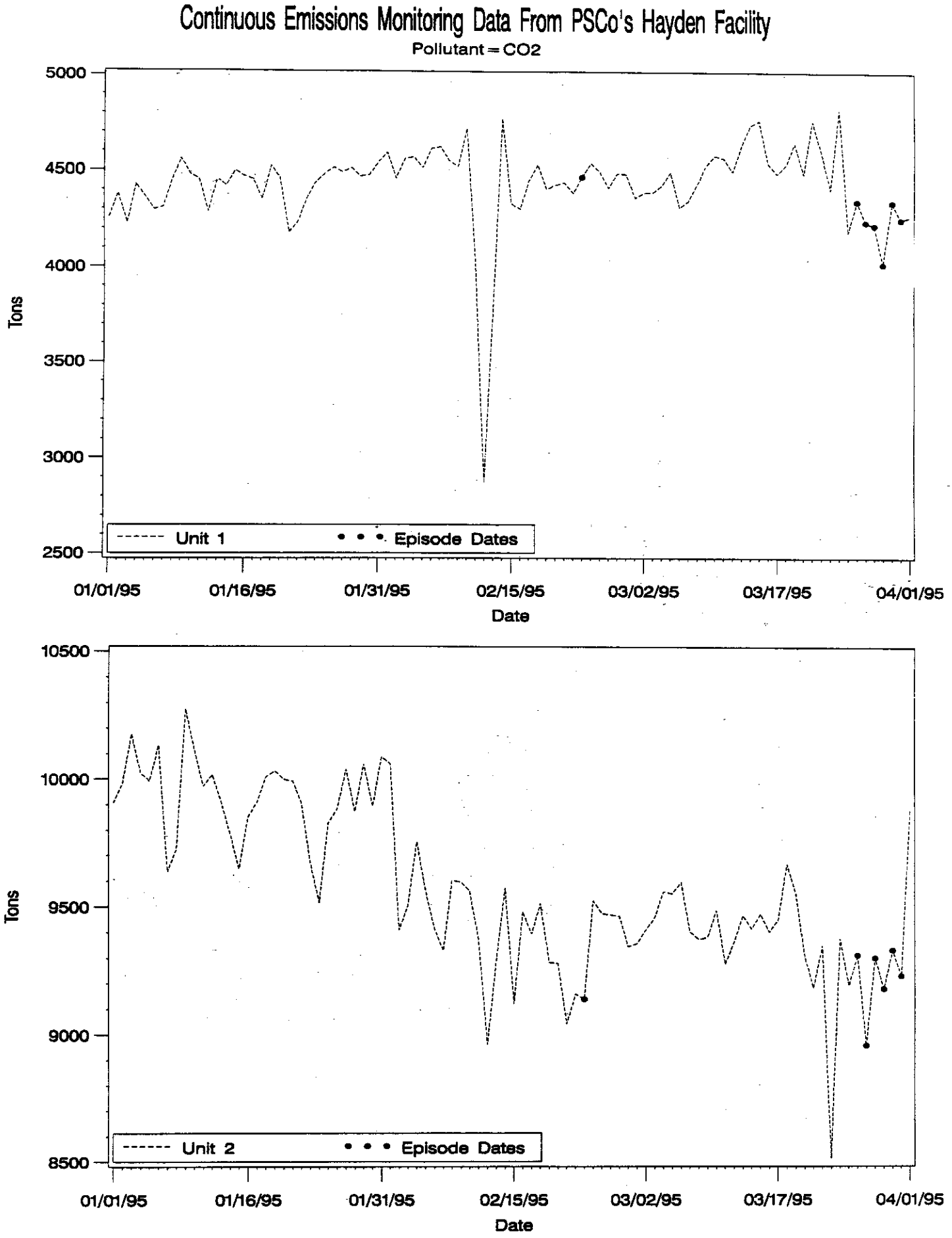
Volume II: Results of Data Analysis and Modeling
Final Report

July 1, 1996

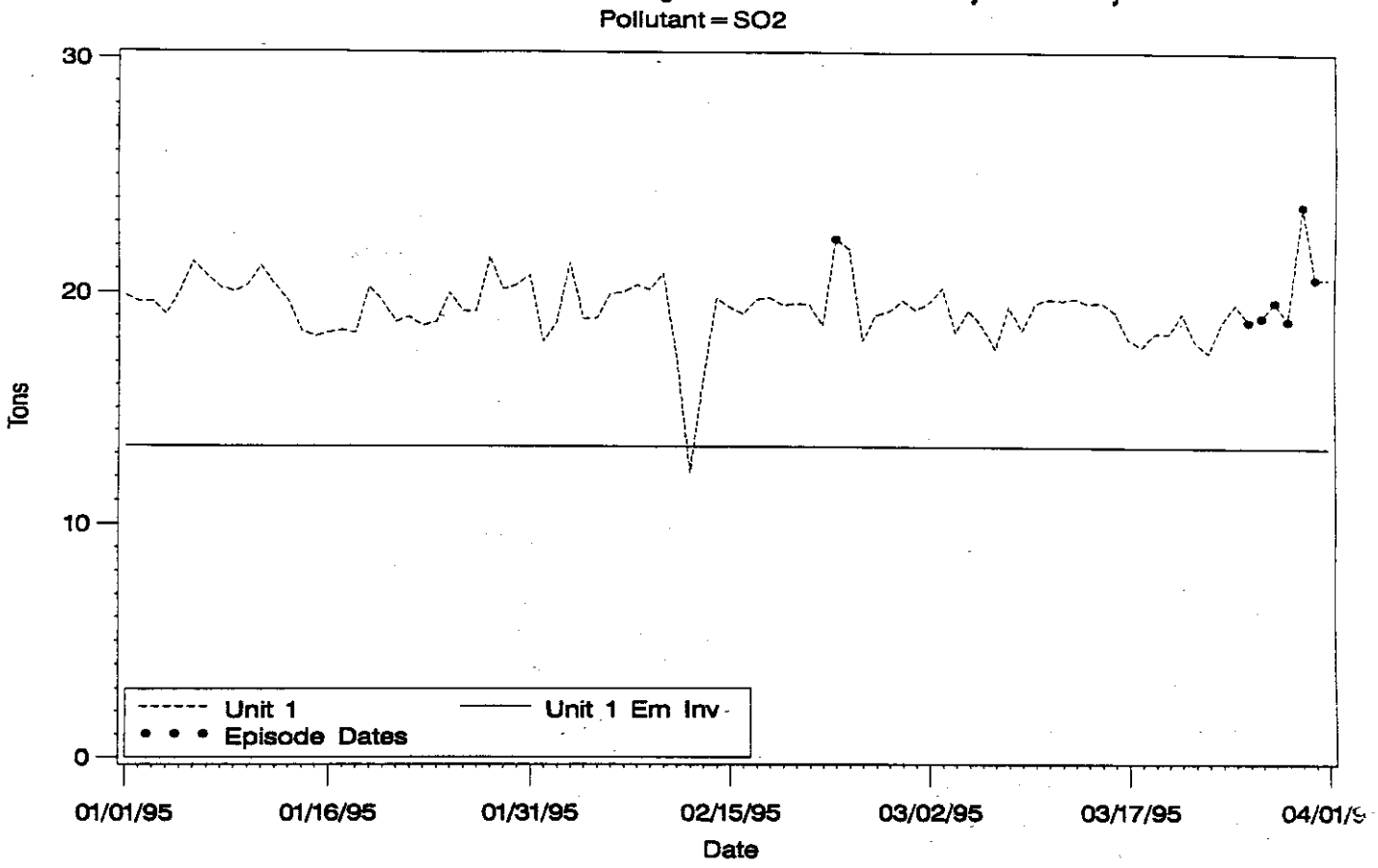
ATTACHMENT A

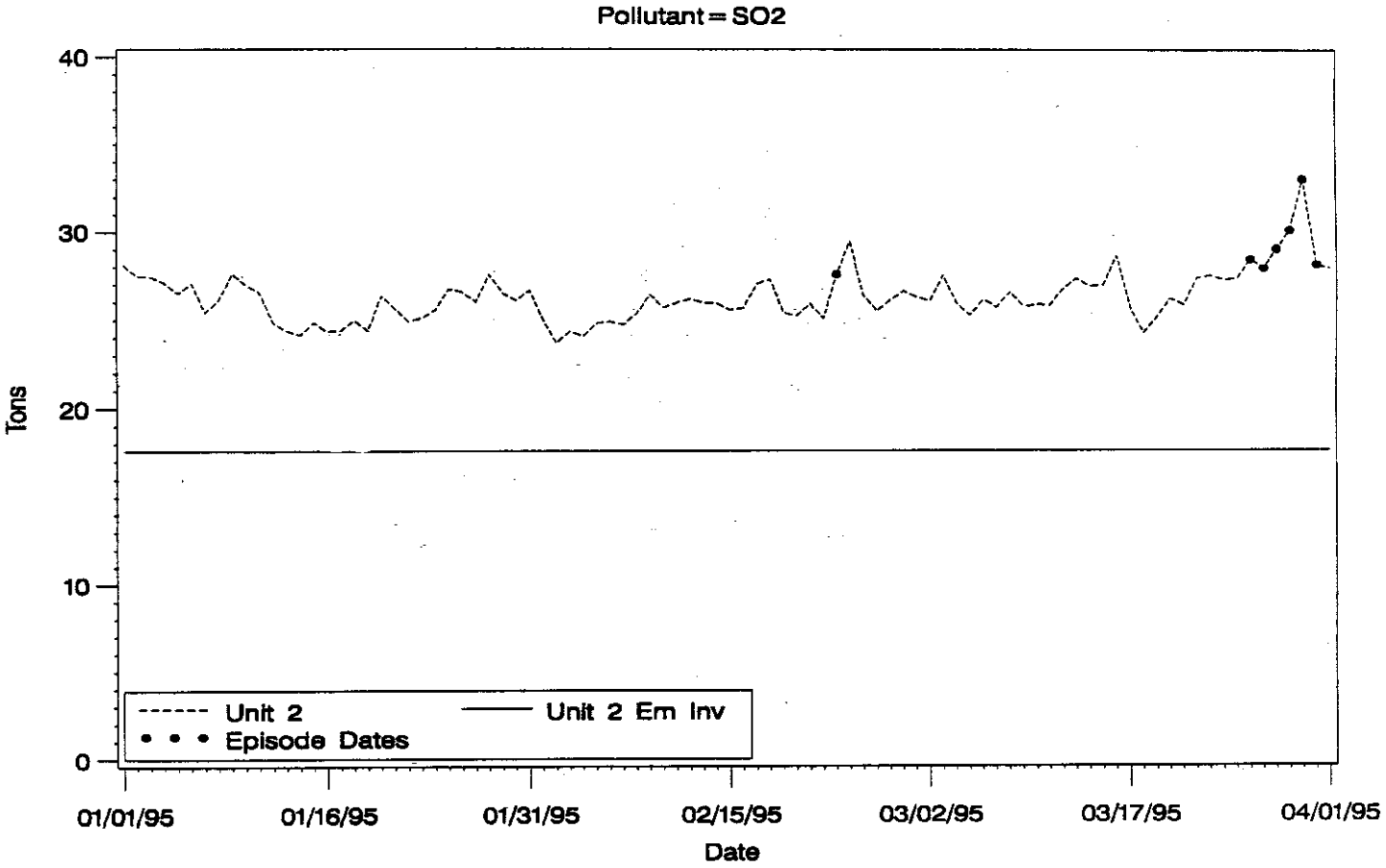
OF APPENDIX B.1

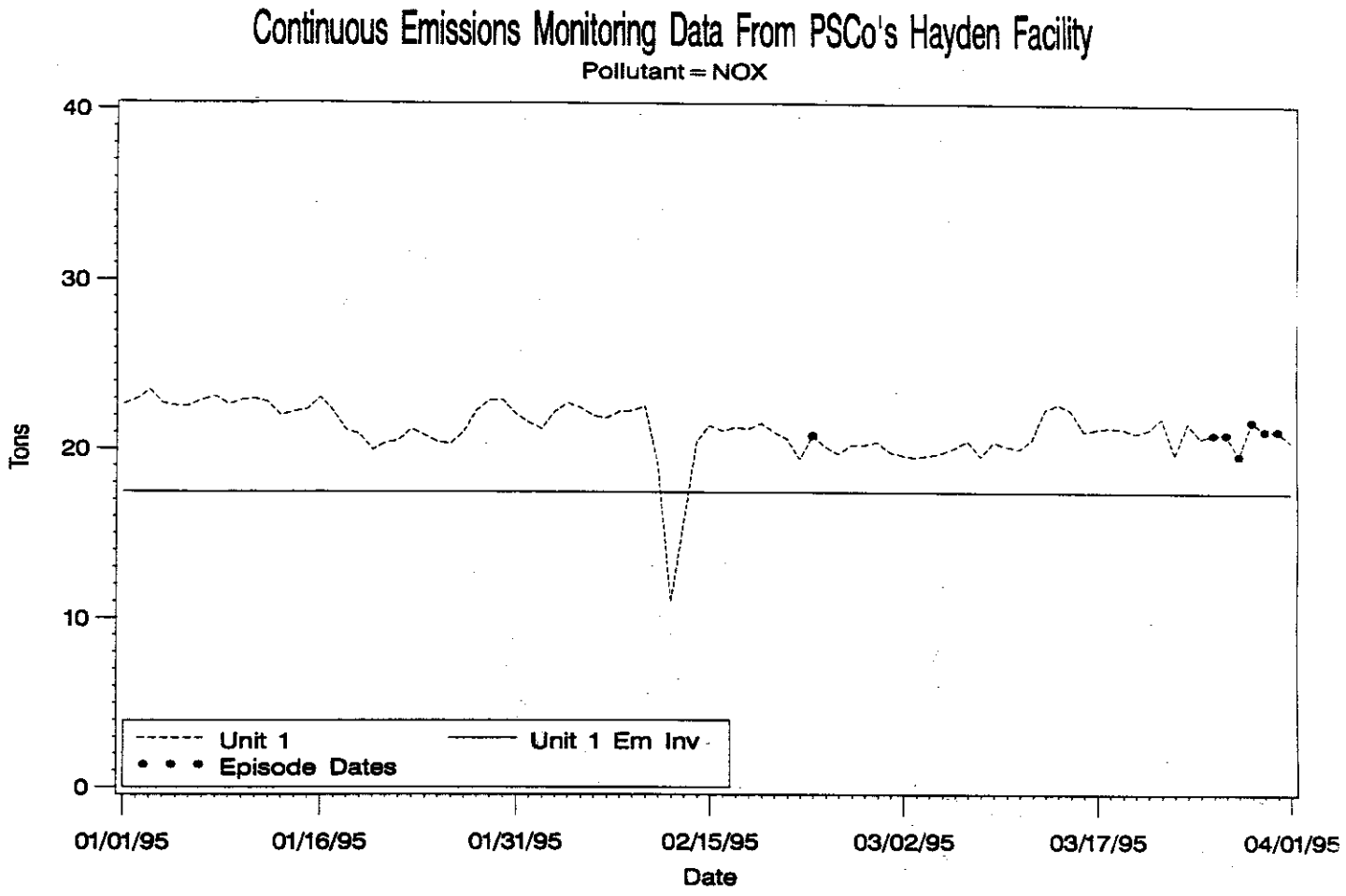
TIME SERIES PLOTS OF CONTINUOUS MONITORING DATA FROM THE HAYDEN AND CRAIG FACILITIES BETWEEN 04/01/95 AND 01/01/96

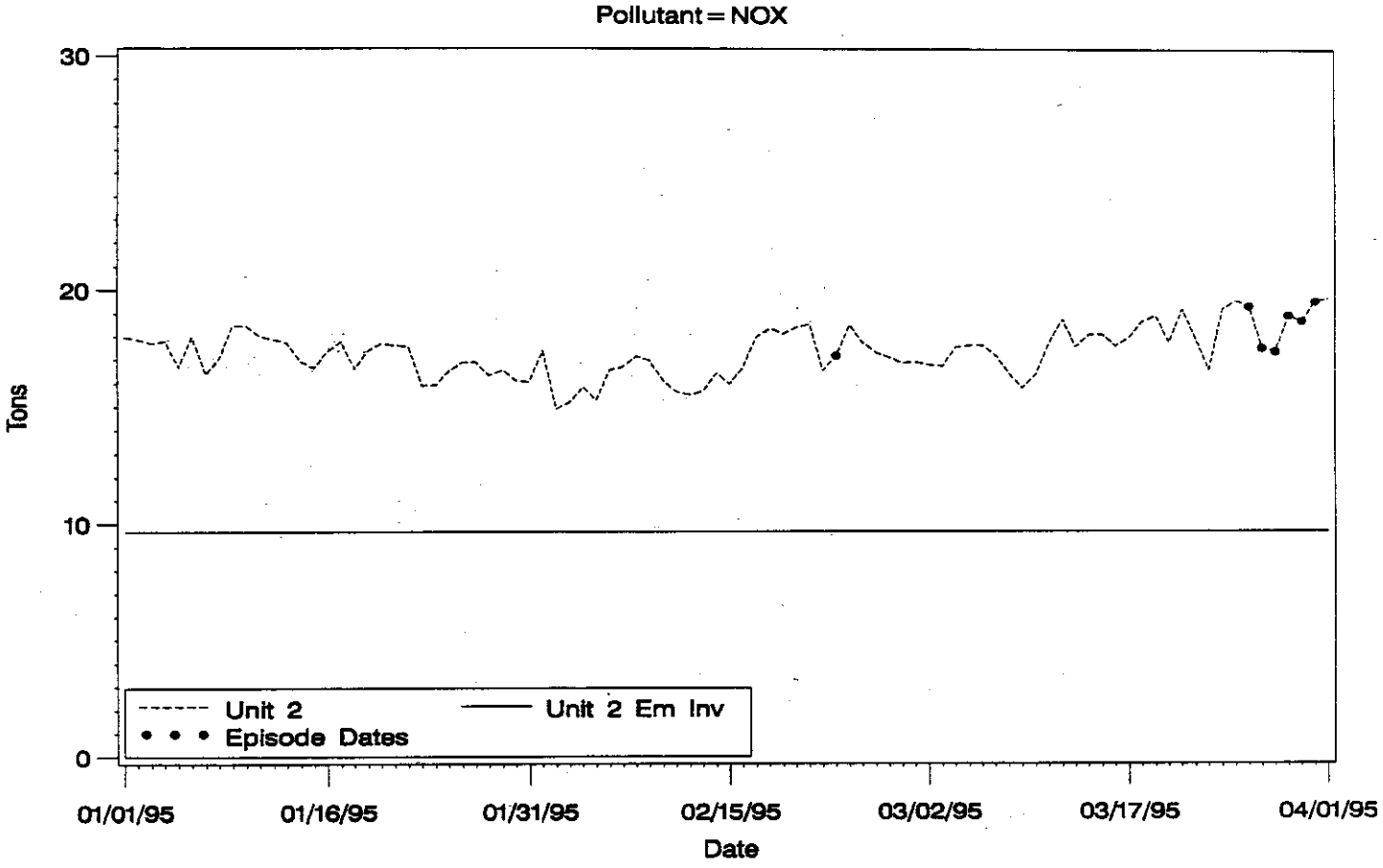

Continuous Emissions Monitoring Data From PSCo's Hayden Facility
Pollutant = CO2
5000
4500
4000
3500
3000
2500
Tons
Unit 1
Episode Dates
01/01/95
01/16/95
01/31/95
02/15/95
03/02/95
03/17/95
04/01/95
Date
10500
10000
9500
9000
8500
Tons
Unit 2
Episode Dates
01/01/95
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04/01/95
Date

Continuous Emissions Monitoring Data From PSCo's Hayden Facility



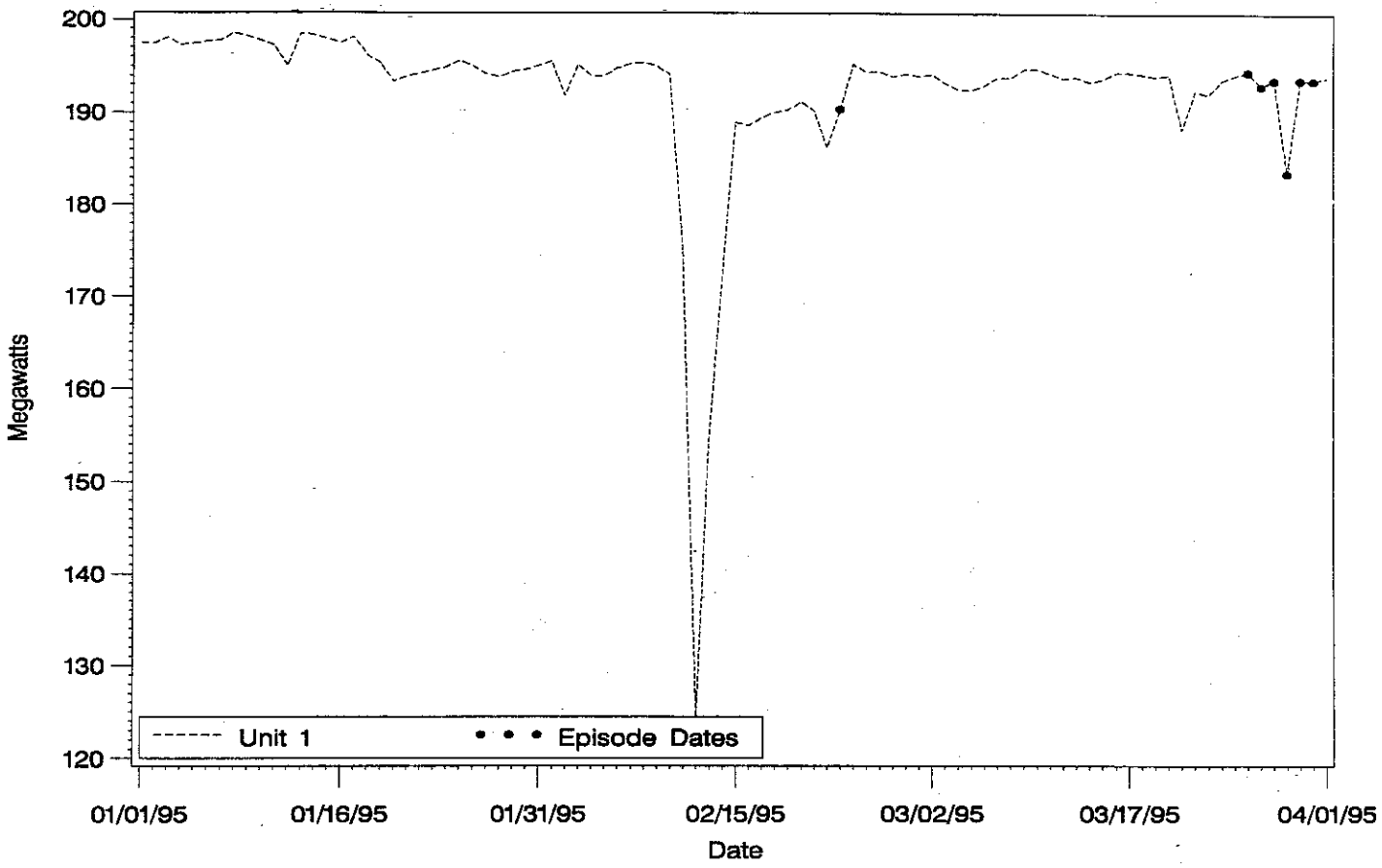


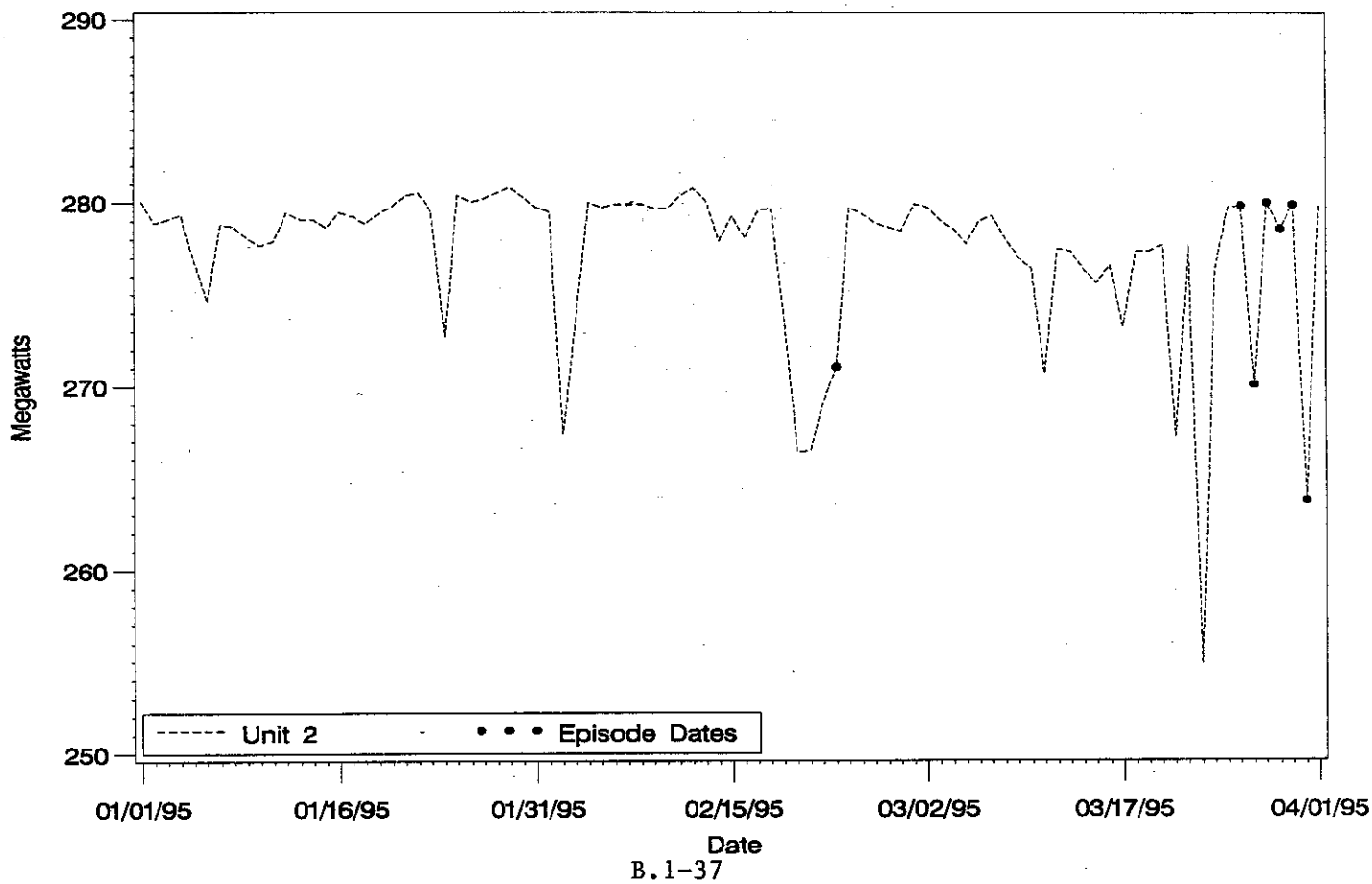

Continuous Emissions Monitoring Data From PSCo's Hayden Facility
Pollutant = NOX
40
30
20
10
0
Tons
Unit 1
Unit 1 Em Inv
Episode Dates
01/01/95
01/16/95
01/31/95
02/15/95
03/02/95
03/17/95
04/01/95
Date


Pollutant = NOX
30
20
10
0
Tons
Unit 2
Unit 2 Em Inv
Episode Dates
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01/16/95
01/31/95
02/15/95
03/02/95
03/17/95
04/01/95
Date

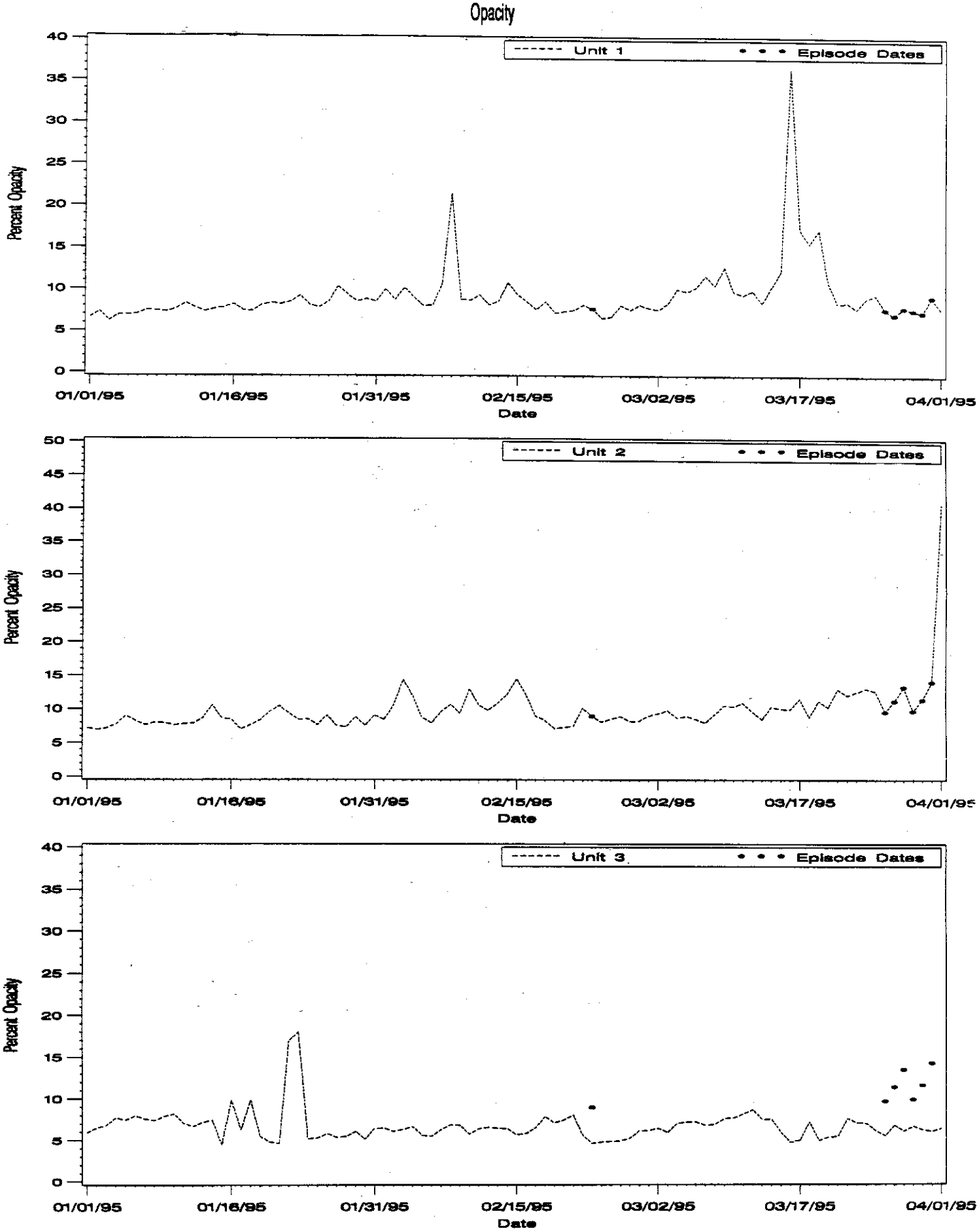
Continuous Emissions Monitoring Data From PSCo's Hayden Facility

Daily Average Unit Load in Megawatts



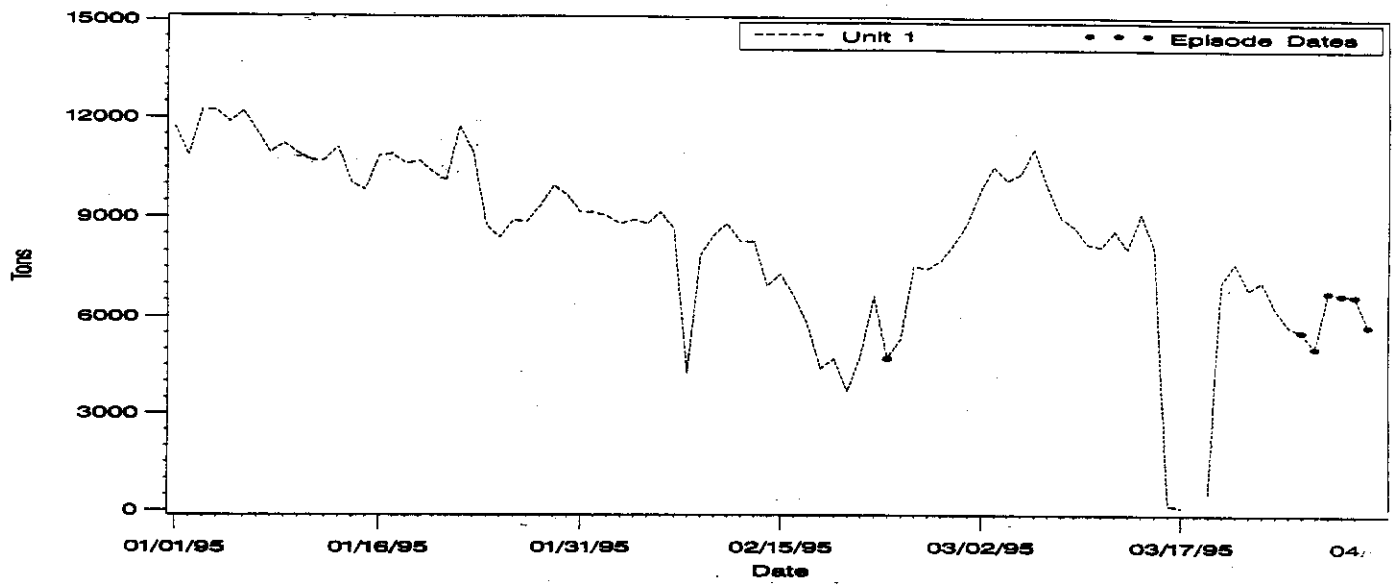


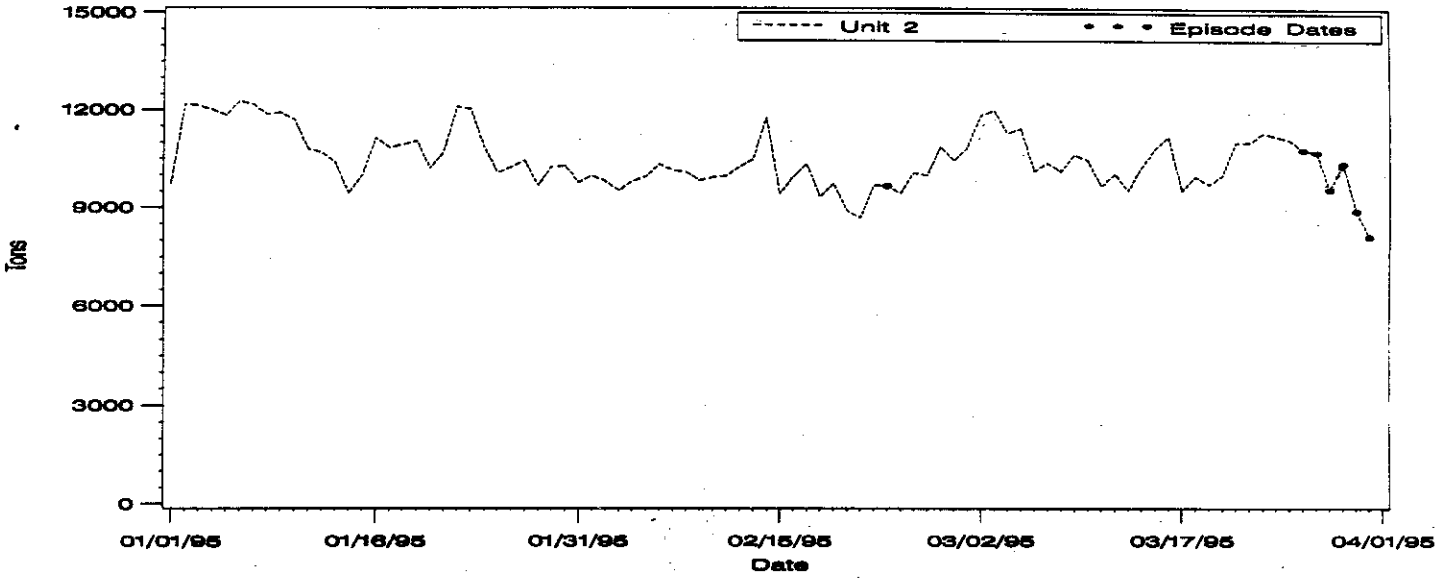
Continuous Emissions Monitoring Data From Tri-State's Craig Facility

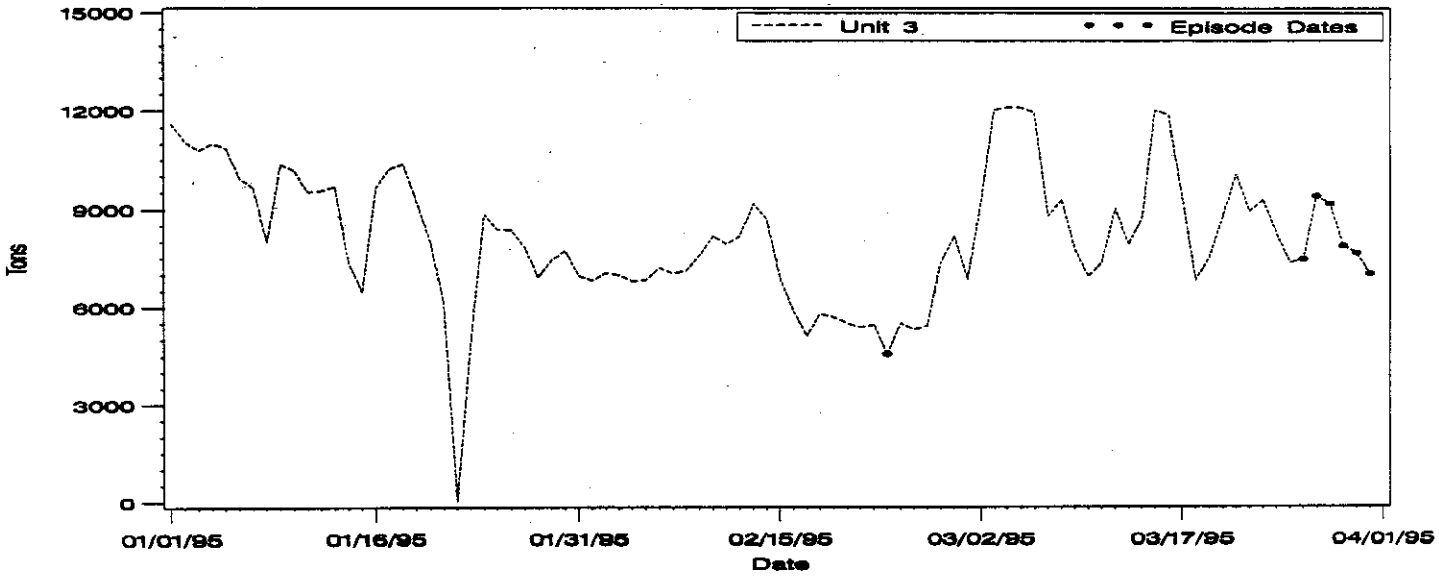


Continuous Emissions Monitoring Data From Tri-State's Craig Facility

Pollutant = CO2

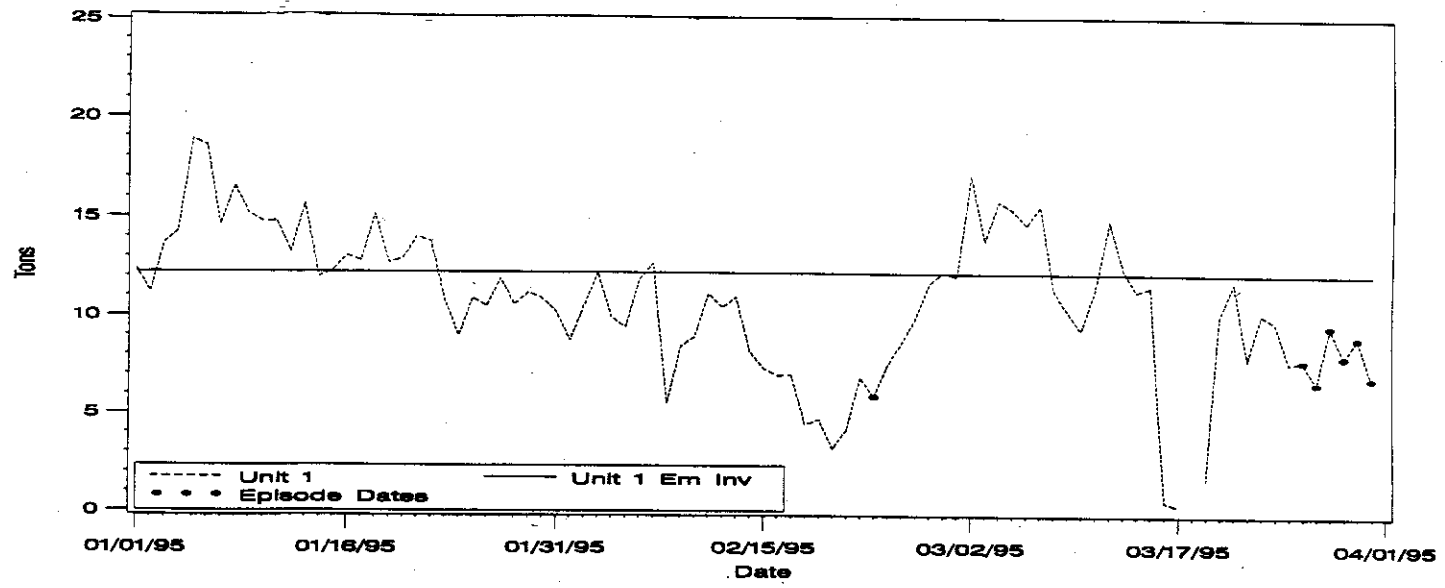


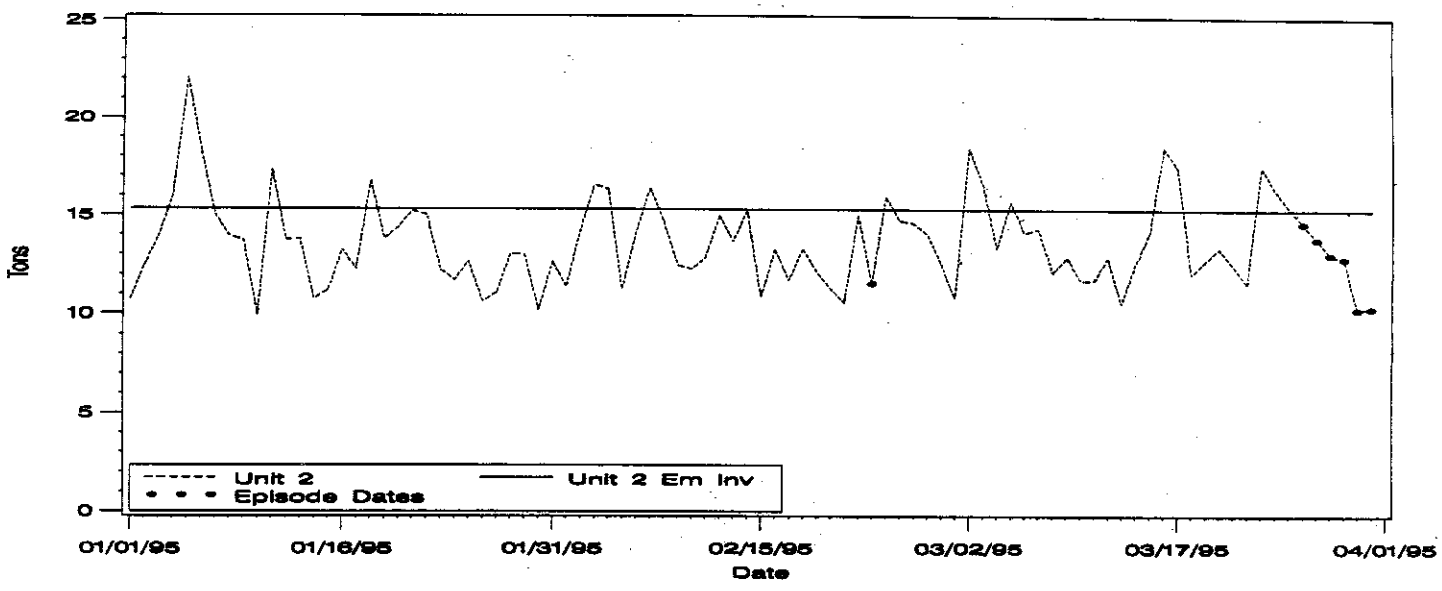


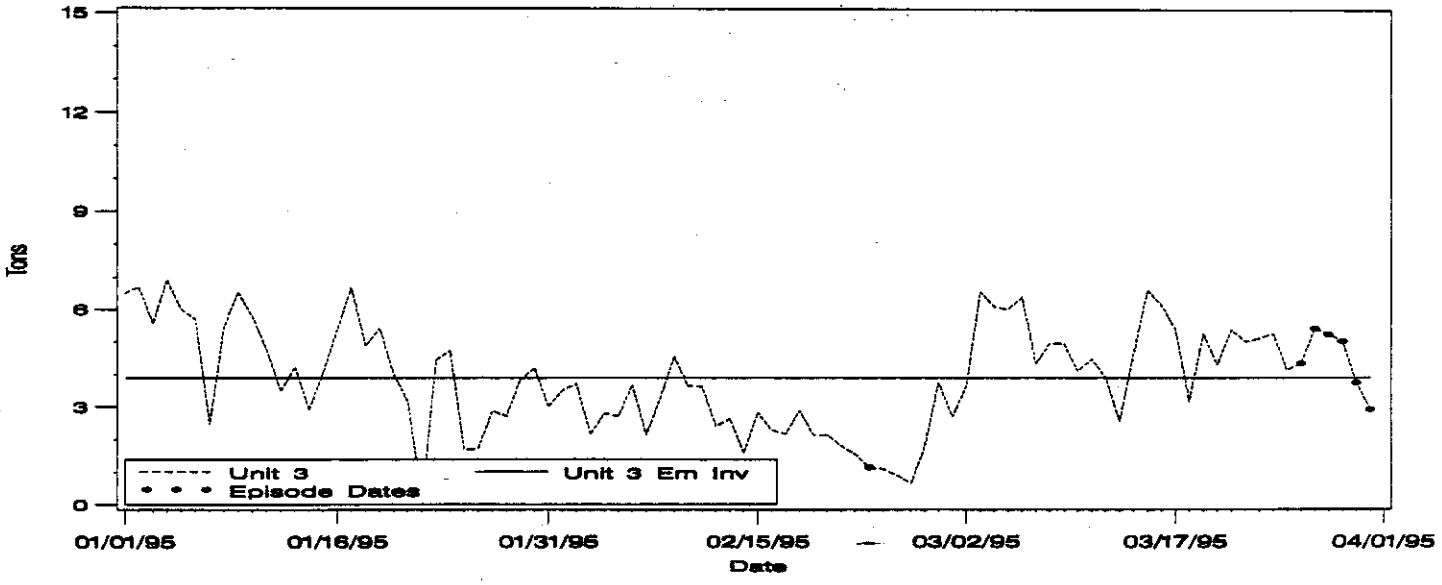


Continuous Emissions Monitoring Data From Tri-State's Craig Facility

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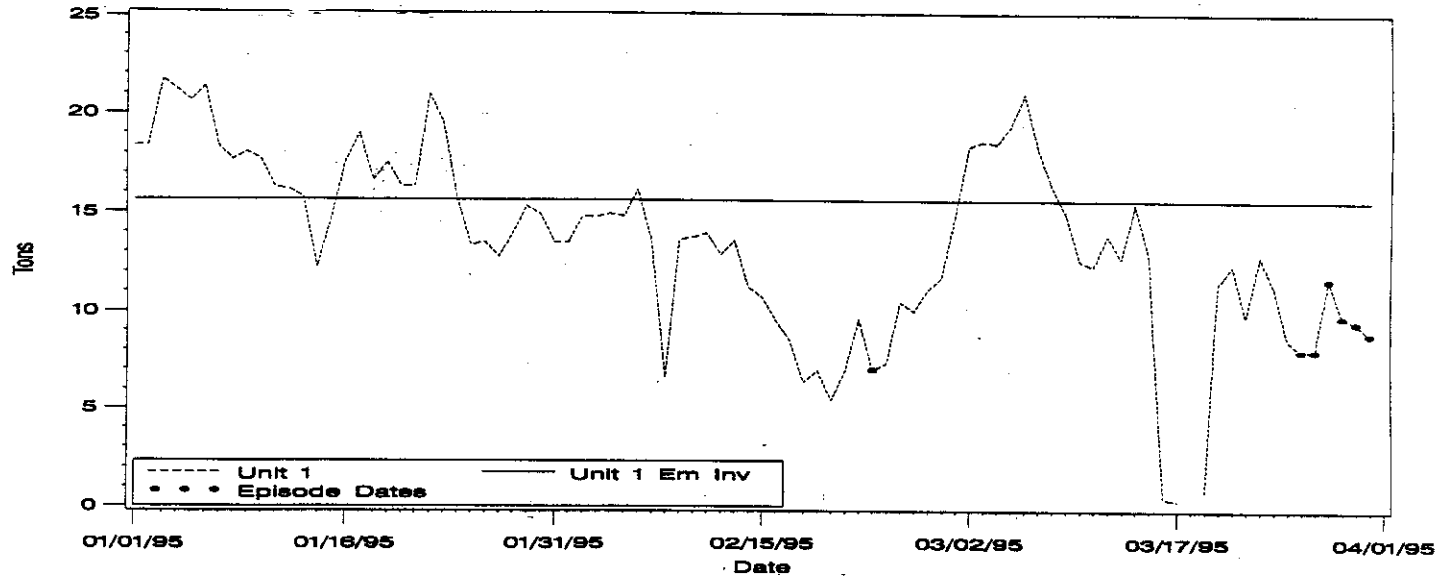


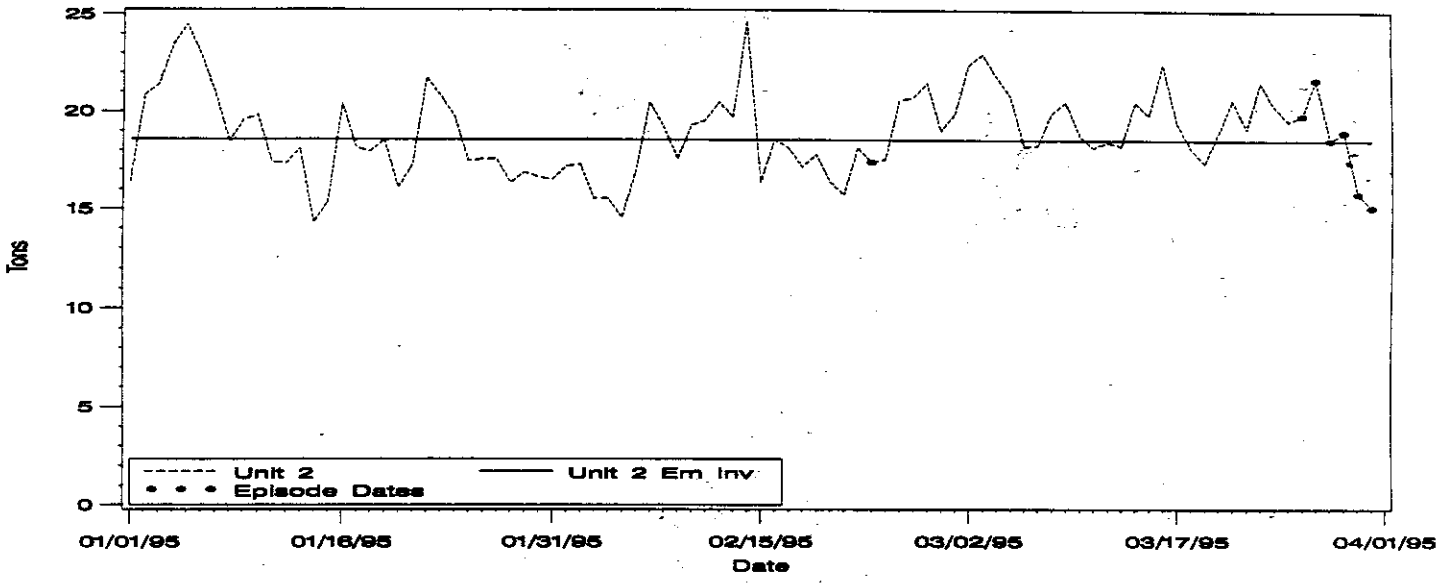


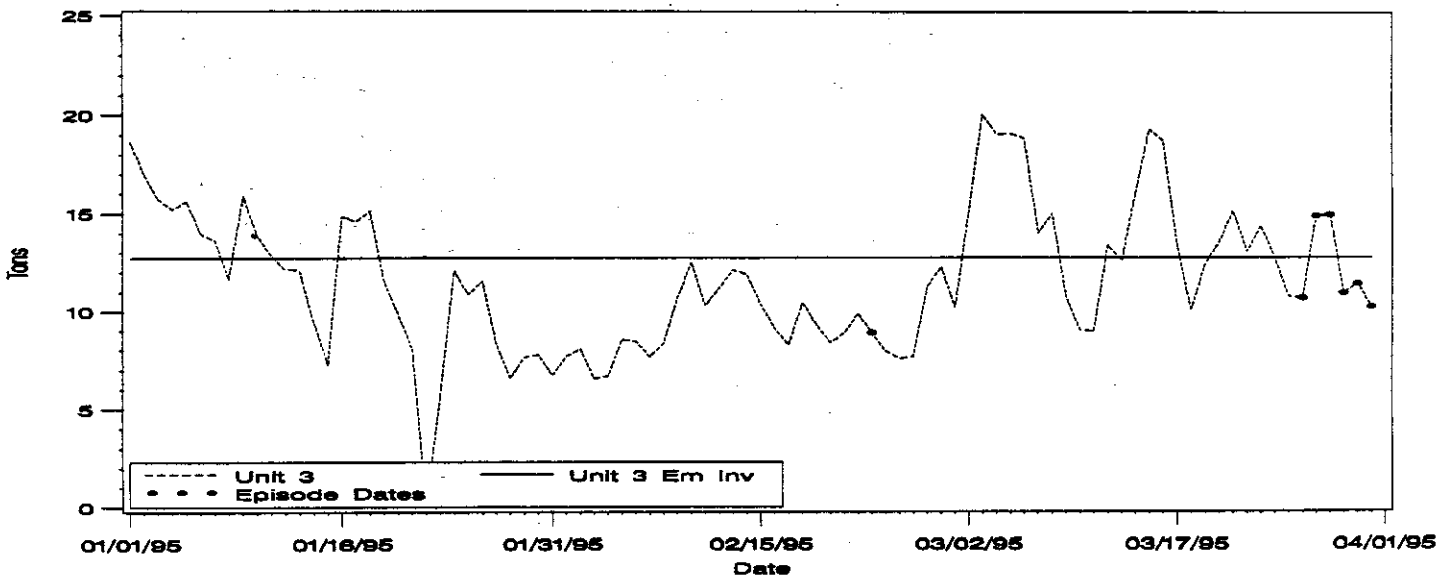


Continuous Emissions Monitoring Data From Tri-State's Craig Facility

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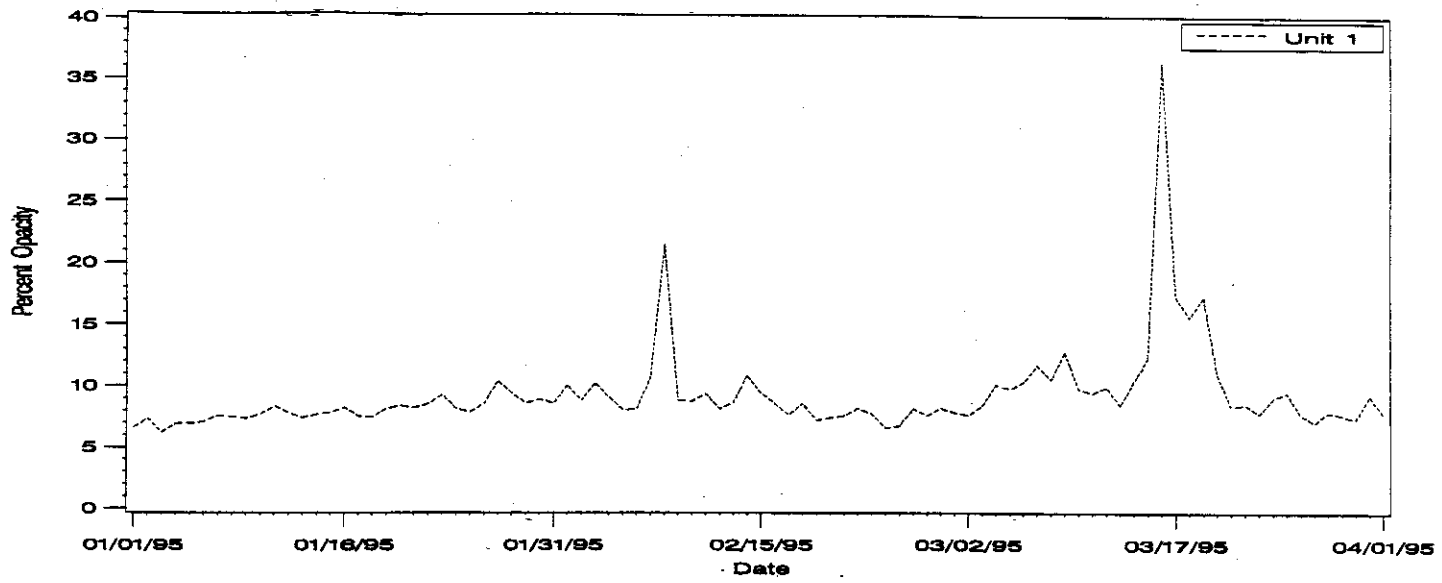


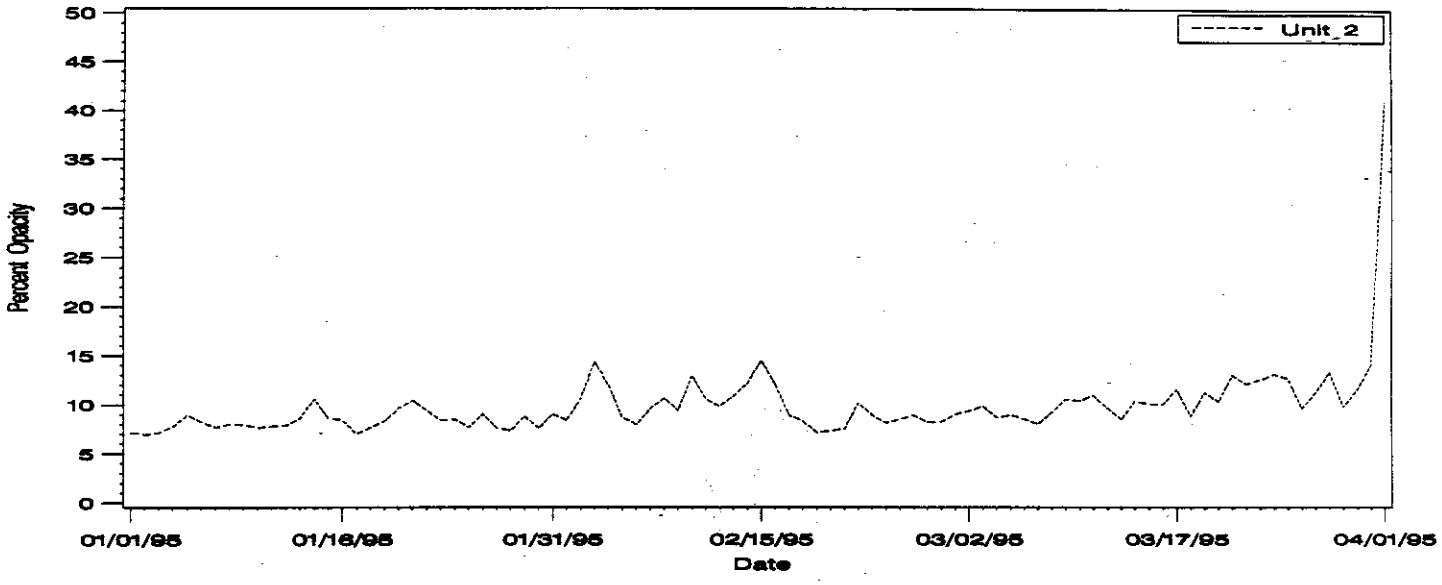


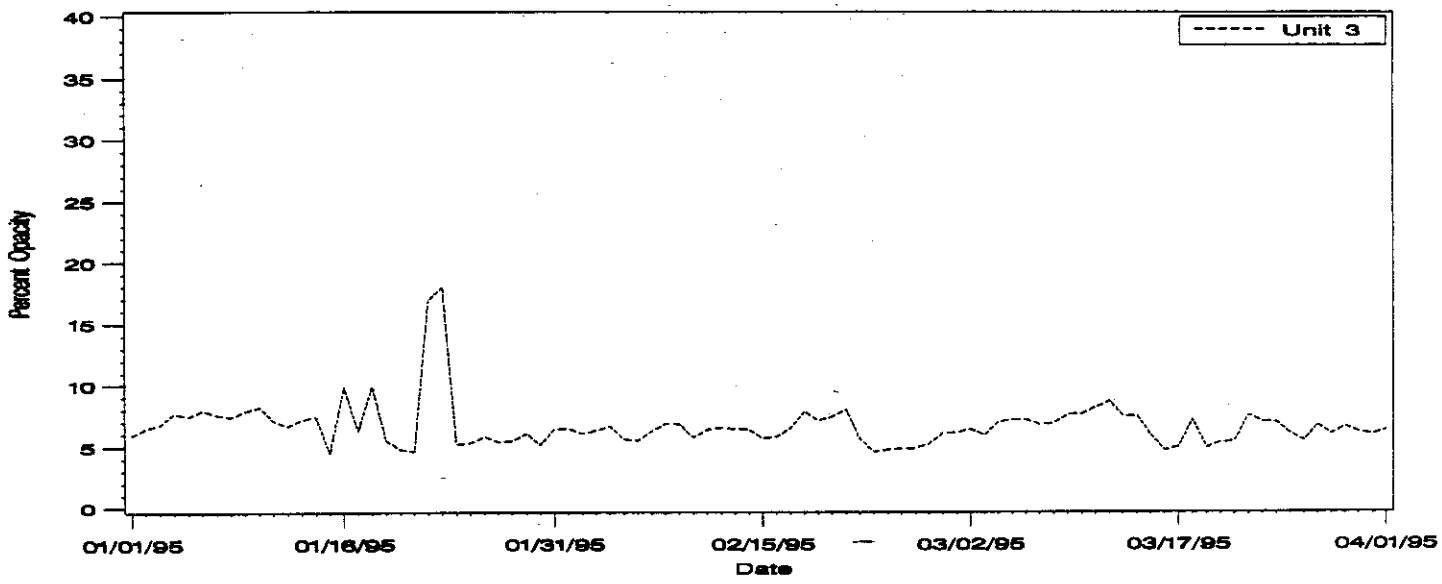


Continuous Emissions Monitoring Data From Tri-State's Craig Facility

Opacity

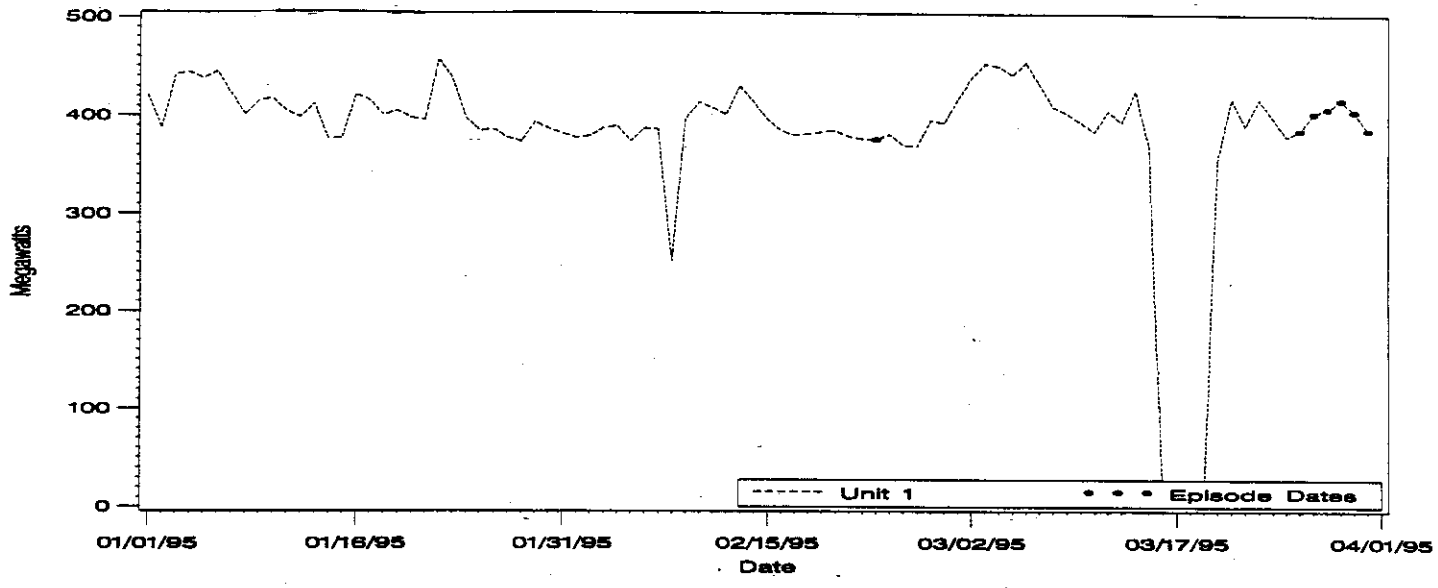


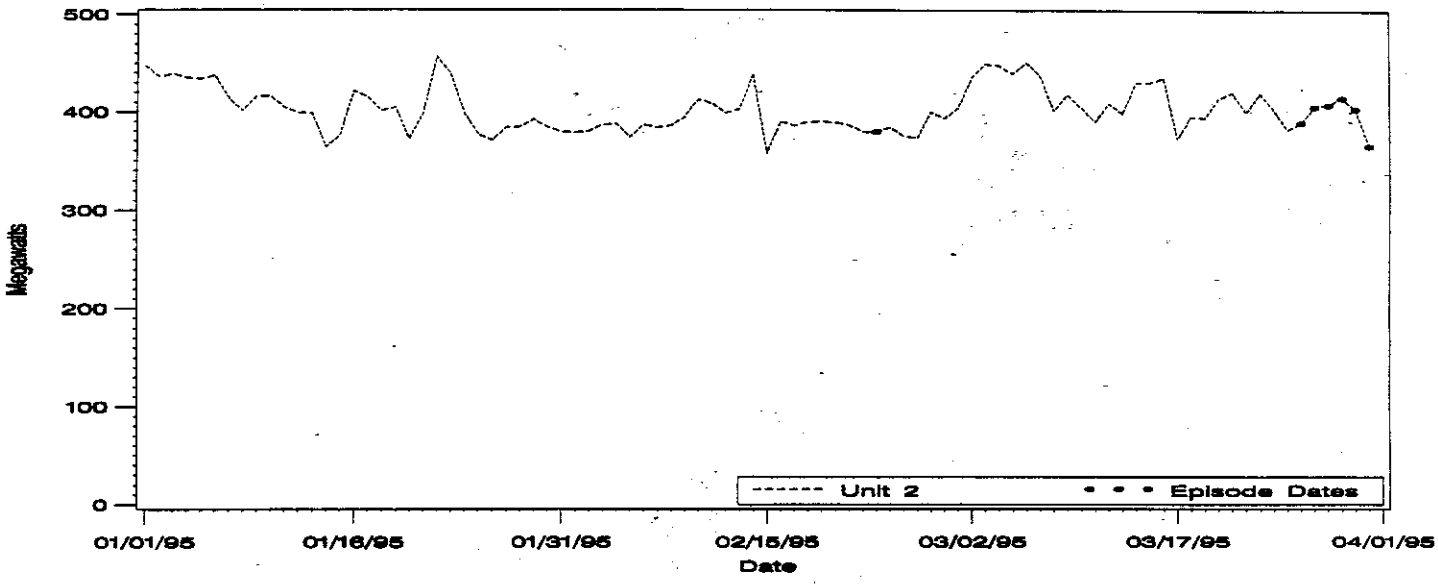


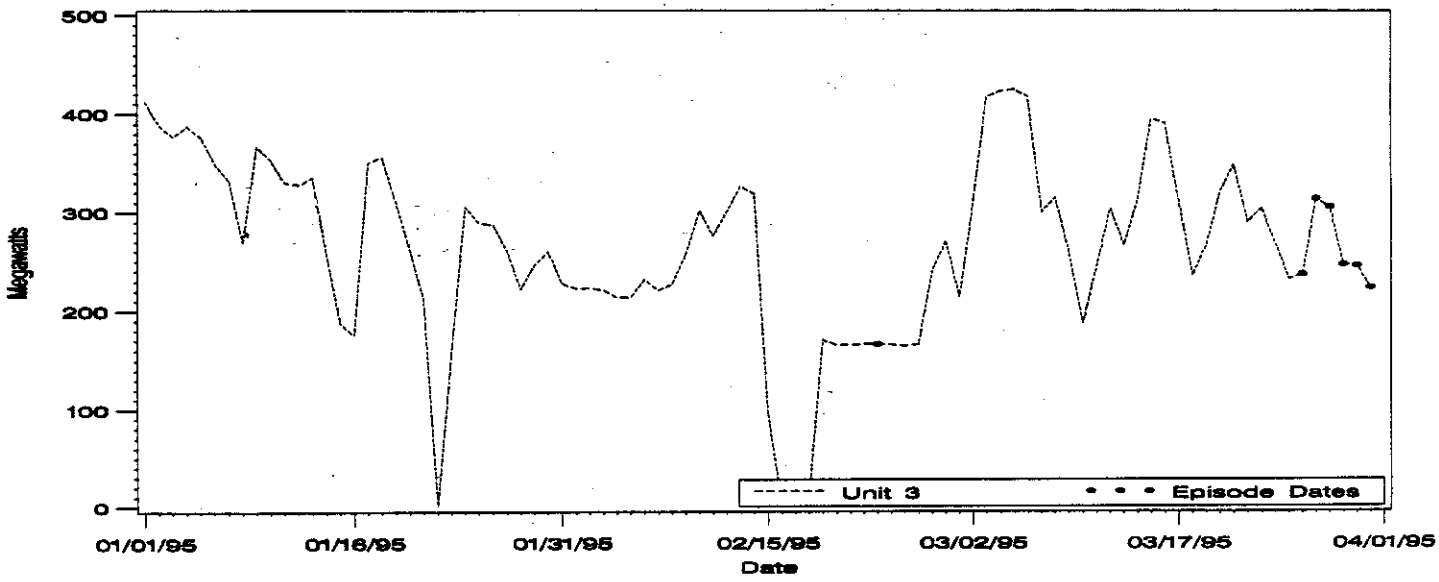


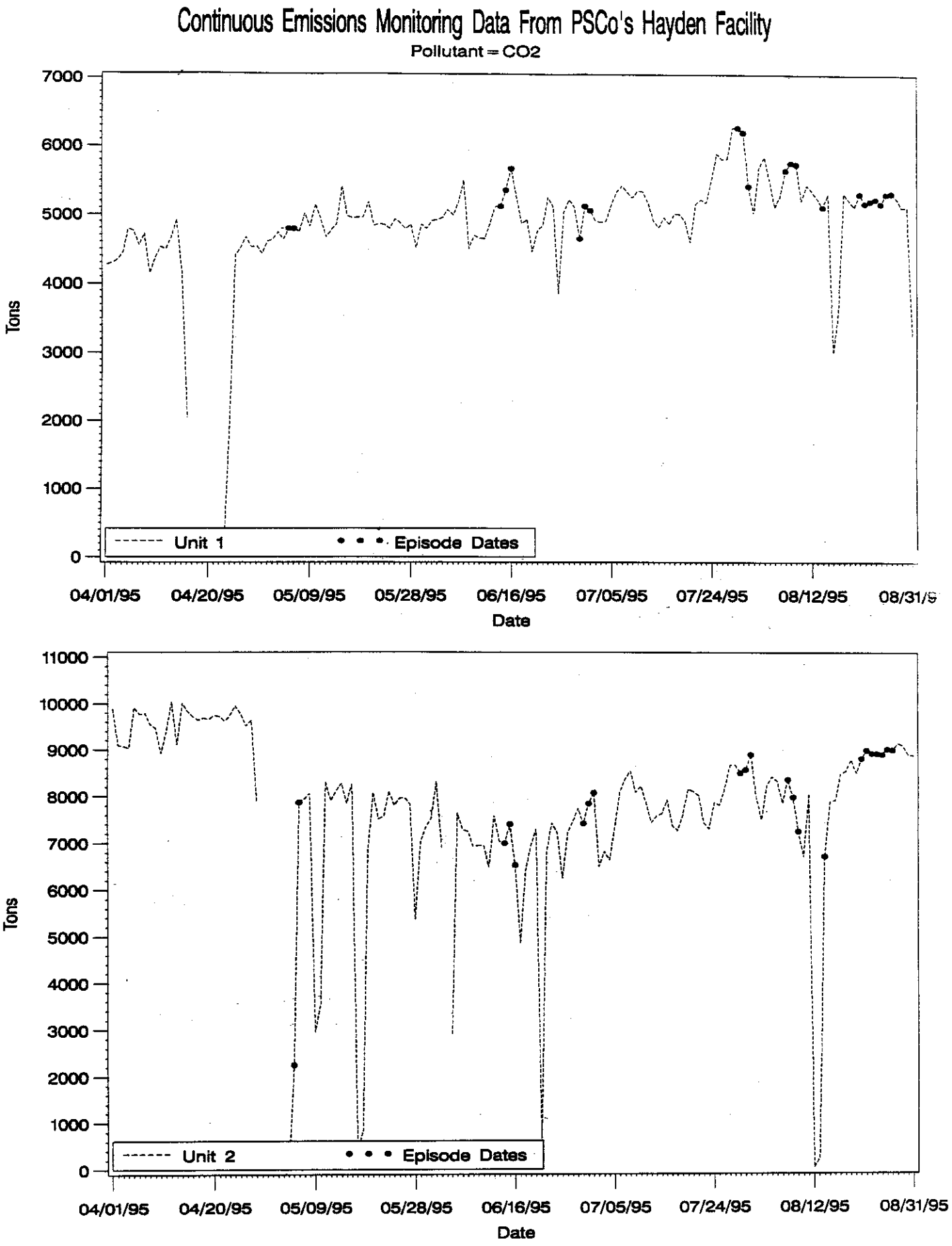
Continuous Emissions Monitoring Data From Tri-State's Craig Facility

Daily Average Unit Load in Megawatts



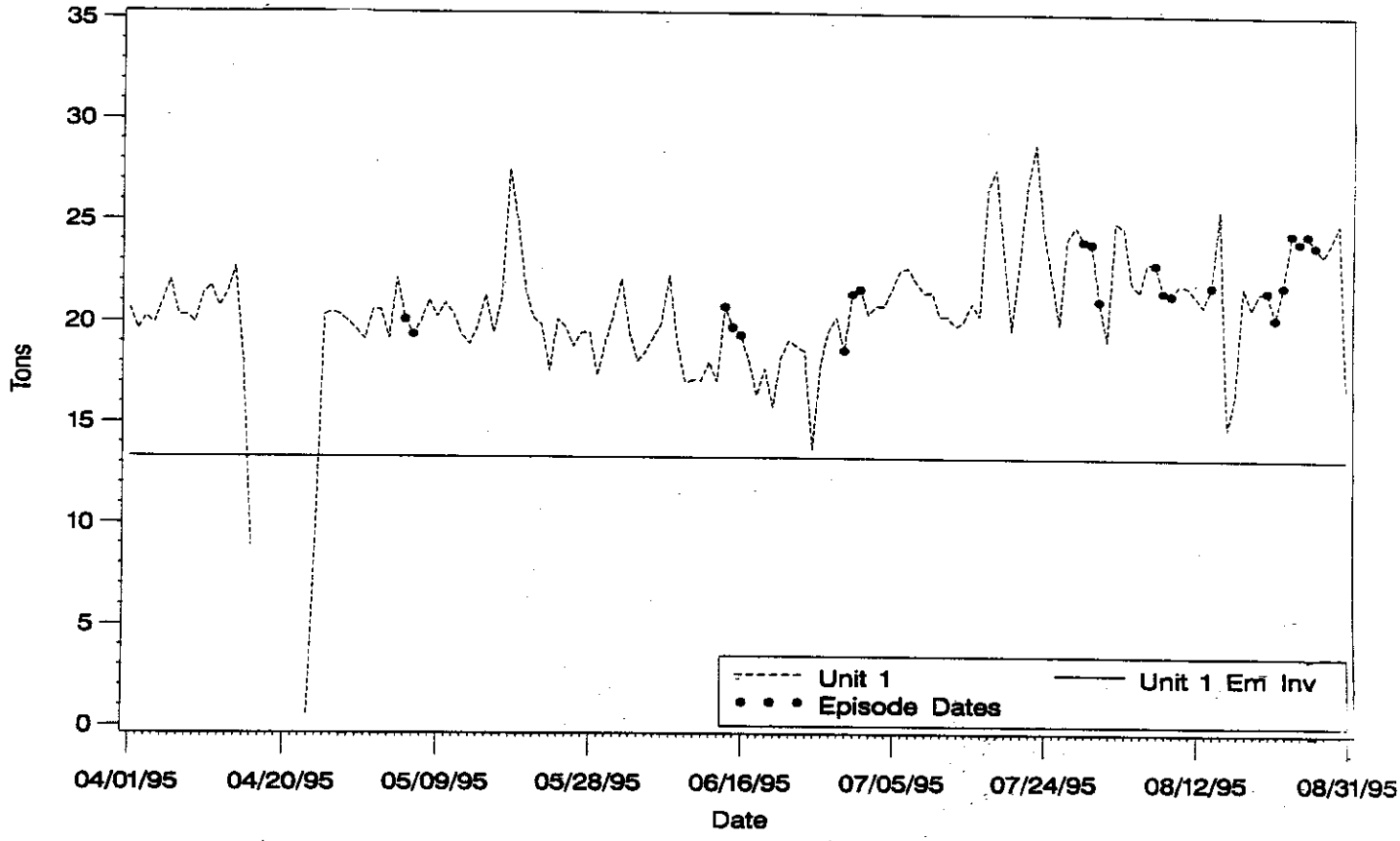




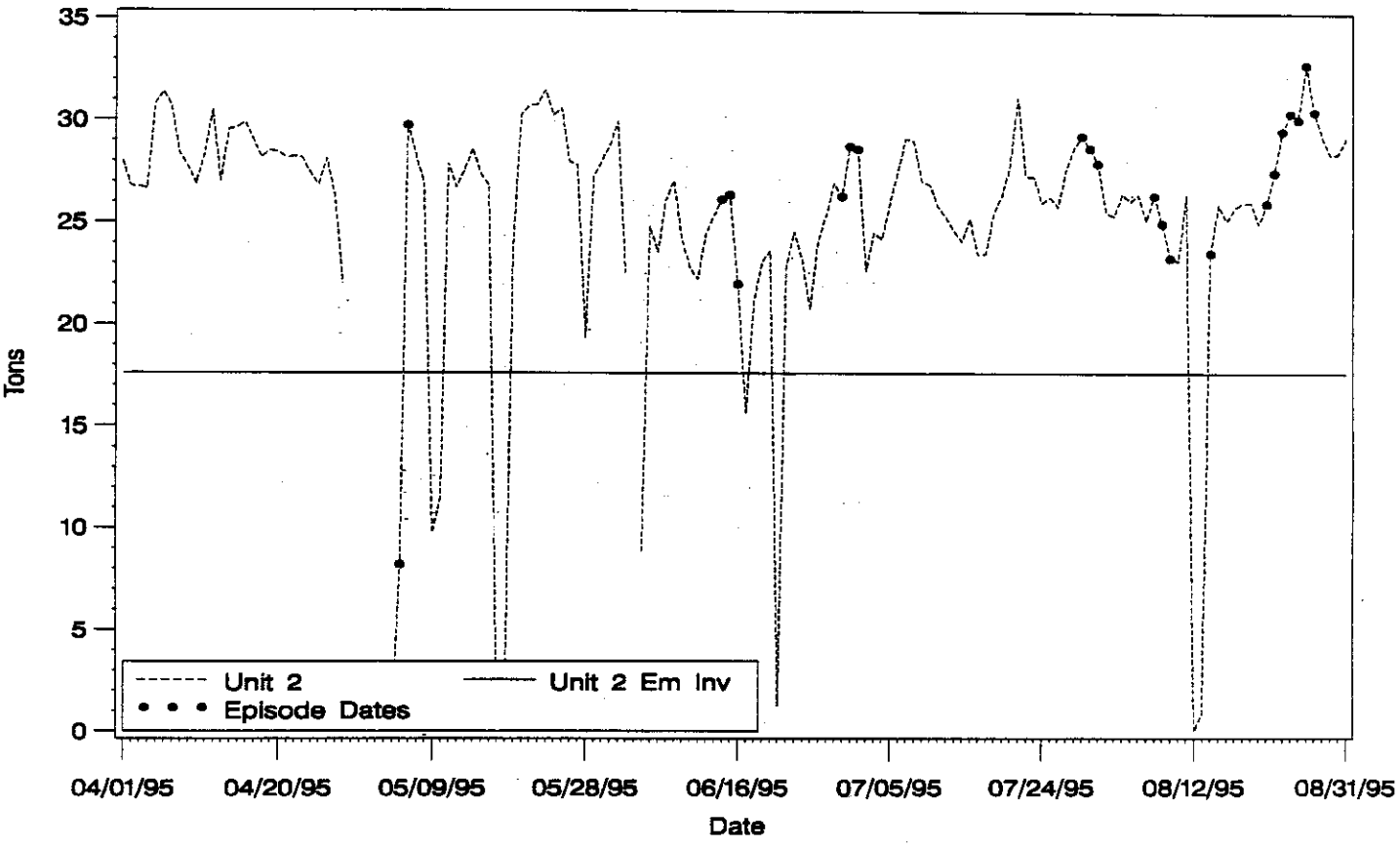

Continuous Emissions Monitoring Data From PSCo's Hayden Facility
Pollutant = CO2
Tons
7000
6000
5000
4000
3000
2000
1000
0
Unit 1
Episode Dates
04/01/95
04/20/95
05/09/95
05/28/95
06/16/95
07/05/95
07/24/95
08/12/95
Date
Tons
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Unit 2
Episode Dates
04/01/95
04/20/95
05/09/95
05/28/95
06/16/95
07/05/95
07/24/95
08/12/95
08/31/95
Date

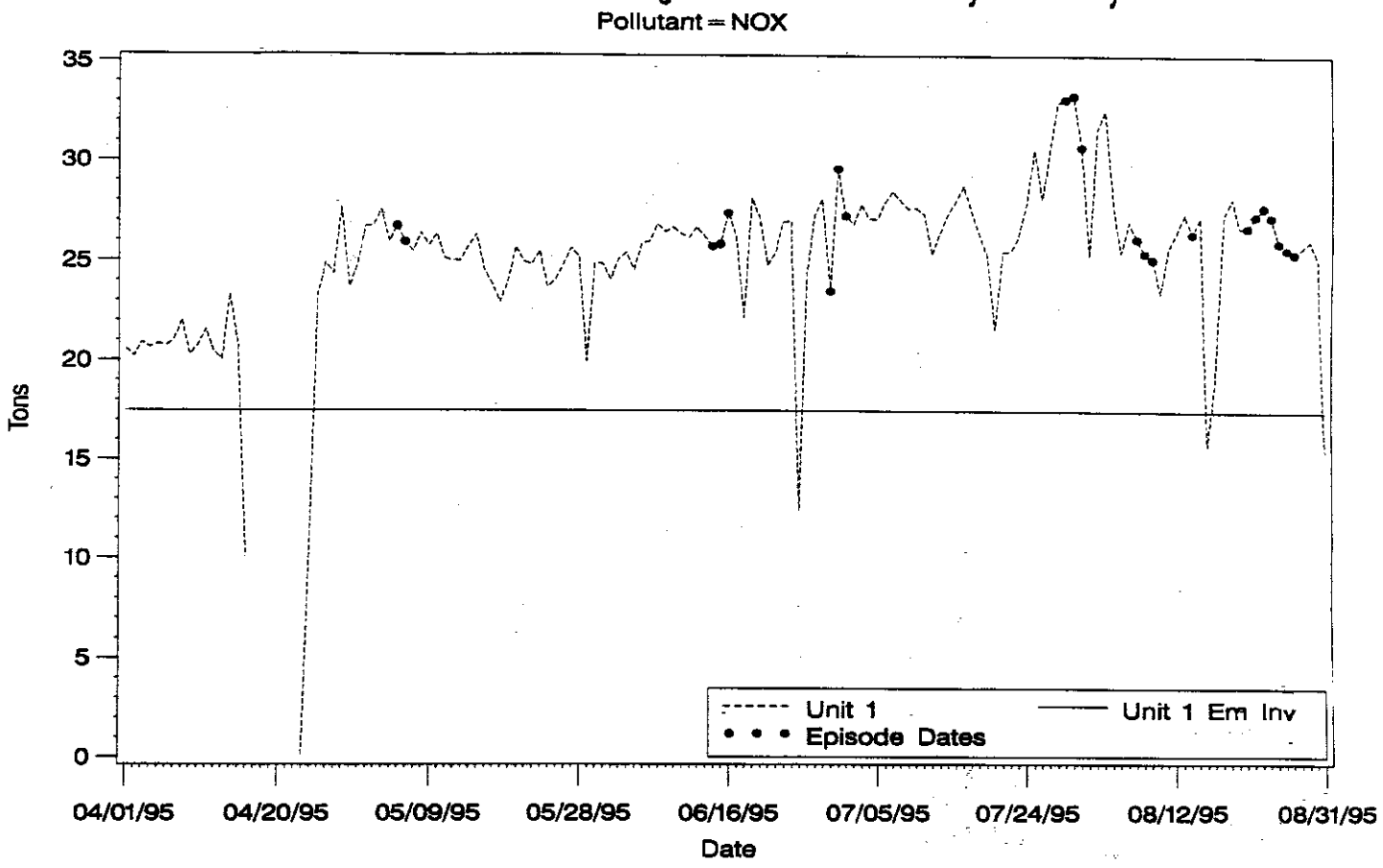
Continuous Emissions Monitoring Data From PSCo's Hayden Facility

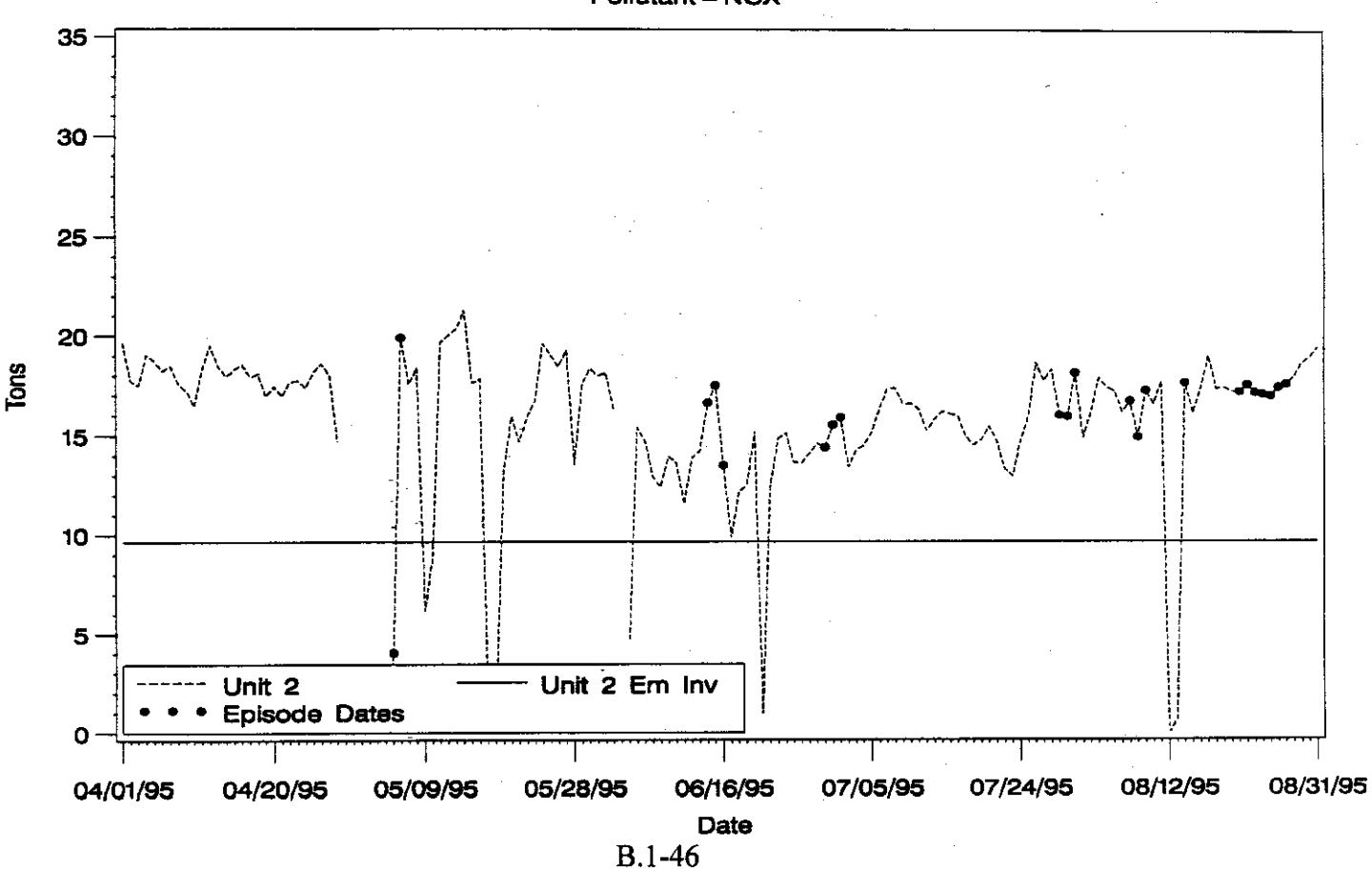
Pollutant = SO2



Pollutant = SO2

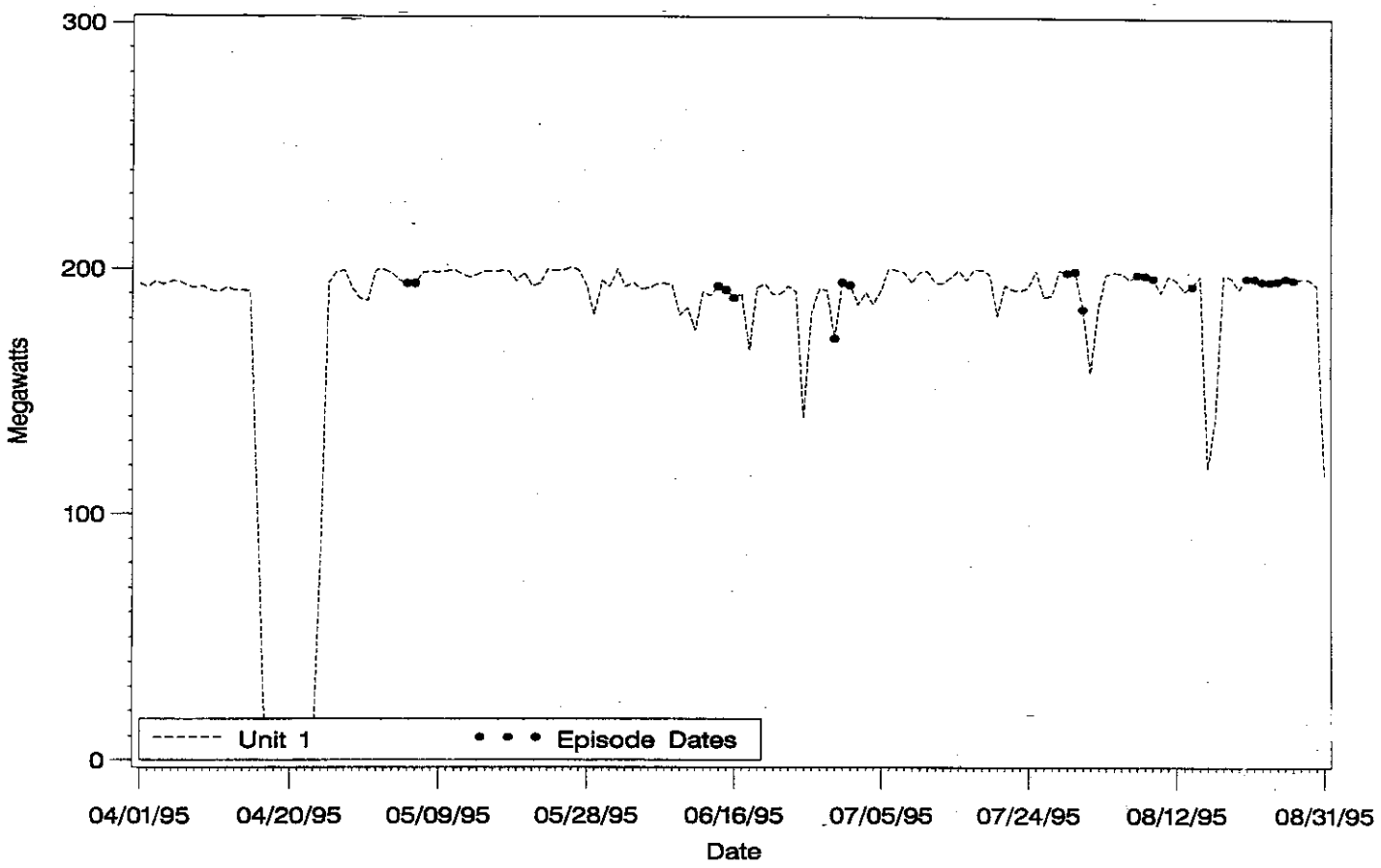


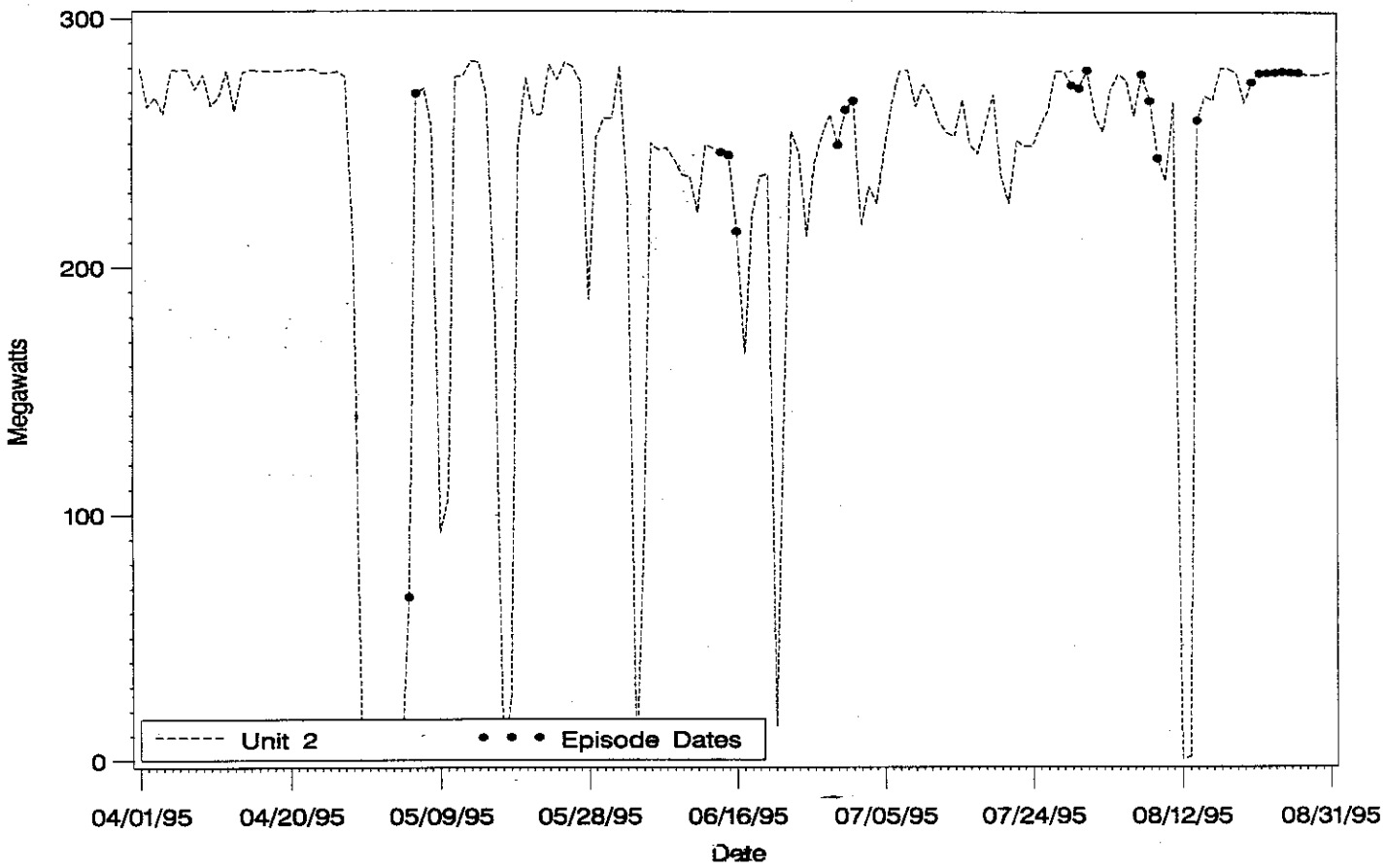

Continuous Emissions Monitoring Data From PSCo's Hayden Facility
Pollutant = NOX
Tons
35
30
25
20
15
10
5
0
Unit 1
Unit 1 Em Inv
Episode Dates
04/01/95
04/20/95
05/09/95
05/28/95
06/16/95
07/05/95
07/24/95
08/12/95
08/31/95
Date


Pollutant = NOX
Tons
35
30
25
20
15
10
5
0
Unit 2
Unit 2 Em Inv
Episode Dates
04/01/95
04/20/95
05/09/95
05/28/95
06/16/95
07/05/95
07/24/95
08/12/95
08/31/95
Date

Continuous Emissions Monitoring Data From PSCo's Hayden Facility

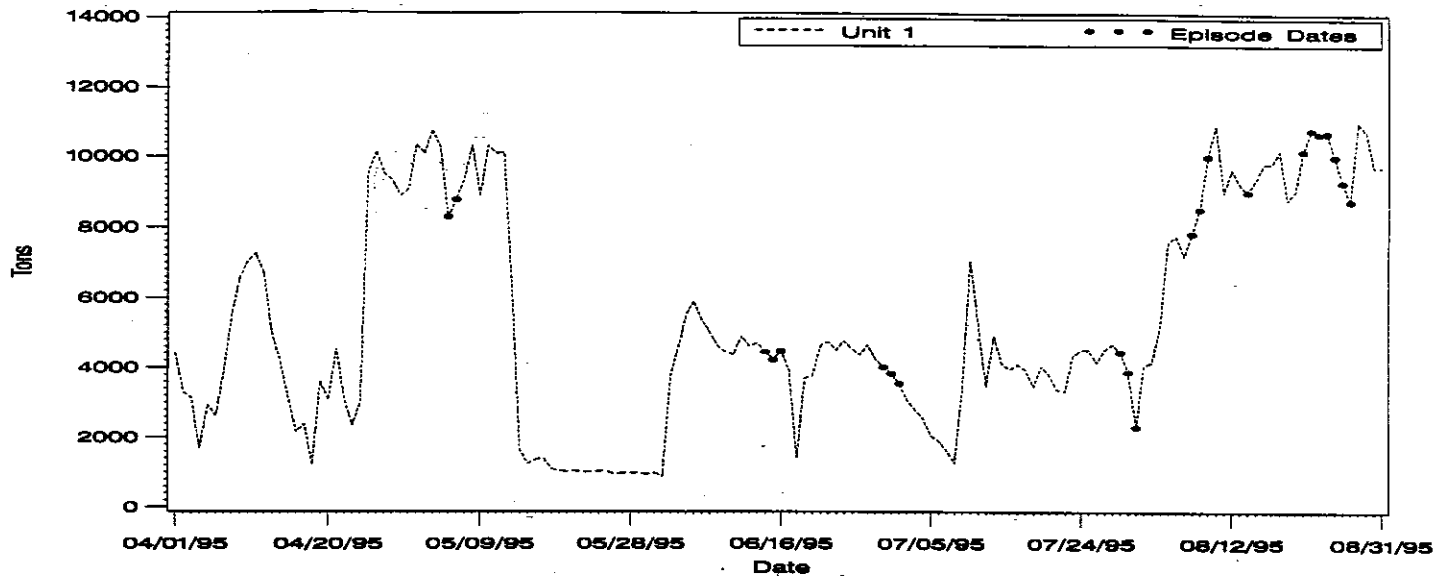
Daily Average Unit Load in Megawatts

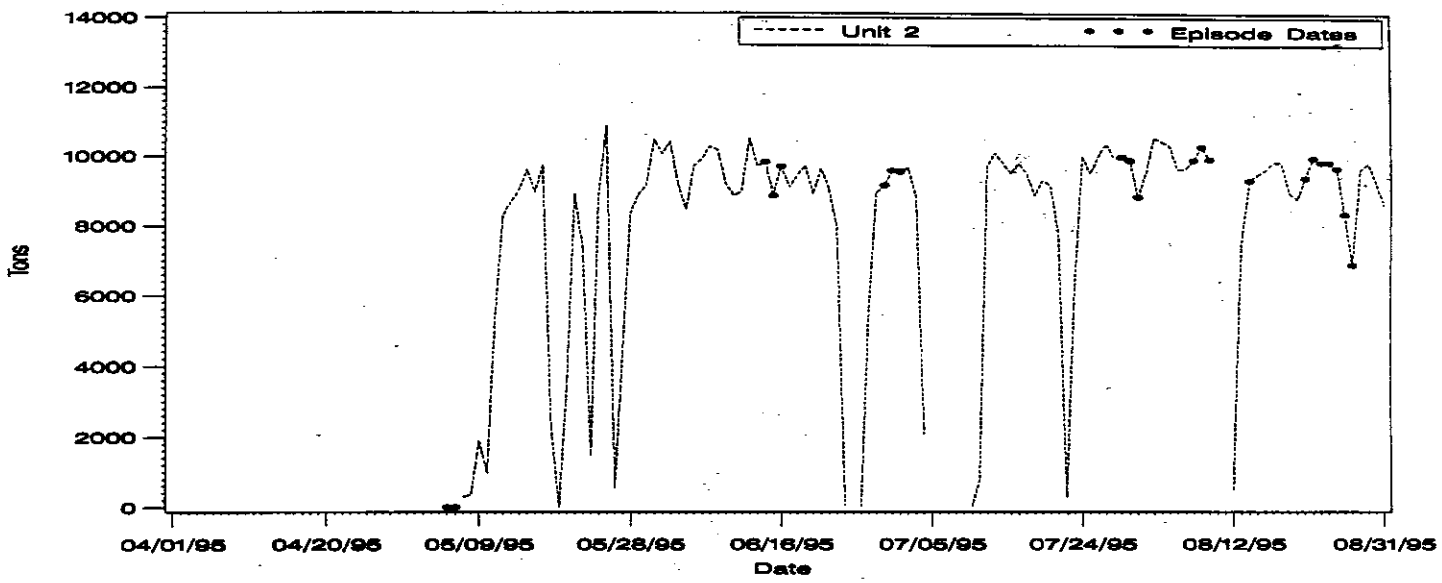


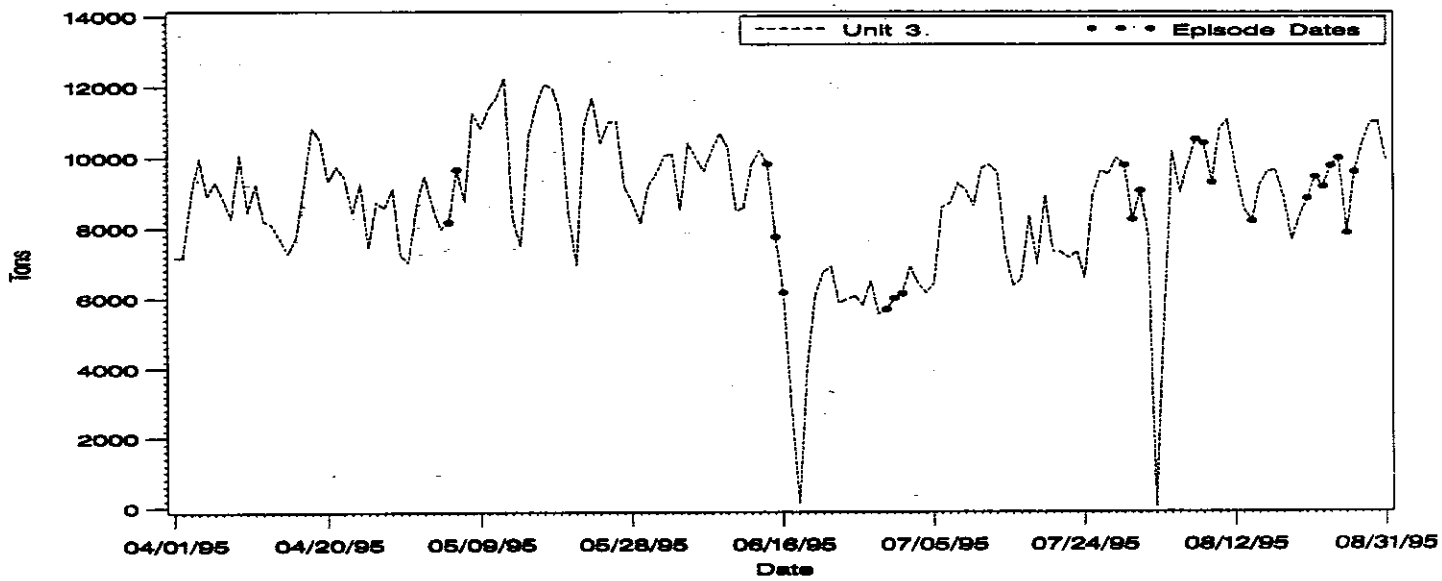


Continuous Emissions Monitoring Data From Tri-State's Craig Facility

Pollutant=CO2

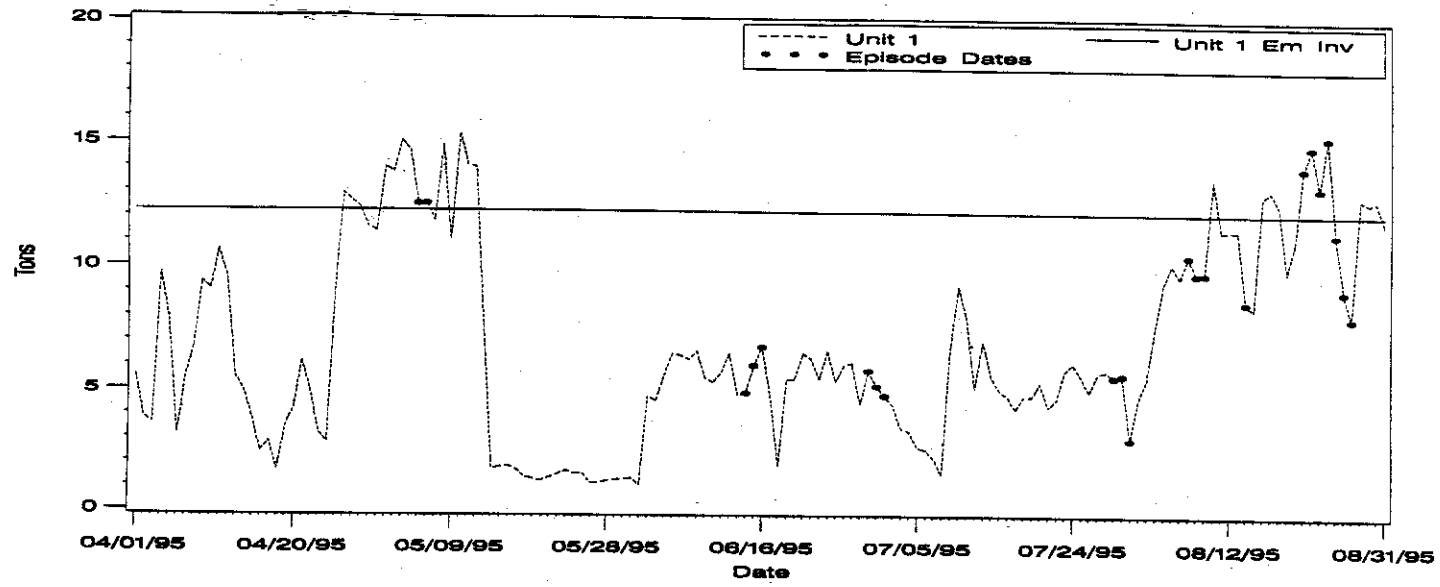


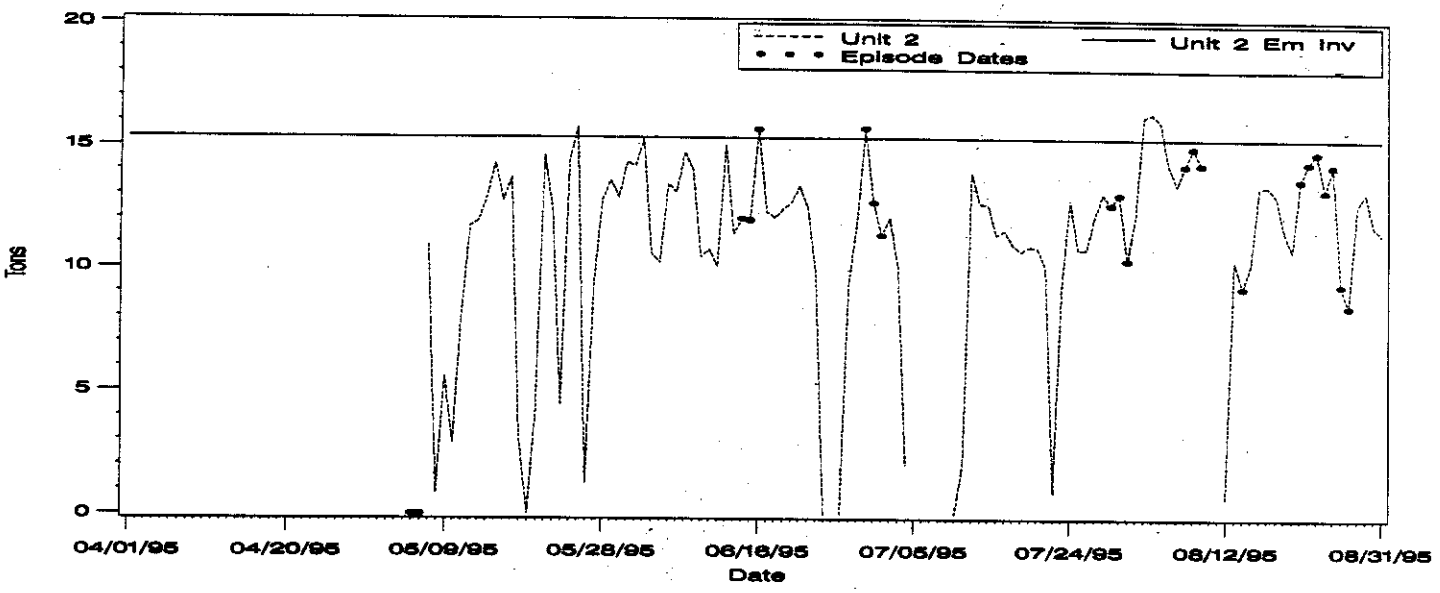


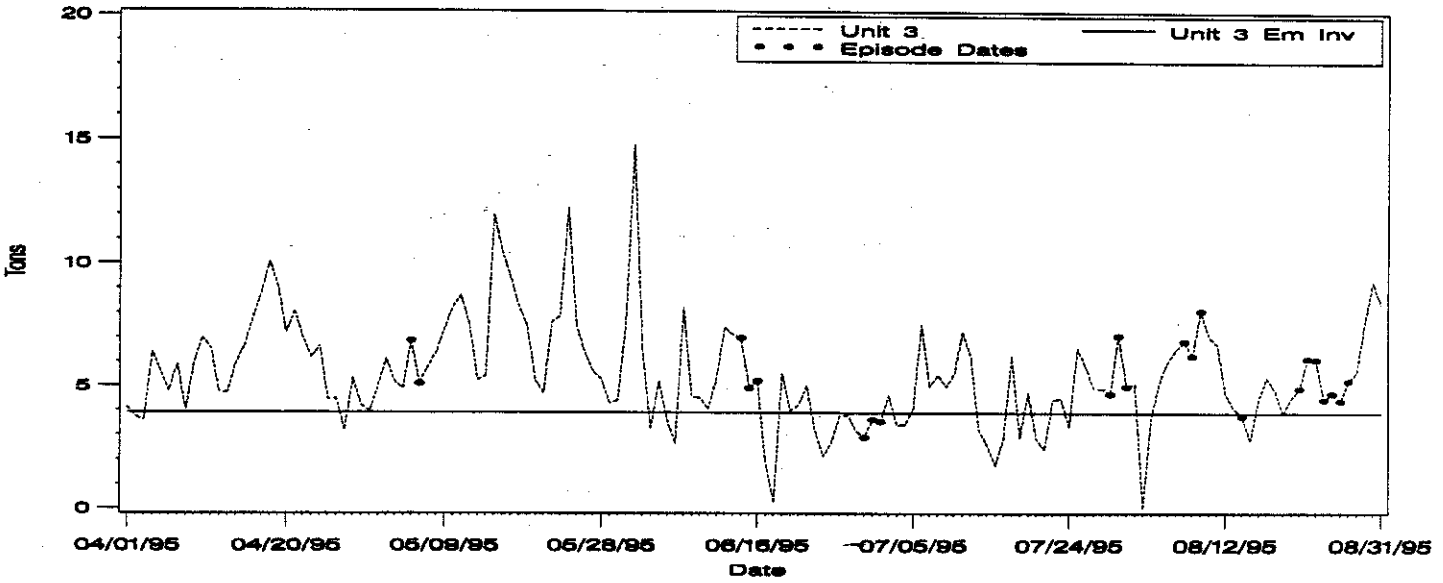


Continuous Emissions Monitoring Data From Tri-State's Craig Facility

Pollutant = SO2

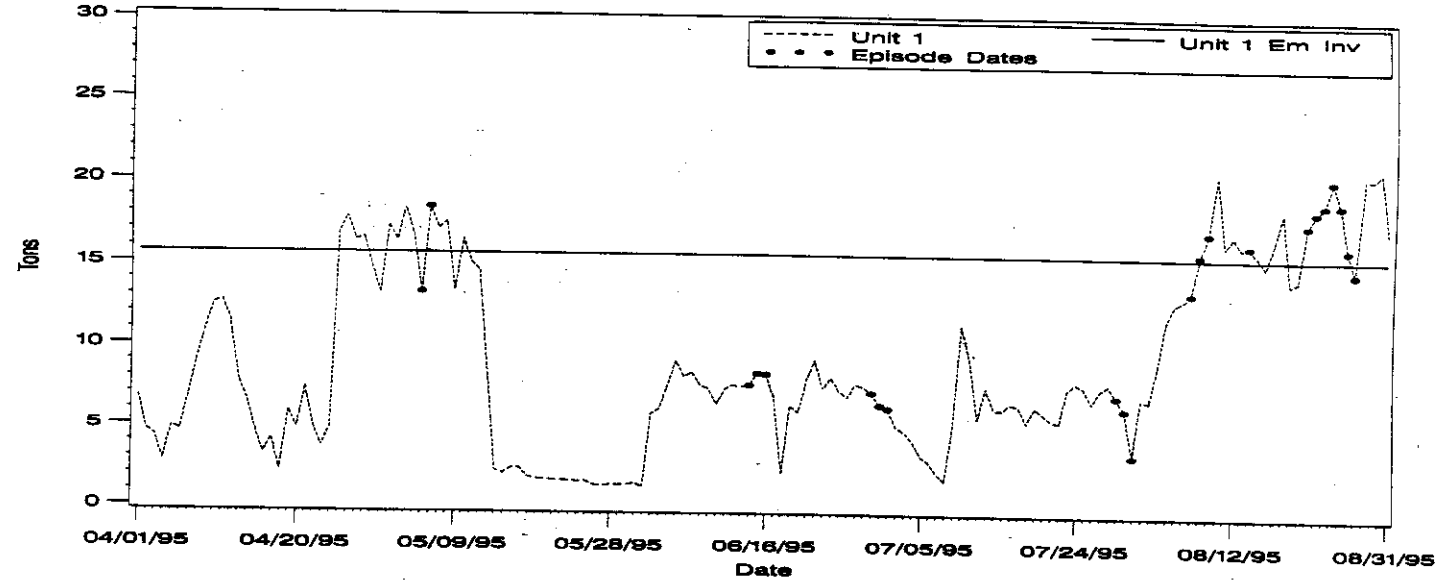


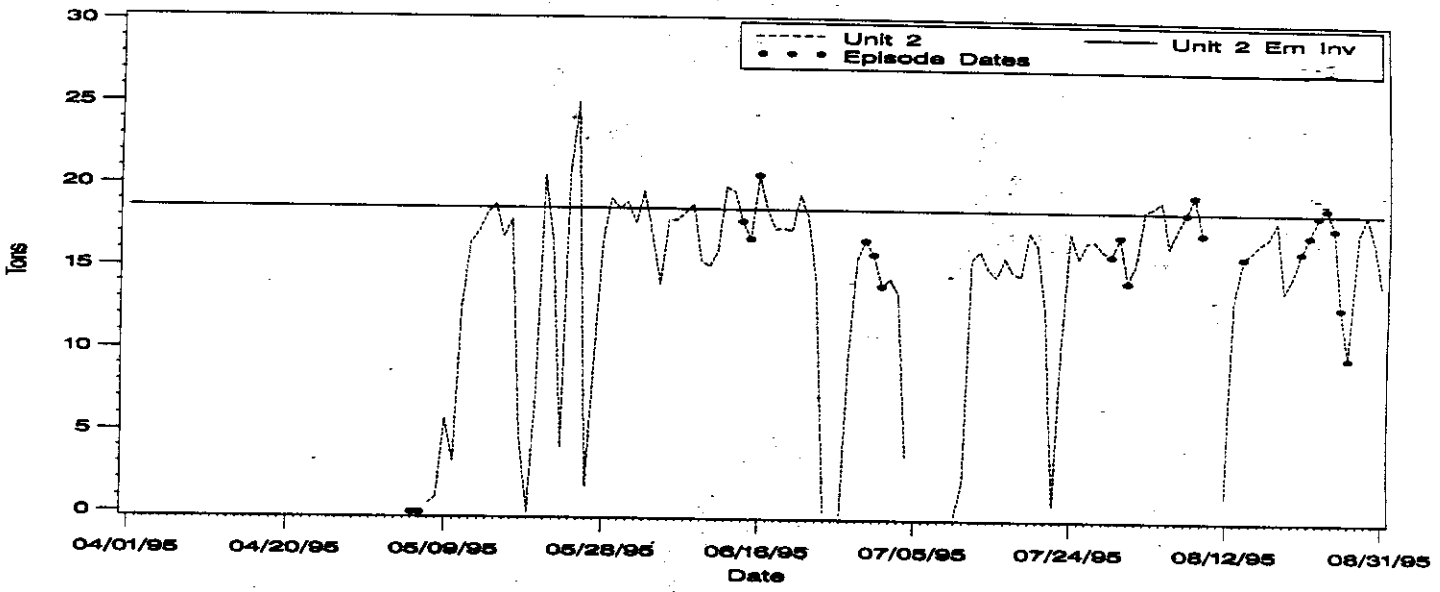


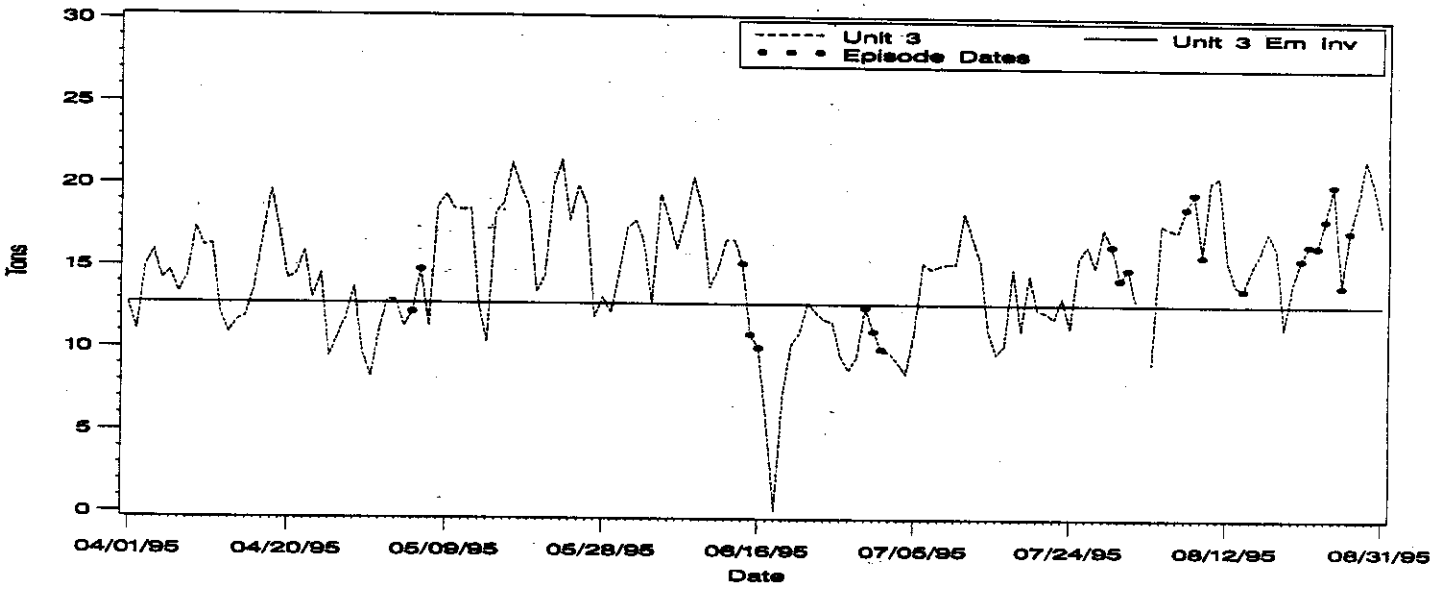


Continuous Emissions Monitoring Data From Tri-State's Craig Facility

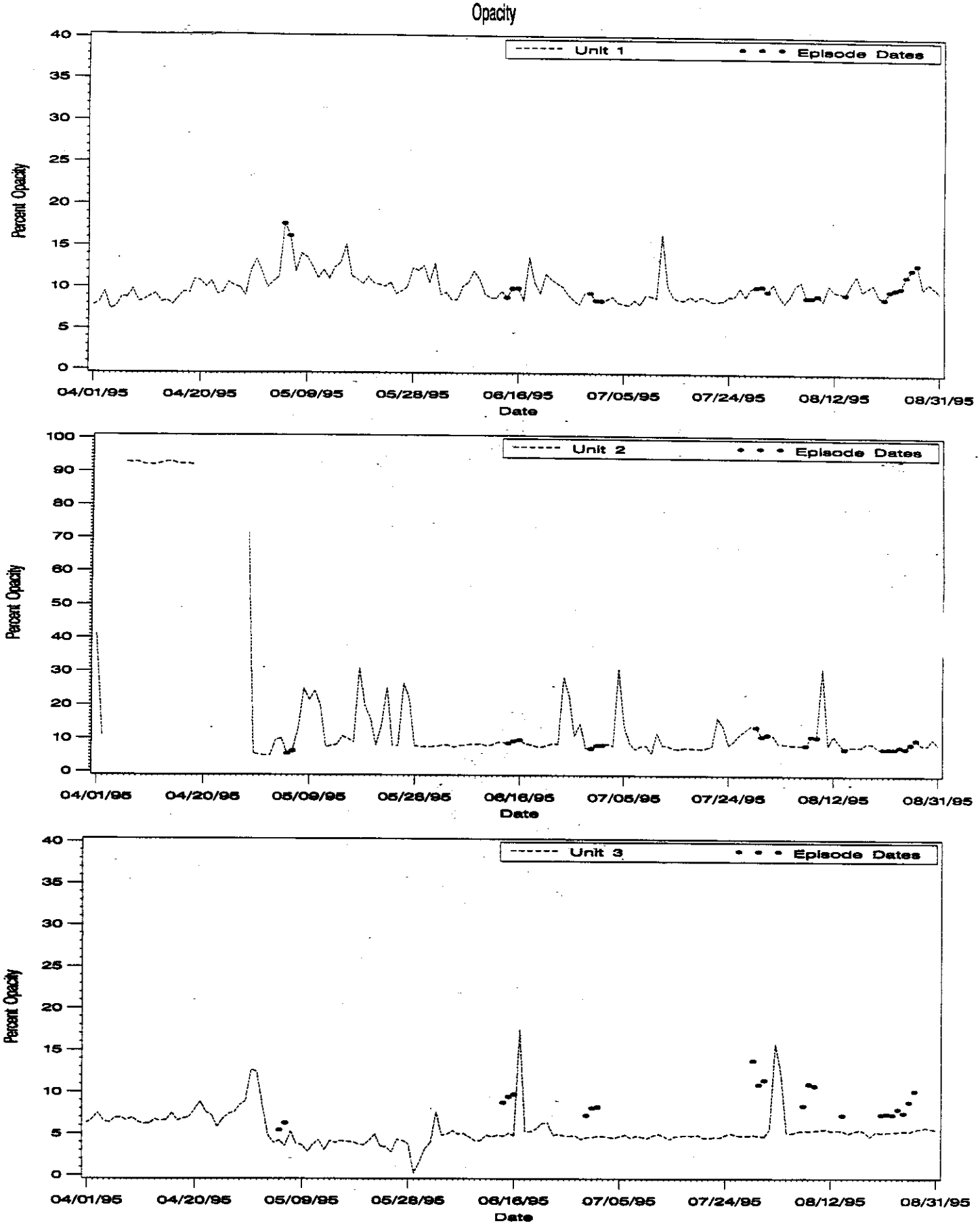
Pollutant = NOX





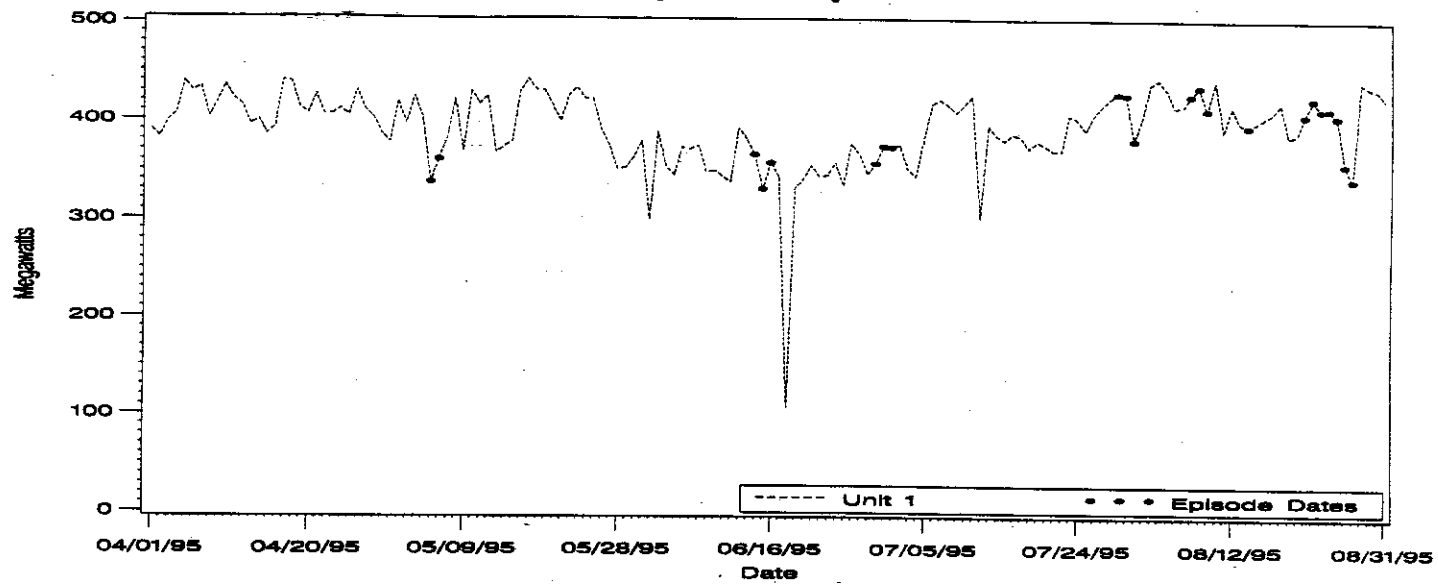


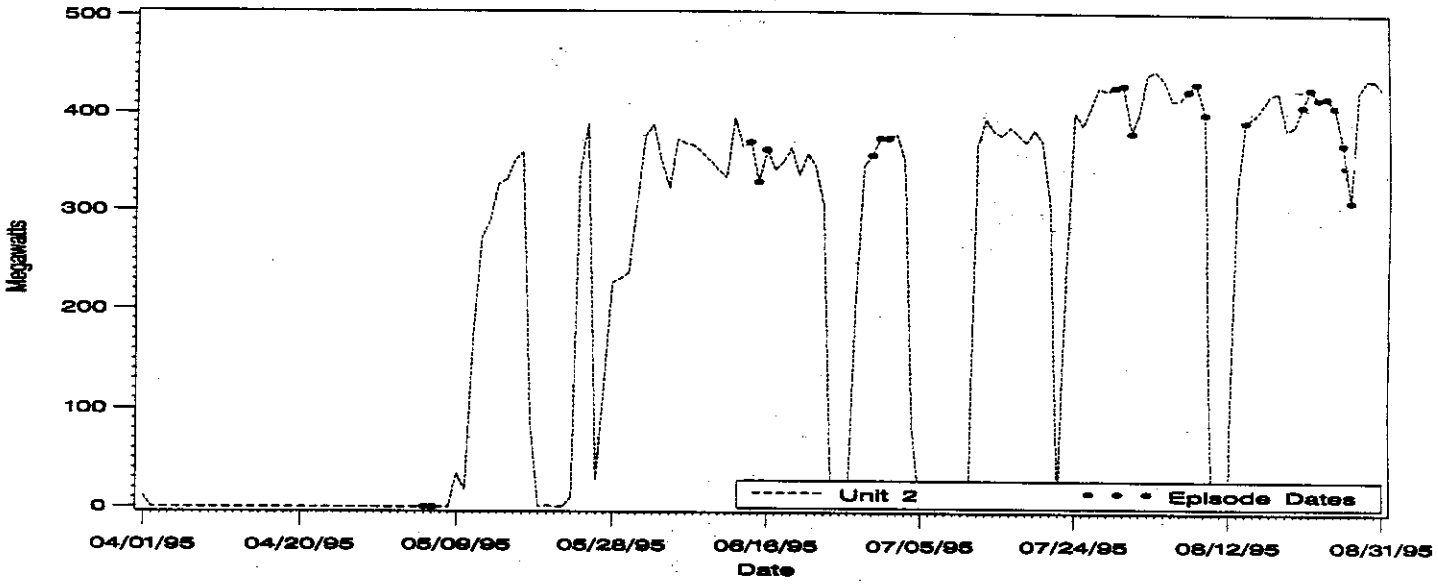
Continuous Emissions Monitoring Data From Tri-State's Craig Facility

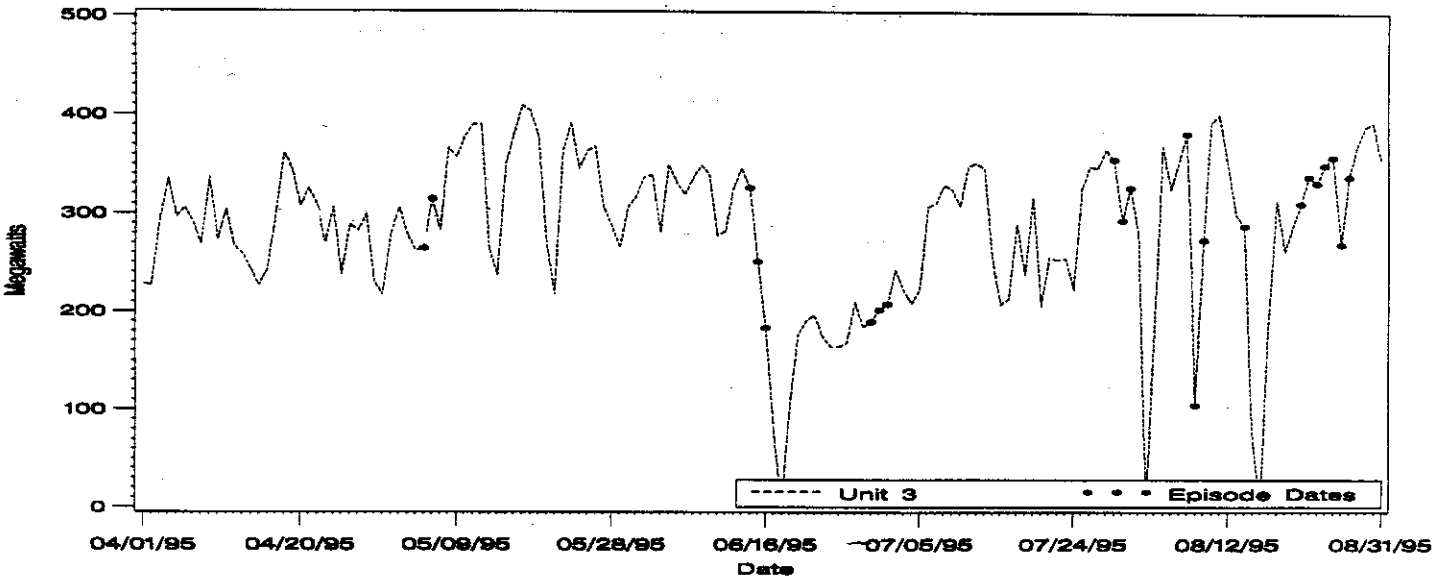


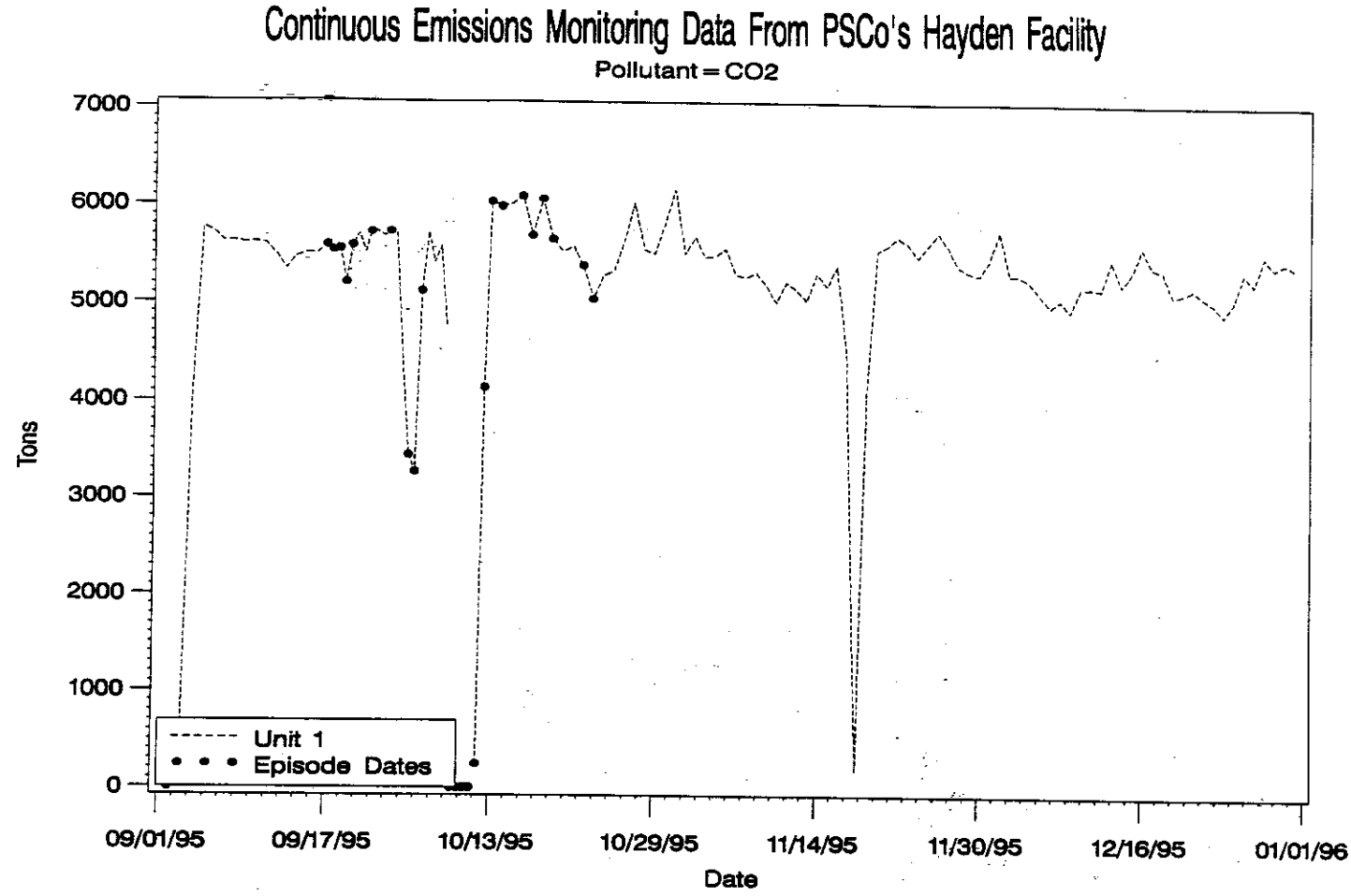
Continuous Emissions Monitoring Data From Tri-State's Craig Facility

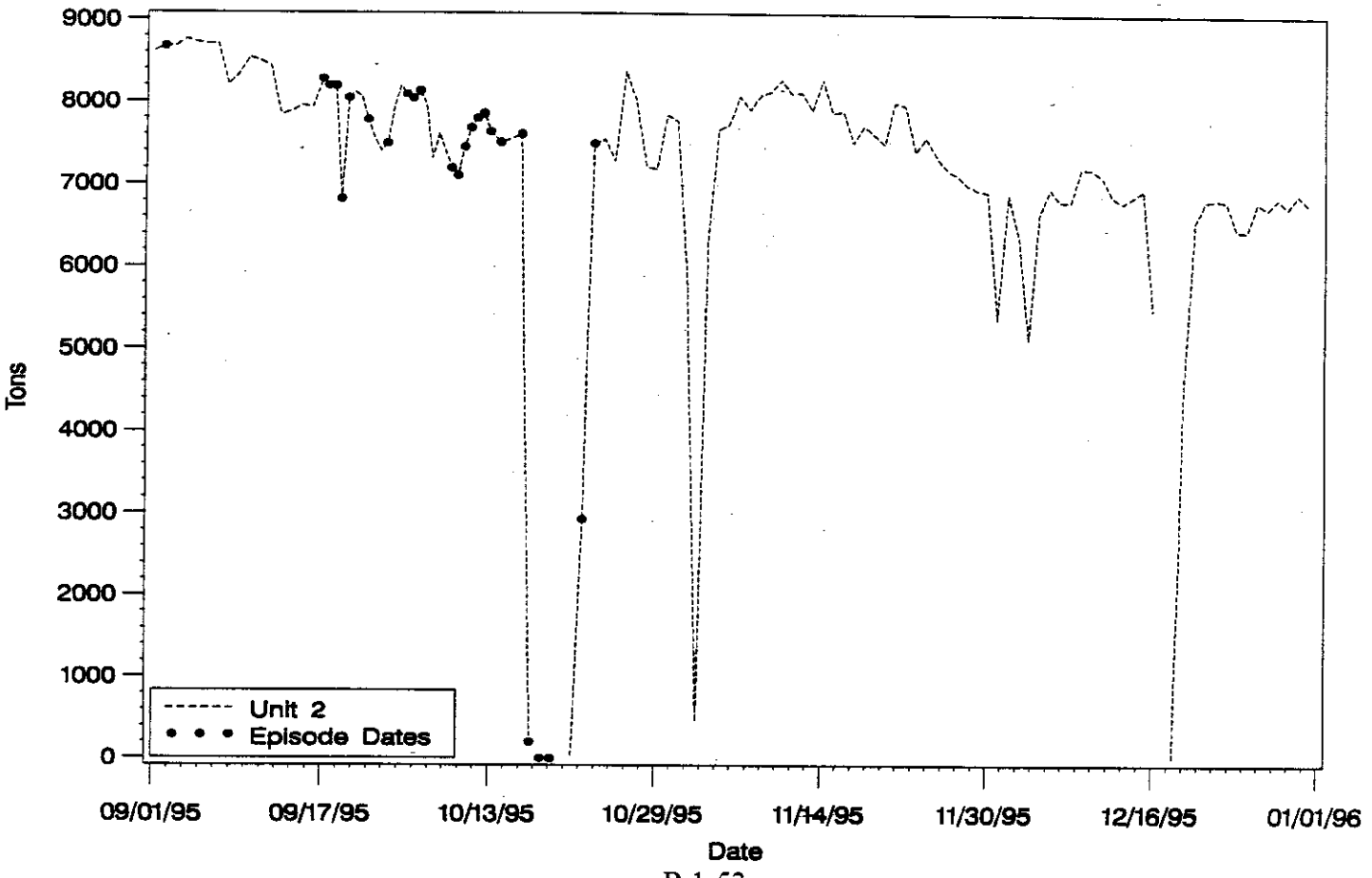
Daily Average Unit Load in Megawatts



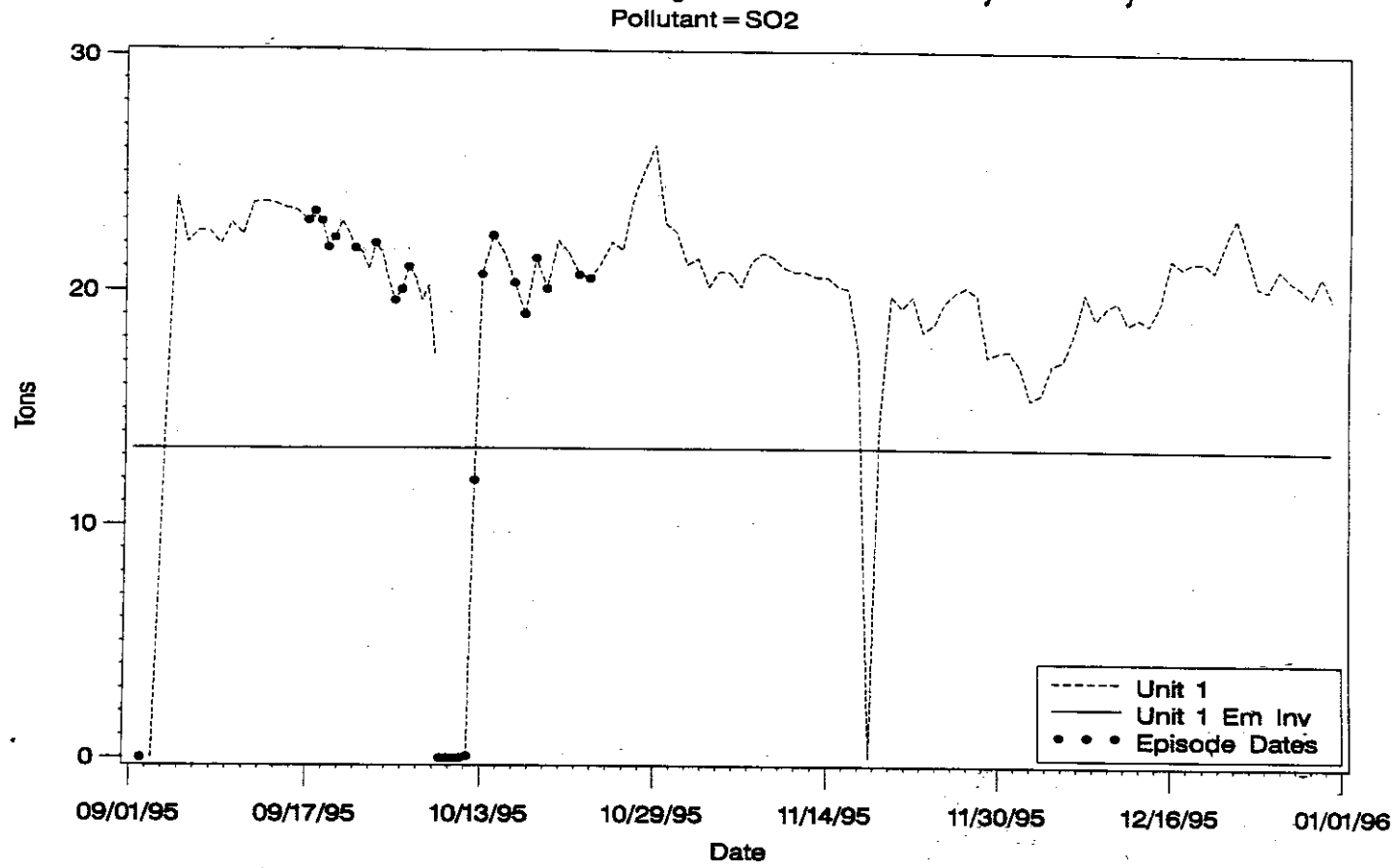


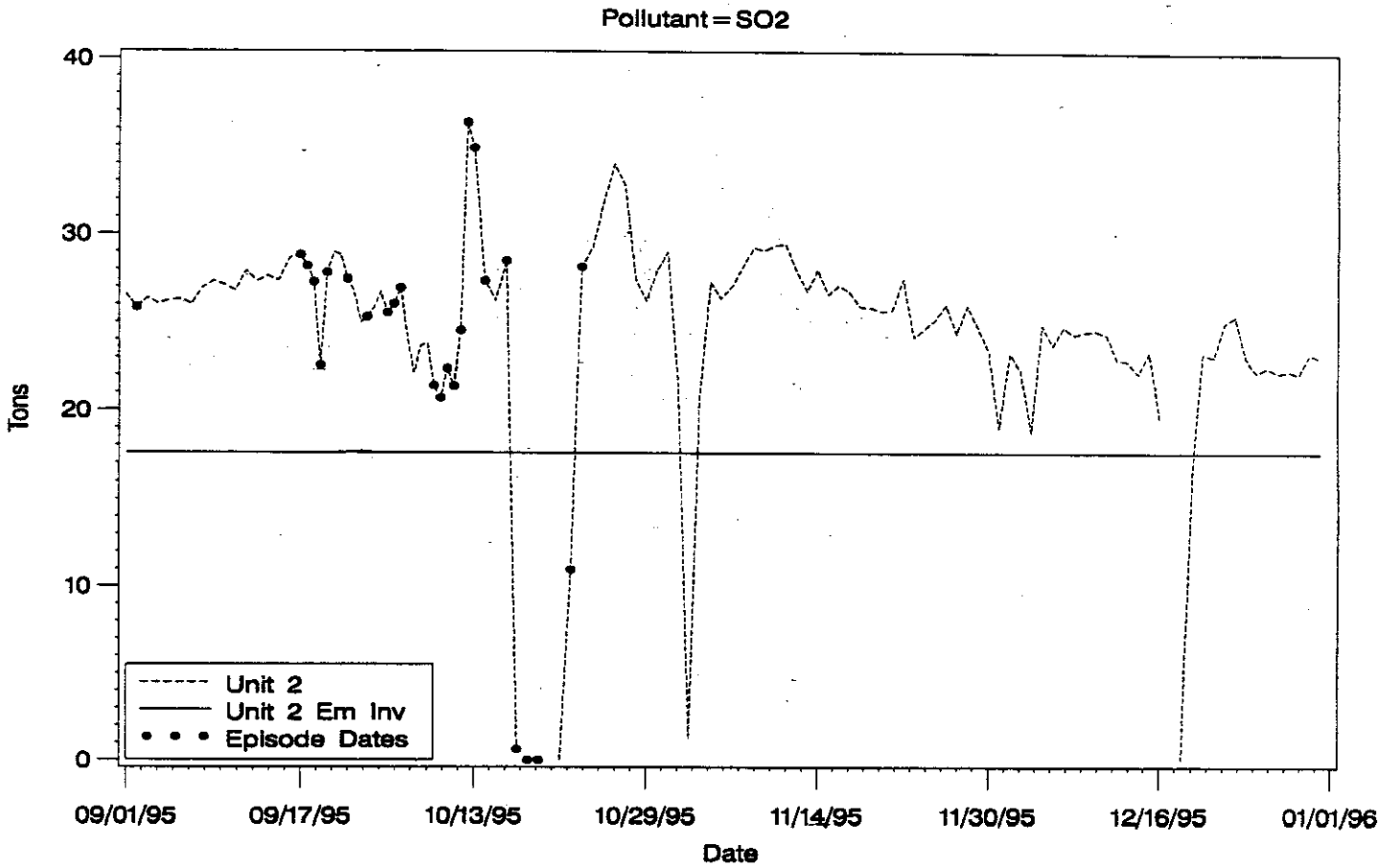


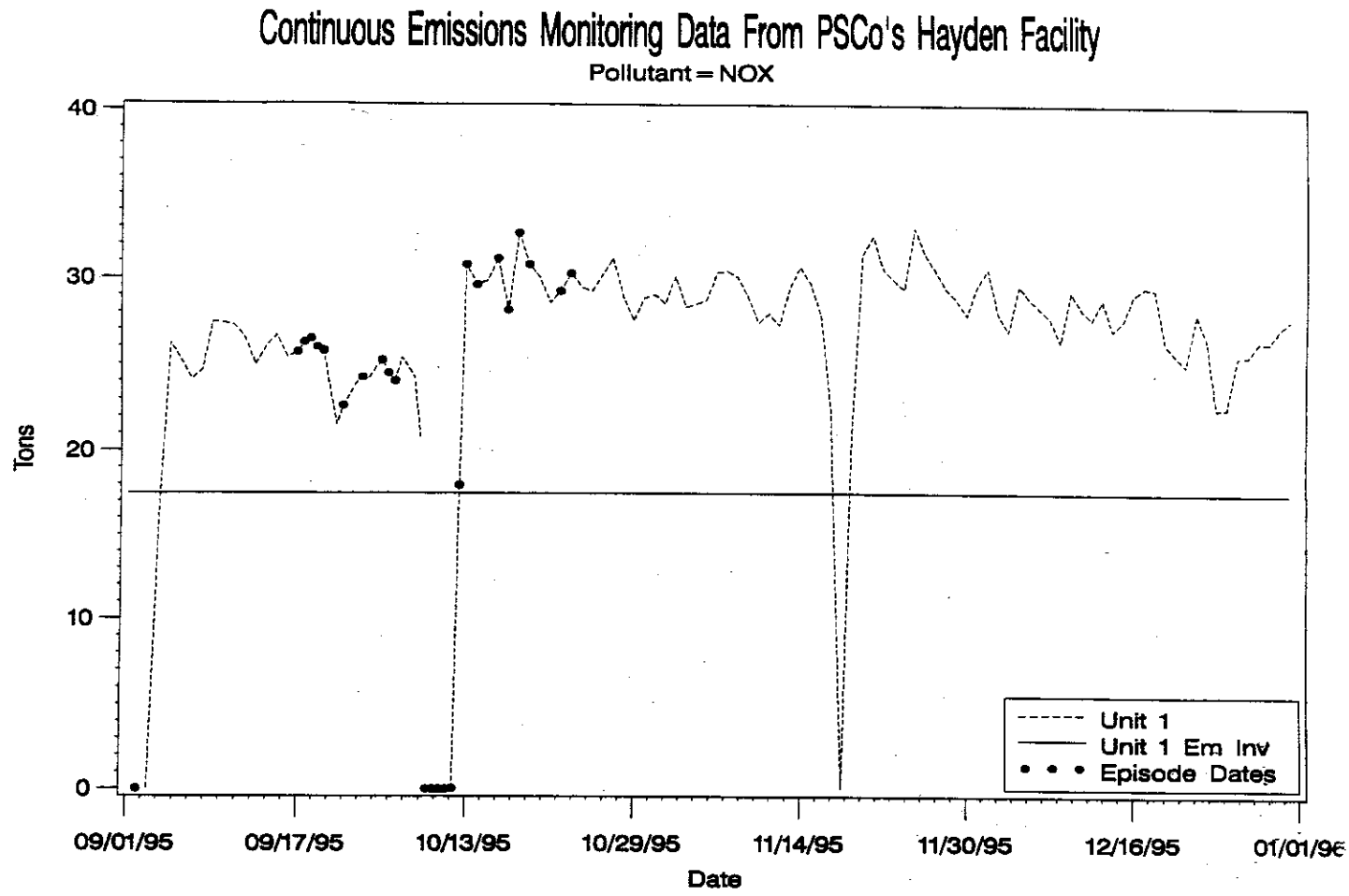

Continuous Emissions Monitoring Data From PSCo's Hayden Facility
Pollutant = CO2
7000
6000
5000
4000
3000
2000
1000
0
Tons
Unit 1
Episode Dates
09/01/95
09/17/95
10/13/95
10/29/95
11/14/95
11/30/95
12/16/95
01/01/96
Date

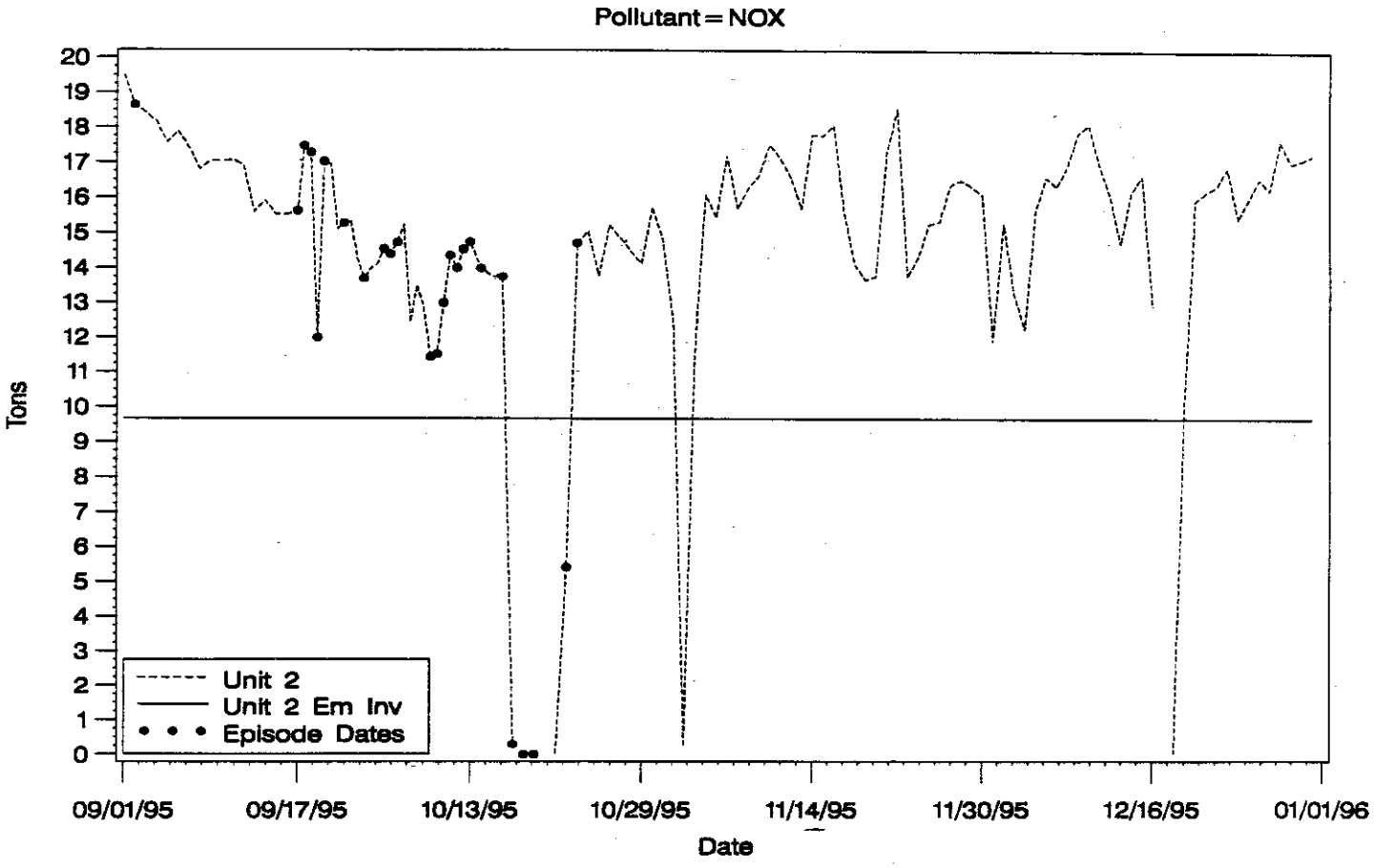

9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Tons
Unit 2
Episode Dates
09/01/95
09/17/95
10/13/95
10/29/95
11/14/95
11/30/95
12/16/95
01/01/96
Date

Continuous Emissions Monitoring Data From PSCo's Hayden Facility



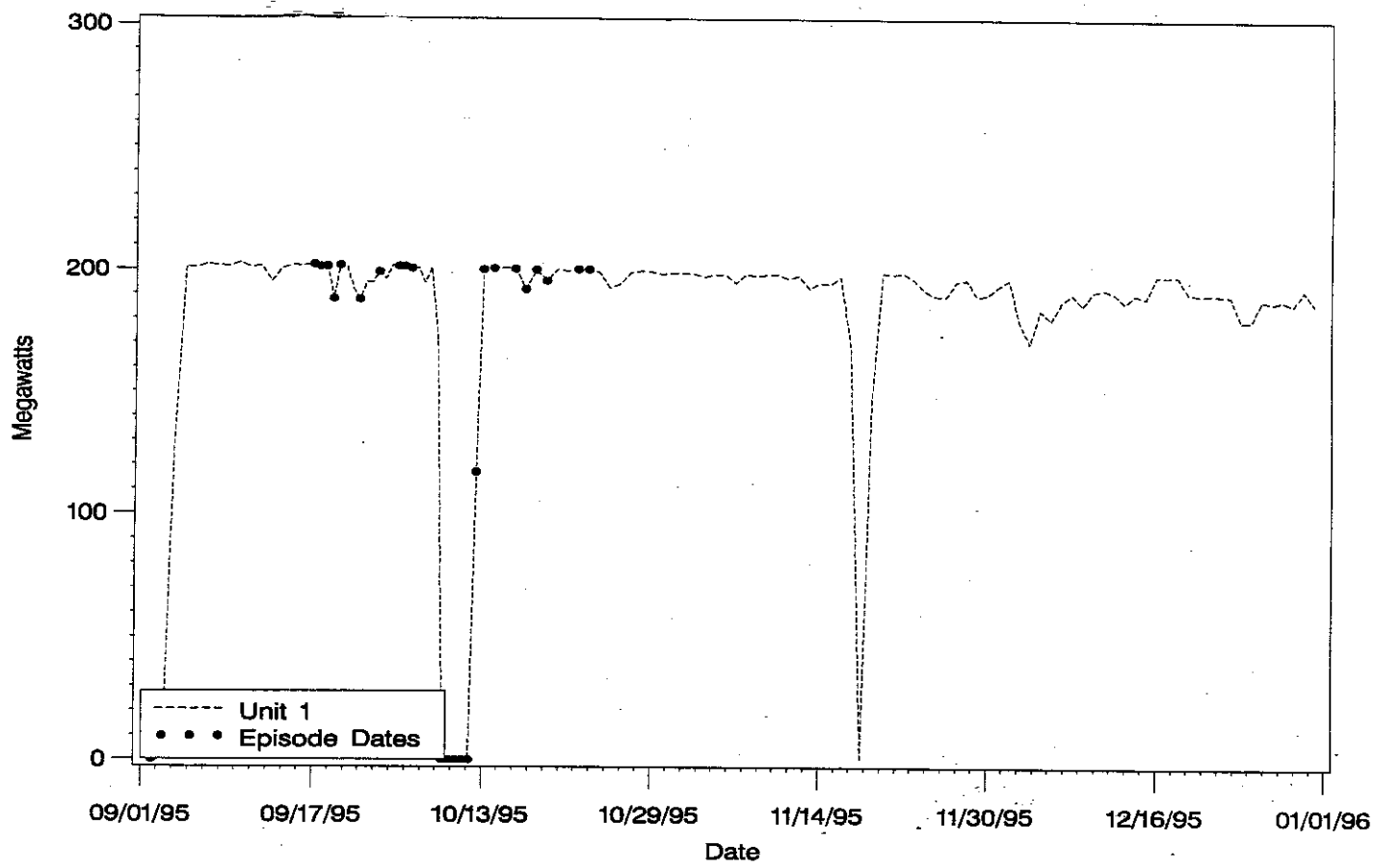


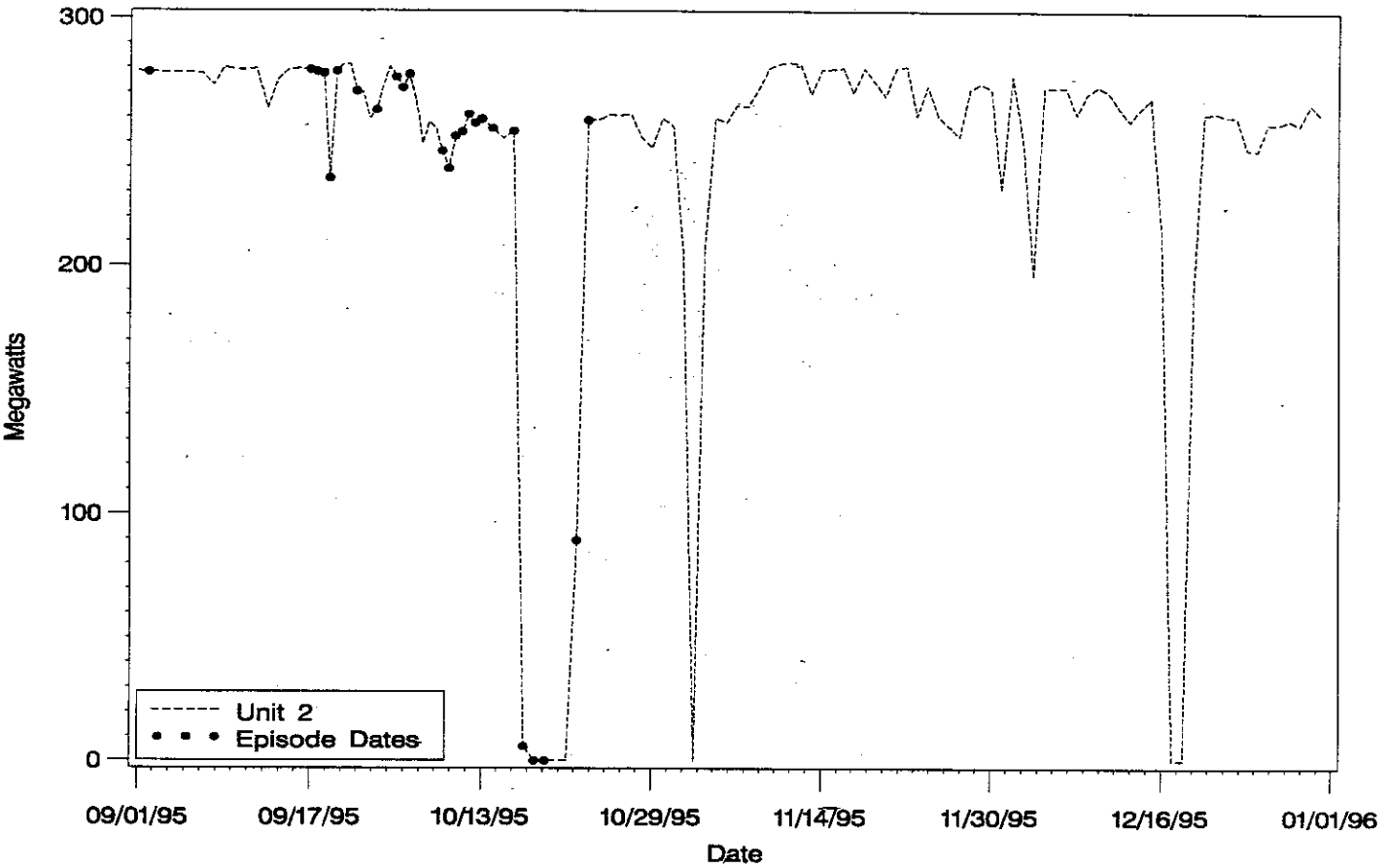

Continuous Emissions Monitoring Data From PSCo's Hayden Facility
Pollutant = NOX
Tons
40
30
20
10
0
09/01/95
09/17/95
10/13/95
10/29/95
11/14/95
11/30/95
12/16/95
01/01/96
Date
Unit 1
Unit 1 Em Inv
Episode Dates


Pollutant = NOX
Tons
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
09/01/95
09/17/95
10/13/95
10/29/95
11/14/95
11/30/95
12/16/95
01/01/96
Date
Unit 2
Unit 2 Em Inv
Episode Dates

Continuous Emissions Monitoring Data From PSCo's Hayden Facility

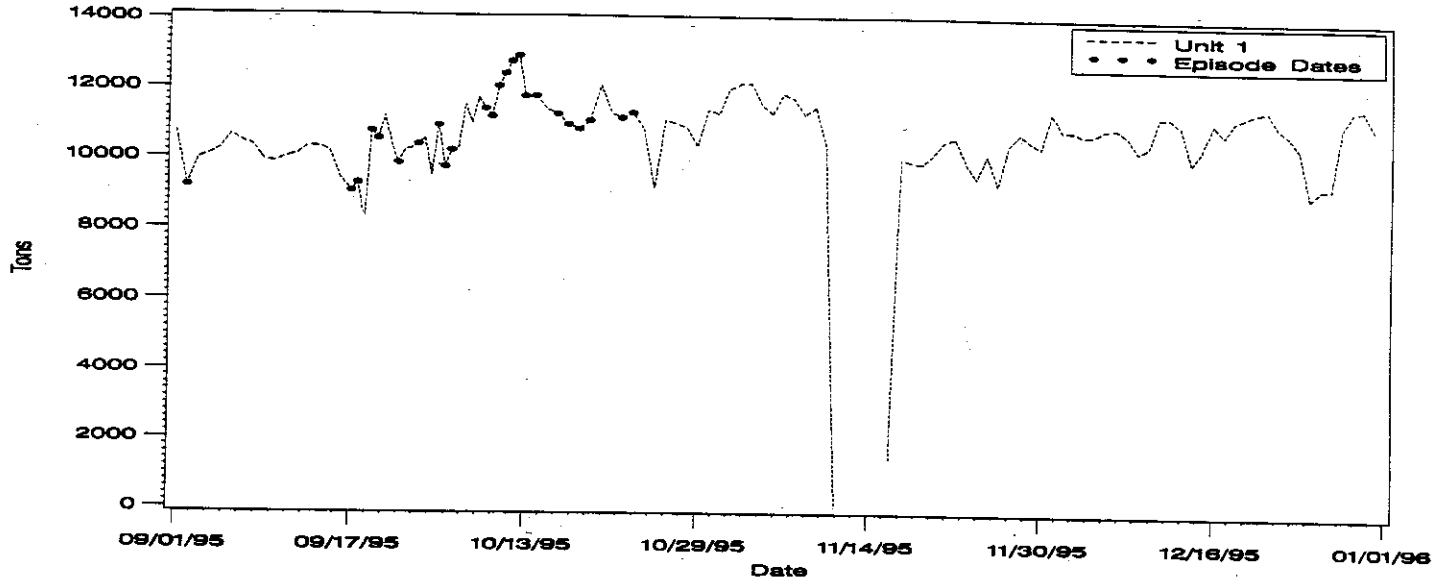
Daily Average Unit Load in Megawatts

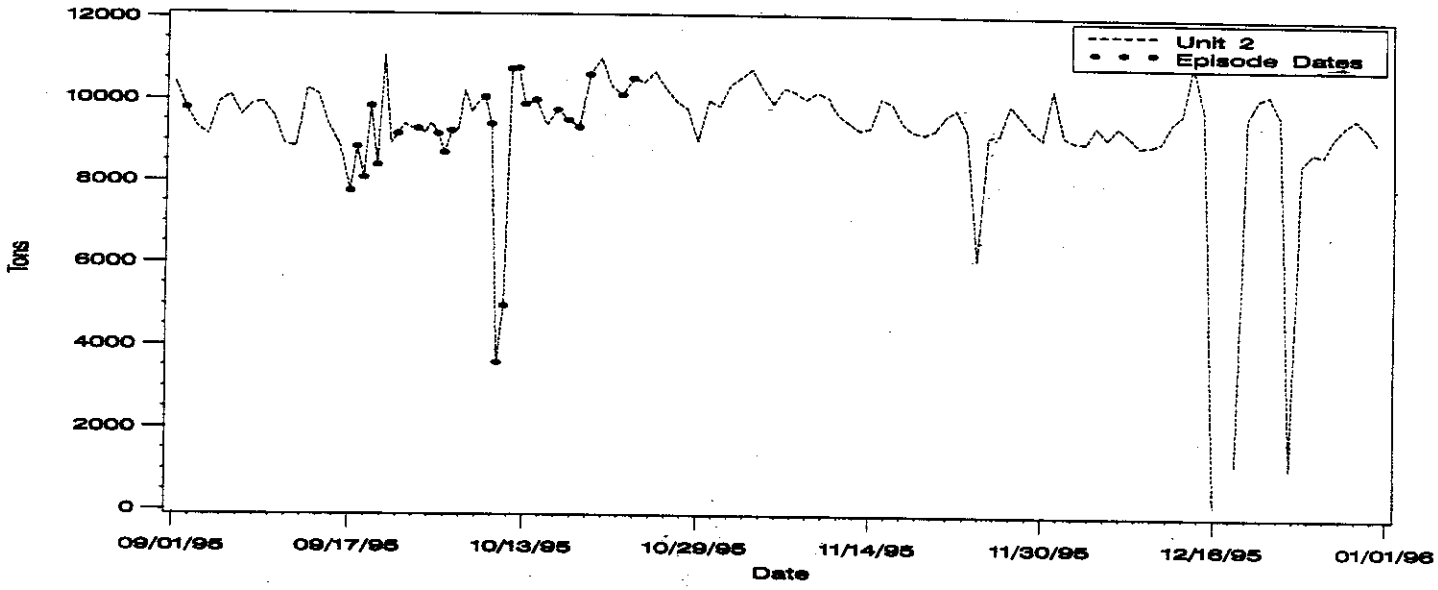


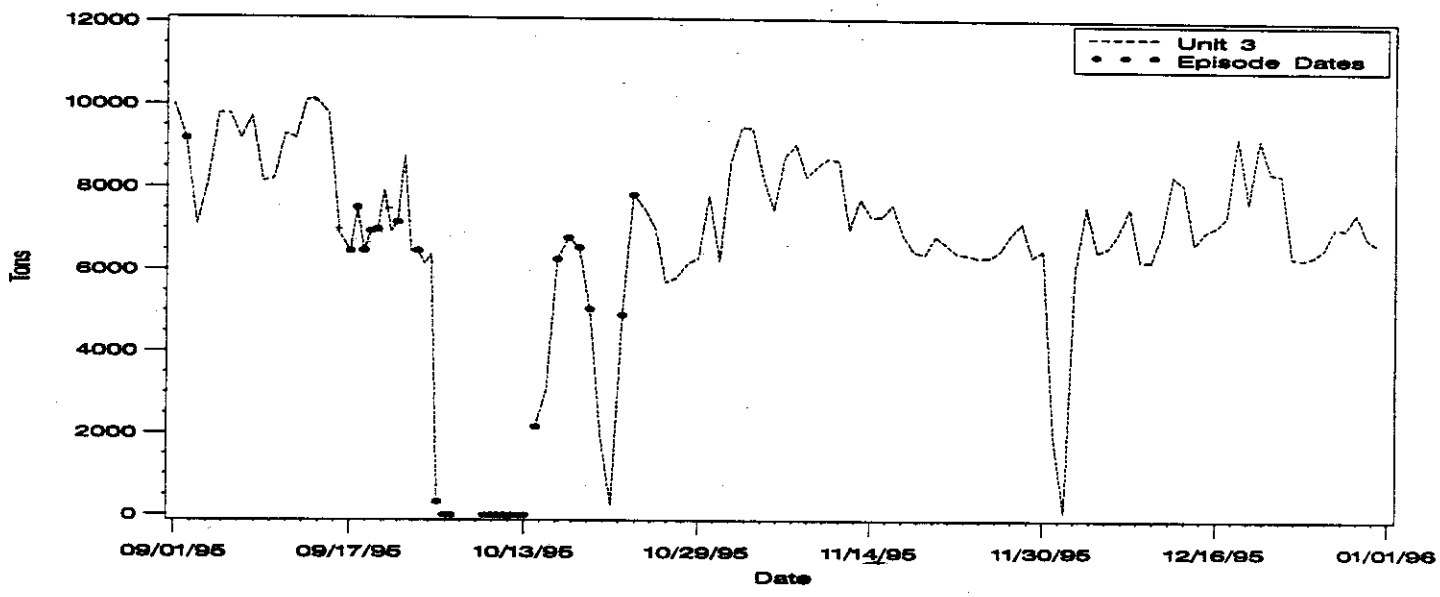


Continuous Emissions Monitoring Data From Tri-State's Craig Facility

Pollutant = CO2

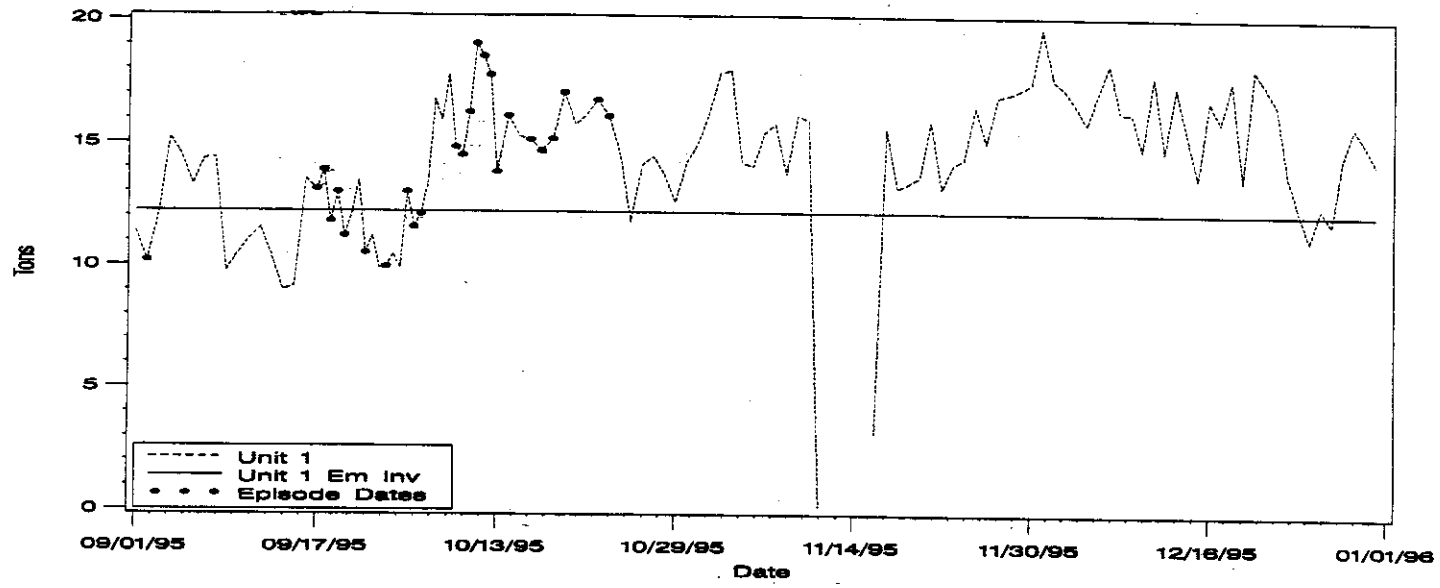


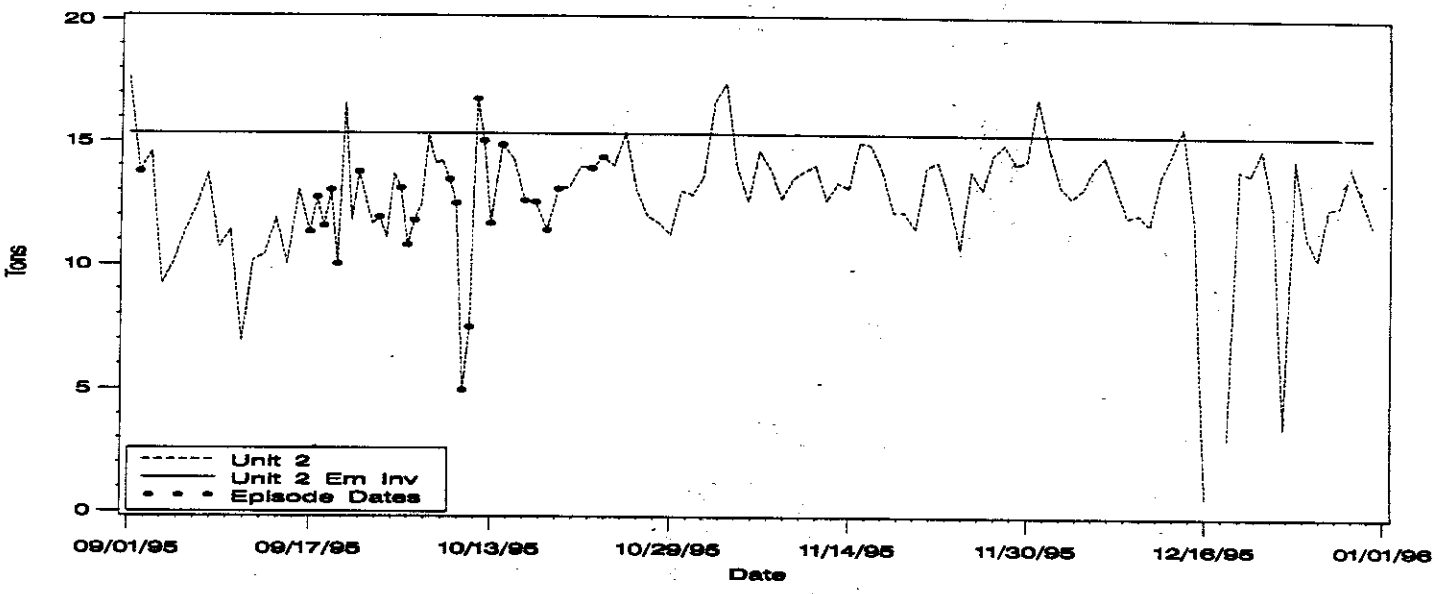


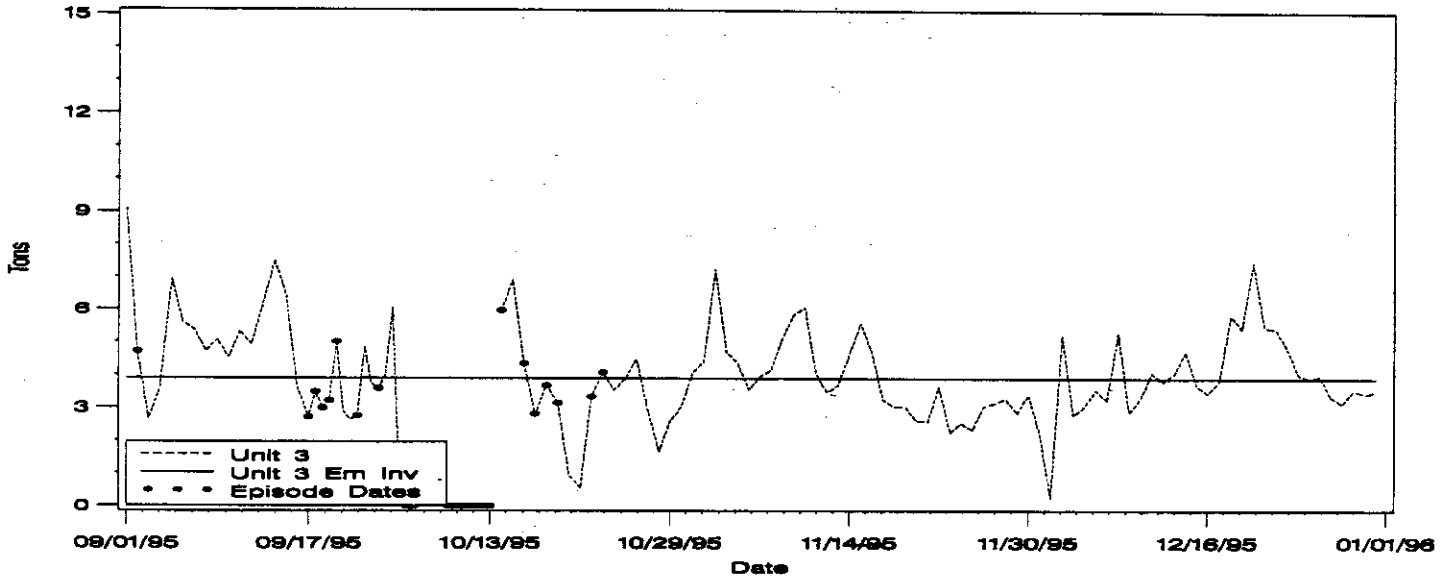


Continuous Emissions Monitoring Data From Tri-State's Craig Facility

Pollutant = SO2

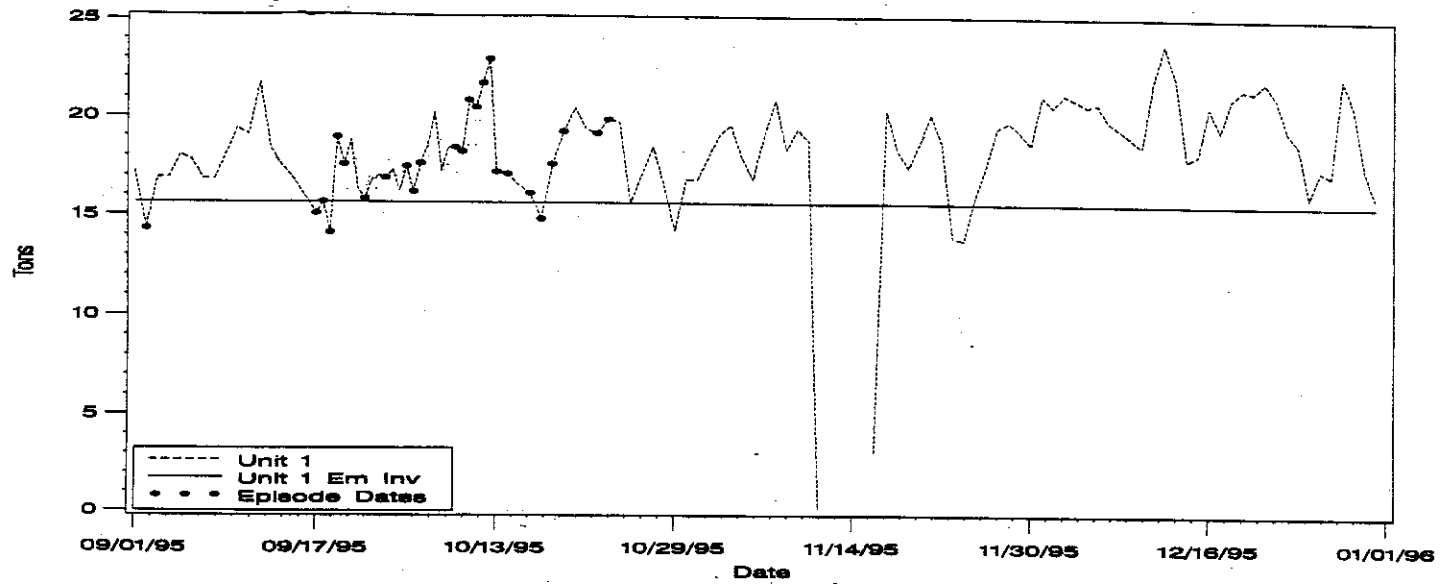


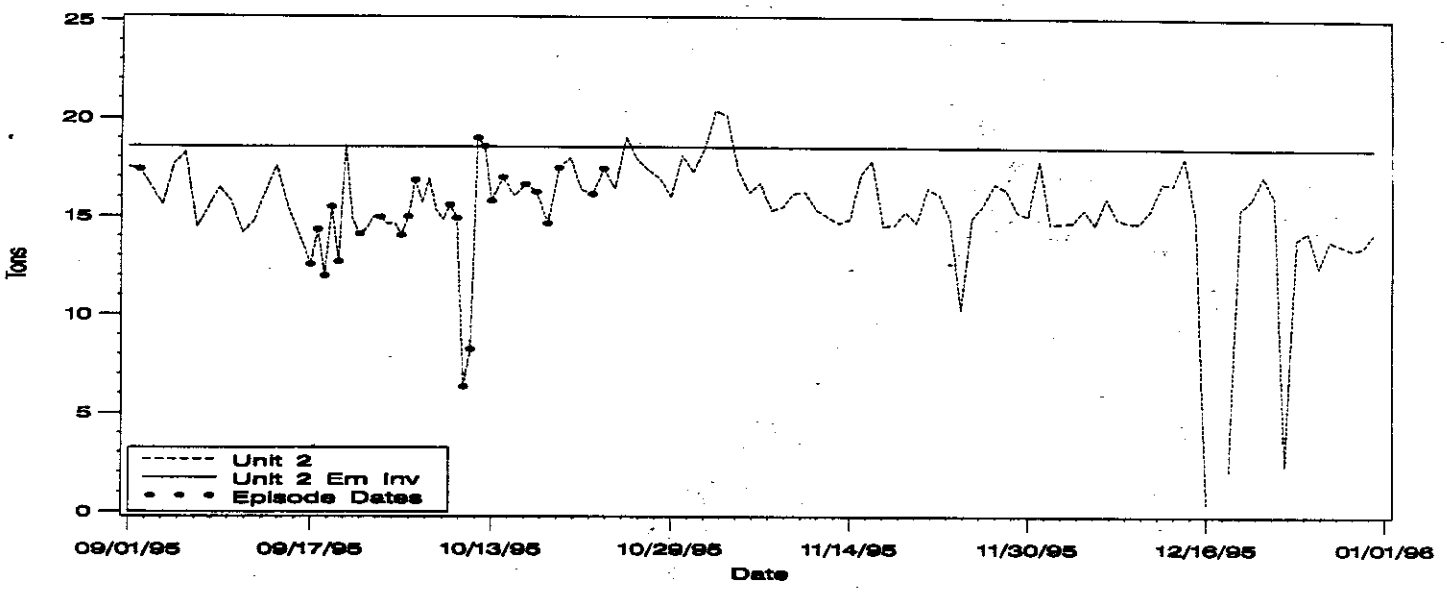


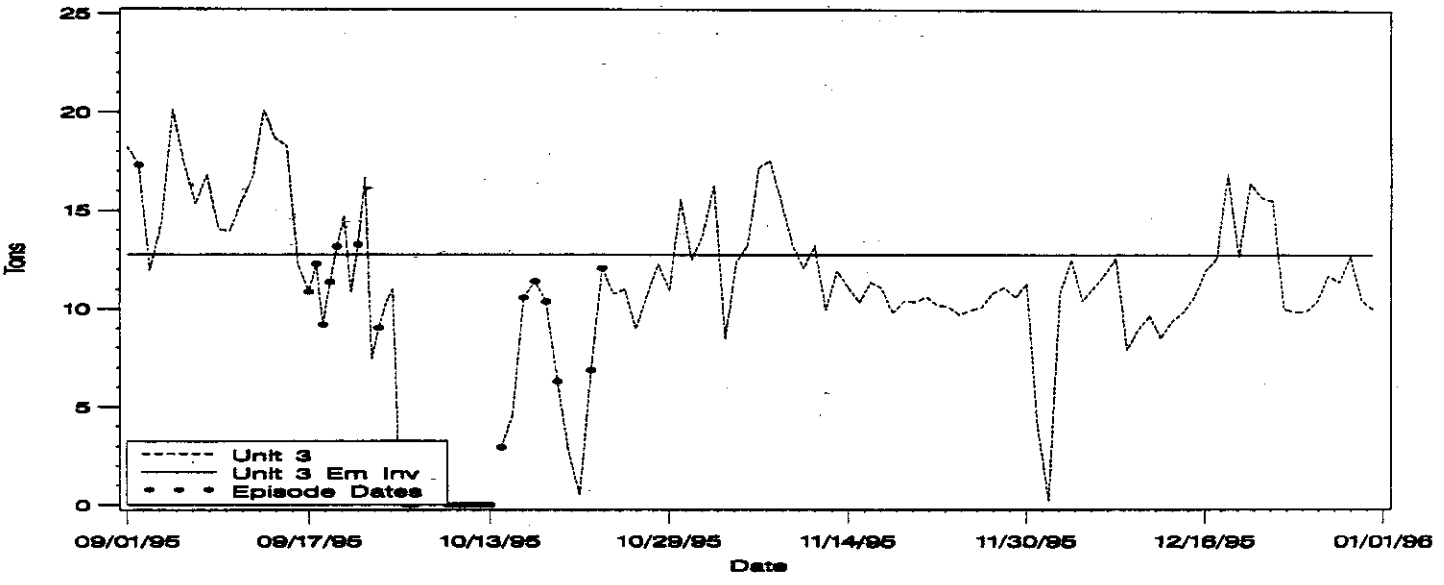


Continuous Emissions Monitoring Data From Tri-State's Craig Facility

Pollutant = NOX

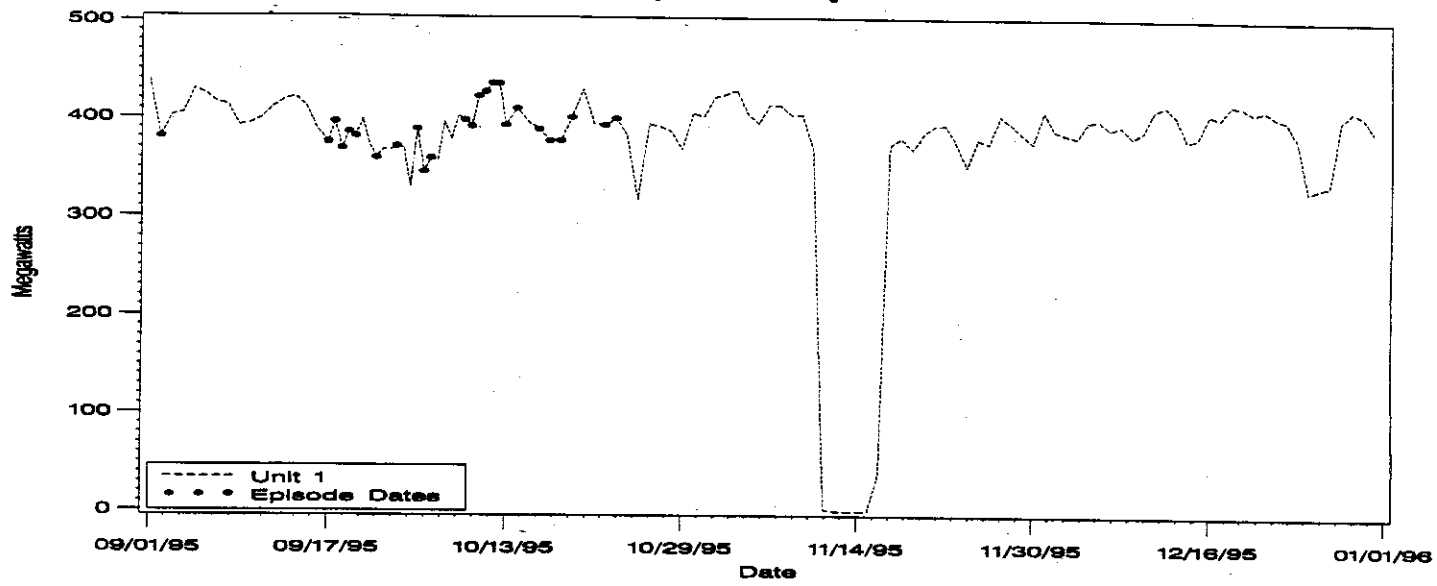


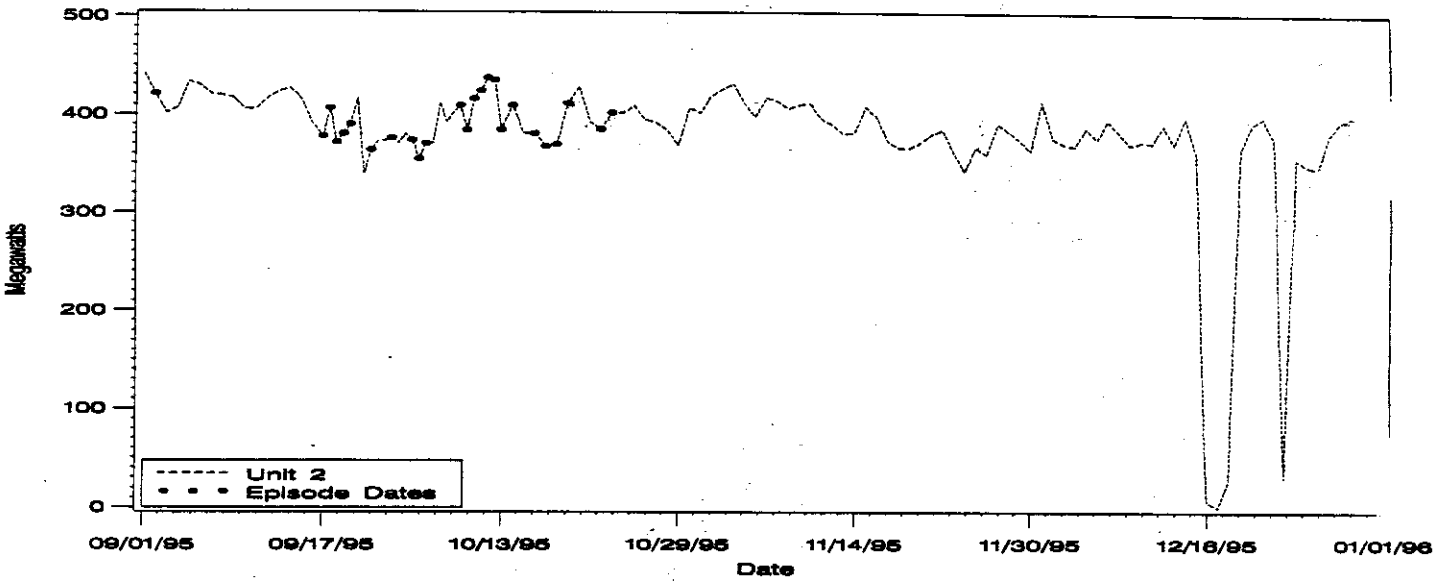


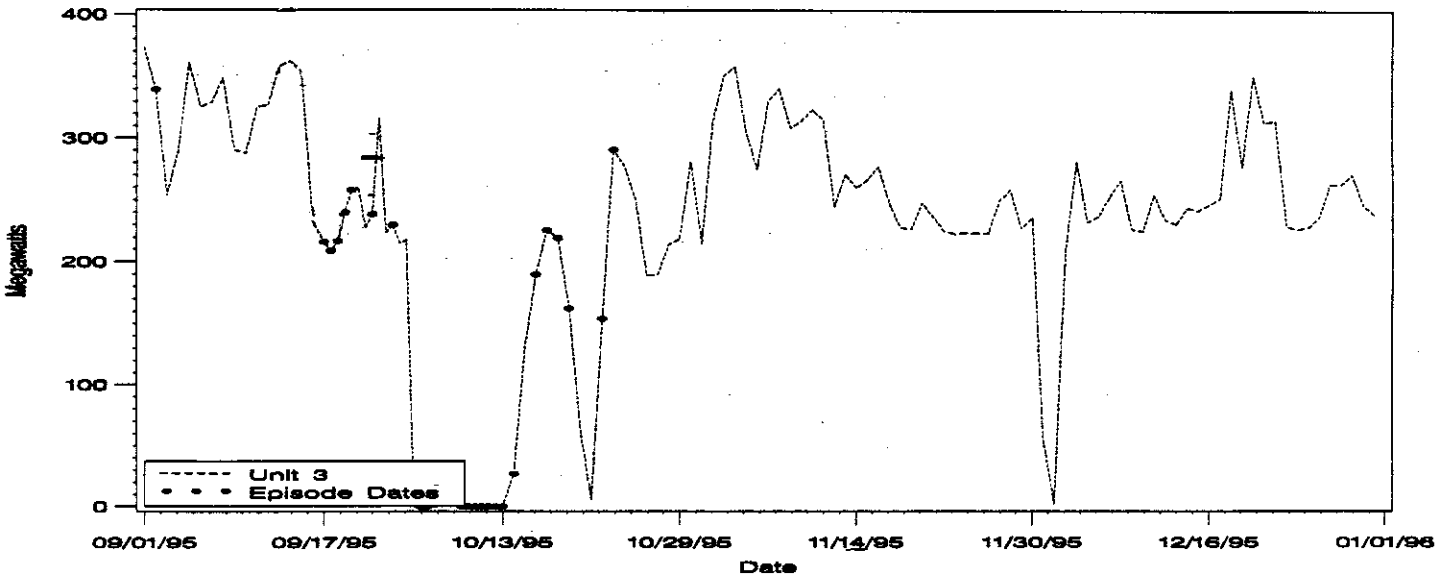


Continuous Emissions Monitoring Data From Tri-State's Craig Facility

Daily Average Unit Load in Megawatts







Mt. Zirkel Wilderness Area
Reasonable Attribution Study of Visibility Impairment

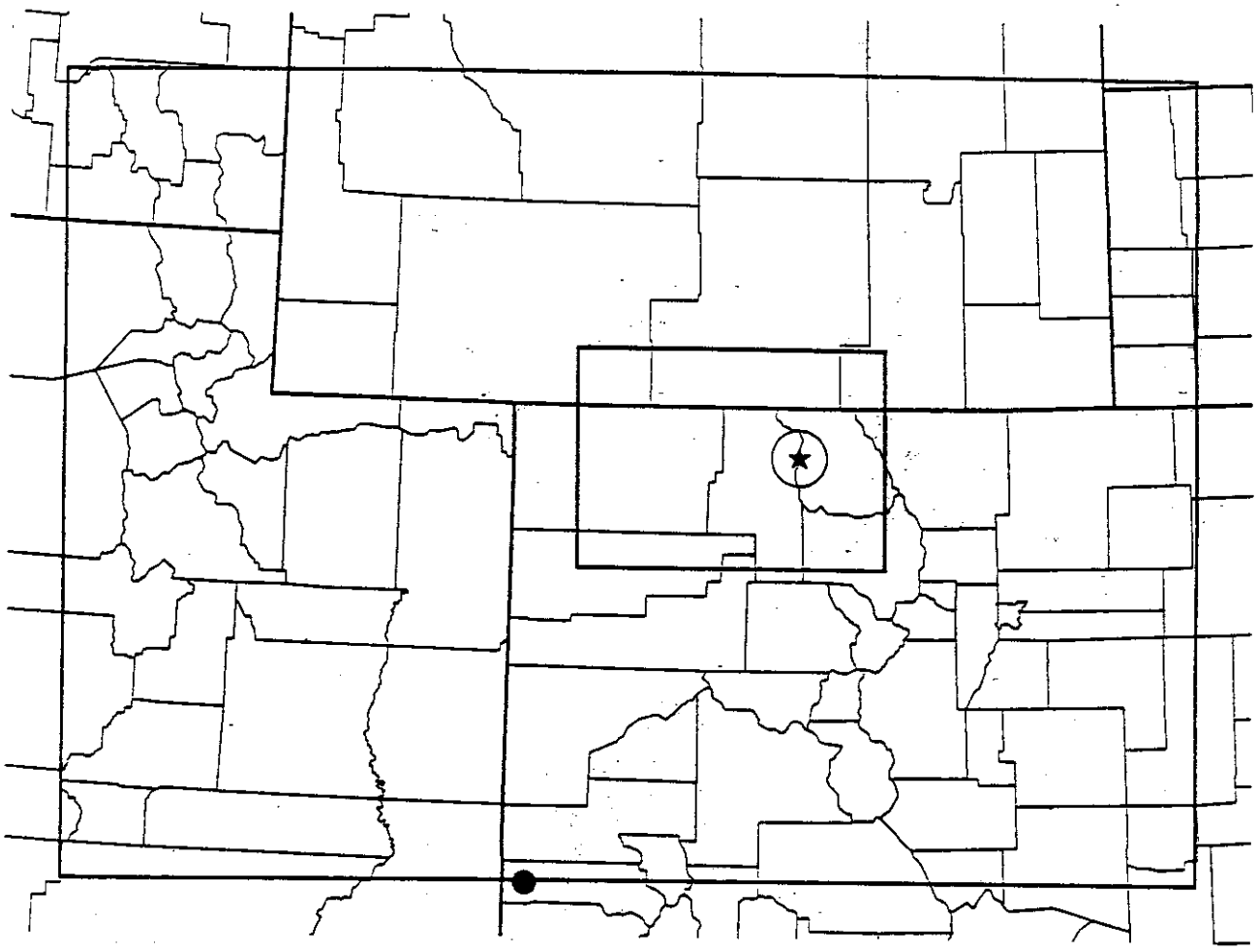
Volume II: Results of Data Analysis and Modeling
Final Report

July 1, 1996

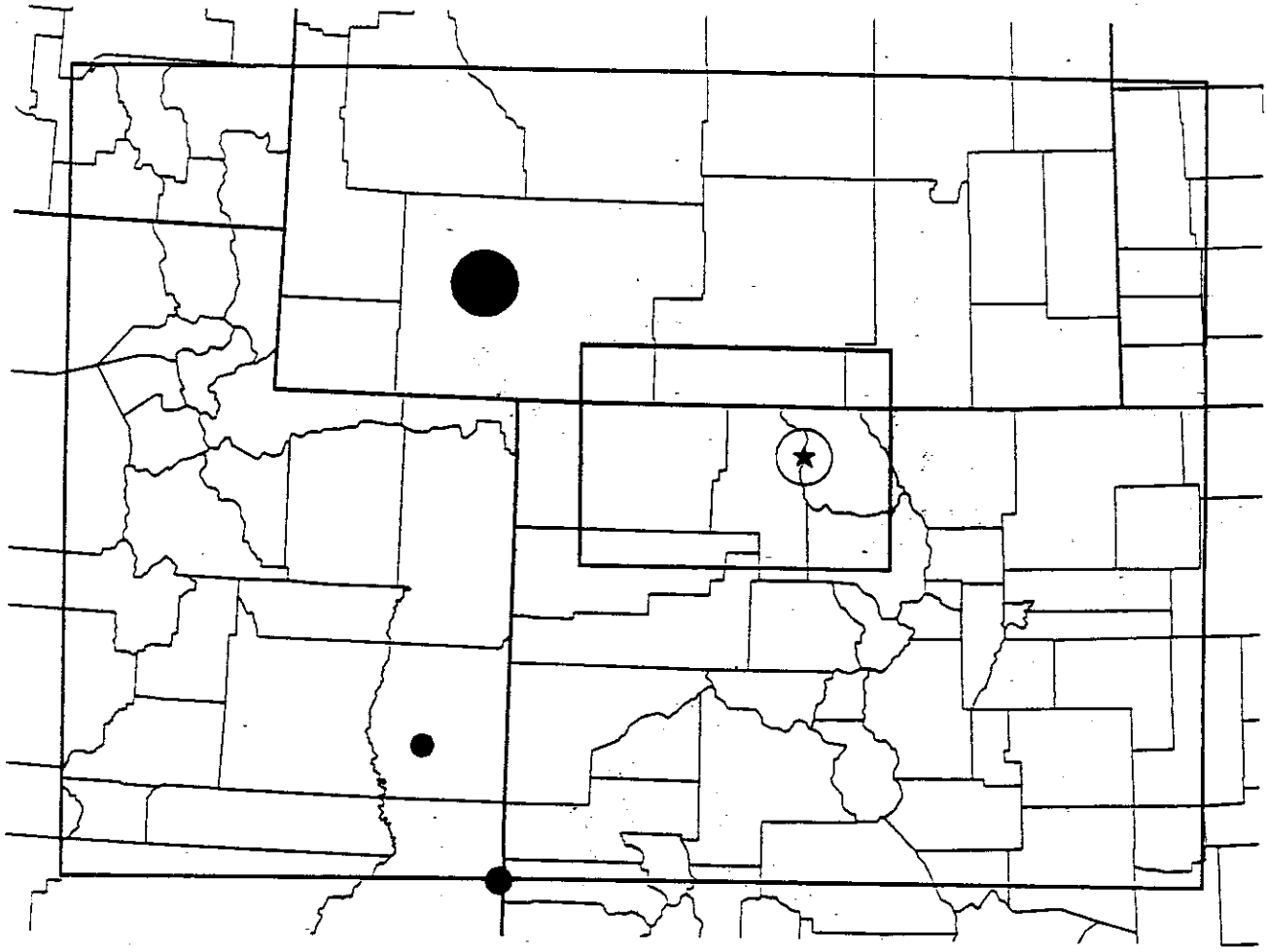
ATTACHMENT B

OF APPENDIX B.1

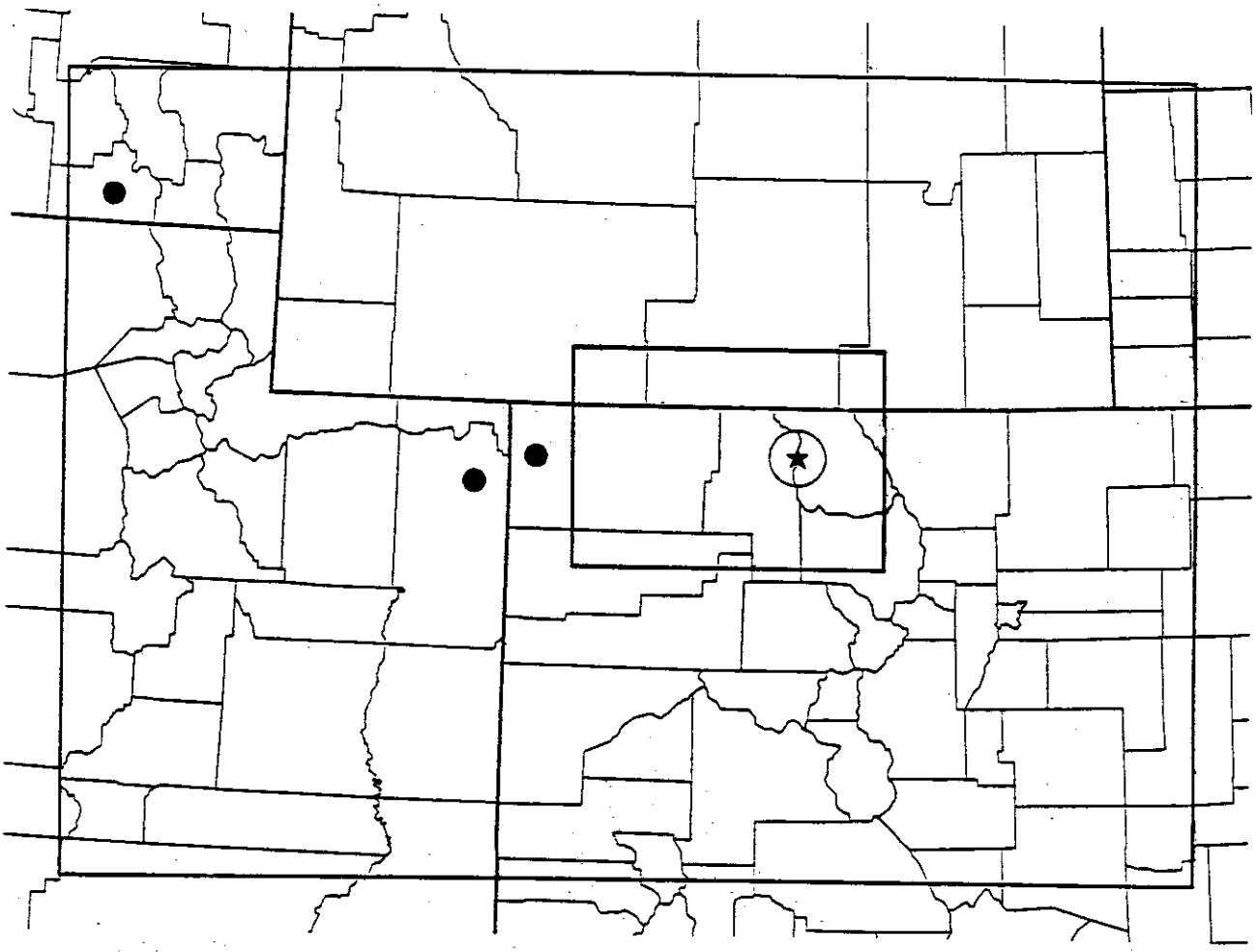
SPATIAL PLOTS OF WILDFIRE EVENTS OCCURRING IN THE REGIONAL-SCALE AND MESOSCALE MODELING DOMAINS BETWEEN 03/26/95 AND 10/23/95



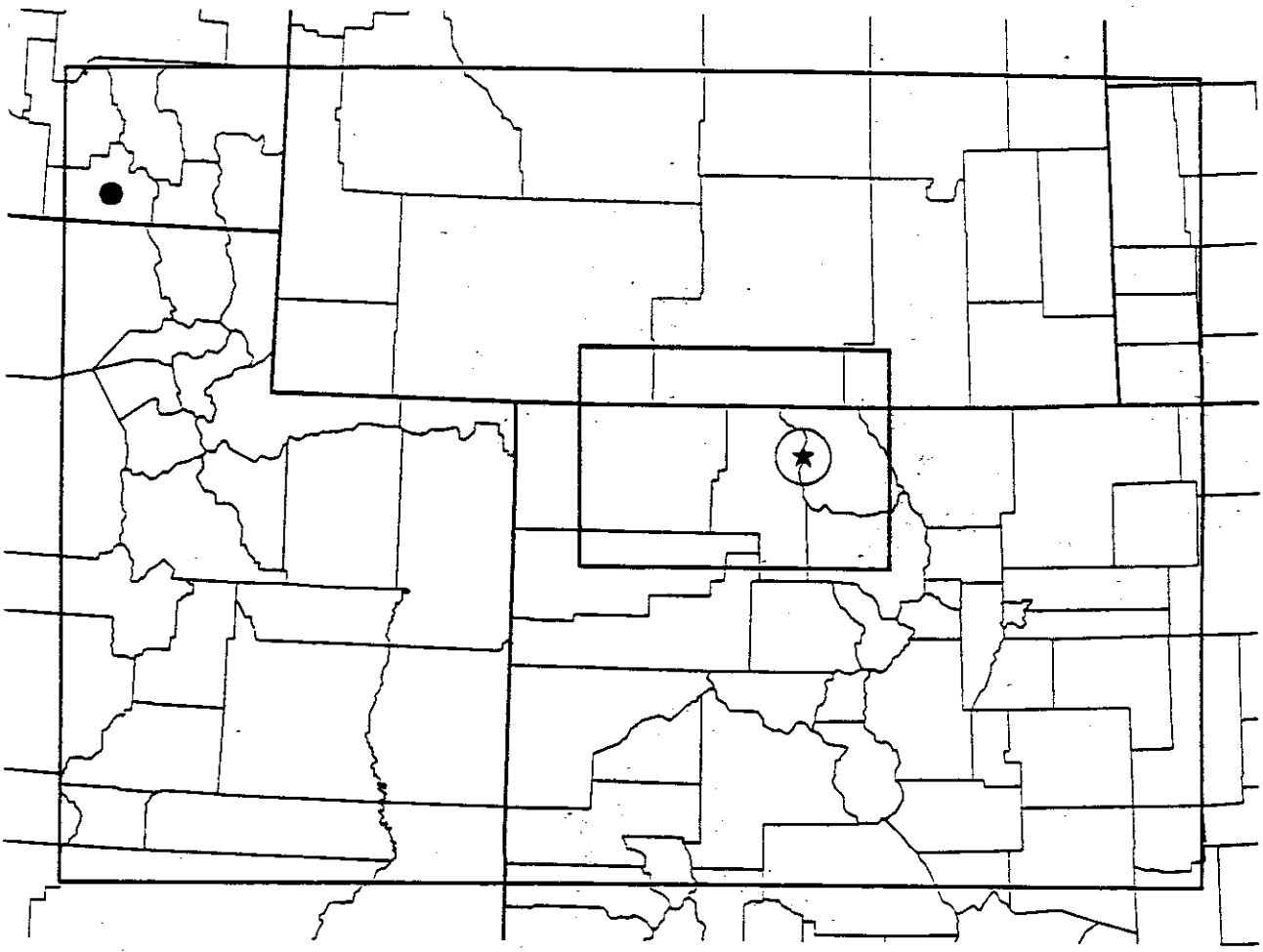
Counties and Modeling Domains Included in the Inventory
Fires Reported 3/26/95 through 3/31/95
Fires Greater than 5 Acres Shown
Mt. Zirkel Wilderness Area Location



Counties and Modeling Domains Included in the Inventory
Fires Reported 6/14/95 through 6/16/95
Fires Greater than 5 Acres Shown
Mt. Zirkel Wilderness Area Location



Counties and Modeling Domains Included in the Inventory
Fires Reported 6/29/95 through 6/30/95
Fires Greater than 5 Acres Shown
Mt. Zirkel Wilderness Area Location

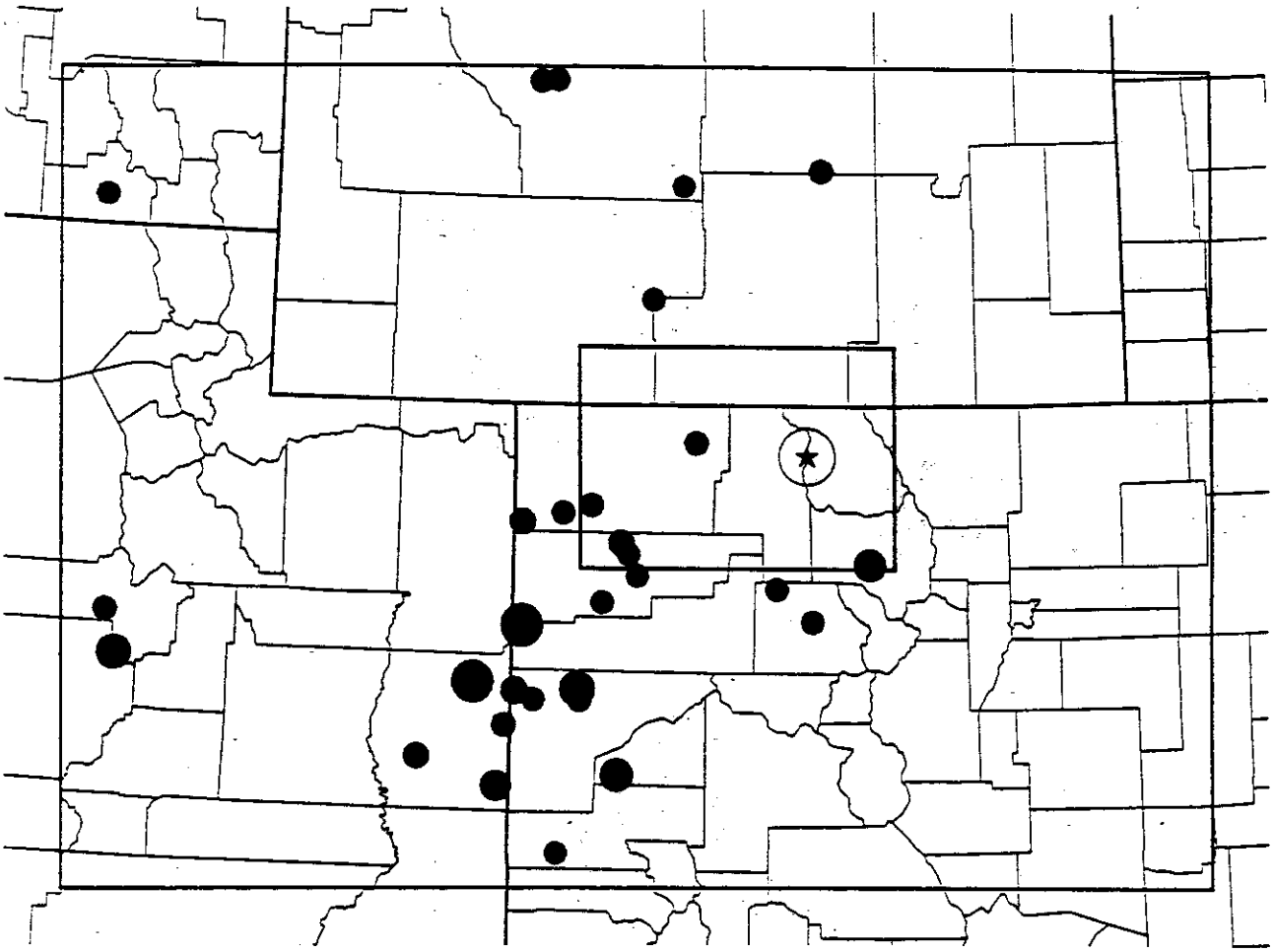


Counties and Modeling Domains Included in the Inventory

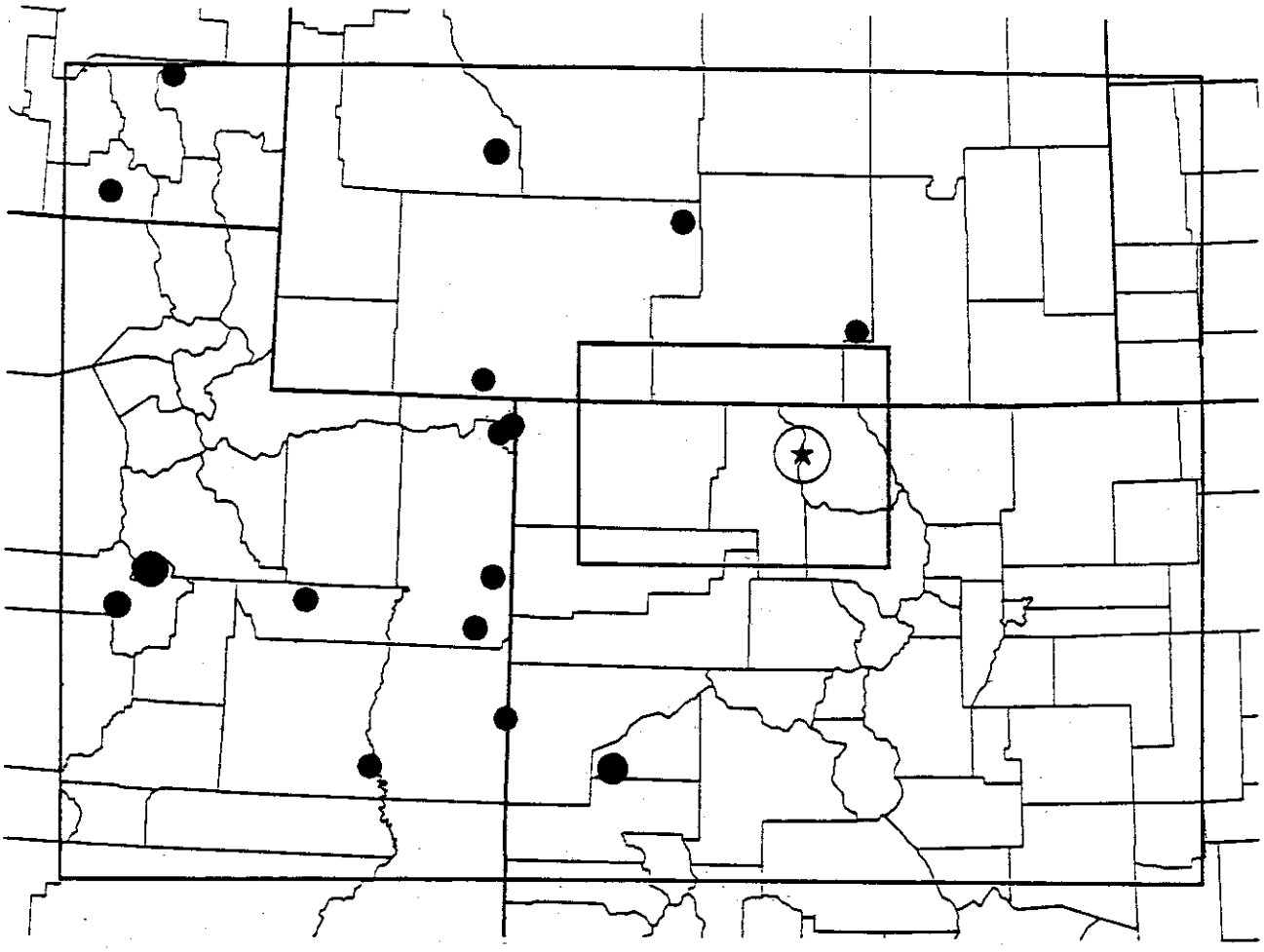
Fires Reported 7/1/95

Fires Greater than 5 Acres Shown

Mt. Zirkel Wilderness Area Location



Counties and Modeling Domains Included in the Inventory
Fires Reported 7/29/95 through 7/31/95
Fires Greater than 5 Acres Shown
Mt. Zirkel Wilderness Area Location

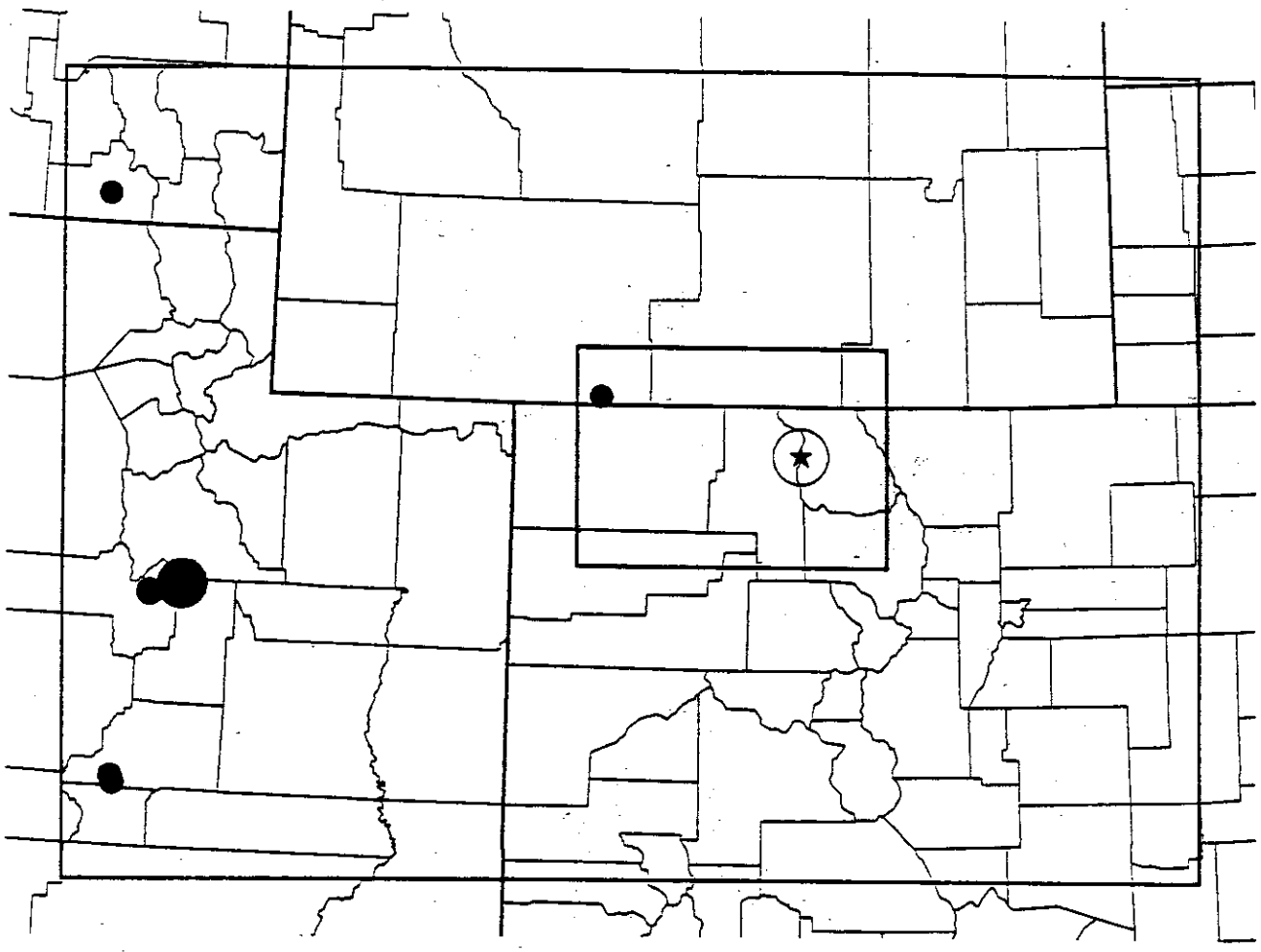


Counties and Modeling Domains Included in the Inventory

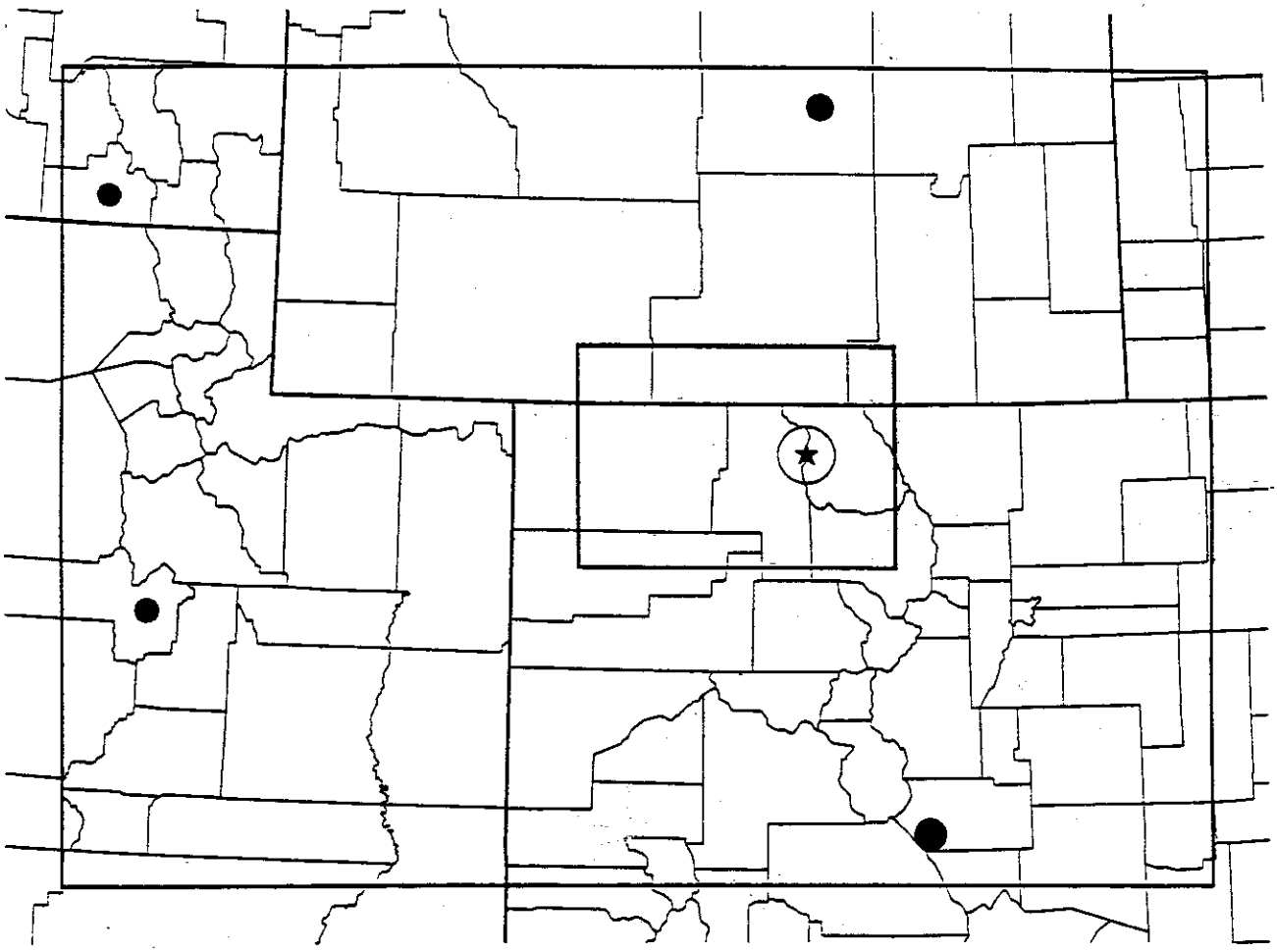
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Fires Greater than 5 Acres Shown

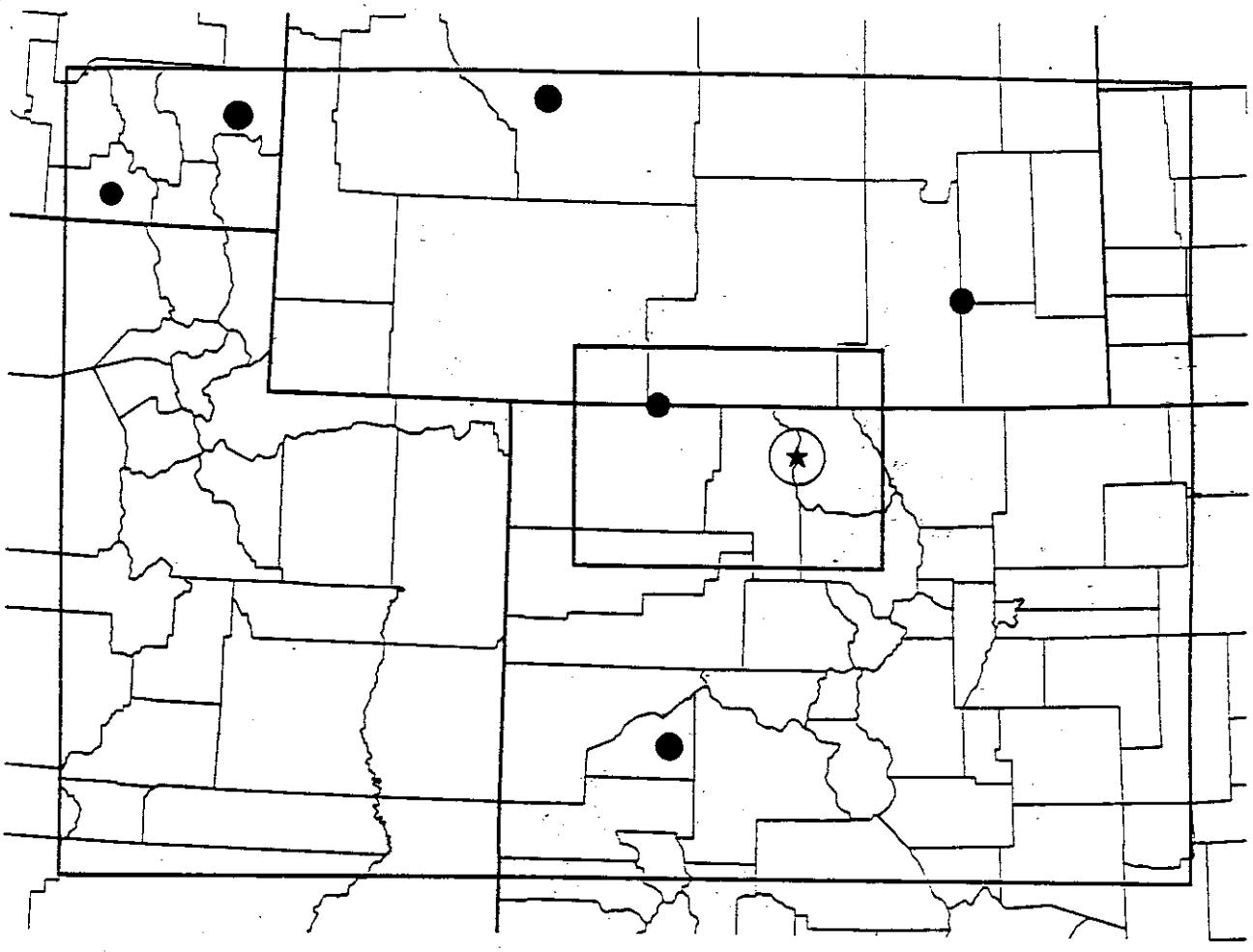
⊛ Mt. Zirkel Wilderness Area Location



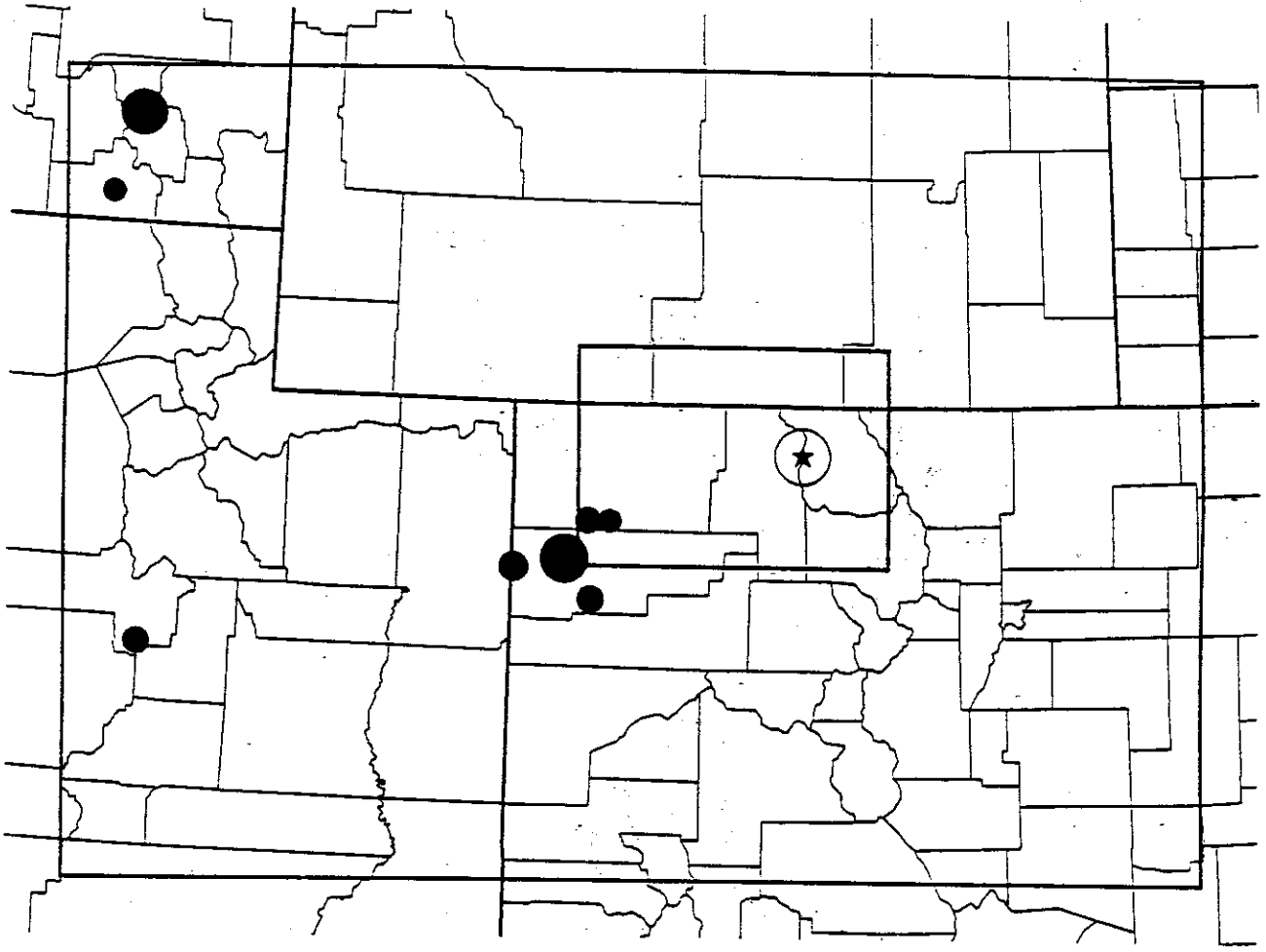
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⊛ Mt. Zirkel Wilderness Area Location



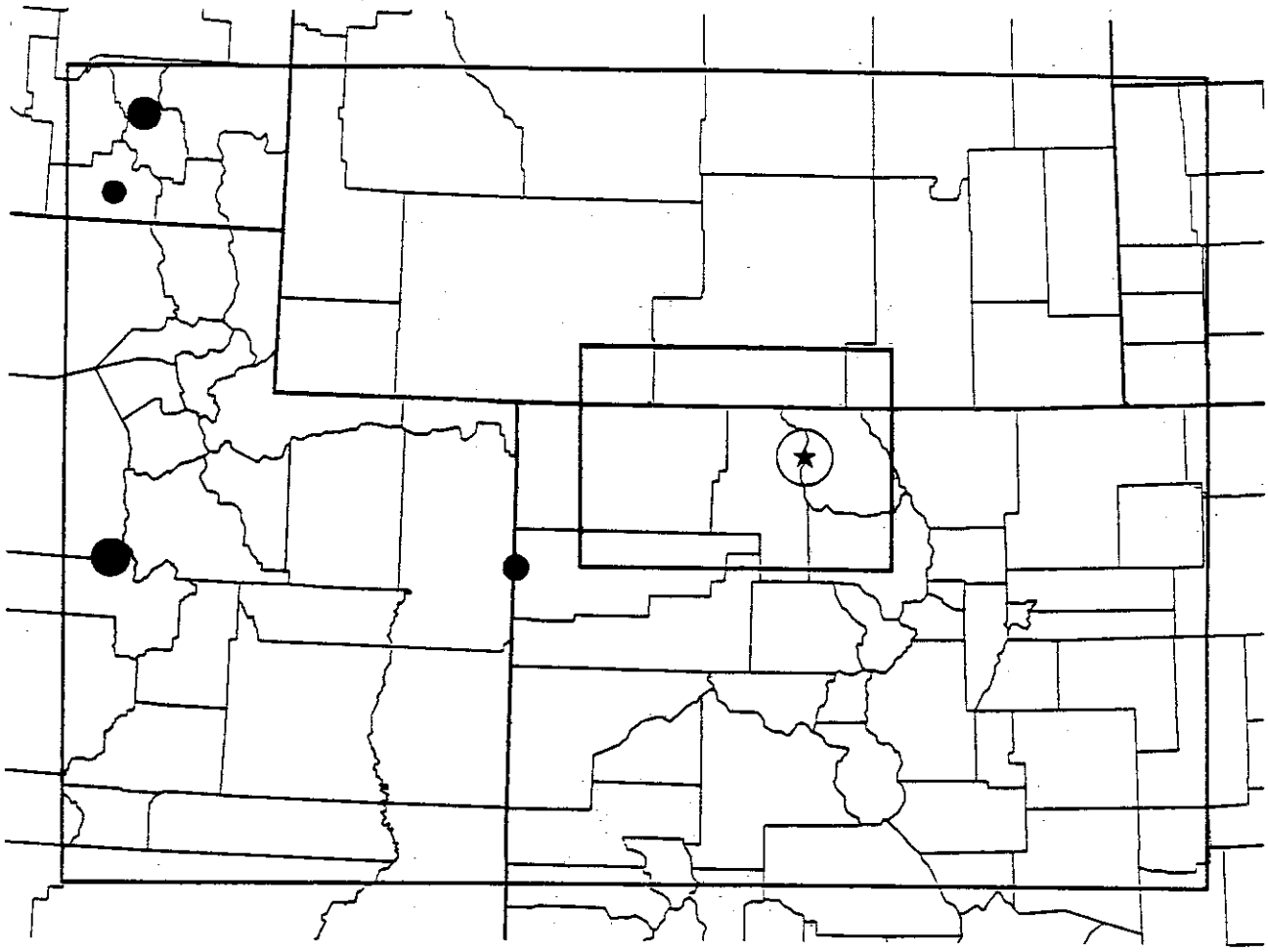
Counties and Modeling Domains Included in the Inventory
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Fires Greater than 5 Acres Shown
Mt. Zirkel Wilderness Area Location



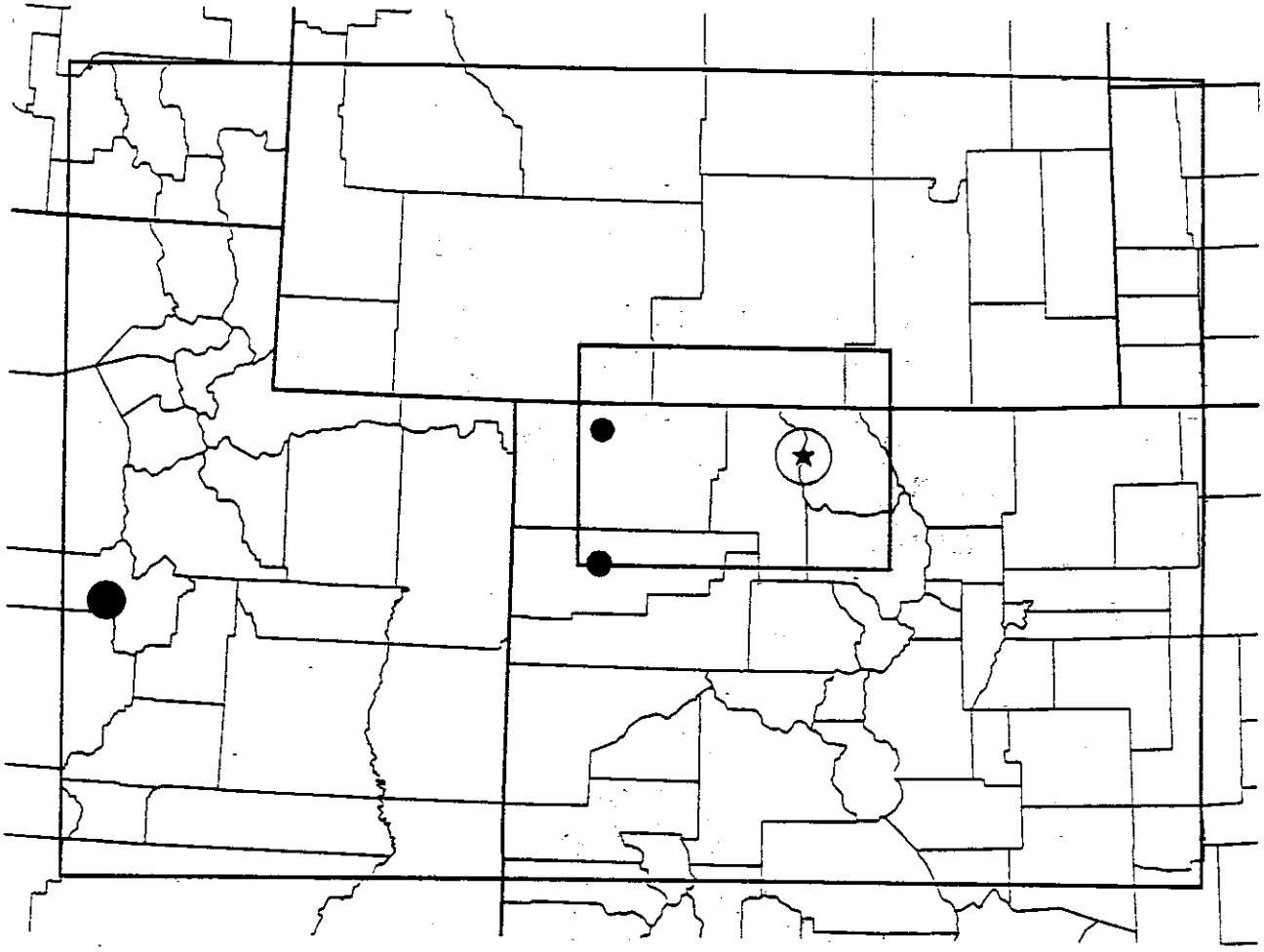
Counties and Modeling Domains Included in the Inventory
Fires Reported 9/2/95
Fires Greater than 5 Acres Shown
Mt. Zirkel Wilderness Area Location



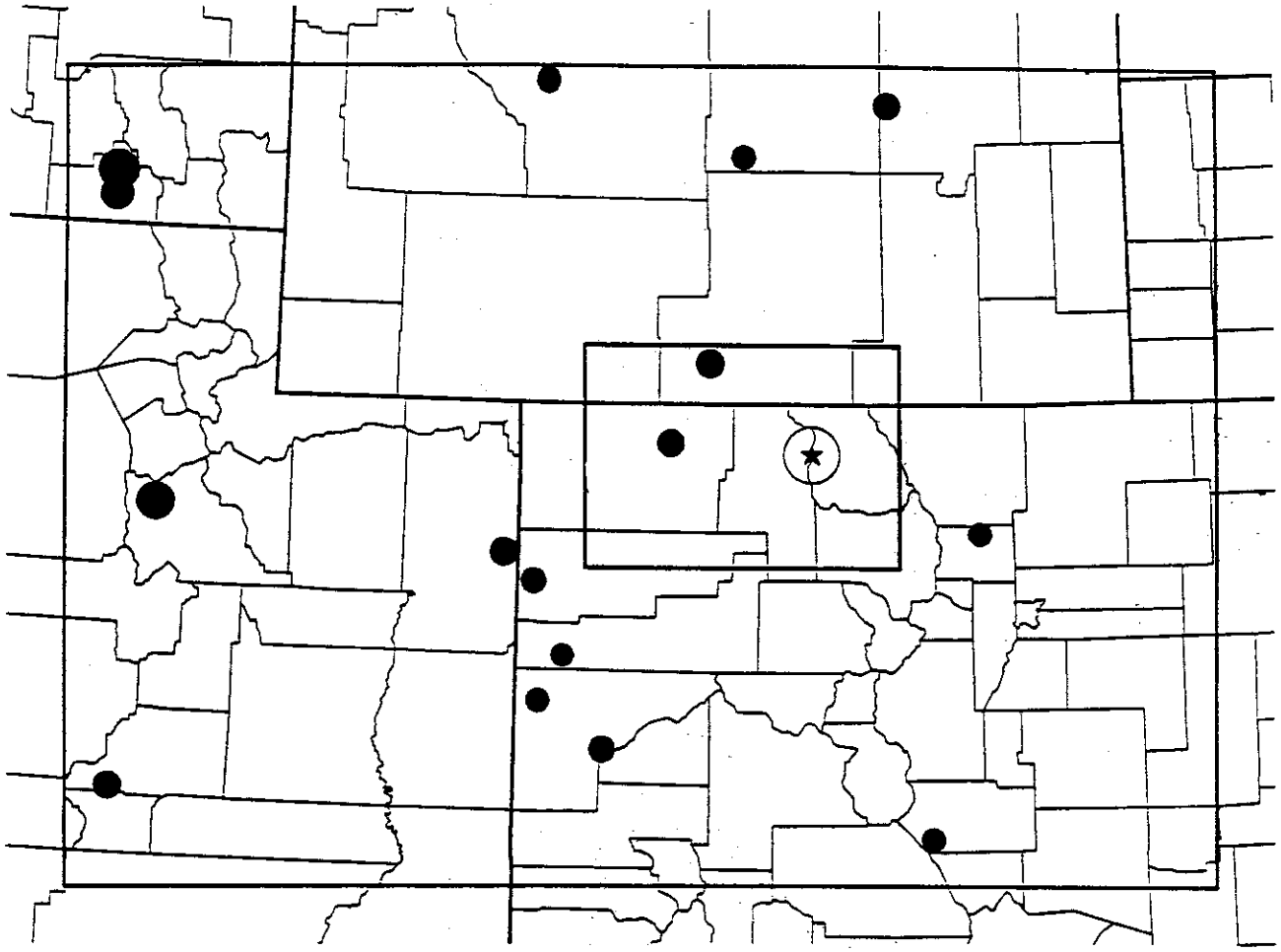
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⊛ Mt. Zirkel Wilderness Area Location



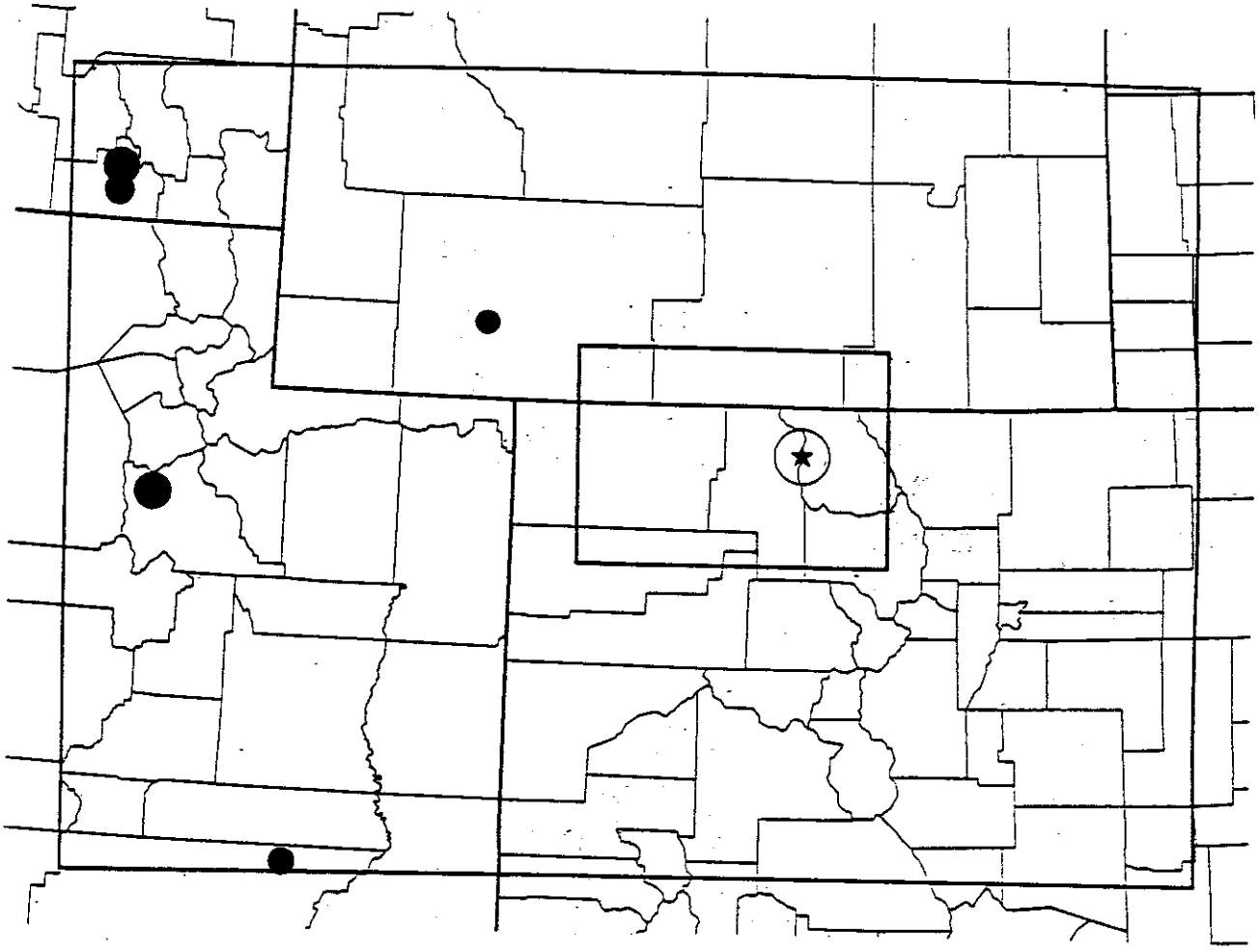
Counties and Modeling Domains Included in the Inventory
Fires Reported 9/24/95
Fires Greater than 5 Acres Shown
⊛ Mt. Zirkel Wilderness Area Location



Counties and Modeling Domains Included in the Inventory
Fires Reported 9/27/95
Fires Greater than 5 Acres Shown
Mt. Zirkel Wilderness Area Location



Counties and Modeling Domains Included in the Inventory
Fires Reported 10/7/95 through 10/19/95
Fires Greater than 5 Acres Shown
Mt. Zirkel Wilderness Area Location



Counties and Modeling Domains Included in the Inventory
Fires Reported 10/22/95 through 10/23/95
Fires Greater than 5 Acres Shown
Mt. Zirkel Wilderness Area Location

Mt. Zirkel Wilderness Area
Reasonable Attribution Study of Visibility Impairment

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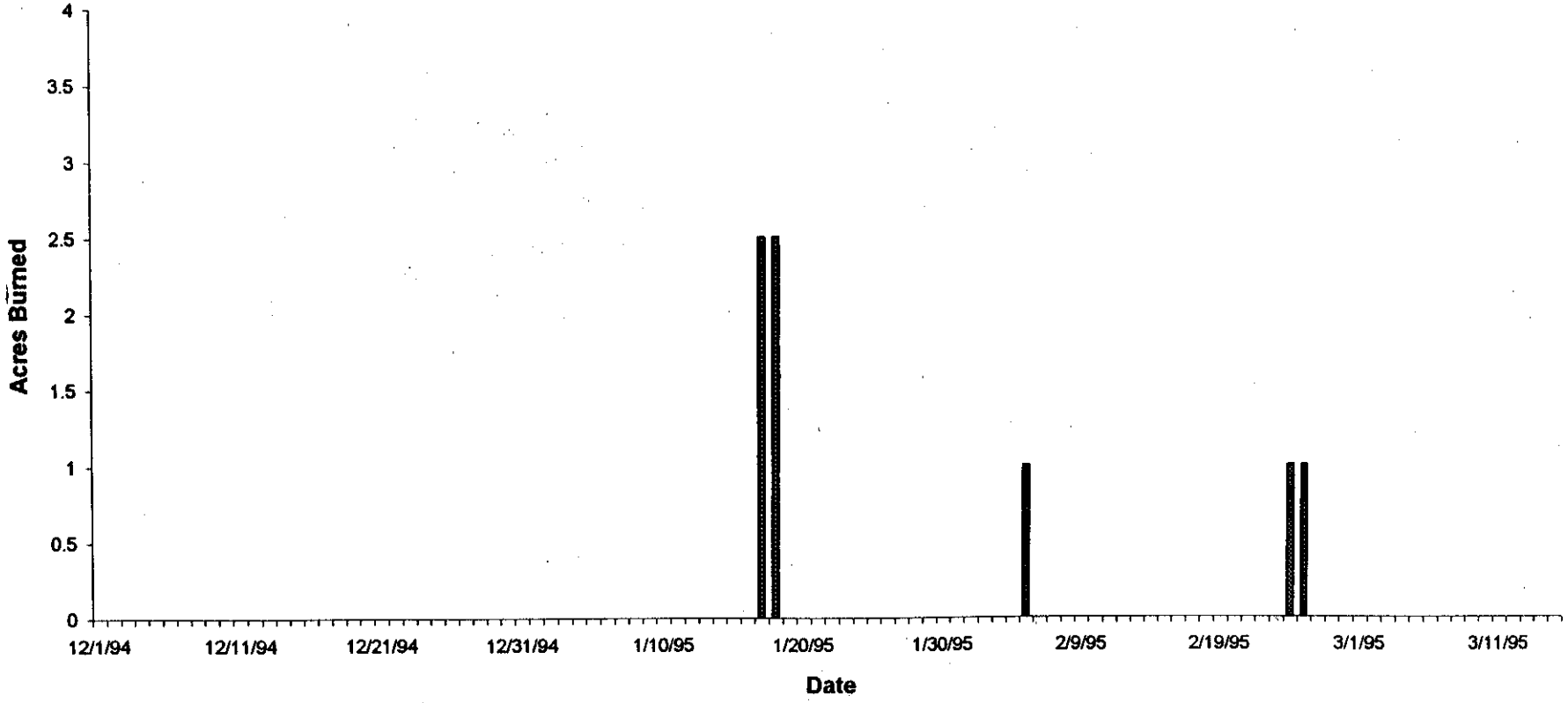
July 1, 1996

ATTACHMENT C

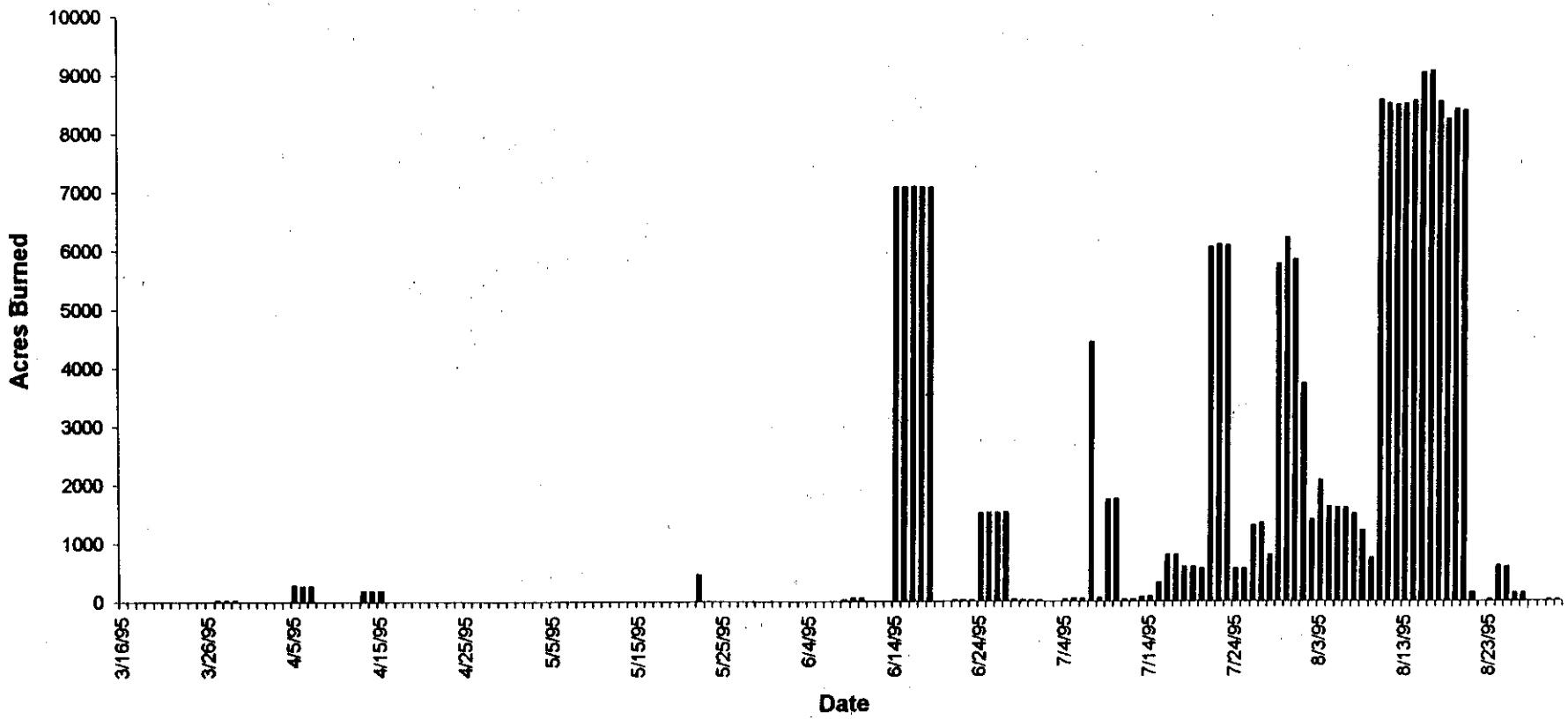
OF APPENDIX B.1

TIME SERIES PLOTS OF ACRES BURNED

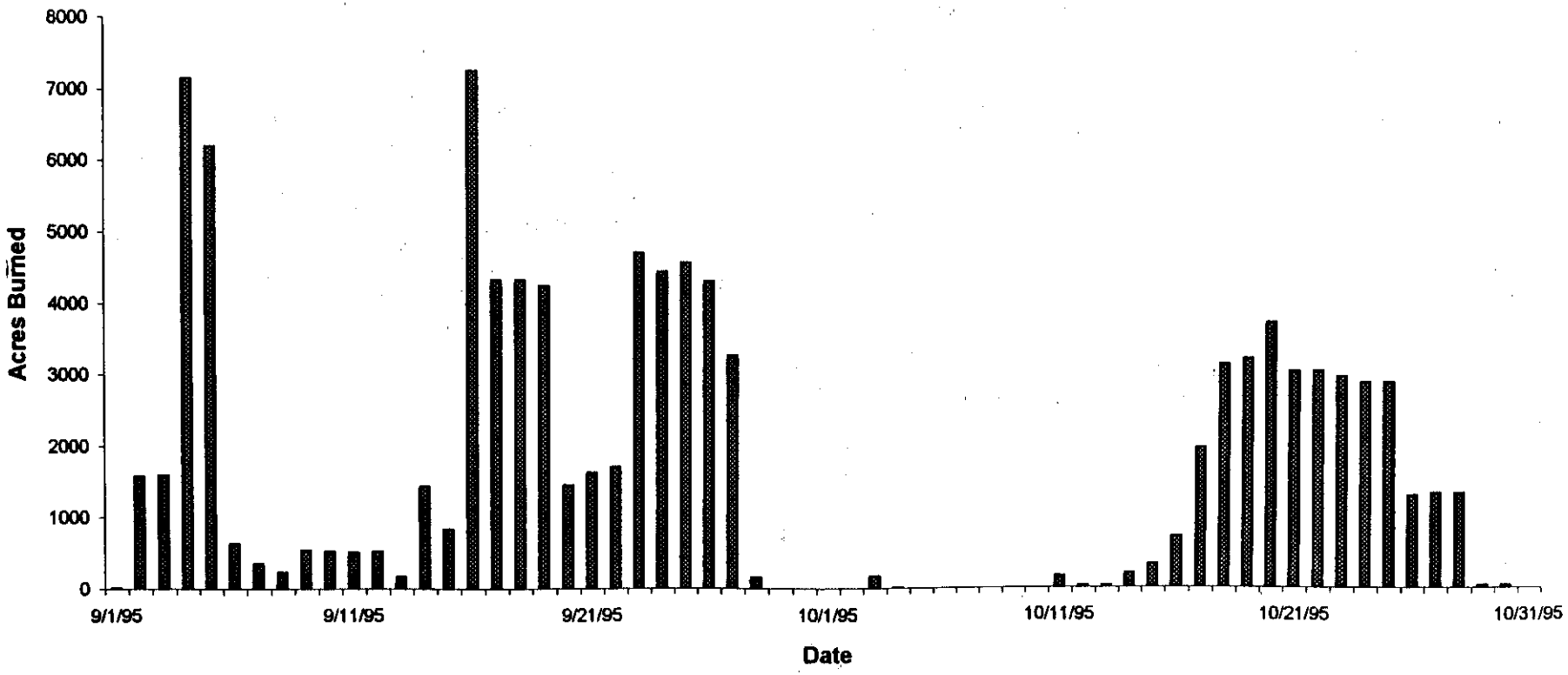
Temporal Distribution of Wildfires - 12/01/94 through 3/15/95
Regional Domain



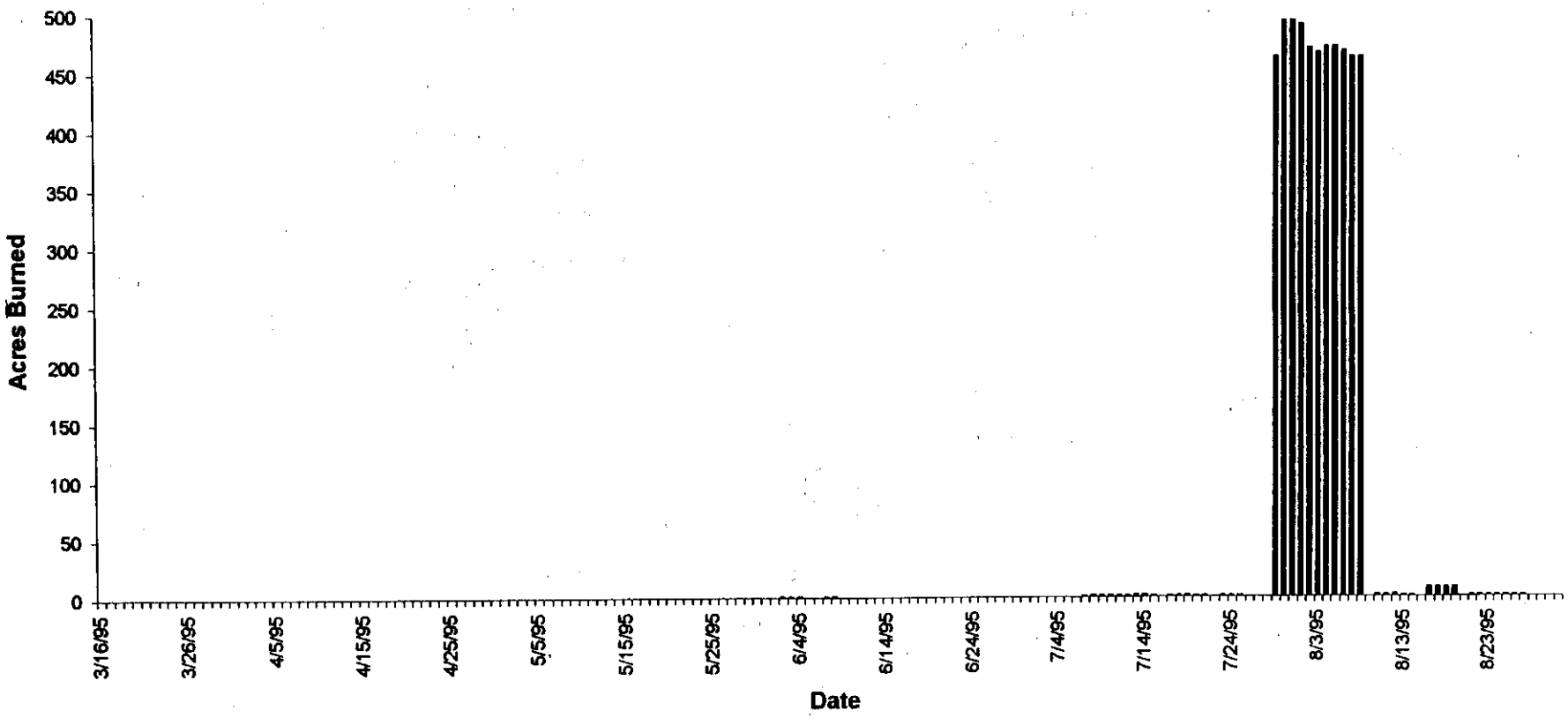
Temporal Distribution of Wildfires - 3/16/95 through 8/31/95
Regional Domain



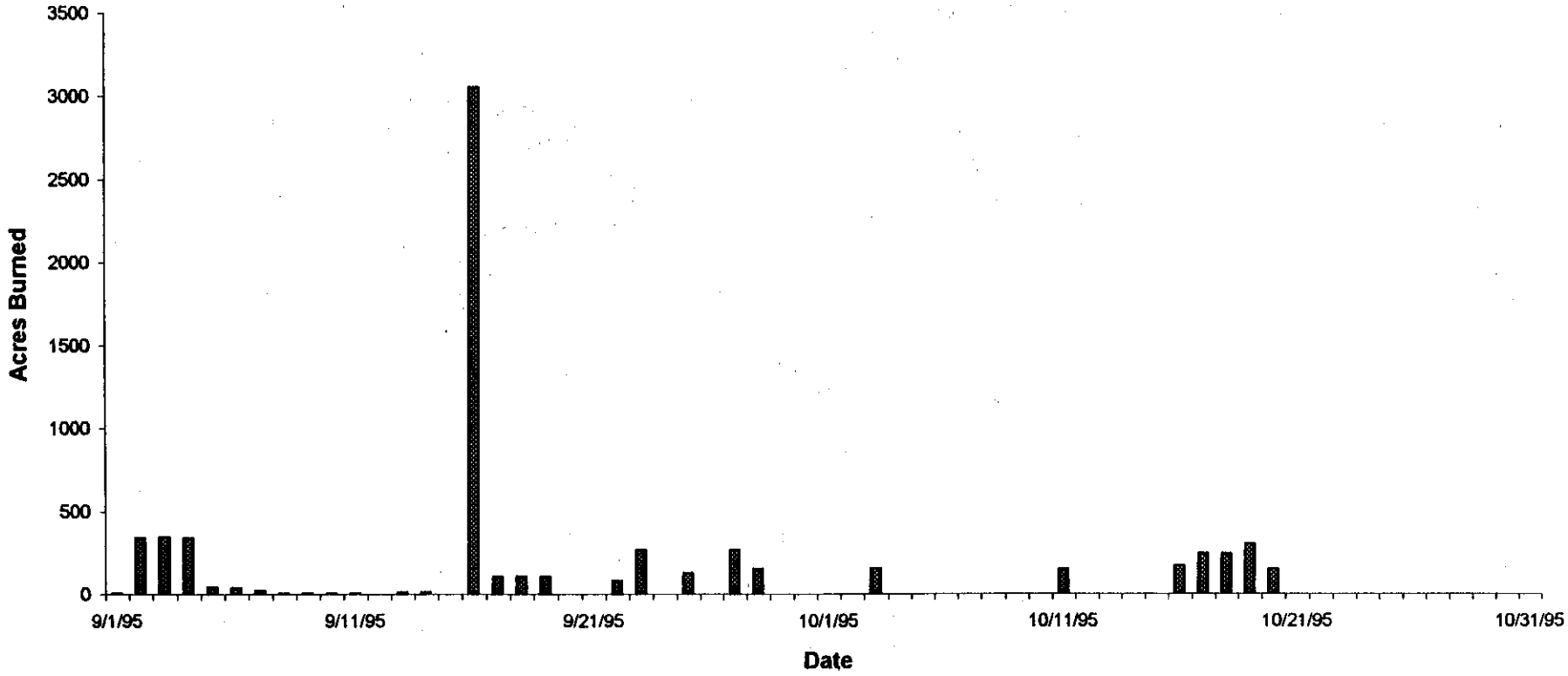
Temporal Distribution of Wildfires - 9/1/95 through 10/31/95
Regional Domain



Temporal Distribution of Wildfires - 3/16/95 through 8/31/95
Mesoscale Domain



Temporal Distribution of Wildfires - 9/1/95 through 10/31/95
Mesoscale Domain



Mt. Zirkel Wilderness Area
Reasonable Attribution Study of Visibility Impairment

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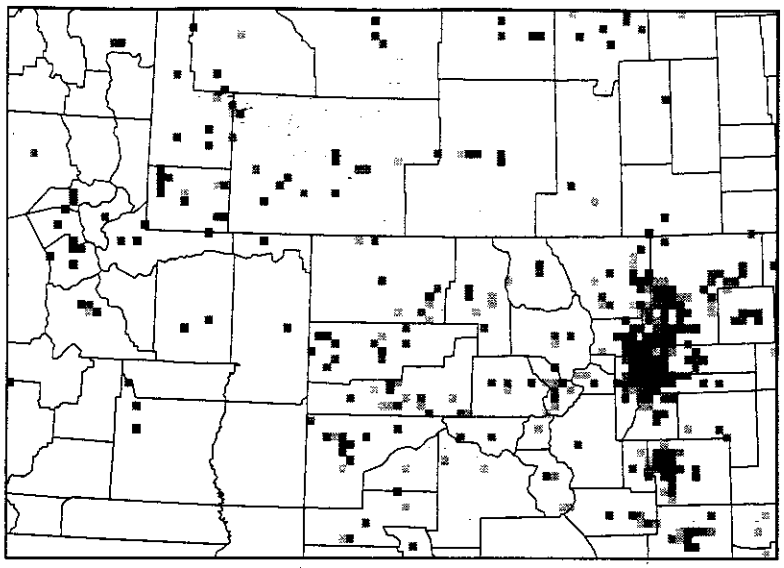
July 1, 1996

ATTACHMENT D

OF APPENDIX B.1

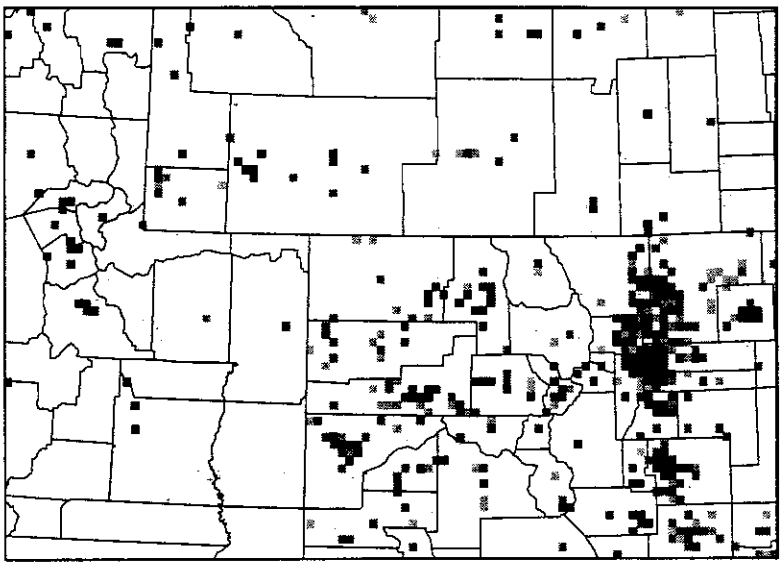
POINT SOURCE EMISSIONS

Point Source Emissions - Summer Scenario - Regional Domain



ROG tons/day

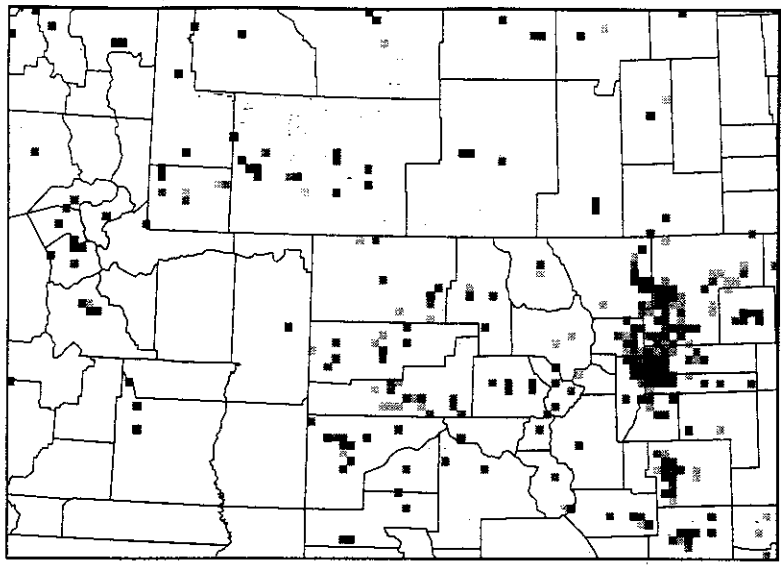
- 0 to 3.2E-03
- 3.2E-03 to 2.4E-02
- 2.4E-02 to 1.7E-01
- 1.7E-01 to 7.5E-01
- > 7.5E-01



PM2.5 tons/day

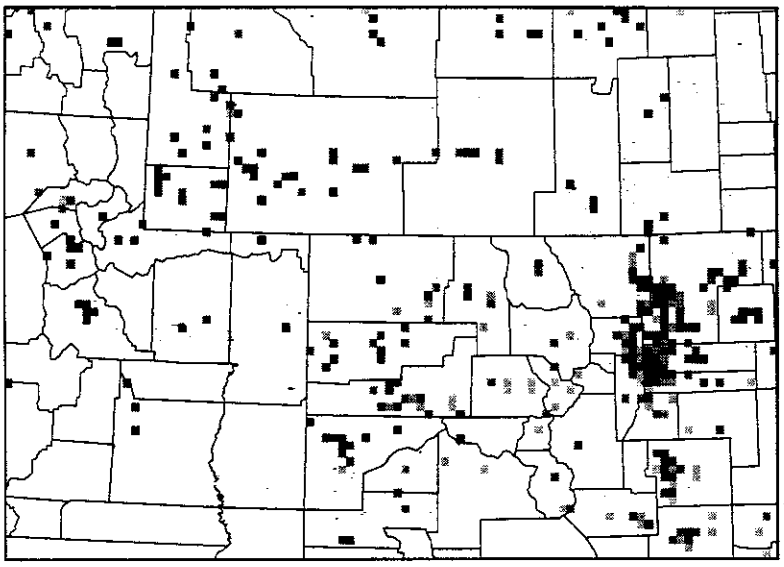
- 0 to 6.0E-04
- 6.0E-04 to 8.0E-03
- 8.0E-03 to 5.7E-02
- 5.7E-02 to 3.0E-01
- > 3.0E-01

Point Source Emissions - Summer Scenario - Regional Domain



SOX tons/day

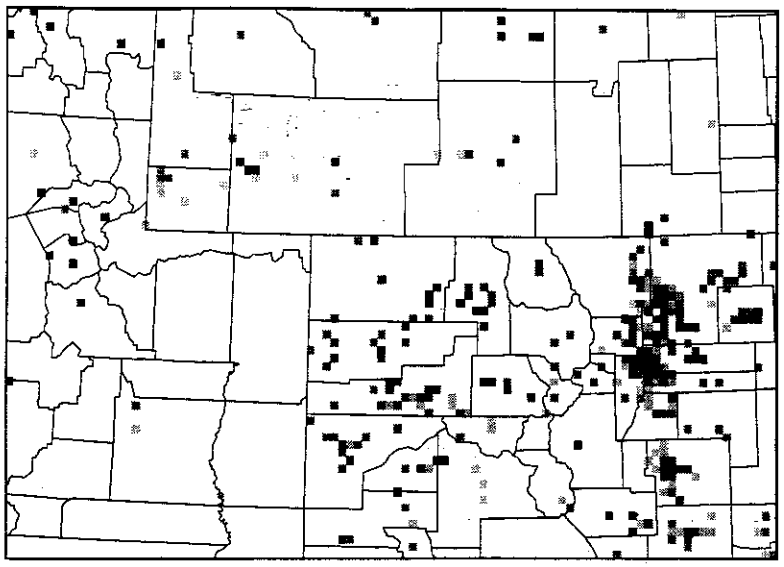
- 0 to 5.8E-05
- 5.8E-05 to 7.2E-04
- 7.2E-04 to 1.3E-01
- 1.3E-01 to 7.2E+00
- > 7.2E+00



NOX tons/day

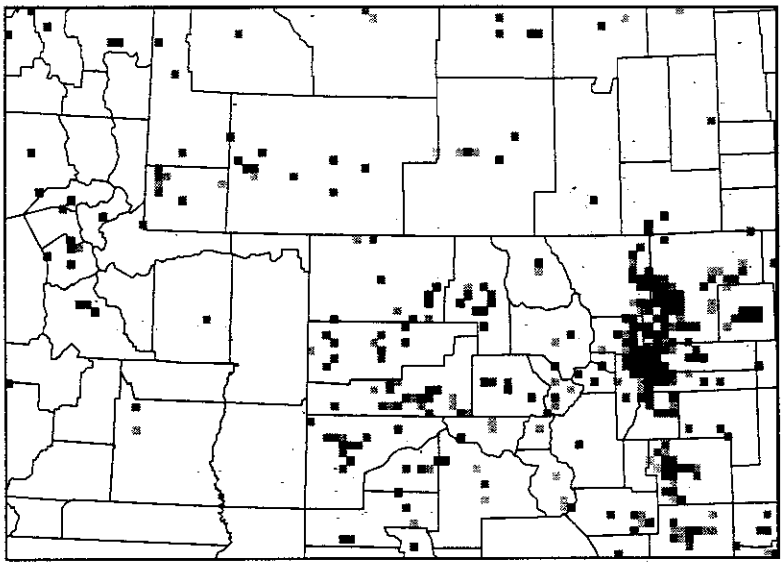
- 0 to 1.7E-02
- 1.7E-02 to 1.8E-01
- 1.8E-01 to 6.8E-01
- 6.8E-01 to 3.8E+00
- > 3.8E+00

Point Source Emissions - Summer Scenario - Regional Domain



EC2.5 tons/day

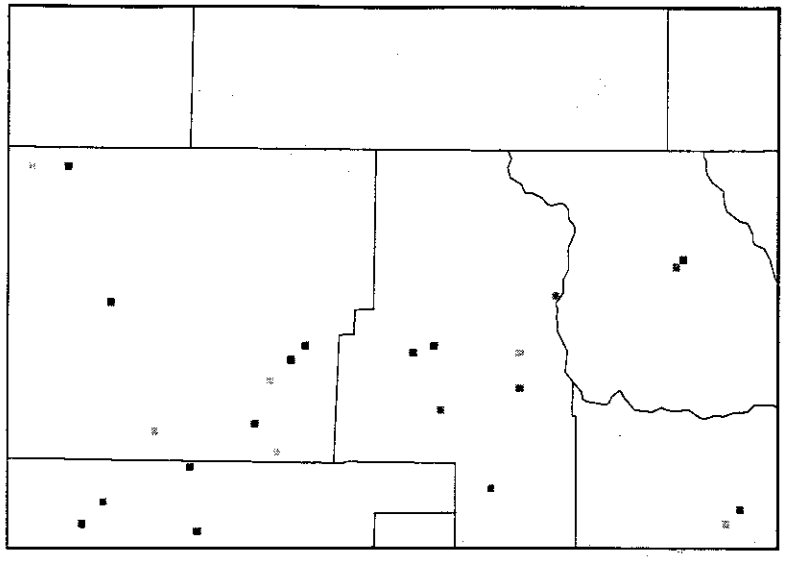
- 0 to 2.1E-05
- 2.1E-05 to 1.8E-04
- 1.8E-04 to 8.7E-04
- 8.7E-04 to 2.9E-03
- > 2.9E-03



OC2.5 tons/day

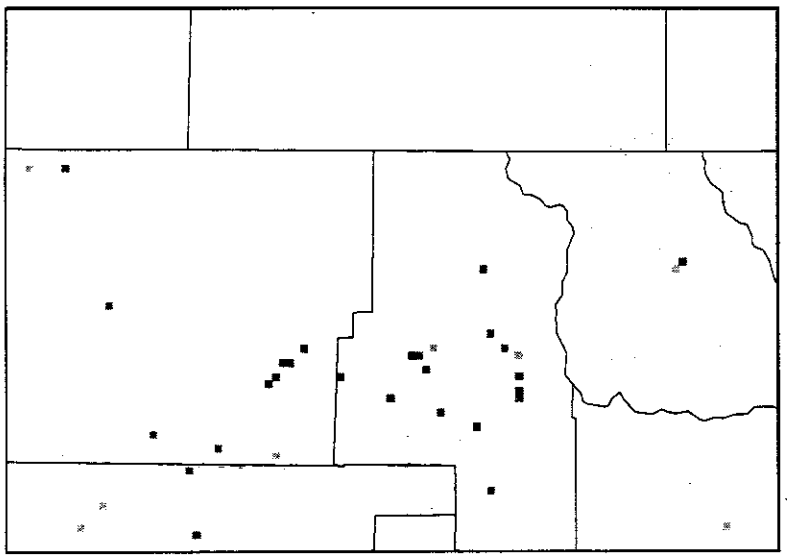
- 0 to 3.8E-05
- 3.8E-05 to 2.4E-04
- 2.4E-04 to 1.5E-03
- 1.5E-03 to 1.2E-02
- > 1.2E-02

Point Source Emissions - Summer Scenario - Mesoscale Domain



ROG tons/day

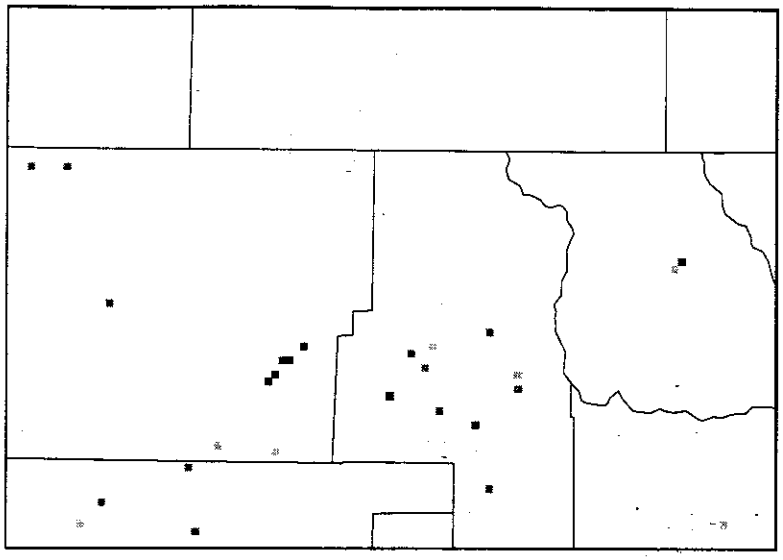
- 0 to 6.8E-04
- 6.8E-04 to 8.4E-03
- 8.4E-03 to 2.1E-02
- 2.1E-02 to 1.4E-01
- > 1.4E-01



PM2.5 tons/day

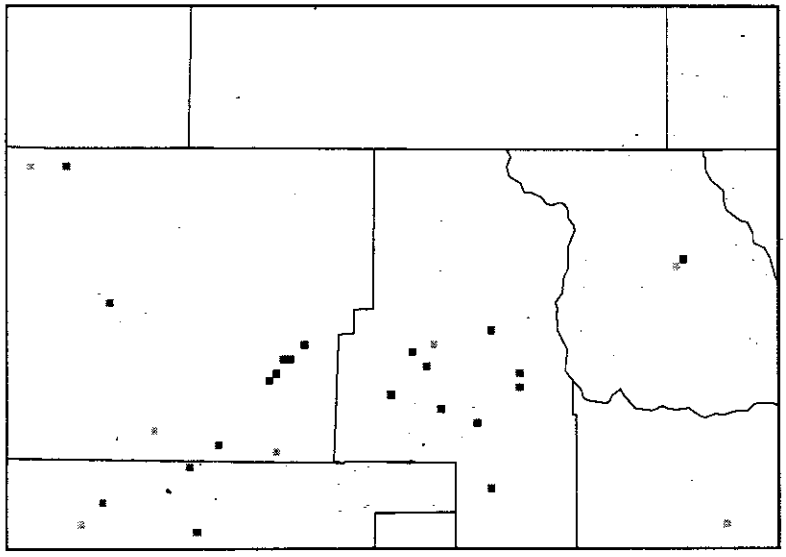
- 0 to 1.8E-04
- 1.8E-04 to 8.6E-03
- 8.6E-03 to 2.7E-01
- 2.7E-01 to 5.2E-01
- > 5.2E-01

Point Source Emissions - Summer Scenario - Mesoscale Domain



EC2.5 tons/day

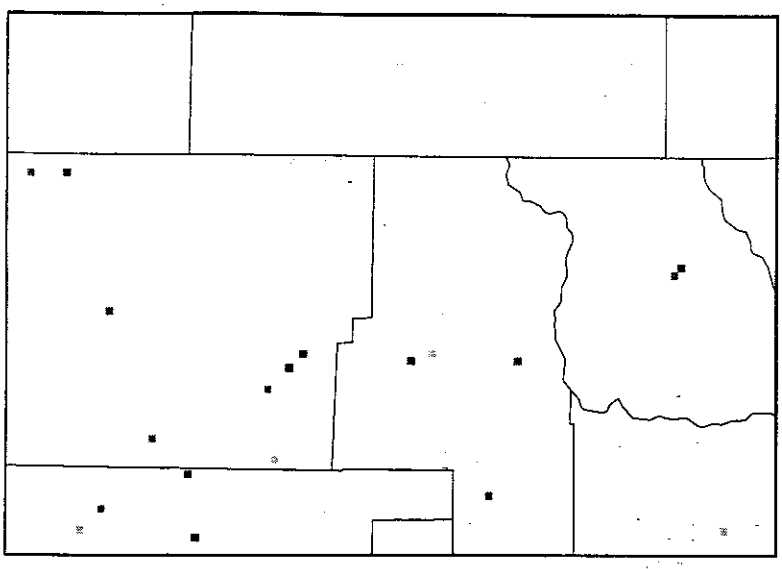
- 0 to 5.3E-05
- 5.3E-05 to 8.4E-04
- 8.4E-04 to 2.9E-03
- 2.9E-03 to 2.2E-02
- > 2.2E-02



OC2.5 tons/day

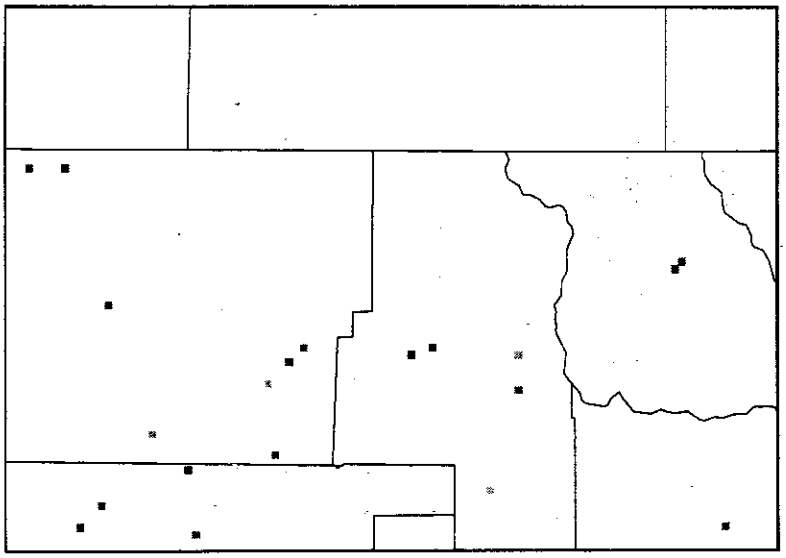
- 0 to 3.6E-05
- 3.6E-05 to 4.9E-04
- 4.9E-04 to 1.0E-02
- 1.0E-02 to 8.0E-02
- > 8.0E-02

Point Source Emissions - Summer Scenario - Mesoscale Domain



SOX tons/day

- 0 to 9.7E-06
- 9.7E-06 to 7.6E-05
- 7.6E-05 to 2.8E-03
- 2.8E-03 to 9.8E-02
- > 9.8E-02



NOX tons/day

- 0 to 4.1E-03
- 4.1E-03 to 4.2E-02
- 4.2E-02 to 1.8E-01
- 1.8E-01 to 1.0E+00
- > 1.0E+00

Mt. Zirkel Wilderness Area
Reasonable Attribution Study of Visibility Impairment

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Final Report

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ATTACHMENT E

OF APPENDIX B.1

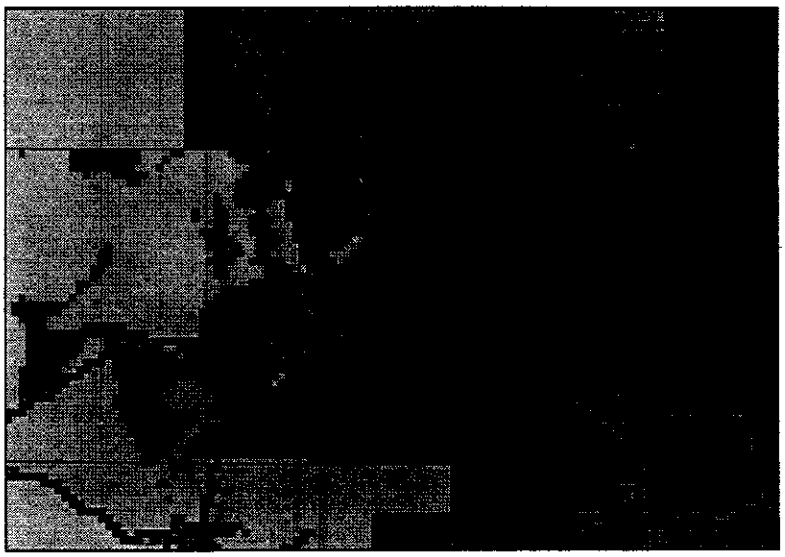
AREA SOURCE EMISSIONS

Area Source Emissions - Summer Scenario - Mesoscale Domain



ROG tons/day

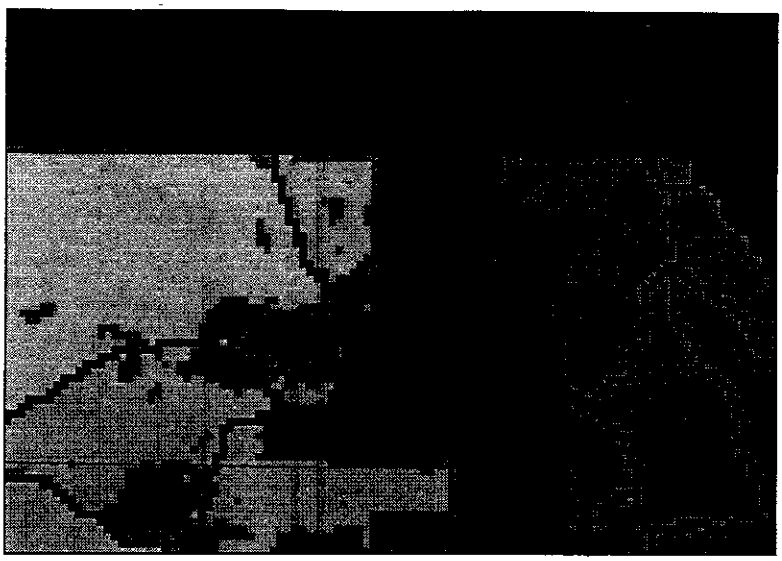
- 0 to 7.1E-05
- 7.1E-05 to 8.7E-05
- 8.7E-05 to 1.8E-04
- 1.8E-04 to 9.8E-04
- > 9.8E-04



PM2.5 tons/day

- 0 to 9.9E-04
- 9.9E-04 to 1.3E-03
- 1.3E-03 to 1.4E-03
- 1.4E-03 to 2.0E-03
- > 2.0E-03

Area Source Emissions - Summer Scenario - Mesoscale Domain



EC2.5 tons/day

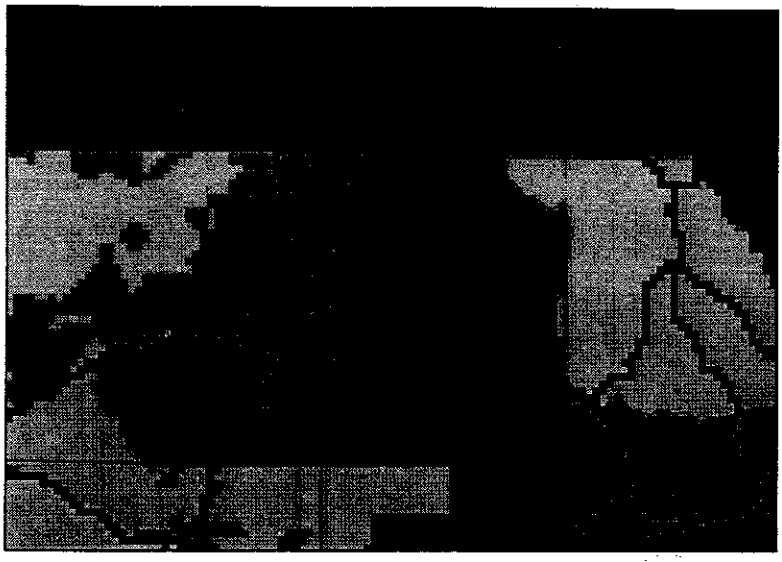
- 0 to 9.1E-06
- 9.1E-06 to 2.2E-05
- 2.2E-05 to 2.3E-05
- 2.3E-05 to 5.4E-05
- > 5.4E-05



OC2.5 tons/day

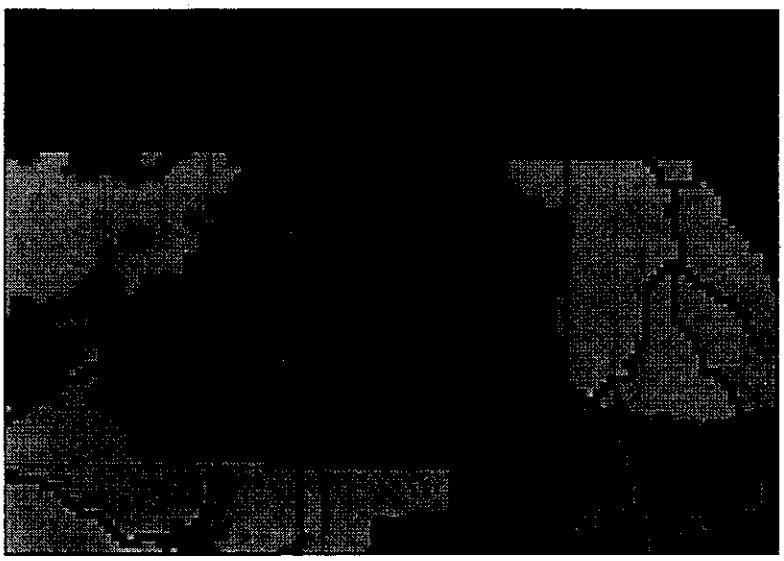
- 0 to 7.9E-06
- 7.9E-06 to 1.8E-05
- 1.8E-05 to 2.1E-05
- 2.1E-05 to 6.2E-05
- > 6.2E-05

Area Source Emissions - Summer Scenario - Mesoscale Domain



SOX tons/day

- 0 to 5.3E-06
- 5.3E-06 to 1.6E-05
- 1.6E-05 to 2.9E-05
- 2.9E-05 to 7.8E-05
- > 7.8E-05



NOX tons/day

- 0 to 8.4E-05
- 8.4E-05 to 1.9E-04
- 1.9E-04 to 4.0E-04
- 4.0E-04 to 1.1E-03
- > 1.1E-03

B.2 CALMET/CALPUFF SOURCE ORIENTED MODELING

The CALMET/CALPUFF modeling system was applied to estimate visibility-related air quality and to provide estimates of source contributions to pollutant concentrations and light extinction along selected sight paths. The CALMET/CALPUFF modeling system was used in two ways:

- Everyday inert SO_2 trajectory simulations were completed for each day of the MZVS period (December 1994 through November 1995) to determine the frequency of occurrence that emissions from each power generation unit at the Hayden and Craig Stations may have been carried toward the Mt. Zirkel Wilderness Area.

- Detailed, multi-source simulations were completed for five multi-day episodes, including many sensitivity simulations, to develop full source attributions to concentrations and light extinction in the wilderness area from sources in the region. The adequacy and uncertainty of the calculated impacts and source attributions were also assessed.

The Interagency Workgroup on Air Quality Modeling (IWAQM) recommends use of the CALMET/CALPUFF modeling system for source attribution of this type. The CALMET/CALPUFF Model (Version 3.0, Modification 1) was available on U.S. EPA's Technology Transfer Network (TTN) under the 7th Air Quality Modeling Conference directory. Though requests were made to obtain U.S. EPA Version 3.0, Modification 3, of the CALMET/CALPUFF model, which contain several updates to the current version, this modification was unavailable to the MZVS.

IWAQM recommends default settings for CALMET/CALPUFF options. The suitability of these recommended settings was investigated for simulating transport, dispersion, chemical transformation, and visibility impairment in the complex terrain of the study region. From these sensitivity simulations, an system options and parameters were selected for the MZVS that differed, in some cases, from the IWAQM recommendations.

B.2.1 Overview of CALMET and CALPUFF

B.2.1.1 CALMET Meteorological Model

The CALMET meteorological model consists of a diagnostic wind field module and separate micrometeorological modules for over-water and over-land boundary layers. For the MZVS domains, the option to adjust input winds to a Lambert Conformal Projection coordinate system to account for Earth's curvature was selected. An objective analysis procedure combines observational data into a first estimate (Step 1) wind field. Options allowing gridded prognostic wind fields (such as those produced by MM4 or CSUMM primitive equation models), may better represent regional flows and certain aspects of sea breeze circulations and slope/valley circulations, but such models were not applied for the MZVS.

The major features and options of the CALMET meteorological model are summarized in Table B.2.1.1 with the IWAQM default settings, the MZVS settings, and settings used in MZVS sensitivity tests. The techniques used for generating gridded meteorological wind fields in the CALMET model are summarized below; details on the derivation of the optimal CALMET settings for this study are documented in Section B.2.2.3.

B.2.1.2 CALMET Wind Fields

Wind fields in CALMET are calculated using a two step approach (Douglas and Kessler, 1988) developed as part of the Diagnostic Wind Model (DWM; Douglas *et al.*, 1990).

- Step 1 Wind Field: The first step of the procedure includes an initial-estimate wind field (large-scale flow) which is adjusted for local kinematic effects of terrain, slope flows, and terrain blocking effects.
  - Kinematic Effects of Terrain: The kinematic terrain effects are evaluated based on the approach of Liu and Yocke (1980). The domain-scale initial-estimate winds are used to compute a terrain-forced vertical velocity, subject to an exponential, stability-dependent decay function. The kinematic effects of terrain on the horizontal wind components are evaluated by applying a divergence-minimization scheme to the initial-estimate wind field. The divergence minimization scheme is applied iteratively until the three-dimensional divergence is less than a threshold value.
  - Slope Flows: The magnitude of slope flows in complex terrain is estimated based on an empirical scheme developed by Allwine and Whiteman (1985). The slope flow is parameterized in terms of the terrain slope, terrain height, domain-scale lapse rate, and time of day. The slope flow wind components are added to the wind field adjusted for kinematic effects.
  - Terrain Blocking Effects: The thermodynamic blocking effects of terrain on the wind flow are parameterized in terms of the local Froude number (Allwine and Whiteman, 1985). If the Froude number at a particular grid point is less than a critical value and the wind has an uphill component, the wind direction is adjusted to be tangent to the terrain.
- Step 2 Wind Field: The second step of the procedure involves the introduction of observational data into the Step 1 wind field through an objective analysis procedure. An inverse-distance squared interpolation scheme is used that weights observational data heavily in the vicinity of the observation station, while the Step 1 wind field dominates the interpolated wind field in regions with no observational data. The resulting wind field is subject to smoothing, an optional adjustment to vertical velocities based on the O'Brien (1970) method, and divergence minimization to produce a final Step 2 wind field.

Table B.2.1.1
Major Features and Options of the CALMET Meteorological Model

Parameter	Default Setting	MZVS Optimal Setting	Sensitivity Tests Performed
I. GRID PARAMETERS			
Grid Resolution (km)			
Mesoscale Region	None	4	4
Regional-Scale Region	None	4	4, 16
Grid Projection Type			
Universal Transverse Mercator (UTM) or Lambert Conformal Mapping (LCM)	UTM	LCM	
Model Domain Extent (km x km)			
Mesoscale Region	None	280 x 152	
Regional-Scale Region	None	784 x 560	
LCM Projection Definition			
Latitude Parallels (deg, deg)	30, 60	38, 43	
Reference Longitude/Latitude (deg, deg)	None	107.0, 40.5	
Top of Modeling Domain (km AGL)			
Mesoscale Region	None	2.8	
Regional-Scale Region	None	2.8	
Number of Vertical Layers[a]			
Mesoscale Region	None	13	12, 13, 25
Regional-Scale Region	None	13	

Table B.2.1.1 (continued)
Major Features and Options of the CALMET Meteorological Model

Parameter	Default Setting	MZVS Optimal Setting	Sensitivity Tests Performed
II. DIAGNOSTIC WIND MODEL (DWM) PARAMETERS			
Model Type (0=objective analysis, 1=DWM)	1	1	
Compute Froude Number Adjustment (0=No, 1=Yes)	1	1	
Compute Kinematic Effects (0=No, 1=Yes)	1	1	
Use O'Brien Procedure to Adjust Vertical Velocity	1	0	
Extrapolate Surface Wind Observations to Upper Layers (1=no extrapolation, 2=power law extrapolation, 3=user input multiplicative factors, 4=similarity theory used) (negative value ignore layer 1 data at upper-air sites)	1	1	1, 4
Minimum Sfc-Upper Site Distance Allowing Vert Extrapolation (km)	4	4	
Use Gridded Prognostic Model Output	No	No	
Kinematic Effect Parameters			
Empirical factor Controlling Kinematic Effects (Alpha)	0.1	0.1	0.1, 0.5
Radius of Influence Parameters			
Use Varying Radius of Influence (True/False)	False	True	
Maximum Radius of Influence Surface Over Land (km)	None	50[b]	
Maximum Radius of Influence Aloft Over Land (km)	None	500[c]	
Maximum Radius of Influence Surface Over Water (km)	None	50	
Minimum Radius of Influence in Wind Field Interpolation (km)	None	0.2	

Table B.2.1.1 (continued)
Major Features and Options of the CALMET Meteorological Model

Parameter	Default Setting	MZVS Optimal Setting	Sensitivity Tests Performed
Slope Flow Parameters (set in code)			
Magnitude of slope flow parameter (Beta2)	±1	±1	±1, ±2
Blocking Effect Parameters			
Critical Froude Number (CRITFR)	1.0	1.0	1.0, 2.0
Radius of Influence of Terrain Features (TERRAD) (km)	None	20	20, 50
Distance Where First Guess Wind Field and Observations are Treated Equally			
Surface Wind Fields (R1) (km)	None	10	10, 20, 50
Aloft Wind Fields (R2) (km)	None	30	30, 50, 100, 200
Divergence Minimization Procedure			
Maximum Acceptable Divergence (m/s)	5.E-6	5.E-6	
Maximum Number of Iterations	50	50	
Number of Smoothing Passes	2 (surface)/ 4 (aloft)	4 (all layers)	4 (all layers), 2 (1st 8 layers)/4 (aloft)
Maximum Number of Stations to Use in Interpolation	None	2 (surface)/ 4 (aloft)	4 (all layers), 2 (surface)/4 (aloft)
Use of Barriers in Wind Interpolation (0=No, 1=Yes)	0	1[d]	0, 1
Surface Temperature Control for DWM (0=compute internally, 1=read from file DIAG.DAT)	0	0	

Table B.2.1.1 (continued)
Major Features and Options of the CALMET Meteorological Model

Parameter	Default Setting	MZVS Optimal Setting	Sensitivity Tests Performed
Surface Site for DWM Temperature	None	Hayden	
Domain Average Lapse Rate Control for DWM (0=compute internally, 1=read from file DIAG.DAT)	0	0	
Upper-Air Station to Use for Domain Average Lapse Rate	None	Clark	Hayden, Clark
Depth Domain Average Lapse Rate is Computed (m AGL)	200	200	200, 1000
Domain Average Wind Components (0=calculate internally, 1=read from file DIAG.DAT)	0	0	
Upper-Air Station Used for Domain Average Wind for DWM (-1=calculate spatially varying values)	None	-1	
Bottom and Top of Layer for Domain Average Wind (m AGL)	1 to 2000	1 to 1500[e]	
Include Lake Breeze Effects	False	False	
III. MIXING HEIGHT, TEMPERATURE, AND PRECIPITATION PARAMETERS			
Neutral Mechanical Mixing Height Constant (B in Equation 2-54)	1.41	1.41	
Convective Mixing Height Constant (E in Equation 2-52)	0.15	0.15	
Stable Mixing Height Constant (B_2 in Equation 2-57)	2400	2400	
Overwater Mixing Height Constant (c_w in Equation 2-64)	0.16	0.16	
Coriolis Parameter (f in Equation 2-64) (1/s)	1.E-4	1.E-4	

Table B.2.1.1 (continued)
Major Features and Options of the CALMET Meteorological Model

Parameter	Default Setting	MZVS Optimal Setting	Sensitivity Tests Performed
Minimum Temperature Lapse Rate Above Mixing Height (K/m)	0.001	0.001	
Depth of Layer Above Convective Mixing Height for Lapse Rate Computation (m)	200	200	
Maximum Overland Mixing Height (m)	2500	2500	
Minimum Overland Mixing Height (m)	20	20	
Maximum Overwater Mixing Height (m)	2500	2500	
Minimum Overwater Mixing Height (m)	50	50	
Conduct Spatial Averaging of Mixing Heights (0=No, 1=Yes)	1	1	
Maximum Search Distance for Spatial Averaging (grid cells)	1	5	1, 3, 5
Half-Angle of upwind-looking Cone for Spatial Averaging (deg.)	30	30	
Layer of Winds Used in Upwind Averaging of Mixing Heights	None	6[f]	
Type of Temperature Interpolation (1=1/r, 2=1/r^2)	1	1	
Conduct Spatial Averaging of Temperatures (0=No, 1=Yes)	1	1	
Radius of Influence for Temperature Interpolation (grid cells)	1	1	1, 3, 5
Default Lapse Rate Overwater Below Mixing Height (K/m)	-0.0098	-0.0098	
Default Lapse Rate Overwater Above Mixing Height (K/m)	-0.0045	-0.0045	

Table B.2.1.1 (continued)
Major Features and Options of the CALMET Meteorological Model

Parameter	Default Setting	MZVS Optimal Setting	Sensitivity Tests Performed
Method of Precipitation Interpolation (1=1/r, 2=1/r^2, 3=1/r^2 *expftn)	2	3	2, 3
Radius of Influence for Precip Interpolation in Methods 1 or 2 (km)	100	50	0, 50, 100
Cutoff Precipitation Rate (mm/hr)	0.01	0.10	0.01, 0.10

[a] The "optimal" vertical cell faces are in meters above ground level (m AGL): 0, 20, 70, 182, 294, 406, 518, 630, 840, 1134, 1526, 1918, 2310, 2800.

[b] Value for every-day inert SO_2 trajectory modeling is 100 km.

[c] Value for every-day inert SO_2 trajectory modeling is 1000 km.

[d] Specification of barriers was not done for every-day inert SO_2 trajectory modeling.

[e] Range used for inert SO_2 trajectory modeling is 1-2000 m.

[f] Value used for inert SO_2 trajectory modeling is 4.

B.2.1.3 CALMET Boundary Layer

The CALMET model contains two boundary layer models for over-land and over-water grid cells:

- Over-land Boundary Layer: Over land surfaces, the energy balance method of Holtslag and van Ulden (1982) is used to compute hourly gridded fields of the sensible heat flux, surface friction velocity, Monin-Obukhov length, and convective velocity scale. Mixing heights are determined from the computed hourly surface heat fluxes and observed temperature soundings using a modified Carson (1973) method based on Maul (1980). Gridded fields of PGT stability class and optional hourly precipitation rates are also determined by the model.

- Over-water Boundary Layer: The aerodynamic and thermal properties of water surfaces require a different method for calculating the boundary layer parameters in a marine environment. A profile technique, using air-sea temperature differences, is used in CALMET to compute the micrometeorological parameters in the marine boundary layer.

An upwind-looking spatial averaging scheme is optionally applied to the mixing heights and three-dimensional temperature fields in order to account for important advective effects.

B.2.1.4 CALMET Input Data

The input data requirements of the CALMET model are summarized in Table B.2.1.2. The modeling system flow diagrams in the User's Manual provide an overview of the various input data sets required by the model as well as the preprocessing steps used to produce them. CALMET requires only routinely-available surface and upper-air meteorological observations, although some special data inputs can be accommodated. For example, twice-daily sounding data (e.g., at the standard sounding times of 0000 and 1200 GMT) are needed as a minimum requirement, but if soundings at more frequent (even arbitrarily spaced) intervals are available, they will be used by the model. However, the sounding must have valid measurements at the surface and at the top of the modeling domain. This limits the use of vertical meteorological information for some special study data (e.g., profiler, sodar, tower), unless the data are extrapolated upwards, or defined as surface observations rather than vertical soundings.

CALMET reads the user's inputs from a "control file" with a default name of CALMET.INP (see Table B.2.1.1). This file contains the user's selections of the various model options, input variables, output options, etc. Four main types of data are used in CALMET model input: 1) geophysical data (land use and terrain); 2) surface meteorological data; 3) upper-air meteorological data; and 4) precipitation data. Section B.2.2.3 documents the procedures used to develop these model inputs.

Table B.2.1.2
Summary of CALMET Model Input Data

I. Surface Meteorological Data

Hourly observations of:

- wind speed
- wind direction
- temperature
- cloud cover
- ceiling height
- surface pressure
- relative humidity

Hourly precipitation data of:

- precipitation rates
- precipitation type code (part of surface data file)

II. Upper-Air Meteorological Data

Twice-daily observed vertical profiles of:

- wind speed
- wind direction
- temperature
- pressure
- elevation

Hourly gridded wind fields (optional) of:

- MM4-FDDA output
- CSUMM output

Overwater observations (optional) of:

- air-sea temperature difference
- air temperature
- relative humidity
- overwater mixing height
- wind speed
- wind direction
- overwater temperature gradients
- above and below mixing height

III. Geophysical Data

Gridded fields of:

- terrain elements
- land use categories
- surface roughness length (optional)
- albedo (optional)
- Bowen ratio (optional)
- soil heat flux constant (optional)
- anthropogenic heat flux (optional)
- vegetative leaf area index (optional)

B.2.1.5 CALMET Model Limitations

The CALMET model is composed of two principal submodels: the Diagnostic Wind Model and the Micrometeorological Model.

The CALMET diagnostic wind model solves the incompressible mass continuity equation in conjunction with parameterizations to account for kinematic terrain effects (i.e., blocking) and slope flows (e.g., mountain valley flows). The solution method allows for the introduction of measured wind influences. The model does not explicitly conserve momentum nor energy as in prognostic models. Smoothing, interpolation, and extrapolation parameterizations are used to artificially constrain the mass conservative solution to prevent physically impossible excursions in momentum and energy fluxes that could occur in the absence of explicit momentum and energy conservation constraints.

The diagnostic wind model may be viewed as a sophisticated mass-conservative measurement interpolation package. Reliability of the interpolated fields improves as the density of the measurement network increases. Conversely, reliability generally suffers where measurements are sparse. Nevertheless, experience has shown that kinematic terrain channeling and blocking effects can be reliably estimated, even in the absence of a dense monitoring network, under moderate to relatively high wind and neutrally stable conditions, so long as there are no significant vertical wind structure complexities. Diagnostic wind models have not been successful in representing light winds situations, highly stable or unstable conditions, or situations with significant vertical wind variations, particularly at very high resolution (<1 km). Under these conditions local effects often dominate, and the model's parameterizations of these small-scale forcings are too simplistic. For example, the CALMET slope wind parameterization is based on the local magnitude of the slope, and domain averaged temperatures and lapse rates, while actual slope winds depend strongly on these plus the local terrain aspect, solar insolation, surface albedo, surface roughness, and slope lengths.

Specific limitations of diagnostic wind models of relevance to the MZVS include their inability to reproduce the vertical recirculation patterns associated with mountain-valley winds, lee waves, lee wakes, and chaotic light wind situations. Mountain-valley wind recirculation is often a dominant flow feature in the Yampa Valley, particularly during visibility impairment episodes; the CALMET diagnostic model's ability to reproduce these flow fields is highly questionable without adequate observational data.

Over land surfaces, micrometeorological parameters required by CALPUFF (surface heat flux, surface momentum flux, and boundary layer height) are calculated in CALMET using an energy budget model based mostly on the work of Holtslag and van Ulden (1982). Different algorithms are used over water surfaces due to their greater thermal mass and small (and variable) roughness lengths. Since there are no major bodies of water in the Mt. Zirkel modeling domains, only the land surface algorithms are applied.

This micrometeorological model uses estimates of the Bowen ratio (ratio of sensible heat flux to latent heat flux), sun angle, surface albedo, temperature, cloud cover, anthropogenic heat flux, surface roughness length, and vertical potential temperature profile for each grid square to compute the required heat and momentum fluxes and the boundary layer height. While various empirical parameterizations used in the model may introduce errors in the calculations, the major limitations are likely to result from the input data, particularly those for which direct measurements are sparse or unavailable (e.g., the temperature profile, Bowen ratio, surface albedo, anthropogenic heat flux, and surface roughness length). Of these, proper specification of the lapse rate and the Bowen ratio in each grid square are likely to result in the most significant inaccuracies.

Use of the seasonal default values by land use categories for the Bowen ratio can lead to errors in stability and mixing height estimates, which may affect the dispersion calculations. More significantly, the spatial and temporal interpolation of limited upper-air data, even with the enhanced sounding data taken as part of the MZVS, introduces errors. Complex terrain greatly exacerbates this problem. In addition, CALMET does not include any adjustment of sun angle to account for the local terrain slope, as documented in the User's Guide. Thus, the model does not adequately account for differential heating of mountain slopes, which can produce significant stability, mixing height, and wind direction differences over surfaces with different orientations relative to the sun.

Given the limitations of the CALMET micrometeorological module, a number of important atmospheric processes in the study domain, such as the development of local-scale convective cells and venting of material trapped below the inversion by flow up heated slopes, are probably not represented by the model. Without accurate lapse rates, and with uncertainties in the estimated surface heat flux due to limited information on Bowen ratios and other parameters, the CALMET daytime convective mixing height calculations will not always produce accurate results. This is of particular concern in this study due to the interaction of generating station plumes with the mixed layer. Since dispersion and transport are strongly dependent on the position of the plume relative to the top of the mixed layer, misplacement of the mixing height can result in large errors in plume location and dispersion.

B.2.1.6 CALPUFF Model

CALPUFF is a multi-layer, multi-species non-steady-state puff dispersion model that simulates the effects of time- and space-varying meteorological conditions on pollutant transport, transformation, and removal. CALPUFF uses either the meteorological fields developed by the CALMET model, or simple, single station winds in a format consistent with the meteorological files used to drive steady-state Gaussian plume models. CALPUFF contains algorithms for near-source effects such as building downwash, transitional plume rise, partial plume penetration, subgrid-scale terrain interactions as well as longer range effects such as pollutant removal (wet scavenging and dry deposition), chemical transformation, vertical wind shear, over-water transport, and coastal interaction effects. It can accommodate arbitrarily-varying point source and gridded area source

emissions. Most of the algorithms contain options to treat the physical processes at different levels of detail depending on the model application.

The memory management scheme used in CALPUFF allows the maximum array dimensions to be easily adjusted to match the requirements of a particular application. An external parameter file contains the maximum array size for the major arrays. A re-sizing of the program can be accomplished by modifying the variable(s) in the parameter file and re-compiling the program. All appropriate arrays in the model will be automatically re-sized by the updated parameter values.

The computer memory required by CALPUFF depends on the specified maximum array dimensions in the parameter file. For example, CALPUFF required approximately 300 kilobytes of memory for a test run with a 10 x 10 km horizontal grid, five vertical layers, and a maximum number of 100 puffs (a configuration suitable for evaluating the near-field impact from a small number of point sources). Over eight megabytes of memory were required for the detailed MZVS modeling due to the large number of sources and size of the modeling domain.

CALPUFF run times vary by a factor of 20 or more depending on the size of the modeling domain, the number of sources, number of receptors, selection of technical options, and meteorological variables such as the mean wind speed (which together with grid resolution controls puff release rate). Because each puff is treated independently, any factor which influences the number and residence time of puffs on the computational grid, as well as the number of receptors at which to sample puff mass, will affect the run time of the model.

B.2.1.7 CALPUFF Model Features and Options

The major features and options of the CALPUFF model are summarized below.

- Source types include: 1) Point sources (constant or variable emissions); 2) line sources (constant emissions); 3) volume sources (constant or variable emissions); and 3) area sources (constant or variable emissions).

- Non-steady-state meteorological conditions include: 1) gridded 3-D fields of meteorological variables (winds, temperatures); 2) spatially-variable fields of mixing height, friction velocity, convective velocity scale, Monin-Obukhov length, and precipitation rate; and 3) vertically and horizontally-varying turbulence and dispersion rates.

- Sampling function options include: 1) integrated puff formulation; and 2) elongated puff (slug) formulation.

- Dispersion coefficients (σ_y,σ_z) options include: 1) direct measurements of σ_v and σ_w; 2) estimated values of σ_v and σ_w based on similarity theory; 3) Pasquill-

Gifford (PG) dispersion coefficients (rural areas); and 4) McElroy-Pooler (MP) dispersion coefficients (urban areas).

- Vertical wind shear options include: 1) puff splitting; and 2) differential advection and dispersion.

- Plume rise options include: 1) partial penetration; 2) buoyant and momentum rise; 3) stack tip effects; 4) vertical wind shear; and 5) building downwash effects.

- Building downwash options include: 1) the Huber-Snyder method; and 2) the Schulman-Scire method.

- Subgrid scale complex terrain options include dividing streamline, H_d. Above H_d, puff flows over hill and experiences altered diffusion rates, below H_d, puff deflects or splits around hill.

- Dry deposition options for gases and PM include: 1) no dry deposition; 2) user-specified diurnal cycles for each pollutant; and 3) full treatment of space and time variations of deposition with a resistance model.

- Wet removal options include: 1) scavenging coefficient approach; and 2) removal rate a function of precipitation intensity and type.

- Overwater and coastal interaction effects include: 1) over-water boundary layer parameters; 2) abrupt change in meteorological conditions and plume dispersion at coastal boundary; and 3) plume fumigation.

- Chemical transformation options include: 1) pseudo-first order chemical mechanism for SO_2, $SO_4^=$, NO_x, HNO_3, and NO_3^- (MESOPUFF II method); 2) user-specified diurnal cycles of transformation rates; and 3) no chemical conversion

Table B.2.1.3 lists CALPUFF options with IWAQM default settings, MZVS settings, and sensitivity test settings. Details on the specifications of these options are provided in Section B.2.2.4.

CALPUFF allows the user to specify puff concentration sampling at a set of user-defined discrete receptor locations and/or at a set of receptors arranged on a regular Cartesian grid. All receptors are located at ground level and can therefore only report surface concentrations. Specification of discrete receptors allows the user to sample modeled air quality at locations where air quality measurements are made, as well as at points between those locations. The "sampling grid" option allows the user to define the sampling grid to coincide with the "computational grid" (i.e., the grid upon which gridded meteorological data drive puff advection, growth, chemistry and deposition), or to cover a subset of the computation grid in a particular area of interest. Further, the sampling grid resolution may be increased to an integral number of sampling points per computation

Table B.2.1.3
Major Features and Options of the CALPUFF Model

Parameter	IWAQM Default Setting	MZVS Optimal Setting	Sensitivity Tests Performed
I. GENERAL RUN CONTROL PARAMETERS			
Starting Date (days before episode)	None	2 to 3[a]	
Number of Modeled Species[b]	5	9	
Averaging Time (min)	60	60	
II. TECHNICAL OPTIONS			
Near-Field Vertical Puff Distribution (0=uniform, 1=Gaussian)	1	1	
Terrain Adjustment (0=none, 1=ISC adjustment, 2=CALPUFF adjustment, 3=half-height adjustment)	1	0	
Sub-Grid Complex Terrain Adjustment (0=none, 1=CTSG model)	None	0	
Near-Field Puff Model (0=puff, 1=elongated "slugs")	1	0[c]	
Plume Rise Calculation (0=final rise only, 1=transitional rise)	1	0[d]	
Stack Tip Downwash (0=no, 1=yes)	1	0	
Vertical Wind Shear used in Plume Rise (0=no, 1=yes)	1	1	
Puff Shear Splitting (0=no, 1=yes)	None	1	0, 1
Chemical Mechanism (0=inert, 1=MESOPUFF II scheme, 2=user-specified rates)	1	1	
Wet Removal (0=no, 1=yes)	1	1[e]	0, 1

Table B.2.1.3 (continued)
Major Features and Options of the CALPUFF Model

Parameter	IWAQM Default Setting	MZVS Optimal Setting	Sensitivity Tests Performed
Dry Removal (0=no, 1=yes)	1	1	
Dispersion Coefficients (1=user-specified turbulence statistics, 2=turbulence statistics from micro-meteorological variables, 3=rural PGT using ISCST approx., urban MP, 4=rural PGT using MESOPUFF equations, urban MP, 5=CTDM equations with user-specified turbulence statistics)	2	2	
PGT Dispersion Coefficients Adjusted for Surface Roughness (0=no, 1=yes)	0	0	
Partial Plume Penetration of Elevated Inversion (0=no, 1=yes)	None	1	
Test for Regulatory Settings (0=no, 1=U.S. EPA short range, 2=U.S. EPA long range visibility, 3=Victoria EPA)	None	0	
III. GRID CONTROL PARAMETERS			
Met/Computational Grid Resolution (km)			
Mesoscale Region	None	4	
Regional-Scale Region	None	4	4, 16
Model Domain Extent (km x km)			
Mesoscale Region	None	280 x 152	
Regional-Scale Region	None	784 x 560	

Table B.2.1.3 (continued)
Major Features and Options of the CALPUFF Model

Parameter	IWAQM Default Setting	MZVS Optimal Setting	Sensitivity Tests Performed
Column Range of Computational Grid[f]			
Mesoscale Region	None	1 to 70	
Regional-Scale Region	None	1 to 196	1 to 49, 1 to 196
Row Range of Computational Grid[b]			
Mesoscale Region	None	1 to 38	
Regional-Scale Region	None	1 to 140	1 to 35, 1 to 140
Column Range of Sampling Grid[g]			
Mesoscale Region	None	1 to 70	
Regional-Scale Region	None	None	1 to 49, 73 to 142, None
Row Range of Sampling Grid			
Mesoscale Region	None	1 to 38	
Regional-Scale Region	None	None	1 to 35, 55 to 92, None
Sampling Grid Nesting Factor			
Mesoscale Region	None	1	
Regional-Scale Region	None	1	
Top of Modeling Domain (km AGL)			
Mesoscale Region	None	2.8	
Regional-Scale Region	None	2.8	
Number of Vertical Layers[h]			
Mesoscale Region	None	13	
Regional-Scale Region	None	13	

Table B.2.1.3 (continued)
Major Features and Options of the CALPUFF Model

Parameter	IWAQM Default Setting	MZVS Optimal Setting	Sensitivity Tests Performed
IV. DRY DEPOSITION PARAMETERS – GASES			
Diffusivity (cm^2/s)			
SO_2	None	0.1509	
NO_x	None	0.1656	
HNO_3	None	0.1628	
ALPHA STAR			
SO_2	None	1.00E+3	
NO_x	None	1.00	
HNO_3	None	1.00	
Reactivity			
SO_2	None	8.0	
NO_x	None	8.0	
HNO_3	None	18.0	
Mesophyll Resistance (s/cm)			
SO_2	None	0.0	
NO_x	None	5.0	
HNO_3	None	0.0	
Henry's Law Coefficient			
SO_2	None	4.0E-2	
NO_x	None	3.5	
HNO_3	None	8.0E-8	

Table B.2.1.3 (continued)
Major Features and Options of the CALPUFF Model

Parameter	IWAQM Default Setting	MZVS Optimal Setting	Sensitivity Tests Performed
V. DRY DEPOSITION PARAMETERS – PARTICLES			
Geometric Mass Mean Diameter (microns)	None	0.48	
Geometric Standard Deviation (microns)	2.00	2.00	
VI. MISC. DRY DEPOSITION PARAMETERS			
Reference Cuticle Resistance (s/cm)	30	30	
Reference Ground Resistance (s/cm)	10	10	
Reference Pollutant Reactivity	8	8	
Unirrigated Vegetation State (1=active and unstressed, 2=active and stressed, 3=inactive)	1	1	

Table B.2.1.3 (continued)
Major Features and Options of the CALPUFF Model

Parameter	IWAQM Default Setting	MZVS Optimal Setting	Sensitivity Tests Performed
VII. WET DEPOSITION PARAMETERS			
Scavenging Coefficient – Liquid Precip (s^{-1})			
SO_2	3.0E-5	3.0E-5	
NO_x	0.0	0.0	
HNO_3	6.0E-5	6.0E-5	
SO_4, NO_3, other PM	10.0E-5	10.0E-5	
Scavenging Coefficient – Frozen Precip (s^{-1})			
SO_2	0.0	0.0	
NO_x	0.0	0.0	
HNO_3	0.0	0.0	
SO_4, NO_3, other PM	3.0E-5	3.0E-5	
VIII. CHEMISTRY PARAMETERS			
Ozone Data[i] (0=use constant background value, 1=use hourly values from file)	1	0, 1	
Background Ozone Concentration in ppb (used if no ozone file read, or if all ozone data is missing)	80	40	
Background Ammonia Concentration (ppb)	10	Episode-specific	
Nighttime SO_2 Loss Rate (percent/hr)	0.2	0.2	
Nighttime NO_x Loss Rate (percent/hr)	2.0	2.0	
Nighttime HNO_3 Formation Rate (percent/hr)	2.0	2.0	

Table B.2.1.3 (continued)
Major Features and Options of the CALPUFF Model

Parameter	IWAQM Default Setting	MZVS Optimal Setting	Sensitivity Tests Performed
IX. DISPERSION PARAMETERS			
Use Heffter Formulas for σ_z (0=no, 1=yes)	1	1	
Critical Horizontal Puff Size to use Heffter Formulas (m)	550	550	
Stability Class for Puffs Above Boundary Layer	5	5	
Vertical Dispersion Constant for Stable Conditions	0.01	0.01	
Vertical Dispersion Constant for Neutral/Unstable Conditions	0.10	0.10	
Range of Urban Land Use Categories	10 to 19	10 to 19	
Maximum Travel Distance of Puff in One Sampling Step (Met Grid Units)	5	1	
Maximum Number of Puffs Released from Each Source during One Time Step	99	99	
Maximum Number of Sampling Steps per Time Step	5	5	
Wind Speed Power Law Exponents for Stabilities A-F	0.07, 0.07, 0.10, 0.15, 0.35, 0.55	0.07, 0.07, 0.10, 0.15, 0.35, 0.55	
Potential Temperature Gradient for Stability E and F (K/m)	0.02, 0.035	0.02, 0.035	
Minimum σ_y of New Puffs (m)	0.01	0.01	
Minimum σ_z of New Puffs (m)	0.01	0.01	
Minimum Turbulence σ_v (m/s)	0.50	0.50	

Table B.2.1.3 (continued)
Major Features and Options of the CALPUFF Model

Parameter	IWAQM Default Setting	MZVS Optimal Setting	Sensitivity Tests Performed
Minimum Turbulence σ_w (m/s)	0.016	0.016	
Minimum Wind Speed for Non-Calm Conditions (m/s)	1.0	0.1	
Maximum Mixing Height (m)	3000	2800	
Minimum Mixing Height (m)	20	20	

[a] Whenever possible, a spin up period of 5 days was used in the every-day inert SO_2 trajectory modeling.

[b] SO_2, $SO_4^=$, NO_x, HNO_3, NO_3^-, elemental carbon (EC), primary organic carbon (POC), secondary organic aerosol (SOA), and other $PM_{2.5}$ (PPM25). Only SO_2 was specified for every-day inert generating station plume trajectory simulations.

[c] The slug formation was used for every-day inert SO_2 trajectory modeling (puffs were used to calculate gridded SO_2 for animation).

[d] Transitional rise was used for every-day inert SO_2 trajectory modeling.

[e] Wet deposition was not invoked for every-day inert SO_2 trajectory modeling.

[f] Coverage of the computational grid in terms of meteorological grid points; resolution must equal meteorological grid resolution. Full coverage of the meteorological grid was used. Row and column ranges given in this table reflect grid resolution listed above.

[g] Coverage of the sampling grid in terms of meteorological grid points; resolution can be equal to or higher than meteorological grid resolution. Sensitivity tests for the regional grid included the entire domain at 16 km resolution, the mesoscale sub-domain at 4 km resolution, and no sampling grid. No sampling grid was used in the final regional production runs.

[h] The "optimal" vertical cell faces in meters above ground level (m AGL) are: 0, 20, 70, 182, 294, 406, 518, 630, 840, 1134, 1526, 1918, 2310, 2800.

[i] A single background value for ozone (40 ppb) was used for the August 7-9 episode due to lack of data at the Hayden VOR site for that period.

point. For the MZVS, discrete receptors were placed at all air quality monitoring sites, as well as at several locations within the Mt. Zirkel Wilderness and along sight paths.

B.2.1.8 CALPUFF Model Inputs and Outputs

Tables B.2.1.4 and B.2.1.5 summarize the CALPUFF model input and output files, respectively. CALPUFF reads user inputs from a "control file" with a default name of CALPUFF.INP. This file contains the user's selections for the various model options, technical input variables, output options, and other user-controllable options.

A meteorological data file (CALMET.DAT) generated by CALMET contains hourly gridded fields of micrometeorological parameters and three-dimensional wind fields. The meteorological data file also contains geophysical data, such as terrain heights and land use, which are required by both the meteorological model and by the CALPUFF model.

The input data provided to CALPUFF by the CALMET preprocessor are:

- Gridded fields of: 1) land use weighted surface roughness lengths; 2) dominant land use category in each cell; 3) terrain elevations; and leaf area indices.

- Hourly gridded fields of: 1) u, v wind components (3-D); 2) air temperature (3-D); 3) surface friction velocity (2-D); 4) convective velocity scale (2-D); 5) mixing height (2-D); 6) Monin-Obukhov length (2-D); 6) PGT stability class (2-D); and precipitation rate (2-D).

- Hourly values at surface meteorological stations for: 1) air density; 2) air temperature; 3) short-wave solar radiation; 4) relative humidity; and 5) precipitation type.

Four files are provided for the input of emissions data. The control file, CALPUFF.INP, includes point, line, volume and area source data for sources with constant emission parameters. Point source data is read from a file with a default name of PTEMARB.DAT. Gridded, time-varying volume source emissions are obtained from the file VOLEM.DAT. Time-varying area source data is read from a file called BAEMARB.DAT. Since the CALPUFF applications in this study use hourly varying emissions, the PTEMARB.DAT and BAEMARB.DAT were used for the point source and area source emission inputs, respectively.

Hourly observations of ozone concentrations are used in the calculation of SO_2 and NO_x transformation rates when the MESOPUFF II chemical transformation scheme is selected. The hourly ozone data for one or more ozone stations are read from the file OZONE.DAT. VD.DAT and CHEM.DAT contain diurnal cycles of user-specified deposition velocities and chemical transformation rates, respectively. These files are optional, and provide substitutes for the values normally computed internally by the deposition and chemical models with sets of time-varying but spatially-uniform externally

Table B.2.1.4
Summary of CALPUFF Model Input Files

Default File Name	Contents	Unit[a] Number	Type
PUFFILES.DAT	File containing the filename and path for each of the input and output (I/O) files used in the current run. If an I/O file name is not specified in the PUFFILES.DAT file, the model uses the default file names shown in this table.	IO14	Formatted
CALPUFF.INP	Control file inputs.	IO5	Formatted
CALMET.DAT	Geophysical and hourly meteorological data, created by the CALMET meteorological model.	IO7	Unformatted
or			
ISCMET.DAT	Single-station ASCII meteorological data in slightly modified ISC2-format.	IO7	Formatted
or			
PLMMET.DAT	Single-station ASCII meteorological data in slightly modified AUSPLUME format.	IO7	Formatted
PTEMARB.DAT	Source and emissions data for point sources with arbitrarily-varying emission parameters (optional).	IO16	Unformatted
BAEMARB.DAT	Emissions data for area sources with time-varying emission parameters. Can be derived from EPM model files (optional).	IO17	Unformatted
VOLEM.DAT	Emissions data for volume sources with time-varying emission parameters (optional).	IO18	Formatted
VD.DAT	User-specified deposition velocities (optional).	IO20	Formatted
OZONE.DAT	Hourly ozone measurements at one or more ozone stations (optional).	IO22	Formatted
CHEM.DAT	User-specified chemical transformation rates (optional).	IO24	Formatted
SIGMA.DAT	Hourly turbulence measurements (σ_v, σ_w) (optional).	IO26	Formatted
HILL.DAT	Hill specifications from CTDM terrain processor (optional).	IO28	Formatted

[a] Variable shown is the parameter controlling the FORTRAN unit number associated with the file. Usually, the value assigned to the parameter is consistent with the name (i.e., IO7 = 7). However, the value can be easily changed in the parameter file to accommodate reserved unit numbers on a particular system.

Table B.2.1.5
Summary of CALPUFF Model Output Files

Default File Name	Contents	Unit[a] Number	Type
CALPUFF.LST	List file produced by CALPUFF	IO6	Formatted
CONC.DAT	One-hour averaged concentrations (g/m^3) at the gridded and discrete receptors for species selected by the user in the control file (optional)	IO8	Unformatted
DFLX.DAT	One-hour averaged dry deposition fluxes ($g/m^2/s$) at the gridded and discrete receptors for species selected by the user in the control file (optional)	IO9	Unformatted
WFLX.DAT	One-hour averaged wet deposition fluxes ($g/m^2/s$) at the gridded and discrete receptors for species selected by the user in the control file (optional)	IO10	Unformatted
VISB.DAT	Relative humidity data required for visibility-related postprocessing (optional)	IO11	Unformatted
DEBUG.DAT	Tables of detailed puff/slug data useful for debugging (optional)	IO30	Formatted

[a] Variable shown is the parameter controlling the FORTRAN unit number associated with the file. Usually, the value assigned to the parameter is consistent with the name (i.e., IO8 = 8). However, the value can be easily changed in the parameter file to accommodate reserved unit numbers on a particular system.

specified values. Another optional input file, SIGMA.DAT, contains hourly observations of σ_v and σ_w, used to compute the plume dispersion coefficients of σ_y and σ_z.

The CALPUFF output list file contains a copy of the inputs used in the run, optional output fields of gridded and discrete receptor concentrations, wet deposition fluxes, dry deposition fluxes, and other run data. The CONC.DAT, WFLX.DAT, and DFLX.DAT files contain the output concentrations, wet deposition fluxes, and dry deposition fluxes, respectively, in an unformatted form suitable for further processing by the postprocessing program, CALPOST. The VISB.DAT file contains relative humidity information which is required by CALPOST in order to perform certain visibility-related computations.

B.2.1.9 CALPUFF Limitations

CALPUFF is a highly parameterized Lagrangian puff model that has numerous limitations and simplifications in its representation of each atmospheric process. This section addresses the limitations with respect to the model treatment of transport, dispersion, wet deposition, dry deposition, and chemical transformation.

One of the major CALPUFF limitations is the assumption of puff coherency, which quickly becomes invalid in the complex terrain flow fields around the Wilderness. Puffs of emissions are advected by a single wind at puff center, even though the puff may have large horizontal and vertical extent. The complex terrain wind fields undoubtedly include significant variations in winds across the puff, which CALPUFF is incapable of using. It is difficult to assess the effects of this uncertainty on the calculated contribution of individual sources or source grouping to PM concentrations in the study region. CALPUFF has a puff splitting feature that might alleviate some of the deficiencies of the puff coherency assumption. However, in order to treat the effects of all of the horizontal and vertical wind shear within the complex terrain wind fields around the study region, the puff would have to be split into so many subpuffs that the computational demands of the model would make it unusable.

Once final rise from stack is determined, elevation of puff center is not adjusted to a mean height when puffs mix through large depths; puffs do not necessarily travel with the mean flow over puff depth (particularly those emanating from low-level area sources). This may artificially lead to a buildup of mass due to weaker near-surface winds, and may not advect puffs with the most appropriate speed or direction.

It is possible for one receptor to simultaneously sample concentrations from near surface puffs and from deeply mixed puffs aloft that move at different speeds and directions, violating a fundamental principle that two columns of mass cannot impinge on a point from more than one direction.

Although CALPUFF has several options for defining puff dispersion, with the exception of an option to use CTDM dispersion curves, none of them are designed to simulate regional dispersion in complex terrain. Puffs are dispersed in a uniform manner,

thus the effects of enhanced dispersion in portions of the puffs due to complex terrain induced turbulence cannot be simulated. After the first day (or less) of travel, the puff's vertical extent will likely traverse vertical zones with differing turbulence rates (stabilities) and different rates of plume expansion correspondingly. However, only one expansion rate can be used for a single puff, introducing additional errors in the puff dispersion. As shown below, the CTDM option did not appear to be fully operational in the version of CALPUFF applied in this study.

CALPUFF uses a fairly complex resistance based dry deposition module which is limited by the lack of sufficiently detailed input data. Surface roughness and other ground characteristics (e.g., leaf area index) need to be specified. Mass is removed from the complete puff based on surface and micrometeorological conditions within the cell containing the puff center point (puffs may span as much as 50 km or more). The uncertainty in dry deposition on the modeling results are difficult to estimate since the parameter values in the CALPUFF dry deposition algorithm are uncertain. However, the effects of the dry deposition uncertainties are much smaller. Than those of the transport and chemistry uncertainties.

CALPUFF uses a simple scavenging coefficient approach to treat wet deposition. During periods of precipitation, the effects of visibility impairment in the Wilderness are often obscured by weather. Since most precipitation during the summer-fall months of the study were convective mountain thundershowers, which are spotty in nature, there may be visibility impairment events, either spatially or temporally, between the convective precipitation events. Thus, the treatment of rainout and washout of pollutants as they are advected towards the Wilderness should be treated. Mass is removed from the entirety of each puff based on hourly precipitation rates at the cell containing the puff center point (puffs may span as much as 50 km or more), regardless of the spatial extent of precipitation in the study region. Although the CALPUFF wet scavenging algorithm is simple, the most uncertain component in the treatment of wet deposition is associated with the input precipitation fields, which are derived from stations with a sporadic distribution within the study domain..

The CALPUFF chemical module is formulated around linear transformation rates for SO_2 to sulfate and NO_X to total nitrate. There are two options for specifying these transformation rates:

- Option 1: An internal calculation of rates based on local values for several controlling variables (e.g., solar radiation, background ozone, relative humidity, and plume NO_X) as used in MESOPUFF-II. The parametric transformation rate relationships employed were derived from box model calculations using the mechanism of Atkinson *et al.* (1982).

- Option 2: A user-specified input file of diurnally varying but spatially uniform conversion rates.

Morris *et al.* (1987) reviewed the MESOPUFF-II mechanism as part of the U.S. EPA Rocky Mountain Acid Deposition Model Assessment study. They found that it provided physically plausible responses to many of the controlling environmental parameters. However, the mechanism had no temperature dependence, which is an important factor in the Rocky Mountain region where there are wide variations in temperature. Furthermore, the MESOPUFF-II transformation scheme was based on box model simulations for conditions more representative of the Eastern U.S. than of the Rocky Mountains.

The largest deficiency in the MESOPUFF-II chemical transformation algorithm is the lack of explicit treatment for in-cloud (aqueous-phase) enhanced oxidation of SO_2 to sulfate. The MESOPUFF-II chemical transformation algorithm includes a surrogate reaction rate to account for aqueous-phase oxidation of SO_2 to sulfate as follows:

$$K_{aq} = 3 \times 10^{-8} \times RH^4 \text{ (\%/hr)} \qquad \text{(B.2-1)}$$

Thus, at 100% relative humidity (RH), the MESOPUFF-II aqueous-phase surrogate SO_2 oxidation rate will be 3% per hour. Measurements in generating station plumes suggest spatially- and temporally-integrated SO_2 oxidation rates due to oxidants in clouds to be 10 times this value.

B.2.1.10 Updates CALMET/CALPUFF

The CALMET/CALPUFF modeling system treats the formation of secondary aerosol components in a simple manner. Secondary species are chemically produced in the atmosphere from directly-emitted gases (e.g., ammonium sulfate from SO_2 and NH_3, ammonium nitrate from NO_x and NH_3, and some organics from VOC). One of the prominent contributors to light extinction is secondary sulfate; thus the ability to estimate the amount of light extinction due to sulfate derived from SO_2 sources is an important component of the study. An assessment of the CALMET/CALPUFF modeling system revealed five potential limitations with respect to the accurate attribution of sulfate to sources of SO_2 precursors:

1. The CALMET/CALPUFF preprocessors are designed to operate using standard National Weather Service (NWS) meteorological observations; such preprocessors can not be used to process much of the extensive meteorological observational data base (e.g., profiler upper-air wind/temperature observations, COOP precipitation data, surface wind observations, etc.) acquired during the MZVS.

2. The CALMET/CALPUFF modeling system only calculates concentrations at ground-level receptors, thus particle concentrations and light extinction along elevated sight paths can not be estimated by the model.

3. The CALPUFF chemical algorithm (MESOPUFF-II pseudo-first order mechanism), while non-linear in precursors (i.e., NO_x), oxidants (ozone), temperature, and relative humidity, does not adequately estimate sulfate oxidation

rates in fogs clouds, and may, in fact, underestimate in-cloud conversion of SO_2 to sulfate by a factor of 10.

4. The CALMET/CALPUFF modeling system provides concentrations for all sources combined in any one simulation, not the individual source contributions.

5. CALPUFF and its CALPOST postprocessor treat SO_2/sulfate and NO_x/nitric acid/nitrate species; additional primary PM species can be simulated by CALPUFF with minor modification, but the CALPOST postprocessor does not calculate extinction due to other (e.g., primary) PM species.

Each of these deficiencies was addressed in this study through updates/adaptations to the CALMET/CALPUFF software. These updates did not affect the CALMET/CALPUFF calculations, but facilitated the use of input data and the availability of model outputs. The five deficiencies were corrected as follows:

1. Additional CALMET meteorological and CALPUFF emissions preprocessors were developed to convert meteorological and emissions data into the formats required by CALMET and CALPUFF.

2. Elevated receptor sampling was implemented within the CALPUFF to provide concentrations at user-specified elevations above mean sea level.

3. Sensitivity tests with increased humidity-dependent (surrogate for in-cloud) sulfate production rates were conducted.

4. Separate model runs were made for emissions from selected source areas and source types to determine their individual contributions . This procedures results in an overstatement of both the formation rate of total nitrate (nitric acid plus nitrate aerosol) and the particulate nitrate, since each CALPUFF run will use all available ammonia for the formation of ammonium sulfate and ammonium nitrate without regards to the fact that such ammonia may have already been taken up by sulfate and nitrate from other sources. However, this deficiency was corrected in the postprocessing of the CALPUFF modeling results where the sulfate-nitrate-ammonia equilibrium was readjusted to account for the total sulfate and nitrate from all sources and the measured ambient ammonia.

5. CALPOST is also unable to develop visibility estimates from concentrations at elevated receptors, and is therefore incapable of integrating such results for the purposes of analyzing visibility along sight paths. The modification of CALPOST to treat the different extinction attributes of primary PM (EC, OC, SOA, other $PM_{2.5}$) and provide sight path information was very complicated. Instead, a new visibility postprocessor was developed to provide (surface and elevated) extinction estimates for all species, sight path integrations, and information necessary for contrast transmittance calculations. Some minor

changes to CALPUFF (block data and chemistry routine) were implemented to allow for several inert species to be modeled.

In addition, a change was made in the CALPUFF code to correct an error in the calculation of plume rise for area source emissions (BAEMARB. DAT file). As obtained from the U.S. EPA TTN, CALPUFF applied a zero surface temperature in the estimation of area source plume rise when using the CALPUFF-formatted meteorological input files. CALPUFF can also operate using the CALGRID-formatted input file for which the area source plume rise estimate was coded correctly. The correction of this error, the modification to allow puff sampling at elevated receptors, and expansion of CALPUFF to handle the original five species plus four new inert PM species, were the only modifications made to CALMET and CALPUFF in this study. The modified computer codes are part of the MZVS data base.

B.2.2 Model Design and Data Processing

B.2.2.1 CALMET/CALPUFF Modeling Domain Definition

The need for a detailed treatment of transport, diffusion, and chemical transformation of pollutants emitted from sources in the immediate vicinity of the Wilderness (e.g., the Craig and Hayden generating stations), combined with the need to account for the influence of regional pollutant sources on visibility (e.g., contributions from Denver, CO; Salt Lake City, UT; other urban areas; and other generating stations) necessitates the use of either two modeling domains of different resolution (i.e., the mesoscale and regional-scale modeling domains corresponding to Figures B.2.2.1 and B.2.2.2, respectively), or one regional domain with the finest resolution possible.

One of two Cartesian (rectangular) grid coordinate systems may be specified for CALMET/CALPUFF: 1) a Universal Transverse Mercator (UTM) projection; or 2) a Lambert Conformal Mapping (LCM) projection. Both systems represent the locations of landmarks (e.g., sources, monitors) in terms of kilometers from a grid "origin"; the UTM coordinate system is more standardized and widely used. In the UTM system, the earth's surface is divided into a set of UTM zones consisting of 6-degree longitudinal "sheets"; the UTM y-axis is aligned with true north only at the central meridian of the UTM zone and the distortion of the y-axis from true north increases as distance from the zone center increases. The LCM projection is defined by specifying two latitude parallels and a latitude/longitude origin. The grid system preserves true north at the origin and there is distortion of the y-axis from true north as distance from the origin increases.

For the MZVS, the mesoscale and regional-scale modeling domains are contained in UTM zones 12 and 13; the dividing meridian between the zones is 108 degrees west longitude, which is located approximately at Meeker, CO, to the west of Craig and Hayden Stations. The mesoscale domain spans almost 300 km in the east-west direction (see Figure B.2.2.1). Thus, for either the UTM or LCM coordinate systems, the observed wind directions must be adjusted from true north to the local orthogonal coordinate system. The CALMET/CALPUFF LCM coordinate system option performs such an adjustment of the

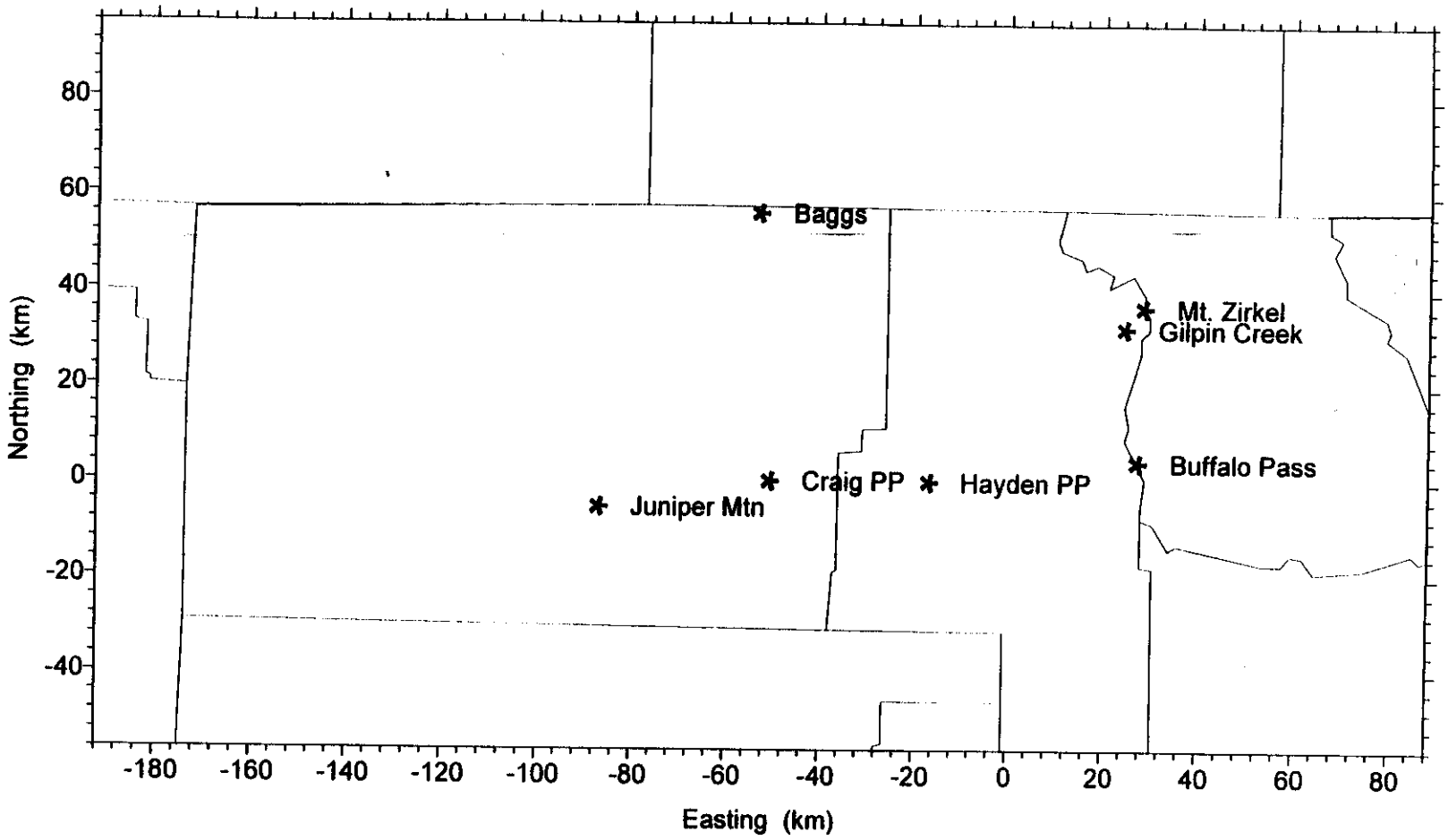


Figure B.2.2.1. Map of the MZVS CALMET/CALPUFF mesoscale modeling domain showing the position of key landmarks, and state and county boundaries.

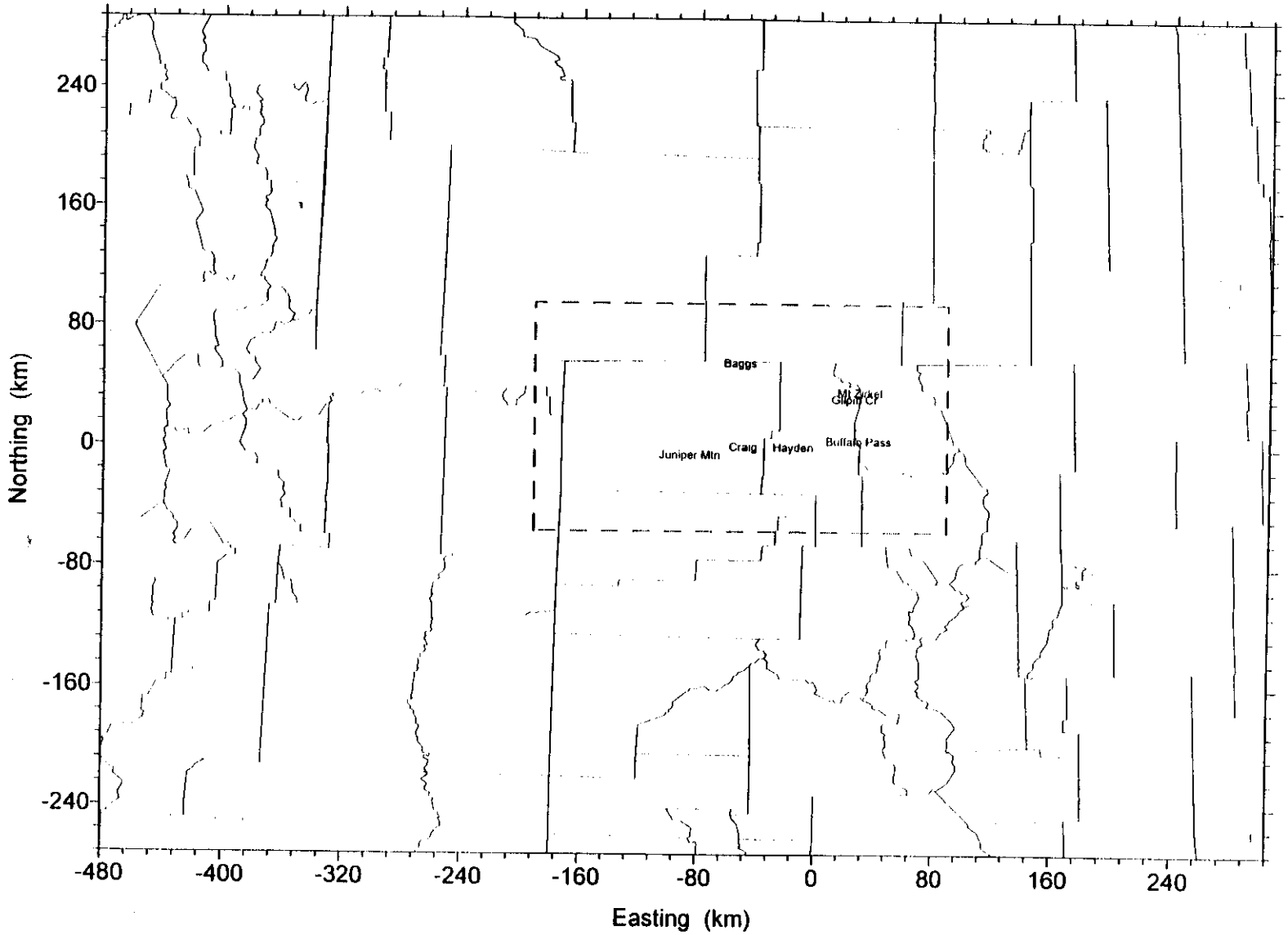


Figure B.2.2.2. Map of the MZVS CALMET/CALPUFF regional modeling domain showing the position of key landmarks, and state and county boundaries. The dashed inset indicates the coverage of the mesoscale domain.

observed winds, whereas the UTM coordinate system option does not. Thus, the LCM coordinate system was selected.

The LCM coordinate system is defined by two latitude parallels (38.0, 43.0) and a reference origin (107.0, 40.5). The reference origin lies between the Hayden and Craig Stations and the Mt. Zirkel Wilderness Area, whereas the two standard latitude parallel approximately correspond to the northern and southern extent of the mesoscale modeling domain. This results in the definition of the mesoscale modeling domain with minimal distortion. The exact definitions of the CALMET/CALPUFF mesoscale and regional-scale modeling domains for this study are given in Table B.2.2.1.

Grid sizes of 4x4 km for the mesoscale domain (Figure B.2.2.1) and 16x16 km for the regional-scale domain (Figure B.2.2.2) were originally selected for the MZVS CALMET/CALPUFF modeling. Every-day inert SO_2 trajectory simulations were performed on the 4 km mesoscale domain only, while a nested two-grid approach was originally planned for several intensive episodic regional simulations. Sensitivity tests indicated significant differences in CALMET mixing height and wind fields between the mesoscale (4 km resolution) and regional (16 km resolution) grids in the Yampa Valley area. These differences were attributed to the inability of the 16 km regional grid to resolve significant terrain features in the Yampa Valley area that proved to have crucial influences on near-surface (< 300 m) wind fields. This might cause in-plume transport and vertical mixing between the two grids. Consequently, the two-grid approach was and a single regional domain with 4 km grid spacing (i.e., Figure B.2.2.2 at 4 km resolution) was used for this study. This increased computational time for both CALMET and CALPUFF models, but it simplified pre- and post-processing analyses.

CALMET calculates horizontal wind fields at several vertical elevations above ground level (AGL). In CALPUFF, individual puffs constituting a plume of emissions are advected by the single horizontal wind located at the center of each puff. Even though the puff may span several horizontal and vertical grid cells, each cell is characterized by a unique terrain-induced wind speed and direction (this is particularly common in the MZVS region). CALPUFF does not use the vertical velocities generated by CALMET, so puffs do not rise and fall relative to local terrain (i.e., they remain at a constant elevation above ground level). An option is available in CALPUFF to treat enhanced vertical mixing in complex terrain. In situations marked by strong vertical wind shear, it is important to define sufficient vertical resolution in the shear zone. This procedure allows puffs near or within the shear zones to be transported in the proper direction, or in the case of the puff-splitting option, that a shear zone is well represented.

Wind profiler data from Hayden Waste water was examined to understand the typical characteristics of the vertical structure of the horizontal winds in the Yampa Valley. Winds aloft (> 800 m) usually possess a strong westerly component that arises from the mean zonal flow typical of the westerlies at this latitude. During the night, the near-surface winds are usually influenced by a fairly strong (3 to 7 m/s) valley drainage flow with a strong easterly component. The depth of the drainage flow varies; a typical range observed during the study

Table B.2.2.1
Definitions of the CALMET/CALPUFF Mesocale and Regional-Scale Modeling Domains[a] in Lambert Conformal Mapping Coordinates

Domain	SW Corner (km)	NE Corner (km)	EW Extent (km)	NS Extent (km)	Grid Spacing (km)	Number of Cells
Mesoscale	(-192, -56)	(88, 96)	280	152	4	70 × 38
Regional-Scale	(-480, -272)	(304, 288)	784	560	4	196 × 40

[a] Routine "annual" CALMET/CALPUFF simulations were performed on the mesoscale domain whereas intensive modeling for the four episodes was performed on the regional domain.

is 300 to 600 m. A transition layer exists in the 300 to 800 m range between the top of the drainage flow and the free-tropospheric flow, where winds turn 180 degrees from easterly to westerly. Plume rise calculations for the Craig and Hayden Station plumes suggested that these sources generally have effective stack heights in the 200 to 400 m range under drainage flow conditions (i.e., stable with fairly low wind speeds) with plume rise heights of 300 to 700 m AGL, and sometimes higher, during the daytime. It was, therefore, important to adequately define vertical resolution in this wind shear range.

Layer depths were selected to match the range gates from the Hayden Waste Water wind profiler, such that vertical averaging and interpolation of winds from this source would be absent in the few layers nearest the surface, and negligible aloft. While not every range gate from the profiler was matched to a model layer, a sufficient number of layers were selected to balance computational constraints with the desire to maximize resolution within the drainage-westerly shear zone. This resulted in layer depths of between 20 and 112 m below 630 m with higher resolution near the surface. Above this level, synoptic winds vary much less and are often quite uniform, so layer depths range from 200 to 500 m. A sensitivity simulation was undertaken to ascertain the effect of increasing the number of model layers below 800 m.

The definition of the top of the modeling domain involves a trade-off between the expected buoyant rise of emission plumes versus the limitations of the upper-air meteorological data and computational requirements. The plume rise estimates suggested a maximum possible plume rise (unstable/low wind speed conditions) of approximately 1,500 m for the generating station plumes. Since CALPUFF does not use the vertical winds, the centerline of the puffs does not rise above this level. The radar profiler measures winds to about 2,800 m AGL. CALMET requires each sounding to have a valid bottom and top wind measurement. If the modeling domain were defined above 2,800 m, then the profiler soundings would have to be extended above this height by either extrapolating the data or by interpolating (in space and time) the NWS rawinsonde soundings to the location of the profiler site. Neither of these approximates is desirable, so the top of the CALMET/CALPUFF models was selected to be 2,800 m AGL for both the mesoscale and regional-scale modeling domains. The definition of the CALMET/CALPUFF vertical grid used for both every-day and detailed simulations is given in Table B.2.2.2.

B.2.2.2 Definition of the Intensive Modeling Episodes

Several episodes were identified during the for chemical analysis and intensive modeling. Four multi-day CALMET/CALPUFF periods were modeled in detail that contained the five episodes submitted to detailed data analysis: 1) 09/17/95 to 09/21/95; 2) 08/07/95 to 08/09/95; 3) 10/07/95 to 10/19/95; and 4) 08/21/95 to 08/27/95.

Because CALPUFF starts with clean air (i.e., no puffs present), the model needs to be initialized several days before the beginning of a modeled period. Based on an estimate of puff transport time from major source regions in the regional-scale domain to the wilderness area, a three-day initialization (ramp up) period was selected. Thus, CALPUFF simulations

Table B.2.2.2
CALMET/CALPUFF Vertical Grid Structure for the Mt. Zirkel Visibility Study

Layer	Layer Top (m AGL)
1	20
2	70
3	182
4	294
5	406
6	518
7	630
8	840
9	1,134
10	1,526
11	1,918
12	2,310
13	2,800

were started at midnight three days prior to each modeled period (i.e., 0000 MST on 09/14/95, 08/04/95, 10/05/95, and 08/18/95). Due to a lack of NWS rawinsonde data, the October period was started on 10/05/95, allowing for a two-day ramp up period.

B.2.2.3 CALMET Input Data Files

An overview of the CALMET/CALPUFF modeling system configuration is documented in the User's Manual. Contained in the CALMET/CALPUFF modeling system is a set of preprocessors that reformat the raw meteorological data from the U.S. National Climatic Data Center (NCDC) file formats to the format required by the CALMET. Data in other formats are processed by the following programs:

- CALLAND: the land use processor that maps a U.S. Geological Survey (USGS) land cover data base to the mesoscale and regional grids and develops a gridded field of predominate land use categories.

- CALTERRAIN: the MZVS terrain processor that maps a USGS terrain elevation data base to the mesoscale and regional grids and develops a gridded field of cell-average terrain elevations.

- MERGE: a data preprocessor that interpolates missing wind and temperature data in the three profiler sounding data bases and combines the surface and profiler upper-air meteorological measurements into a single sounding for input into the UPP_MET preprocessor.

- UPP_MET: a preprocessor that reads available upper-air data, including NWS and processed profiler soundings, and produces CALMET-ready upper-air data input files for each upper-air site.

- SURF_MET: a preprocessor that reads available surface meteorological data and produces a single CALMET-ready surface data input file.

- PRECIP: a preprocessor that reads available precipitation data and produces a single CALMET-ready precipitation data input file.

The following sections document the use of the CALMET preprocessors to generate CALMET model inputs for the modeling episodes in the regional-scale modeling domain.

B.2.2.3a Geophysical Data (GEO.DAT)

The CALMET geophysical data input file, GEO.DAT, contains gridded information on land use type, terrain elevation, surface parameters (surface roughness length, albedo, Bowen ratio, soil heat flux parameter, and vegetation leaf area), and anthropogenic heat flux. Default values relating these surface characteristic parameters to land use category are provided in the model (Table B.2.2.3). Because detailed information on these surface

Table B.2.2.3
Default Land Use Categories and Associated Geophysical Parameters in the CALMET Model[a]

Land Use Type	Description	Surface Roughness (m)	Albedo	Bowen Ratio	Soil Heat Flux Parameter	Anthropogenic Heat Flux (W/m^2)	Leaf Area Index
10	Urban or Built-up Land	1.0	0.18	1.5	0.25	0.0	0.2
20	Agricultural Land - Unirrigated	0.25	0.15	1.0	0.15	0.0	3.0
-20[b]	Agricultural Land - Irrigated	0.25	0.15	0.5	0.15	0.0	3.0
30	Rangeland	0.05	0.25	1.0	0.15	0.0	0.5
40	Forest Land	1.0	0.10	1.0	0.15	0.0	7.0
50	Water	0.001	0.10	0.0	1.0	0.0	0.0
51	Small Water Body	0.001	0.10	0.0	1.0	0.0	0.0
55	Large Water Body	0.001	0.10	0.0	1.0	0.0	0.0
60	Wetland	1.0	0.10	0.5	0.25	0.0	2.0
61	Forested Westland	1.0	0.1	0.5	0.25	0.0	2.0
62	Nonforested Wetland	0.2	0.1	0.1	0.25	0.0	1.0
70	Barren Land	0.05	0.30	1.0	0.15	0.0	0.05
80	Tundra	0.20	0.30	0.5	0.15	0.0	0.0
90	Perennial Snow or Ice	0.20	0.70	0.5	0.15	0.0	0.0

[a] Based on the U.S. Geological Survey Land Use Classification System (14-Category System).
[b] Negative values indicate "irrigated" land use.

parameters are not available for the Rocky Mountain region, these default values have been used for this modeling.

The gridded fields of land use categories for each CALMET/CALPUFF modeling domain (mesoscale or regional-scale) were generated using the CALLAND land use preprocessor. CALLAND was supplied with up to 30 1:250,000 scale (200 m) digital USGS land cover maps. Although the USGS data base provides abundant detail on the fractional coverage of many different land use categories, the CALMET model requires just one land use category from the list in Table B.2.2.3 to characterize each grid cell. Thus, the CALLAND preprocessor determines which land use category is the most predominate in each grid cell and outputs the gridded array of land use categories in the GEO.DAT format.

The gridded fields of average terrain elevation for each modeling grid were generated using the CALTERRAIN preprocessor. CALTERRAIN was supplied with a 30" (approximately 900 m) resolution USGS terrain data base; the preprocessor averages all terrain elevation data within each CALMET modeling domain grid cell. The resultant terrain field for the mesoscale and regional modeling domains at 4 km resolution are shown in Figures B.2.2.3 and B.2.2.4, respectively.

The every-day inert SO_2 trajectory simulations were performed over 11 months, and therefore required the specification of snow cover in the GEO.DAT file so that dry deposition could be appropriately treated during months of significant snow cover. The spatial coverage of snow was varied with the time of year based on a minimum terrain elevation as shown below:

January, February	All cells snow covered
March	7,700 ft (2,316 m)
April, May, June, November	8,200 ft (2,500 m)
June through October	No snow cover

During the snow season, the grid cells with elevations higher than those listed above were assigned a land use of permanent snow. June was selected as the month to test the effect of different snow covers on the model results because of the extensive snow cover at the beginning of the month and lack of snow on the sunny slopes at the end of the month. June was therefore run with two different levels of snow.

B.2.2.3b Surface Meteorological Data (SURF.DAT)

The surface meteorological data required by CALMET include wind speed, wind direction, ceiling height, sky cover, temperature, relative humidity, pressure, and precipitation code (liquid or frozen). As CALMET was designed to accept routine hourly NWS airways reports, only the NWS data base contains all of these parameters, or at least sufficient data from which to calculate these parameters (e.g., temperature, dewpoint and pressure are used to determine relative humidity). Most other sites report only wind and temperature data. Missing values are allowed, but at least one surface site should contain a valid non-missing parameter for each hour (e.g., temperature cannot be missing from all sites for a given hour). The one exception is precipitation code, which was set to a missing flag

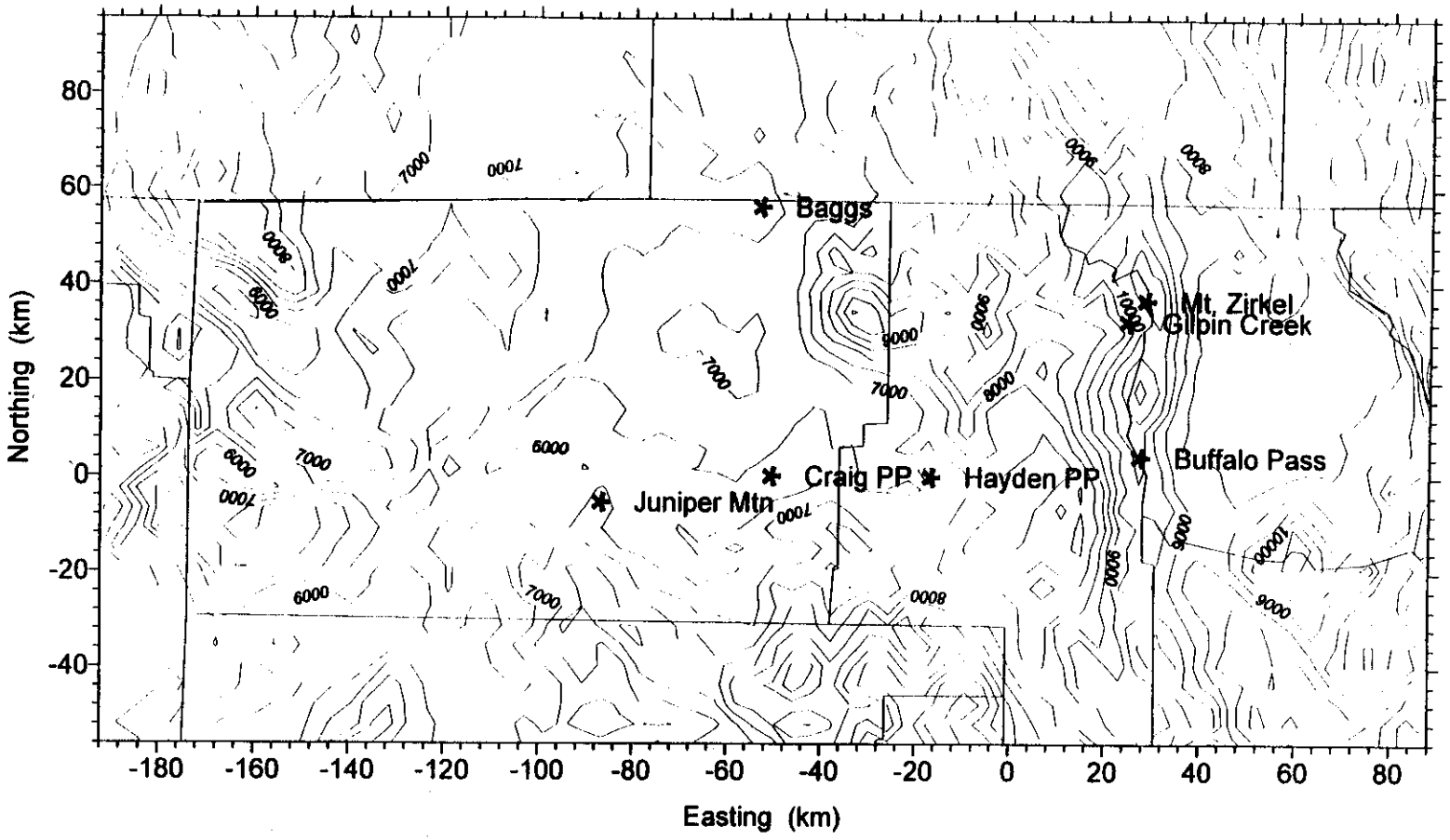


Figure B.2.2.3 Map of the MZVS CALMET/CALPUFF mesoscale modeling domain showing terrain contours at 4 km resolution. Contour intervals are 500 m.

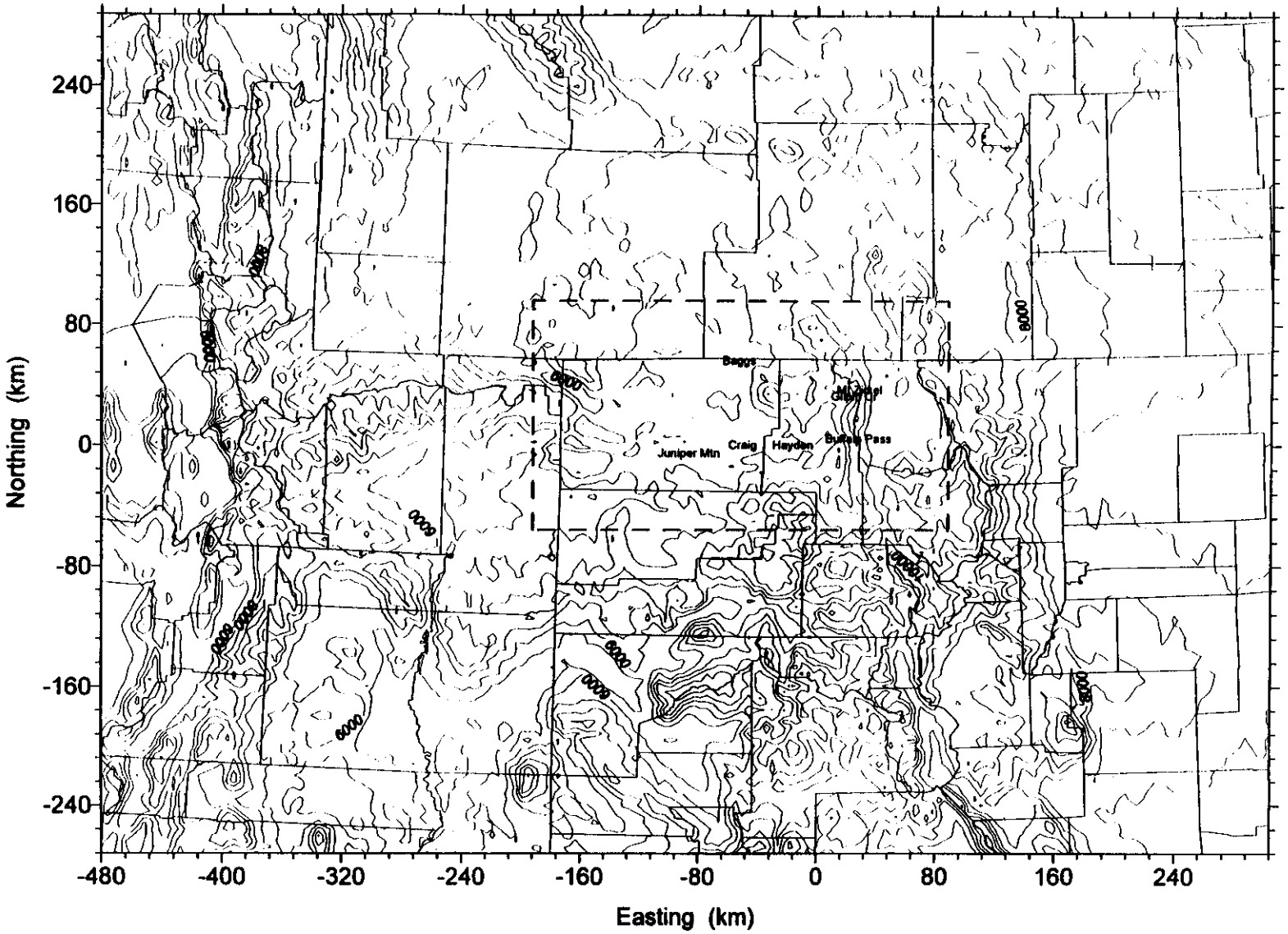


Figure B.2.2.4 | Map of the MZVS CALMET/CALPUFF regional modeling domain showing terrain contours at 4 km resolution. Contour intervals are 1000 m. The dashed inset indicates the coverage of the mesoscale domain.

for all stations and all hours. In such cases, CALMET uses surface temperature to determine the state of precipitation.

In processing surface meteorological data for the annual every-day inert SO_2 application of CALMET/CALPUFF, default values were developed for each surface parameter in the event that all stations report a particular parameter missing for a given hour. The default values were chosen rather arbitrarily, and were applicable to winter and fall periods. For intensive episode modeling, only ceiling height and sky cover were occasionally missing from all sites for certain hours; default values for these parameters were developed based on episode averages.

During processing of surface meteorological data, CALMET-derived gridded surface wind fields were plotted on a map of the domain along with surface wind measurements to assure that the gridded winds were not distorted by questionable input data. Data exhibiting obvious problems were removed from preprocessing; the NWS site at the Craig-Moffat County airport was removed from the data base due to erroneous wind speeds.

Figure B.2.2.5 presents the locations of all available surface meteorological sites within the regional-scale modeling domain; typically, sufficient data were available for about 80% of these sites. Data from sites outside but within 50 km of the regional-scale modeling domain boundary were also used for CALMET but are not shown in this figure. Table B.2.2.4 lists surface meteorological data bases and meteorological variables measured at each location. Only a subset of these data were used for the mesoscale and regional-scale applications due to data availability and the process of removing sites outside a 50 km zone around each domain.

B.2.2.3c Upper-Air Meteorological Data (UPN.DAT)

CALMET requires upper-air temperature, pressure, and wind soundings for at least every 12-hour interval (0000 and 1200 GMT). Whereas it is necessary at the very least to supply valid wind and temperature data at the surface and at the top of the modeling domain for each sounding, the model can run even if there is no pressure data available. In cases of missing sounding data at the surface or near model top, particularly with regard to shallow profiler temperature soundings, several steps were necessary to create non-missing upper-air data. Table B.2.2.5 lists the upper-air data sources for the rawinsonde and profiler measurements. The meteorological tower data near the Craig generating station was used only to provide independent data for model performance evaluation and was not used as model input. The Craig tower data include measurements at 6 and 60 m only; substantial wind and temperature profile data would have to be generated for this site in order for CALMET to accept the tower data as valid vertical soundings.

Profiler measurements were acquired at Hayden, Baggs, and Clark. While all three profilers reported hourly wind soundings, only the Clark and Hayden sites reported hourly virtual temperature soundings. In both cases, virtual temperature soundings extended from 100 m to 400 to 800 m; however, while the Clark temperature profiler operated 24 hours per day, the Hayden temperature profiler only operated between the hours of 0800 and 2200

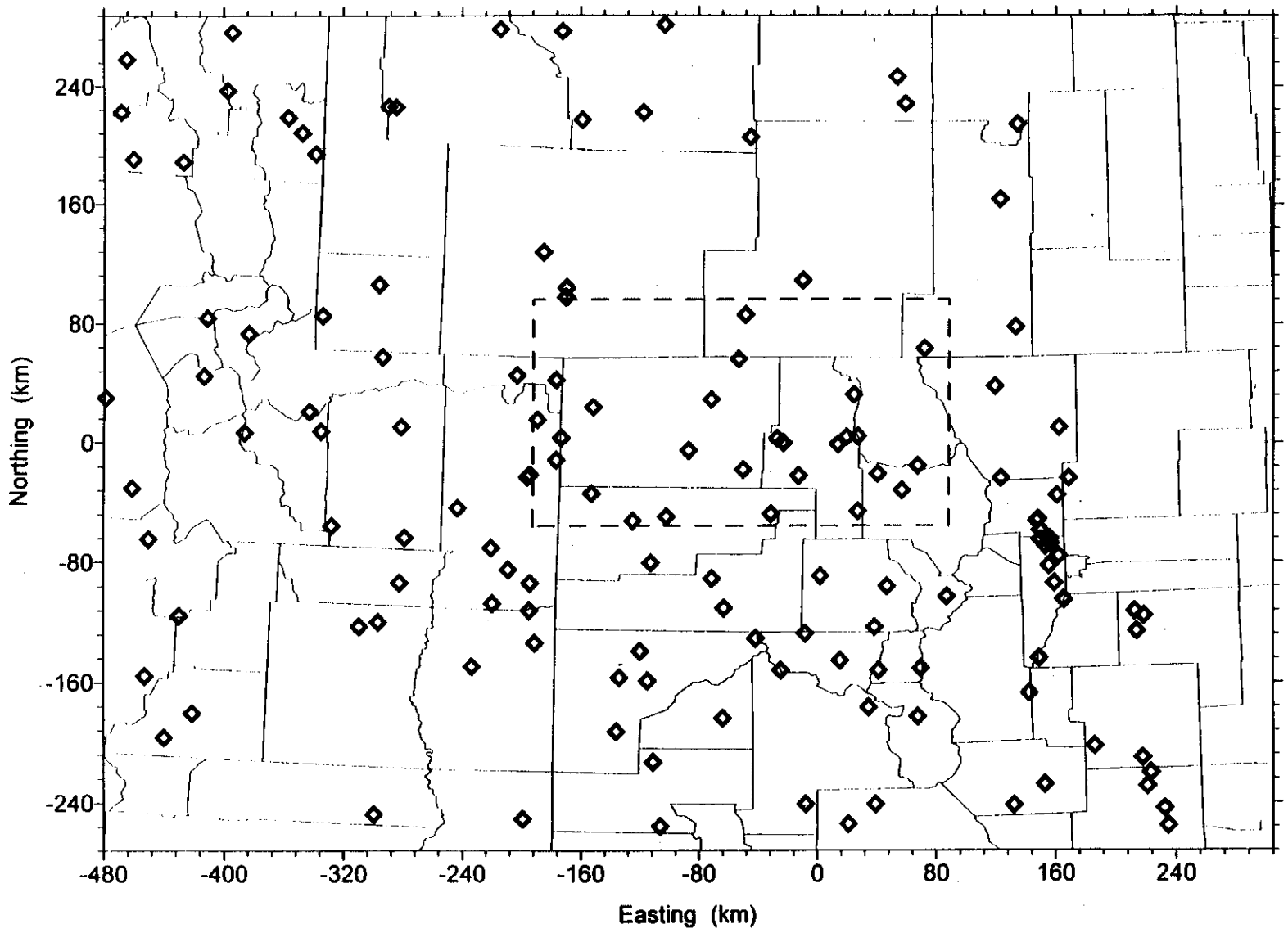


Figure B.2.2.5 Surface meteorological monitoring site locations in the MZVS CALMET/CALPUFF regional modeling domain. The dashed inset indicates the coverage of the mesoscale domain.

Table B.2.2.4
Sources of Surface Meteorological Data in the Mt. Zirkel Visibility Study

Agency or System	Number of Sites	Parameters (Units)
ARS	6	Temperature (C) Relative Humidity (%) Wind Speed (m/s) Wind Direction (Degrees from N)
CDOH	18	Wind Speed (m/s) Wind Direction (Degrees from N) Temperature (C)
NWS	39	Pressure (mb) Temperature (C) Dewpoint Temperature (C) Wind Speed (m/s) Wind Direction (Degrees from N) Cloud Cover (SCT, BKN, OVC) Ceiling Height (100s ft) Visual Range (mi)/Current Weather (CLR,R,S,F,TRW,etc)
RAWS	193	Wind Speed (m/s) Wind Direction (Degrees from N) Temperature (C) Relative Humidity (%)
STI	1	Wind Speed (m/s) Wind Direction (Degrees from N) Temperature (C) Relative Humidity (%) Dewpoint Temperature (C) Pressure (mb) Precipitation (in/hr)

Table B.2.2.5
Sources of Upper-Air Meteorological Data in the Mt. Zirkel Visibility Study

Agency (System)	Number of Sites	Parameters (Units)
ARS (6m/60m Tower) * SEQUESTERED *	1	Temperature (C) Wind Speed (m/s) Wind Direction (Degrees from N)
NWS (Rawinsonde)	5	Elevation (m MSL) Presssure (mb) Temperature (C) Dewpoint Temperature (C) Wind Speed (m/s) Wind Direction (Degrees from N)
NOAA (Profiler)	2	Elevation (m MSL) Wind Speed (m/s) Wind Direction (Degrees from N) Virtual Temperature (C) (one site)
STI (Profiler)	1	Elevation (m MSL) Wind Speed (m/s) Wind Direction (Degrees from N) Virtual Temperature (C) (0800-2200)

MST. Only the Hayden site contained collocated surface data. The difference between surface temperature and surface virtual temperature at Hayden was used to adjust the virtual temperature soundings at both the Hayden and Clark sites to actual temperature. At Clark, the surface temperature was obtained using the surface temperature gradient obtained from the Hayden site. During hours in which no temperature sounding was available at Hayden, the virtual temperature adjustment and surface temperature gradient from the last valid hour was used.

The following procedure was used to extend the Hayden and Clark temperature data to the top of the modeling domain:

- Hourly mixing heights at the Hayden and Clark sites were generated using CALMET in a long-term screening application for the period 01/05/95 to 10/12/95, supplied only with NWS upper-air data from Lander/Riverton, WY, and Grand Junction, CO.

- For each hour of an episode, if the highest elevation of valid temperature data was greater than the calculated mixing height, a standard atmosphere lapse rate (-6.1 °K/km) was used to extrapolate data to the top of the model.

- If the highest elevation of valid temperature data was less than the calculated mixing height, an adiabatic lapse rate (-9.8 °K/km) was used to extrapolate to the mixing height; a stable lapse rate (+6.1 °K/km) was used to artificially increase the temperature for 300 m above the mixing height; and finally a standard atmosphere lapse rate was used to extrapolate temperatures to the top of the model.

The Lander, WY rawinsonde site was moved to Riverton, WY during August, so upper-air soundings from Riverton were used after 08/28/95. The radar profiler data were not used in the screening simulations to obtain mixing depths. Resulting mixing depths were compared to C_n^2 analyses of the radar profiler data at Hayden (Section 5.2.2). Time series plots of hourly comparisons show good agreement, and support the use of these calculated mixing depths to extrapolate the RASS temperature data.

The Baggs profiler did not measure any temperature data. Since CALMET requires valid temperature data at all upper-air sites, the Hayden temperature profiles were simply copied to Baggs.

The NOAA profiler data were archived within the MZVS data base as separate high and low resolution data files (i.e., two files per hour per site). High and low resolution files were first merged together into single profiler data sets for Clark and Baggs each. Surface level winds at Clark and Baggs were obtained using a power-law profile to extrapolate the first upper level winds to the surface. The power-law exponent was calculated from Hayden surface and profiler data to be 0.143; this value was used in preprocessing all surface wind data from Clark and Baggs. The following algorithm was used to extend profiler wind data

at all three sites to the top of the modeling domain if actual wind data did not extend to that level:

- If the highest elevation of valid wind data was greater than 1,500 m, the highest level wind value was extended to the top of the domain.
- If the highest elevation of valid wind data was less than 500 m, that hour's data was invalidated.
- If the highest elevation of valid wind data was between 500 m and 1,500 m, then:
  - if there was valid data within 12 hours, winds were temporally interpolated to that time and height;
  - if there was no valid data within 12 hours, data from other profiler sites were copied to the given profile;
  - if there were no valid data at any other profiler site, that hour's data was invalidated.

Certain profiler data were unavailable during precipitation events for extended periods. When the interval of missing data exceeded the minimum 12-hour interval acceptable to CALMET, profiler data gaps were filled to maintain at least the 12-hour minimum. During such periods, available nearby or collocated surface data were combined with soundings from valid profiler data at other sites. Only valid profiler data above 1,000 m AGL were used to fill missing soundings since analyses indicated strong terrain influences between the surface and about 1,000 m. For the new soundings, CALMET was allowed to simply interpolate data between the surface and 1,000 m internally.

NWS rawinsonde soundings also contained some data gaps longer than the maximum 12 hours. In some circumstances, only wind soundings were missing; in most cases, however, both wind and temperature soundings were missing. In the case of a single missing 12-hourly sounding, profiles were filled by interpolating (in time) wind and temperature at 700, 500, 400, and 300 mb between the last and next valid soundings. Nearby surface observations for the missing hour were used for the surface-level data point. Data below 700 mb were not used in the interpolation due to the possible terrain influences discussed above. For the new soundings, CALMET was allowed to simply interpolate data between the surface and 700 mb internally. In the case of extended periods of missing soundings, either the upper-air site was deleted from the data base for the particular episode, or data from other NWS soundings at and above 700 mb were copied to the site.

B.2.2.3d Precipitation Data (PRECIP.DAT)

CALMET was supplied hourly precipitation rates from an array of measuring sites. The MZVS data base contains precipitation data from the NOAA COOP system; these data include 24-hour accumulated precipitation (liquid equivalent, inches), 24-hour snowfall (inches), and snow depth (inches) for 652 sites throughout Colorado, Utah, Idaho, and

Wyoming. Figure B.2.2.6 displays the locations of 461 sites within the regional domain (data are available for about 75% of these). Snow depth was not used as there was no significant snow cover during the intensive modeling episodes.

The NWS surface meteorological data contain descriptive weather fields that report cloud cover, ceiling height, and any weather that might be present (fog, rain, thundershowers, snow, etc.). NWS surface data within the mesoscale and regional-scale domains were scanned during the intensive modeling periods to produce an hourly list of sites reporting precipitation. Rain periods were subjectively assigned each day based on the number of sites reporting precipitation each hour. Generally, the methodology involved identifying the hours with the most sites reporting precipitation, biased by whether a significant number of sites within the mesoscale domain reported precipitation as well. A new preprocessor was written to read the COOP 24-hour liquid precipitation totals, and for each site to distribute the 24-hour totals throughout the daily rain periods in terms of constant hourly rates. The preprocessor then output the new hourly data into a CALMET-ready data file.

It would have required an unreasonable amount of effort to use these data and this processing system as the basis to supply CALMET with precipitation data for the 11 months of the every-day inert SO_2 trajectory simulations. Therefore, every-day CALMET modeling was performed with zero precipitation, and wet deposition was not included in the every-day CALPUFF simulations. The effect of this simplification on the inert SO_2 trajectory simulation results is that the model overestimates SO_2 concentrations in puffs that are exposed to rain.

B.2.2.3e Definition of CALMET Model Options and CALMET Sensitivity Tests

Many of the model options were selected based on the need to characterize wind flow over complex terrain and other physical phenomenon necessary for the CALMET applications; others were derived after performing CALMET sensitivity simulations. Table B.2.1.1 lists the model parameter values used for detailed CALMET applications, and values used in sensitivity tests. Table B.2.2.6 condenses this information into a list of sensitivity tests, including preliminary values for each parameter from the modeling protocol, values tested, and final selection for use in episodic runs. Tests were made for the 09/17/95 to 09/21/95 period, and options selected based on these tests were applied to the other detailed modeling periods.

With the exception of "slope flow parameter", all values were altered within the CALMET user-control input file. The slope flow parameter is a "hard-coded" variable within the CALMET source code, and was thus modified by altering the value within the code and recompiling the model program. While altering the slope flow parameter from one to two markedly increased down-slope flows during stable (e.g., nighttime) conditions, the lack of observations on long steep slopes made it difficult to determine whether the resulting wind fields were actually improved. Little difference in wind speed or direction resulted near observations, partly because observations were generally not located on steep slopes, but mainly because the influence of observations on nearby grid points far outweighed the slope

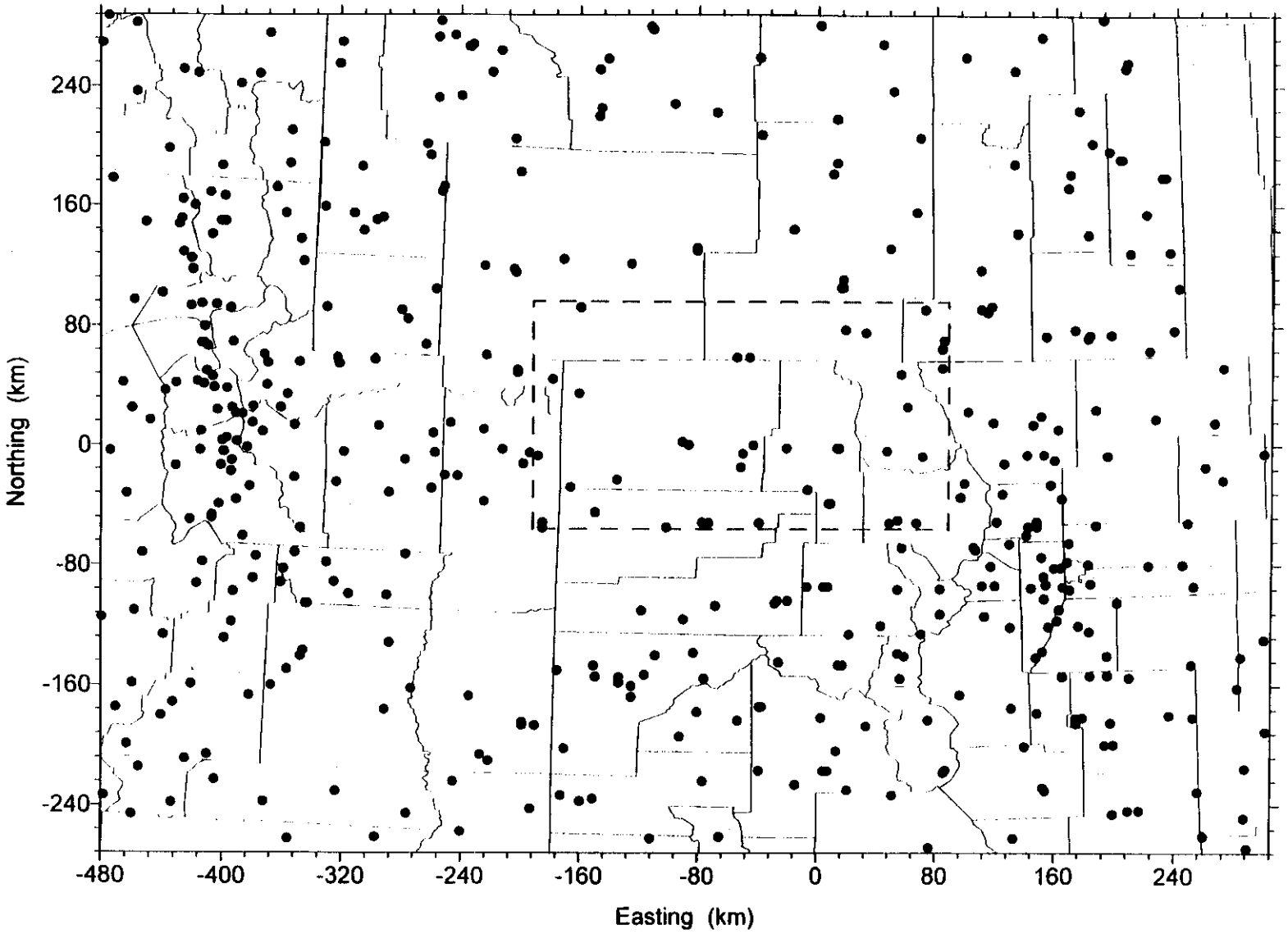


Figure B.2.2.6 Precipitation monitoring site locations in the MZVS CALMET/CALPUFF regional modeling domain. The dashed inset indicates the coverage of the mesoscale domain.

Table B.2.2.6
CALMET Model Sensitivity Tests

Parameter	Preliminary Value	Tests	Selection
Kinematic Parameter	0.1	0.5	0.1
Slope Flow Parameter	±1	±2	±1
Terrain Influence Radius (km).	20	50	20
Depth of Domain-Scale Lapse (m)	200	1000	200
Interpolation Parameters			
Surface obs-terrain weighting (km)	20	10, 50	10
Aloft obs-terrain weighting (km)	50	30, 100, 200	30
Max number of stations to use	4 (all layers)	2 (sfc) / 4 (aloft)	2 (sfc) / 4 (aloft)
Smoothing Passes	4 (all layers)	2 (first 8 layers) / 4 (aloft)	4 (all layers)
Use of Barriers to Interpolation	No	Yes	Yes
Max Distance Used in H Average (cells)	1	3,5	5
Extrapolate Surface Obs Aloft	No	Yes	No
Smoothing passes		2 (first 8 layers) / 4 (aloft)	
Max number of stations to use		2 (first 8 layers) / 4 (aloft)	
Vertical Resolution	12 (protocol)	13 (Hayden profiler),	13 (Hayden profiler)
Site for Domain-Scale Lapse Rate	Hayden	Clark	Clark
Critical Froude Number	1.0	2.0	1.0
Precipitation Interpolation			
Radius of influence (km)	50	0, 100	50
Type of interpolation	$1/r^2$	exp/r^2	exp/r^2
Min precipitation cutoff (mm/hr)	0.01	0.10	0.10

influences. This test was carried out to understand model sensitivity to the slope flow parameter; since there was no technical reasons for model code modification.

Model sensitivity to most of the parameters listed in Table B.2.2.6 was small, but obvious differences in the wind fields were found in layer 1 (first 10 m AGL) for a few localized areas at certain hours of each day. "Improvements" were generally ascertained through the use of conceptual models, rather than direct comparison with observations. Since gridded winds were strongly weighted by observations in their vicinity (< 10 km), wind fields near observations were never sensitive to these tests. Only remote areas of the grid that were well removed from observations indicated marginal sensitivity. Conceptual models included expected motions associated with valley drainage flows, and kinematic effects such as flow diverted around terrain features during stable conditions, or accelerated flow aloft over terrain features.

Since CALMET generates final wind fields by combining stability-dependent, terrain-induced flow with wind observations, the model was most sensitive to those parameters controlling the weighting of terrain flow and observations. In particular, the distance from a wind measurement site at which the observed wind and terrain-induced wind field are equally weighted were reduced from 20 to 10 km in layer 1, and from 50 to 30 km in layers aloft. This decision was based upon the conceptual model that surface observations taken within complex terrain are locally influenced, and should only represent winds in an area smaller than a few kilometers from the station. As elevation above ground increases, this "radius of influence" increases. The larger values of this influence (20 km at the surface, 50 km aloft) tended to improperly impact on drainage flows along the sides of the Yampa Valley. Reduction of these values allowed for slope flows to converge onto the valley floor, then turn down-valley at the bases of ridges as measured along the Yampa Valley floor. Aloft, the larger radius of influence also reduced the kinematic acceleration of flows over ridges and around singular mountain features. Another improvement was found by limiting the number of surface sites used in the interpolation to two instead of four.

It was found that the use of "barriers" to interpolation of observations to grid points was necessary. During the interpolation procedure, a grid point within a radius of influence of a measured wind is weighted by that observation, regardless of any intervening terrain that might be present between the measurement site and grid point. In the Yampa Valley, several measurement sites are placed on the western slopes of the Continental Divide and at Buffalo Pass. It was found that these observations were improperly affecting the development of slope-induced flows on the eastern side of the divide, even with the radius of influence parameters reduced as mentioned above. Therefore, barriers were specified along the Continental Divide, extending from the northern border of the mesoscale domain to Rabbit Ears Pass, and continuing south along the Gore Range. Another barrier was placed from Dome Peak westward to the Elkhead Mountains to limit the influences of Yampa Valley surface sites and sounders to the southwestern side of MZWA and to the southern side of the Elkhead Mountains. Figure B.2.2.7 shows the position and orientation of the two barriers specified for all four intensive modeling episodes.

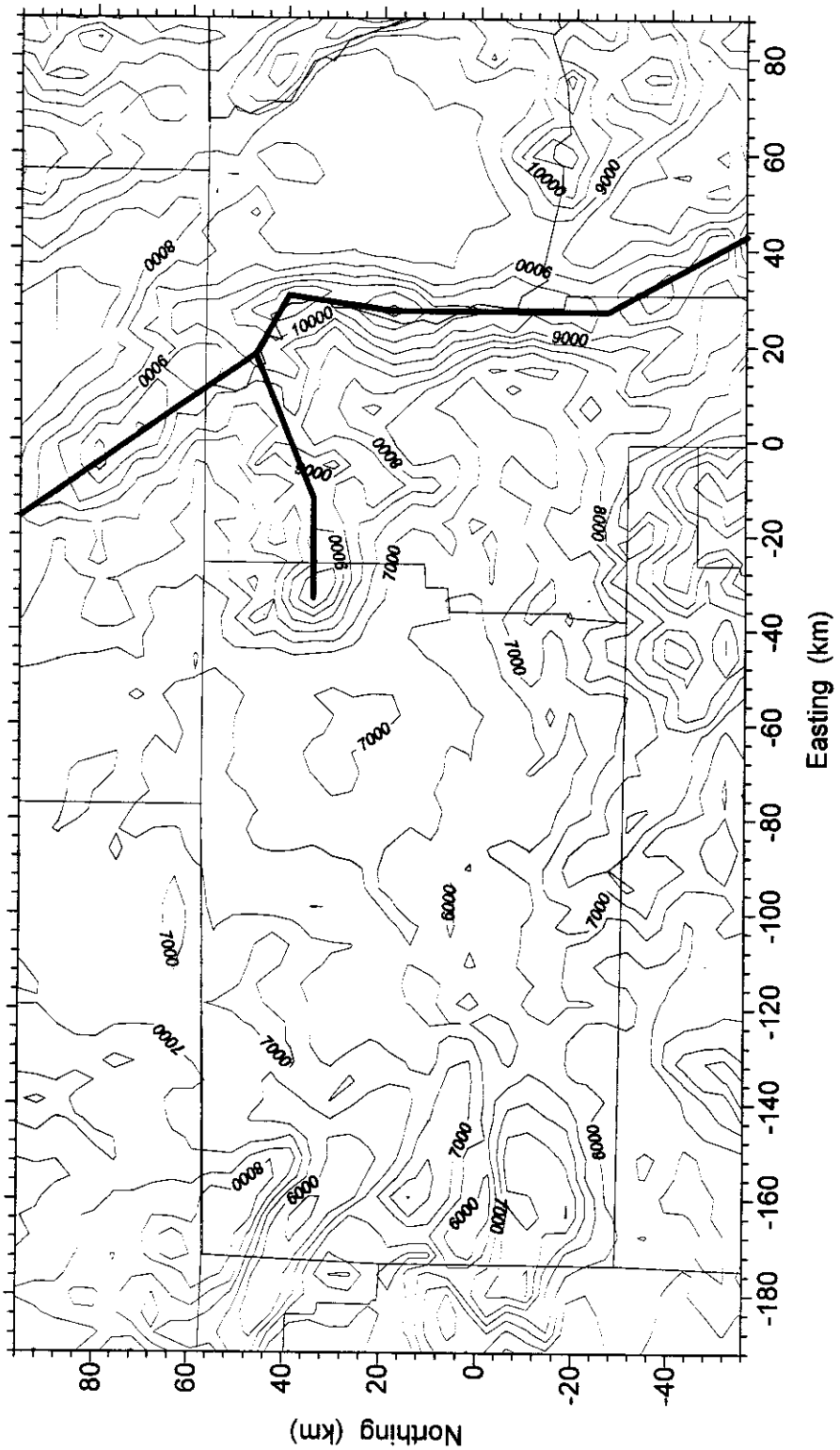


Figure B.2.2.7 Position of two barriers to wind interpolation within the 4 km mesoscale domain. Barriers end at domain boundaries. These barriers were also used for the CALMET applications on the regional grid.

Originally, the Hayden temperature soundings were used to specify the hourly domain-mean lapse rates. However, the temperature sounder was deactivated between 2200 and 0700 MST each night, and these data gaps were filled using the MERGE preprocessor. Under some circumstances, the nighttime lapse rates were set to neutral stability for rather deep layers, causing the model to produce upslope wind flows. This was in obvious disagreement with our conceptual model of nighttime downslope flows under stable conditions. The site specified for domain-mean lapse rates was therefore moved to the Clark sounder site, which operated 24 hours per day, and contained very little data gaps. Slope flows were dramatically improved overall, and the periods of doubtful nighttime upslope flow were properly reversed.

The original vertical grid definition presented in the modeling protocol divided the 2,800 m domain depth into 12 layers ranging from 20 m thickness (layer 1) to 500 m near the model top. The vertical grid was altered in one sensitivity test to use a 13 layer configuration that matched the Hayden Waste Water wind profiler range gates. The purpose of this was to limit the amount of interpolation and/or averaging of profiler wind data to the vertical grid, and possibly improve the representation of the highly sheared environment that sets up each night in the Yampa Valley. While results from this change in the Hayden area were not noticeably different over the entire September episode, the 13-layer Hayden-based structure was used for the remaining episodic applications to minimize any error resulting from translating Hayden wind data to the vertical grid.

The most obvious and important conclusion drawn from these CALMET sensitivity tests is that the representation of terrain plays a crucial role in diagnostic wind modeling. Hence, the model is highly sensitive to horizontal resolution as grid point spacing determines how well terrain features and details are depicted. Generally, finer resolution improves the response of the model to upslope/downslope flow, kinematic blocking, and terrain-induced accelerations. However, a lower limit to resolution applies because the parameterizations developed to treat these responses were aimed at depicting mesoscale flows on the order of 1 to 10 km. Increasing grid point spacing to less than about 1 km would likely degrade wind model performance as the very steep terrain gradients that may lead to overly strong forcing. In fact, sensitivity applications on the mesoscale domain using 2 km grid spacing indicated some discernible yet small differences in near-surface wind fields from the 4 km applications. This suggests that increased resolution from 4 to 2 km did not markedly impact the representation of terrain over much of the domain.

In contrast, initial regional applications of CALMET with 16 km grid resolution smoothed ridges and mountains within the mesoscale domain far too greatly, and all but removed terrain influences on the resulting gridded wind fields. This is illustrated by comparing the final 4 km mesoscale wind field (Figure B.2.2.8), with a preliminary 16 km wind field (Figure B.2.2.9) on the regional grid at the same time using the same parameter selections as the 4 km run (compare regional wind fields within the dashed box). The regional wind fields are much smoother and nearly unaffected by the smooth terrain. The differing wind fields between 4 km mesoscale and 16 km regional grids also affected important parameters such as mixing depth, which for the 16 km fields were drastically

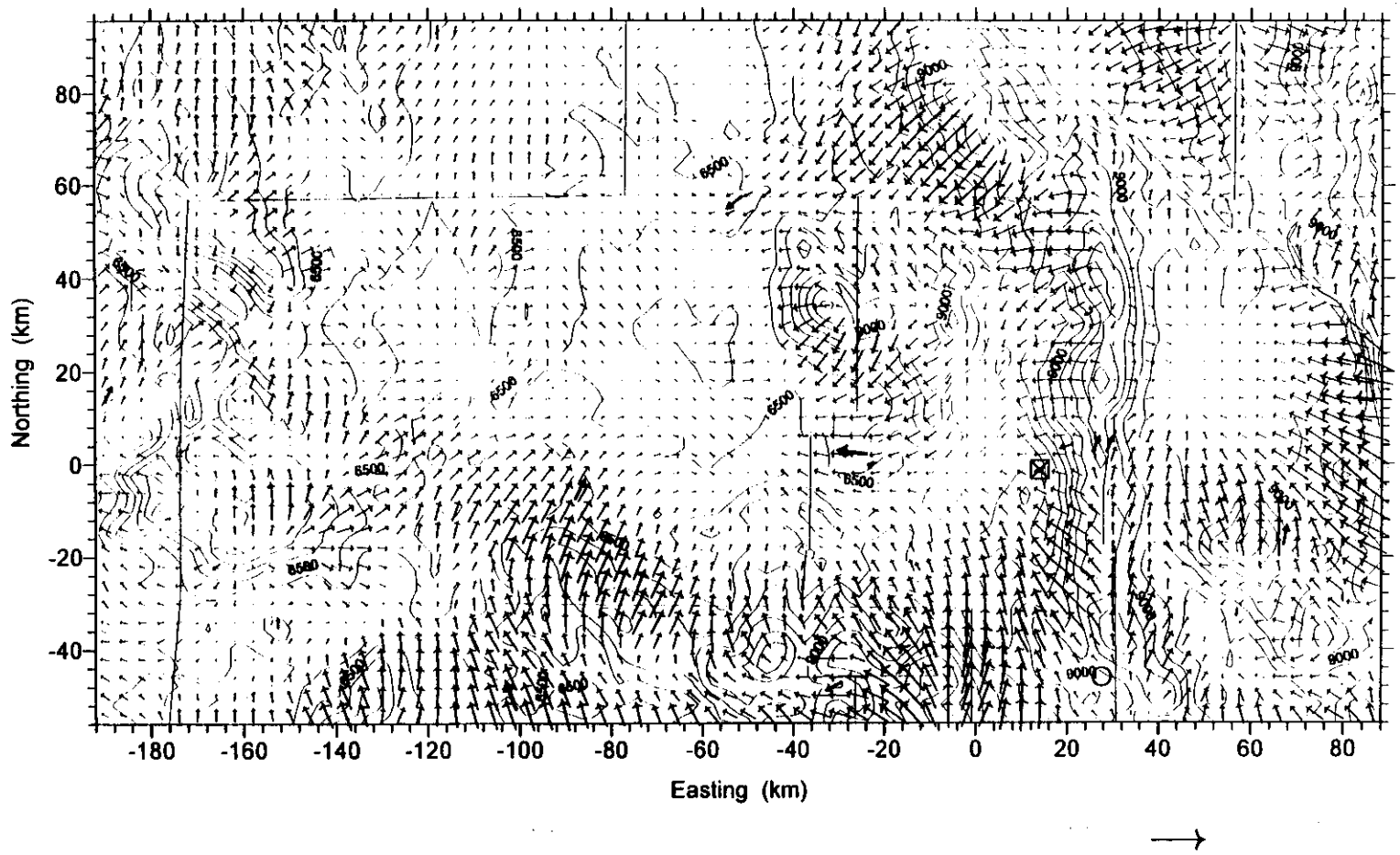


Figure B.2.2.8 An example of 4 km resolution wind field (September 17, 0000 LST) on the MZVS CALMET/CALPUFF mesoscale modeling domain. Wind field for layer 1 (10 m AGL); length of 10 m/s wind vector is indicated above. Heavy vectors indicate speed and direction of surface wind observations at this time.

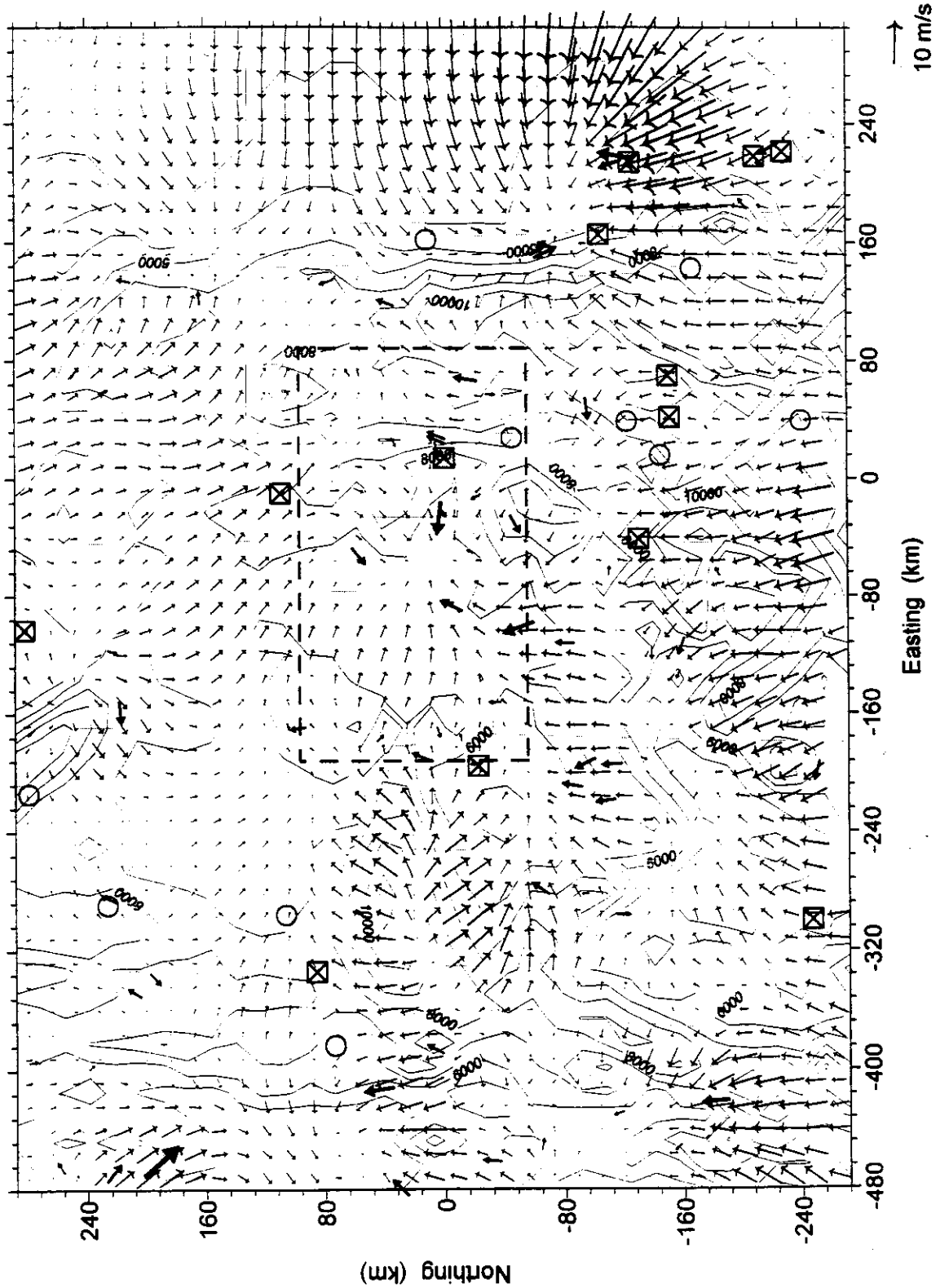


Figure B.2.2.9 An example of 16 km resolution wind field (September 17, 0000 LST) on the MZVS CALMET/CALPUFF regional modeling domain. Wind field for layer 1 (10 m AGL), and every fourth vector is plotted; length of 10 m/s wind vector is indicated above. Heavy vectors indicate speed and direction of surface wind observations at this time. The dashed inset indicates the coverage of the mesoscale domain.

reduced by factors of 4 to 20 in the area covered by the mesoscale domain. The major ramification of this in terms of CALPUFF modeling is that inconsistencies between mesoscale and regional-scale flow and mixing patterns have a large potential for introducing significant differences in plume trajectories and depths among sources originating within the mesoscale domain. This is a key reason for dropping a two-grid modeling approach in favor of one regional grid with 4 km resolution.

The results of CALMET sensitivity tests are summarized below:

- The model works best: 1) when and where terrain-induced flow agrees with observations; and 2) for near-surface wind fields away from complex terrain, in data-rich areas, and aloft (> 1,000 m).

- The model is questionable: 1) near observed calms; 2) when and where observations appear to be locally influenced (< 1 km); 3) when well away from any observations; and 4) when surface observations directly affect only layer 1 wind fields, leading to potentially very large vertical shear.

- The model breaks down: 1) when and where divergence minimization creates spurious high-speed winds near the surface; 2) when and where measured or inferred lapse rates do not agree with conceptual model describing time-varying nature of stability; and 3) when and where observations influence near-surface wind fields on opposite sides of terrain features.

B.2.2.4 CALPUFF Model Input Data

CALPUFF requires four types of input data: 1) meteorological/terrain/land use information from CALMET; 2) definition of the receptors; 3) emission inputs; and 4) model options and parameters. The assumptions and procedures used to generate the CALPUFF meteorological, terrain, and land use inputs have been described previously. The following sections discuss the assumptions and definitions for the remainder of the CALPUFF modeling inputs.

B.2.2.4a Receptor Definitions

CALPUFF allows two types of receptor inputs: 1) a gridded receptor array in which grid spacing must be as fine or finer (even multiple) than the meteorological grid (4 km); and 2) discrete receptors. While proper characterization of precursor and PM surface concentration fields are obviously important in the application of CALPUFF to evaluate model performance, the ultimate goal in the modeling exercise is to quantify visibility impairment along sight paths initiated within the Mt. Zirkel Wilderness Area due to the presence of elevated levels of PM concentrations. Sight paths to be evaluated were defined prior to the modeling applications; generally, all sight paths originate from some elevated terrain feature, and extend horizontally over valleys and lowlands to distant ridges and peaks. Therefore, visibility along such sight paths is affected by pollutant concentrations aloft in elevated layers rather than by concentrations at ground level.

As noted above, an option was added to allow for the inclusion of elevated receptors. When the user selects this flag to be "false", the model defaults to the standard version and reports only the standard ground-level concentrations. When the flag is set to "true", the user must supply CALPUFF with a set of receptor heights in units of meters above mean sea level (MSL), *not* above ground level (AGL). Horizontal sight paths generally follow fairly constant mean sea level elevations; specifying constant elevations in above ground level would lead to sight paths that follow the undulating terrain. Elevated receptors are located at each of the specified mean sea level altitudes above each discrete receptor. Those receptors existing at MSL elevations that are below the local resolved terrain heights are set to the local gridded terrain height (or "0" m AGL).

The CALPUFF sampling algorithms were modified to calculate the time-average concentrations for the full elevated receptors. Only the "puff" sampling algorithm was modified since the "elongated slug" approach was not applied for detailed modeling (the slug option was used in every-day inert SO_2 trajectory modeling, in which sight path calculations were not performed). The routines that write resulting concentrations to output files were revised to include the elevated receptors and appropriate altitude information.

Only the detailed CALPUFF modeling applied the elevated receptor option for the sight path receptors; the every-day inert SO_2 trajectory applications used the standard surface-based receptor methodology. The first six sight paths have both sight path end points within the MZWA, whereas the last four sight paths start within the MZWA and extend outside the wilderness area to the north, east, south, and west (see Figure 6.8.1). Species concentrations were sampled at elevated receptors that extended along each sight path. The mean distance between sight path receptors was about 10 km. For those short sight paths within MZWA (about 10 km or less), only concentrations from the two endpoint receptors were used to obtain the mean extinction along the segment. For the longer sight paths, extinction was calculated for each receptor, and the average extinction along the entire path was determined from a weighted average of the distance between receptors. Concentrations were translated to extinction using species dependent extinction efficiencies developed by the ELSIE modeling (Appendix B.3) and relative humidity extracted from the CALPUFF output VISB.OUT file.

Also, the episodic simulations were not run with gridded surface receptors so that model run times on the large 4 km regional grid could be reduced to manageable durations. Removal of the mesoscale receptor grid greatly increased model run speed by a factor of about 50. Discrete receptors were placed at all sites in which PM chemistry data were taken to allow for comparison of model predictions with measurements in a performance evaluation. These include Buffalo Pass, Gilpin Creek, Baggs, Juniper Mountain, Hayden VOR, and Hayden Waste Water sites. One other discrete receptor was located in the southwest corner of the MZWA at Mad Creek for the purposes of evaluating the predicted distribution of PM species at a lower elevation than Buffalo Pass yet within the MZWA. The total of all discrete receptors (sight path receptors plus chemistry receptors) is 50; Table B.2.2.7 lists each receptor used in the episodic applications along with coordinates and elevation above sea level.

Table B.2.2.7
List of Non-Gridded (Discrete) Receptors used for Episodic CALPUFF Applications[a]

	Receptor	X LCM (km)	Y LCM (km)	MSL Elev (m)	Description
1	Buffalo Pass	27.341	4.283	3224	MZVS chemistry site
2	Gilpin Creek	24.530	32.440	2850	MZVS chemistry site
3	Baggs	-53.086	56.194	2030	MZVS chemistry site
4	Juniper Mtn	-86.942	-5.357	2399	MZVS chemistry site
5	Hayden Waste	-22.755	-0.432	1950	MZVS chemistry site
6	Hayden VOR	-27.254	2.516	2150	MZVS chemistry site
7	Mad Creek	13.047	11.520	2317	Southwest MZWA
8	Mt. Zirkel	28.385	36.856	3713	End point Views 1,3,4,7,8,10
9	Davis Pk	25.179	46.771	3482	End point Views 1,2,6,9
10	Little Agnes Pk	23.968	36.340	3505	End point View 2
11	V3a	26.602	28.789	3646	View 3
12	The Dome	24.819	20.722	3579	End point View 3
13	V4a	27.685	26.681	3674	View 4
14	Mt. Ethel	26.984	16.506	3635	End point Views 4,5
15	Cont Divide Tr	25.503	6.474	3262	End point View 5
16	V6a	23.533	38.166	3389	View 6
17	V6b	21.887	29.562	3296	View 6
18	V6c	20.241	20.957	3203	View 6
19	Southern Ridge	18.595	12.352	3110	End point View 6
20	V7a	32.452	45.277	3706	View 7
21	V7b	36.520	53.700	3699	View 7
22	V7c	40.587	62.120	3692	View 7
23	V7d	44.655	70.542	3684	View 7
24	V7e	48.722	78.963	3677	View 7
25	V7f	52.790	87.385	3670	View 7
26	Medicine Bow Pk	56.857	95.806	3662	End point View 7
27	V8a	36.471	31.115	3771	View 8
28	V8b	44.557	25.375	3828	View 8
29	V8c	52.644	19.634	3886	View 8
30	V8d	60.730	13.893	3943	View 8
31	V8e	68.816	8.152	4001	View 8
32	V8f	76.902	2.412	4058	View 8
33	V8g	84.988	-3.329	4116	View 8
34	V8h	93.074	-9.070	4174	View 8
35	V8i	101.161	-14.811	4231	View 8
36	V8j	109.247	-20.551	4289	View 8
37	Longs Pk	117.333	-26.292	4346	End point View 8
38	V9a	20.856	37.984	3443	View 9
39	V9b	16.533	29.197	3404	View 9
40	V9c	12.210	20.410	3365	View 9
41	V9d	7.887	11.623	3326	View 9
42	V9e	3.564	2.836	3287	View 9
43	V9f	-0.759	-5.951	3248	View 9
44	V9g	-5.082	-14.738	3209	View 9
45	V9h	-9.405	-23.525	3170	View 9
46	Flat Tops W	-13.728	-32.312	3131	End point View 9
47	V10a	20.079	34.964	3614	View 10
48	V10b	11.774	33.072	3515	View 10
49	V10c	3.468	31.180	3416	View 10
50	Meaden Pk	-4.838	29.288	3317	End point View 10

[a] All site-path (View) receptors are "elevated" using the difference between mean sea level altitude and local resolved terrain altitude. Chemistry sites are at ground level.

B.2.2.4b Emissions Inputs

The CALPUFF PTEMARB.DAT and BAEMARB.DAT input files were used to specify hourly varying point source (elevated) and low-level source emissions, respectively. As the intensive episode modeling periods occurred in the summer and early fall (August to October), typical summer day emissions were used to represent point and area source emissions, except for the Craig and Hayden generating stations for which Continuous Emissions Monitoring (CEM) data were available so that hourly- and day-specific emissions could be prescribed.

The CALPUFF execution time depends on the number of sources, puff release rates, number of receptors, modeling domain, and episode duration. Most CALPUFF applications model single or small groups of sources. Especially for regional-scale applications, the number of puffs must be kept to a manageable number (e.g., tens of sources) to maintain reasonable execution times. For these CALPUFF applications, the number of sources was limited to between 50 and 100. Except for the Craig and Hayden generating stations, and other point sources in the smaller emissions domain, collocated point source stacks were aggregated (combined) into single emission sources. The gridded low-level emissions (area source, mobile source, low-level point source, and biogenic emissions) were aggregated into several source regions. Estimates of fire emissions were also provided to CALPUFF. The following subsections describe the emissions processing for the CALPUFF modeling.

Gridded low-level and elevated point source emission data, documented in Section B.1, were used to develop the CALPUFF model inputs. These data were provided on two domains: 1) a mesoscale modeling domain, which is similar to the MZVS mesoscale domain only with the western boundary 60 km further east (Figure B.2.2.1 with western boundary at -132 km rather than -192 km), where low-level emissions were provided on a "108 x 76" 2 km grid; and 2) the regional-scale modeling domain (Figure B.2.2.2) where low-level emissions were provided on a "216 x 152" 8 km grid. The number of elevated point source stacks in the mesoscale and regional-scale domains were 24 and 1,801, respectively.

The data provided consisted of hourly emissions estimates representative of a typical summer day for the following species:

SO_2	Sulfur dioxide
NO	Nitric oxide
NO_2	Nitrogen dioxide
HONO	Nitrous acid
CO	Carbon monoxide
PM_{10}	Particulate matter with aerodynamic diameters of less than 10 microns (not always available)

$PM_{2.5}$	Particulate matter with aerodynamic diameters of less than 2.5 microns
$EC_{2.5}$	$PM_{2.5}$ elemental carbon
$OC_{2.5}$	$PM_{2.5}$ organic carbon
NH_3	Ammonia
VOC	Several VOC species speciated according to the SAPRC90 chemical mechanism (see Table B.2.2.8)

Several steps were necessary to process the raw gridded low-level and elevated point sources emissions for input into CALPUFF: 1) mapping the provided species into CALPUFF spedies; 2) processing regional-scale domain and mesoscale domain point source emissions into CALPUFF formats; 3) processing regional-scale domain and mesoscale domain low-level emissions into CALPUFF format; 4) merging mesoscale domain and regional-scale domain emissions into unified input files; 5) addition of episode-specific hourly emissions for the Craig and Hayden generating stations using the CEM data; and 6) processing fire emissions.

The gridded low-level and elevated point emission species were mapped to the nine species modeled by CALPUFF as follows:

CALPUFF Species	Emissions Data Base
SO_x	SO_2
$SO_4^=$	
NO_x	$NO + NO_2 + HONO$
HNO_3	
NO_3^-	
$PPM_{2.5}$ (primary $PM_{2.5}$)	$PM_{2.5} - EC_{2.5} - OC_{2.5}$
$EC_{2.5}$	$EC_{2.5}$
$OC_{2.5}$	$OC_{2.5}$
SOA	VOC (adjusted according to SOA yields)

CALPUFF cannot treat the conversion of VOC into Secondary Organic Aerosol (SOA). Thus, SOA was treated in CALPUFF as a primary emitted species assuming that a portion of the VOC was already converted into SOA. Table B.2.2.8 displays the total

Table B.2.2.8
Secondary Organic Aerosol Yields for the
SAPRC90 Chemical Mechanism Organic Classes

Species	Description	Numbers of Carbons	Aerosol Yield[a]
ALK1	Less reactive alkanes ($k_{OH} \leq 10{,}000$ ppm $^{-1}$min^{-1})	4.5	1.4
ALK2	More reactive alkanes ($k_{OH} > 10{,}000$ ppm $^{-1}$min^{-1})	7.4	144.
ARO1	Less reactive aromatics ($k_{OH} \leq 20{,}000$ ppm $^{-1}$min^{-1})	7.1	402.
ARO2	More reactive aromatics ($k_{OH} > 20{,}000$ ppm $^{-1}$min^{-1})	8.5	416.
CRES	Cresols and other alkyl phenols	7.	221.
OLE1	Less reactive alkenes ($k_{OH} \leq 75{,}000$ ppm $^{-1}$min^{-1})	3.7	9.5
OLE2	More reactive alkenes ($k_{OH} > 75{,}000$ ppm $^{-1}$min^{-1})	5.0	30.
OLE4	Biogenic C10 alkenes	10.	762.
HCHO	Formaldehyde	1.	0.
CCHO	Acetaldehyde	2.	0.
RCHO	Propionaldelhyde and higher aldehydes	3.	0.
MEK	Methyl ethyl ketone and lumped higher ketones	4.	0.
MGLY	Methyl glyoxal	3.	0.
MEOH	Methanol	1.	0.
ETOH	Ethanol	2.	0.
MTBE	Methyl tertiary butyl ether	5.	0.
ETHE	Ethene	2.	0.
OLE3	Isoprene	5.	0.

[a] Aerosol yields are in $\mu g/m^3$/ppm of aerosol mass, including carbon, hydrogen, oxygen, etc. (not just carbon). The individual component yields are from Pandis *et al.* (1992). The lumped compound yields are based on the VOC composition of the 1987 regional emissions inventory for the South Coast Air Basin.

Secondary Organic Aerosol (SOA) yields for the SAPRC90 VOC species as estimated by Pandis *et al.* (1992). These estimates are associated with uncertainty factors of five or more and represent the total amount of SOA that is produced from each VOC species assuming the VOC species is completely consumed. The SOA yields from VOC under the pristine conditions in the Rocky Mountains is expected to be much lower than the yields measured under the high-NO_x smog chamber conditions given in Table B.2.2.8.

Emissions from 1,801 (regional domain) and 24 (mesoscale domain) point source stacks were provided in the Urban Airshed Model (UAM) elevated point source file format (Morris *et al.*, 1990). Modeling each stack as a separate source would result in excessive computer time so that the modeling could not be completed within the time constraints of the study. Thus, procedures were developed to combine stacks, when appropriate, into single sources for modeling. If two stacks have similar plume rises, combining the stacks results in exactly the same concentration estimates as modeling the stacks separately, but with half of the computational time.

The procedures used to combine point source stacks into single source inputs for CALPUFF modeling involved the following:

- Combine collocated point source stacks (i.e., stacks within a specified distance to each other) into a single emissions source;
- Check whether total emissions of SO_x+NO_x+VOC+$PM_{2.5}$+NH_3 of the combined collocated point source is greater than a CUTOFF value; if so emissions are treated as an elevated point source in the CALPUFF PTEMARB.DAT file, otherwise the emissions are combined with the low-level emissions and treated as a "surface" area source in the CALPUFF BAEMARB.DAT input file;
- For those combined point sources which consist of emissions from several different collocated stacks, use the stack parameters (i.e., stack height, diameter, exit velocity, and exit temperature) from the stack with the most dominant (i.e., highest) emissions.

Different criteria were used to process the point sources in the mesoscale and the regional-scale domains. Because of the proximity of point sources in the mesoscale domain to the MZWA, and the need to estimate the separate contributions of each unit of the Craig and Hayden generating stations, all stacks whose emissions exceeded the CUTOFF value of 0.05 tons/day were modeled as separate sources. Of the 24 point source stacks in the mesoscale emissions domain, nine were allocated to the CALPUFF elevated source file and the emissions from the remaining stacks were included with the low-level area source emission inputs. The nine remaining stacks included 100% of the SO_x and almost 100% of the NO_x emissions from elevated sources.

In the regional-scale modeling domain, sources from the mesoscale domain were excluded to prevent double counting. Stacks within 1 km of each other (i.e., collocated stacks or stacks within the same facility) were combined into a single emission source. The

aggregated point sources whose (combined) total emissions (SO_x+NO_x+VOC+$PM_{2.5}$+NH_3) exceeded 10 tons/day were treated as elevated point sources, whereas the remainder of the point sources were included with the low-level area source emissions. This procedure reduced the 1,801 stacks in the initial UAM elevated point source file to 29 elevated sources for CALPUFF modeling. The 29 CALPUFF elevated sources accounted for 90% of the SO_x and 85% of the NO_x emissions from elevated sources in the regional-scale modeling domain.

In order to aid in the reconciliation of the receptor and CALMET/CALPUFF modeling, the emissions of all coal-fired generating stations was modeled separately. The information on the UAM formatted elevated point source file was insufficient to determine whether emissions from a specific stack was associated with a coal-fired utility boiler. Thus, the raw emissions data were examined and source locations and parameters for all coal-burning sources were extracted. Three of those sources were not generating stations and were eliminated from consideration. The coal-fired generating station cross-reference list was matched with the UAM elevated source file to obtain the coal-fired generating station input file for CALPUFF modeling. Because the resolution (precision) of the coal-fired generating station cross-reference file was higher than the UAM input file, identifying all of the coal-burning units was an interactive process. In the end, 84 of the 85 coal-burning units were identified for CALPUFF modeling. Thus, potentially one coal-fired boiler is not in the CALPUFF coal-fired generating station input emission file.

The hourly episodic-specific Continuous Emissions Monitoring (CEM) data were used to specify SO_x and NO_x emissions for each unit of the Craig and Hayden generating stations. In addition to the hourly-specific SO_x and NO_x emissions, hourly-specific temperature, exit velocities, and flow rates were also used for the CALPUFF modeling. Table B.2.2.9 compares the Craig and Hayden SO_x emissions for a typical 1993 summer day with CEM measurements for each intensive modeling period.

The Craig generating station total SO_x emissions during the 1995 intensive modeling periods are fairly close to the 1993 values for a typical summer day. However, the Hayden generating station SO_x emissions during three out of the four intensive modeling periods are significant higher (60 to 70% higher) than those from 1993 for a typical summer day. During the intensive modeling period of 10/07/95 to 10/19/95, the Hayden SO_x emissions are closer to the 1993 summer estimates (within 15%), however this is because Hayden Units 1 and 2 were down during portions of the modeling period resulting in a lower average daily emission rate. Note that the 1993 typical summer day emissions of primary PM and VOC were used for the Craig and Hayden generating stations since no CEM data were available for these species.

Separate gridded emission estimates for a mesoscale domain at 2 km resolution and for the regional-scale domain at 8 km resolution were prepared. Two separate low-level emission files were provided for each grid; one contained combined emissions for area, mobile, and biogenic sources, whereas the other contained emissions for low-level points. Elevated point sources with low emissions (as determined during point source processing)

Table B.2.2.9
Comparison of Craig and Hayden SO_x Emission Rates for Typical Summer Day (1993) versus 1995 Episode-Specific Emissions using CEM Data for Intensive Modeling Periods (tons/day)

	Summer 1993	09/14/95 to 09/21/95	08/04/95 to 08/09/95	10/04/95 to 10/21/95	08/18/95 to 08/27/95
Craig 1, 2, and 3	29.9	28.2	30.8	30.7	29.3
Craig 1	11.6	11.8	9.9	16.2	12.0
Craig 2	14.6	12.0	14.5	12.8	12.4
Craig 3	3.7	4.3	6.5	1.7	4.9
Hayden 1 and 2	29.8	50.2	47.5	34.2	51.0
Hayden 1	13.7	23.0	22.2	13.4	22.6
Hayden 2	16.1	27.3	25.3	20.8	28.4

were combined with the two gridded emissions files to obtain a total gridded low-level emissions data base for both the mesoscale and regional-scale domains.

Based on emission densities, topographic features (e.g., ridgelines), and proximity to the MZWA, the mesoscale and regional-scale domain were divided up into geographic areas to be treated as separate single source regions in the CALPUFF modeling. The mesoscale emissions domain was divided up into 18 separate CALPUFF area source emission regions, with the towns of Steamboat Springs, Hayden, and Craig, CO, and the roadway links between them, treated as separate sources.

For the regional-scale domain, the cities of Denver, CO, and Salt Lake City, UT, were treated as separate emission source regions. The remainder of the regional-scale domain (without the smaller emissions domain discussed above) was divided up into 27 area source regions, with smaller area source regions being specified closer to the MZWA. This resulted in a total of 47 area source regions to be modeled by CALPUFF (18 in the mesoscale domain and 29 in the regional-scale domain).

The approach taken for modeling fire emissions was strictly to provide indications of whether the potential existed for fire emissions to contribute to visibility impairment in the vicinity of the MZWA. Thus, very rough estimates of emissions were generated, which were then revised based on comparisons of the modeled impacts of the fires with measured PM concentrations.

Information on the location, duration, and acreage burned of fires during the field study period were compiled as discussed in Section B.1. Although such data provided information on the location and time of the fires, the data was incomplete for emission estimates. Thus, emissions from fires on Colorado Bureau of Land Management (BLM) lands were summarized using the Grand Canyon Visibility Transport Commission (GCVTC) emissions data base. Table B.2.2.10 lists the fire emissions factors. Emission rates from fires are very uncertain and a simple examination of the mean and maximum/minimum emission factors from the GCVTC data base in Table B.2.2.10 reveals that for any given fire, the average emissions rate may be underestimated by 50% or overestimated by a factor of 10.

Preliminary estimates of fire emissions were prepared assuming that the total emissions for each fire was based on the average emissions rate from Table B.2.2.10 (tons/acre) combined with the total acres burned. The hourly emission rate during the duration of each fire was assumed to be uniform throughout the duration of the fire, and the initial size of the fire was equal to the total acreage burned. Fires were treated as buoyant area sources with an assumed release temperature of 500 °K to represent an average for the fire area.

B.2.2.4c Emissions Adjustment Based on Emission/Model/Measurement Reconciliation

Based on reconciliation between the preliminary CALPUFF estimated PM concentrations and measured values, three adjustments were made to the inventory that

Table B.2.2.10
Average Emission Flux (tons/acre) for Wild Trees
on Colorado Bureau of Land Management Lands[a]

Species	N	Average	Std Dev	Minimum	Maximum
$PM_{2.5}$[b]	110	0.0690	0.0344	0.028	0.113
NO_x	110	0.0532	0.0294	0.005	0.091
$OC_{2.5}$	110	0.0372	0.0294	0.005	0.091
$EC_{2.5}$	110	0.0035	0.0011	0.001	0.0046

[a] From the Grand Canyon Visibility Transport Commission.
[b] $PM_{2.5}$ includes $OC_{2.5}$ and $EC_{2.5}$.

deviated from the original procedures given in the Modeling Protocol (Morris and Emery, 1995):

- Emissions from fires were reduced by about one third (0.3 factor);
- Non-EC/OC primary $PM_{2.5}$ (i.e., dust) emissions were reduced by one tenth (0.1 factor); and
- The SOA yield from VOC estimates were reduced one third and a 50% conversion rate was assumed (final 0.15 factor).

Note that each of these adjustments are to areas of the inventory which are known to be highly uncertain (e.g., fire and dust emissions) or an area that is fabricated due to the limitations of CALPUFF (i.e., treating SOA as a primary emissions). No adjustments were made to the anthropogenic SO_2, NO_x, $EC_{2.5}$ or $OC_{2.5}$ emissions. Also note that these adjustments were based solely on the results of the first episode (09/17/95 to 09/21/95).

Preliminary CALPUFF simulations using the fire emission factors in Table B.2.2.10 produced $OC_{2.5}$ estimates due to fires alone that were 2 to 4 times higher than measurements of total organics. Emissions from fires are very buoyant and chaotic, so some of the smoke is transported in layers near the surface, whereas the rest may rise much higher. However, emissions from fires are transported in CALPUFF as a stream of puffs with a mean plume height derived from an assumed release temperature. This could greatly overestimate the impacts of fires as it does not allow for the fact that much of the emissions from large fires are in the upper troposphere and do not strongly interact with the daily variation of boundary layer depth and influence surface concentrations. Thus, emissions from fires were reduced by approximately one third, which is about the average $OC_{2.5}$ overestimation.

The non-carbonaceous primary $PM_{2.5}$ is dominated by reentrained road dust, construction activities, and other anthropogenic dust generation activities. Recent studies as part of the PM_{10} Technical Enhancement Program (PTEP) in the South Coast Air Basis (SOCAB) have found that standard (AP42) emission factors for reentrained road dust and construction activities are factors of three to four too high. This overestimation of dust $PM_{2.5}$ was also seen in the preliminary CALPUFF modeling for which the non-carbonaceous primary $PM_{2.5}$ measurements for the episode between 09/17/95 and 09/21/95 were overestimated without fires by a factor of two to four. Later CALPUFF applications with all sources for this September episode indicated $PPM_{2.5}$ was 10 times higher than the measured concentrations on (time and space) average. Thus, primary non-carbonaceous $PM_{2.5}$ emissions were multiplied by 0.3 (reduced by approximately two-thirds) in subsequent CALPUFF modeling.

The treatment of Secondary Organic Aerosol (SOA) as primary emissions is fundamentally incorrect, but necessary due to the limitations of CALPUFF and the abundance of measured organic PM near the MZWA. For the conditions around the study area, the estimated SOA based on Pandis *et al.* (1992) (see Table B.2.2.8) may be a factor of three too high (Lurmann, 1996). The formation rate of SOA from VOC depends on the

reactivity of the atmosphere. Thus, it may be inferred that SOA is formed much slower in the MZWA region than in an urban atmosphere. Since it is probable that all of the VOC will not be fully converted to SOA by the time it arrives at the MZWA, a 50% conversion rate was assumed. Reducing the yield estimates by a factor of three and assuming that 50% of the VOC emissions have been converted to SOA results in a final yield that is 15% of the full yield estimates in Table B.2.2.8.

Tables B.2.2.11a to B.2.2.11d summarize the emissions in the regional-scale modeling domain by source category for the four intensive modeling episodes. These are the actual episode-average emissions used in the CALPUFF modeling. Note that the only emissions which vary from episode to episode are the SO_x and NO_x emissions from the Craig and Hayden generating stations and emissions from fires. All other emissions are representative of a typical summer day. The source groupings listed in Tables B.2.2.11 are the same source groupings that are used in reporting source attribution impacts of PM concentrations and extinction at the key receptors and sight paths around the MZWA.

A total of approximately 970 tons per day (TPD) SO_x emissions are emitted within in the regional-scale domain, of which a little under 10% come from the Yampa Valley subdomain, primarily (over 99%) due to the Craig and Hayden generating stations. Coal-fired generating stations account for a little over 50% of the SO_x emissions in the regional-scale domain. There is approximately twice as much NO_x emissions as SO_x emissions in the regional-scale domain, a majority of which come from sources besides coal-fired generating stations (e.g., mobile sources and oil and gas point source combustion). Fires contribute a small fraction (< 3%) of the total NO_x emissions.

Primary $PM_{2.5}$ emissions are divided up into three categories, elemental carbon ($EC_{2.5}$), organic carbon ($OC_{2.5}$), and other non-carbonaceous $PM_{2.5}$ ($PPM_{2.5}$). Fires are estimated to contribute significantly to each of these component of primary $PM_{2.5}$ during some of the episodes. For example, for the first episode of 09/17/95 to 09/21/95, fires are estimated to contribute approximately 9% of the $EC_{2.5}$, 33% of the $OC_{2.5}$, and 4% of the $PM_{2.5}$ (Table B.2.2.11a). The contributions of fires to the total regional-scale domain PM emissions is less for the other episodes. Coal-fired generating stations have a negligible contribution to primary $PM_{2.5}$ emissions.

The representation of Secondary Organic Aerosols (SOA) in the emission inventory are produced primarily from low-level sources (e.g., VOCs from biogenic, mobile sources, etc.) outside of the Yampa Valley (96%). The total SOA "emissions" in the regional-scale domain is comparable, but larger, than the primary $OC_{2.5}$ emissions. Urban-scale aerosol modeling in California's South Coast Air Basin (UAM-AERO) and Denver, CO (DAQM) estimate that SOA comprises much less than half of the total particulate organic carbon (OC) (e.g., approximately 20% in California's South Coast Air Basin. Thus, SOA may be overestimated, even though the SOA contribution to total OC is expected to be greater in the rural MZWA than in an urban area.

Table B.2.2.11a
Summary of Emissions for the MZVS Regional-Scale Domain
Averaged Over the Intensive Modeling Period between 09/14/95 and 09/21/95

Emissions Category	SO_2 (TPD)	SO_2 (%)	NO_x (TPD)	NO_x (%)	$PPM_{2.5}$ (TPD)	$PPM_{2.5}$ (%)	$EC_{2.5}$ (TPD)	$EC_{2.5}$ (%)	$OC_{2.5}$ (TPD)	$OC_{2.5}$ (%)	SOA (TPD)	SOA (%)
Total Emissions w/ Fires	970.63	100.0	1942.17	100.0	228.21	100.0	36.93	100.0	108.71	100.0	114.79	100.0
Total Emissions w/o Fires	970.63	100.0	1891.50	97.4	220.12	96.5	33.55	90.9	73.26	67.4	114.79	100.0
Total Yampa Valley	78.87	8.1	139.69	7.2	4.75	2.1	0.44	1.2	0.93	0.9	5.09	4.4
Craig Units #1, #2, #3	28.21	2.9	68.07	3.5	0.09	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Units #1, #2	23.87	2.5	47.72	2.5	0.09	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Unit #1	11.83	1.2	25.19	1.3	0.04	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Unit #2	12.04	1.2	22.53	1.2	0.05	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Unit #3	4.34	0.4	20.35	1.0	0.01	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Hayden Units #1, #2	50.22	5.2	64.12	3.3	0.12	0.1	0.00	0.0	0.00	0.0	0.00	0.0
Hayden Unit #1	22.95	2.4	39.91	2.1	0.05	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Hayden Unit #2	27.27	2.8	24.21	1.2	0.07	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Steamboat Springs	0.07	0.0	1.06	0.1	0.17	0.1	0.03	0.1	0.07	0.1	0.12	0.1
Other Yampa Valley	0.37	0.0	6.44	0.3	4.36	1.9	0.41	1.1	0.86	0.8	4.96	4.3
Non-Yampa Valley	891.76	91.9	1751.81	90.2	215.37	94.4	33.11	89.7	72.33	66.5	109.70	95.6
Denver	69.91	7.2	167.87	8.6	22.58	9.9	3.69	10.0	9.68	8.9	0.66	0.6
Colorado w/ Denver	241.95	24.9	736.87	37.9	117.03	51.3	17.14	46.4	41.68	38.3	42.82	37.3
Non-Colorado	649.81	66.9	1014.94	52.3	98.33	43.1	15.98	43.3	30.65	28.2	66.88	58.3
Coal-Fired Power Plants	488.14	50.3	677.53	34.9	2.75	1.2	0.00	0.0	0.00	0.0	0.05	0.0
All Other Sources	482.49	49.7	1264.64	65.1	225.46	98.8	36.93	100.0	108.71	100.0	114.74	100.0
Fires	0.00	0.0	50.67	2.6	8.09	3.5	3.38	9.1	35.45	32.6	0.00	0.0

Table B.2.2.11b
Summary of Emissions for the MZVS Regional-Scale Domain
Averaged Over the Intensive Modeling Period between 08/04/95 and 08/09/95

Emissions Category	SO_2 (TPD)	SO_2 (%)	NO_x (TPD)	NO_x (%)	$PPM_{2.5}$ (TPD)	$PPM_{2.5}$ (%)	$EC_{2.5}$ (TPD)	$EC_{2.5}$ (%)	$OC_{2.5}$ (TPD)	$OC_{2.5}$ (%)	SOA (TPD)	SOA (%)
Total Emissions w/ Fires	970.44	100.0	1923.24	100.0	223.61	100.0	35.01	100.0	88.57	100.0	114.79	100.0
Total Emissions w/o Fires	970.44	100.0	1901.36	98.9	220.12	98.4	33.55	95.8	73.26	82.7	114.79	100.0
Total Yampa Valley	78.68	8.1	149.54	7.8	4.75	2.1	0.44	1.3	0.93	1.1	5.09	4.4
Craig Units #1, #2, #3	30.80	3.2	76.54	4.0	0.09	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Units #1, #2	24.33	2.5	49.23	2.6	0.09	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Unit #1	9.85	1.0	21.55	1.1	0.04	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Unit #2	14.48	1.5	27.68	1.4	0.05	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Unit #3	6.47	0.7	27.30	1.4	0.01	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Hayden Units #1, #2	47.45	4.9	65.51	3.4	0.12	0.1	0.00	0.0	0.00	0.0	0.00	0.0
Hayden Unit #1	22.17	2.3	40.05	2.1	0.05	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Hayden Unit #2	25.28	2.6	25.46	1.3	0.07	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Steamboat Springs	0.07	0.0	1.06	0.1	0.17	0.1	0.03	0.1	0.07	0.1	0.12	0.1
Other Yampa Valley	0.37	0.0	6.44	0.3	4.36	2.0	0.41	1.2	0.86	1.0	4.96	4.3
Non-Yampa Valley	891.76	91.9	1751.82	91.1	215.37	96.3	33.11	94.6	72.33	81.7	109.70	95.6
Denver	69.91	7.2	167.87	8.7	22.58	10.1	3.69	10.5	9.68	10.9	0.66	0.6
Colorado w/ Denver	241.95	24.9	736.87	38.3	117.03	52.3	17.14	48.9	41.68	47.1	42.82	37.3
Non-Colorado	649.81	67.0	1014.95	52.8	98.33	44.0	15.98	45.6	30.65	34.6	66.88	58.3
Coal-Fired Power Plants	487.96	50.3	687.38	35.7	2.75	1.2	0.00	0.0	0.00	0.0	0.05	0.0
All Other Sources	482.49	49.7	1235.86	64.3	220.87	98.8	35.01	100.0	88.57	100.0	114.74	100.0
Fires	0.00	0.0	21.88	1.1	3.50	1.6	1.46	4.2	15.31	17.3	0.00	0.0

Table B.2.2.11c
Summary of Emissions for the MZVS Regional-Scale Domain
Averaged Over the Intensive Modeling Period between 10/04/95 and 10/19/95

Emissions Category	SO_2 (TPD)	SO_2 (%)	NO_x (TPD)	NO_x (%)	$PPM_{2.5}$ (TPD)	$PPM_{2.5}$ (%)	$EC_{2.5}$ (TPD)	$EC_{2.5}$ (%)	$OC_{2.5}$ (TPD)	$OC_{2.5}$ (%)	SOA (TPD)	SOA (%)
Total Emissions w/ Fires	957.08	100.0	1870.87	100.0	221.67	100.0	34.20	100.0	80.06	100.0	114.79	100.0
Total Emissions w/o Fires	957.08	100.0	1861.16	99.5	220.12	99.3	33.55	98.1	73.26	91.5	114.79	100.0
Total Yampa Valley	65.33	6.8	109.33	5.8	4.75	2.1	0.44	1.3	0.93	1.2	5.09	4.4
Craig Units #1, #2, #3	30.65	3.2	56.33	3.0	0.09	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Units #1, #2	28.97	3.0	51.91	2.8	0.09	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Unit #1	16.20	1.7	28.54	1.5	0.04	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Unit #2	12.77	1.3	23.37	1.2	0.05	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Unit #3	1.68	0.2	4.42	0.2	0.01	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Hayden Units #1, #2	34.24	3.6	45.50	2.4	0.12	0.1	0.00	0.0	0.00	0.0	0.00	0.0
Hayden Unit #1	13.42	1.4	28.87	1.5	0.05	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Hayden Unit #2	20.82	2.2	16.63	0.9	0.07	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Steamboat Springs	0.07	0.0	1.06	0.1	0.17	0.1	0.03	0.1	0.07	0.1	0.12	0.1
Other Yampa Valley	0.37	0.0	6.44	0.3	4.36	2.0	0.41	1.2	0.86	1.1	4.96	4.3
Non-Yampa Valley	891.76	93.2	1751.83	93.6	215.37	97.2	33.11	96.8	72.33	90.3	109.70	95.6
Denver	69.91	7.3	167.87	9.0	22.58	10.2	3.69	10.8	9.68	12.1	0.66	0.6
Colorado w/ Denver	241.95	25.3	736.87	39.4	117.03	52.8	17.14	50.1	41.68	52.1	42.82	37.3
Non-Colorado	649.81	67.9	1014.95	54.3	98.33	44.4	15.98	46.7	30.65	38.3	66.88	58.3
Coal-Fired Power Plants	474.60	49.6	647.17	34.6	2.75	1.2	0.00	0.0	0.00	0.0	0.05	0.0
All Other Sources	482.48	50.4	1223.70	65.4	218.92	98.8	34.20	100.0	80.06	100.0	114.74	100.0
Fires	0.00	0.0	9.71	0.5	1.55	0.7	0.65	1.9	6.80	8.5	0.00	0.0

Table B.2.2.11d
Summary of Emissions for the MZVS Regional-Scale Domain
Averaged Over the Intensive Modeling Period between 08/18/95 and 08/27/95

Emissions Category	SO_2 (TPD)	SO_2 (%)	NO_x (TPD)	NO_x (%)	$PPM_{2.5}$ (TPD)	$PPM_{2.5}$ (%)	$EC_{2.5}$ (TPD)	$EC_{2.5}$ (%)	$OC_{2.5}$ (TPD)	$OC_{2.5}$ (%)	SOA (TPD)	SOA (%)
Total Emissions w/ Fires	972.48	100.0	1944.83	100.0	226.93	100.0	36.40	100.0	103.08	100.0	114.79	100.0
Total Emissions w/o Fires	972.48	100.0	1902.22	97.8	220.12	97.0	33.55	92.2	73.26	71.1	114.79	100.0
Total Yampa Valley	80.72	8.3	150.40	7.7	4.75	2.1	0.44	1.2	0.93	0.9	5.09	4.4
Craig Units #1, #2, #3	29.29	3.0	75.24	3.9	0.09	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Units #1, #2	24.36	2.5	50.75	2.6	0.09	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Unit #1	11.99	1.2	26.48	1.4	0.04	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Unit #2	12.36	1.3	24.27	1.2	0.05	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Craig Unit #3	4.93	0.5	24.49	1.3	0.01	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Hayden Units #1, #2	51.00	5.2	67.66	3.5	0.12	0.1	0.00	0.0	0.00	0.0	0.00	0.0
Hayden Unit #1	22.57	2.3	41.11	2.1	0.05	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Hayden Unit #2	28.43	2.9	26.55	1.4	0.07	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Steamboat Springs	0.07	0.0	1.06	0.1	0.17	0.1	0.03	0.1	0.07	0.1	0.12	0.1
Other Yampa Valley	0.37	0.0	6.44	0.3	4.36	1.9	0.41	1.1	0.86	0.8	4.96	4.3
Non-Yampa Valley	891.76	91.7	1751.82	90.1	215.37	94.9	33.11	91.0	72.33	70.2	109.70	95.6
Denver	69.91	7.2	167.87	8.6	22.58	10.0	3.69	10.1	9.68	9.4	0.66	0.6
Colorado w/ Denver	241.95	24.9	736.87	37.9	117.03	51.6	17.14	47.1	41.68	40.4	42.82	37.3
Non-Colorado	649.81	66.8	1014.95	52.2	98.33	43.3	15.98	43.9	30.65	29.7	66.88	58.3
Coal-Fired Power Plants	489.99	50.4	688.24	35.4	2.75	1.2	0.00	0.0	0.00	0.0	0.05	0.0
All Other Sources	482.49	49.6	1256.59	64.6	224.18	98.8	36.40	100.0	103.08	100.0	114.74	100.0
Fires	0.00	0.0	42.62	2.2	6.81	3.0	2.84	7.8	29.82	28.9	0.00	0.0

The spatial distribution of SO_x emissions in the regional-scale modeling domain as modeled by CALPUFF is shown in Figures B.2.2.10a to B.2.2.10c. Figure B.2.2.10a displays "bubble plots" of the source strengths that are treated as elevated sources by CALPUFF. Note that for collocated sources (e.g., the different units from the Craig and Hayden generating stations), the information from the bubble plots are hard to interpret because the information is printed on top of each other (e.g., the 23 TPD emissions from Hayden Unit #1 is completely obscured by the 28 TPD value for Hayden Unit #2). The point source SO_x emission bubble plots clearly show the locations of the major generating stations and other large SO_x emitters in the region. Figure B.2.2.10b displays the low-level CALPUFF emissions; the "bubbles" display the magnitude of the emissions whereas the rectangles show the size of the area source and how the gridded emissions were aggregated into one source for CALPUFF modeling. Finally, the combined elevated and low-level CALPUFF SO_x emissions are displayed in Figure B.2.2.10c. The large point sources clearly dominate the SO_x emissions in the vicinity of the MZWA.

Figures displaying the point source, area source, and combined NO_x emissions are given in Figures B.2.2.11a, B.2.2.11b, and B.2.2.11c, respectively. Unlike SO_x, there are significant quantities of NO_x emissions emitted from low-level sources; the metropolitan regions of Denver, CO, and Salt Lake City, UT, are especially apparent.

As for SO_x and NO_x, Figures B.2.2.12a to B.2.2.12c display the spatial distribution of primary organic carbon ($OC_{2.5}$) emissions from point, low-level, and combined point and low-level source emissions, respectively. Results for other primary PM emissions (i.e. $PPM_{2.5}$ and $EC_{2.5}$) are similar. As seen in Figure B.2.2.12c, the largest quantities of primary $OC_{2.5}$ emissions are emitted in the Denver, CO, and Salt Lake City, UT, metropolitan areas. However, primary $OC_{2.5}$ emissions from fires can be even more significant, as during episodes 1 and 3 there were forest fires that were estimated to emit more $OC_{2.5}$ emissions than either Denver or Salt Lake City. During episode 1 (09/17/95 to 09/21/95), in particular, a large forest fire in the mesoscale domain immediate upwind (west) of the MZWA emitted approximately 15 TPD averaged over the episode.

The displays of point, low-level, and combined point and low-level source SOA "emissions" are provided in Figures B.2.2.13a to B.2.2.13c. SOA is estimated to be produced primarily from low-level source emissions, but the amount of SOA "emitted" appears to be proportional to the size of the region being represented by the puff rather than industrial activity, which suggests that biogenic sources are the primary source of SOA precursors in the Rocky Mountain region.

B.2.2.4d CALPUFF Model Options and Parameters

Table B.2.1.3 lists the user-defined inputs and option codes required for each CALPUFF simulation. IWAQM default values, sensitivity settings, and optimal MZVS settings are presented. Those optimal MZVS settings, not associated with sensitivity tests and that differ from the IWAQM default values, are based on the combination of MZVS modeling goals and past experience with the CALPUFF modeling system and other

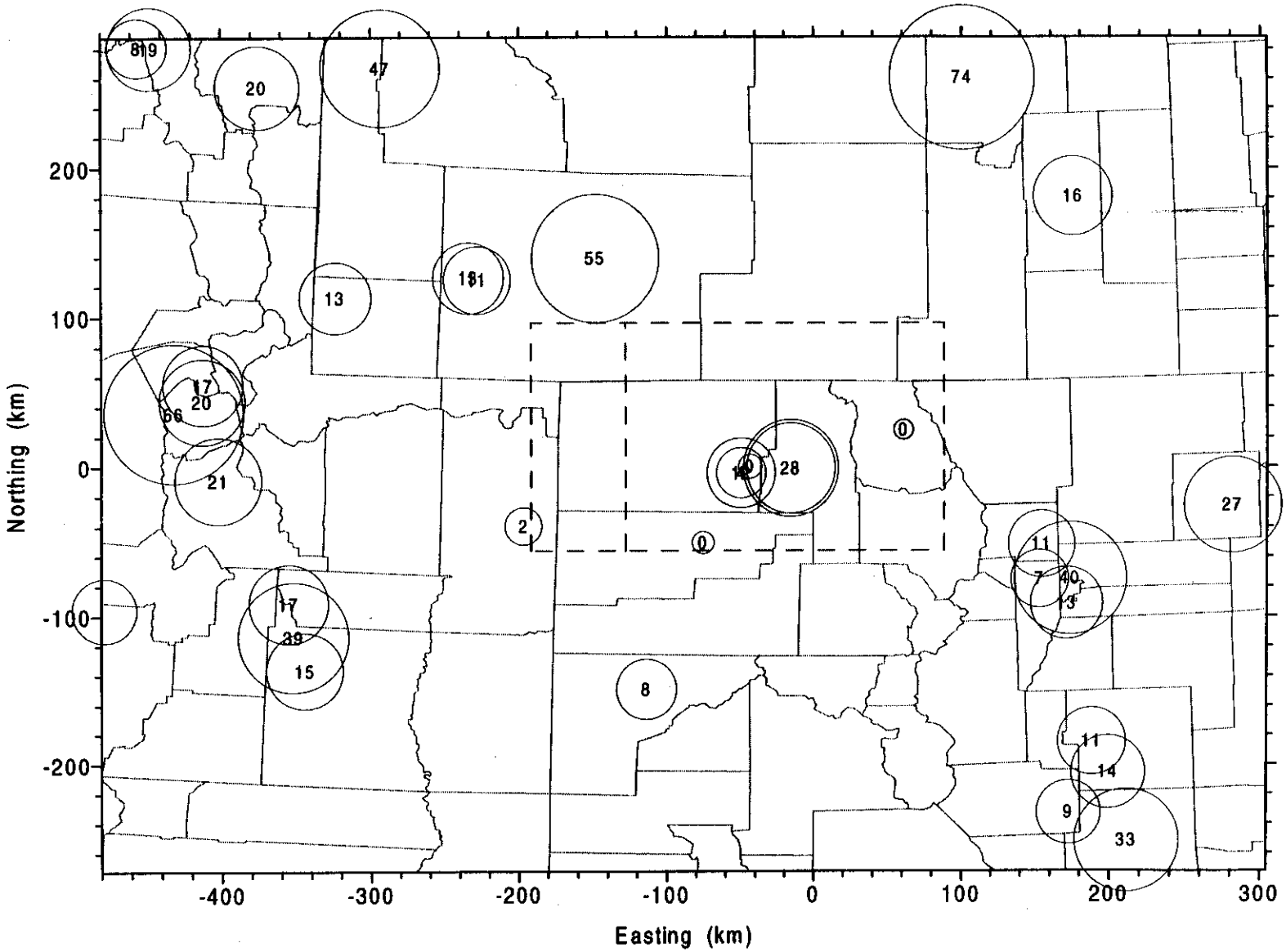


Figure B.2.2.10(a) Locations and strengths of CALPUFF-ready SO_x emissions (TPD) from elevated point sources in the MZVS CALPUFF regional modeling domain. The dashed inset indicates the coverage of the mesoscale domain.

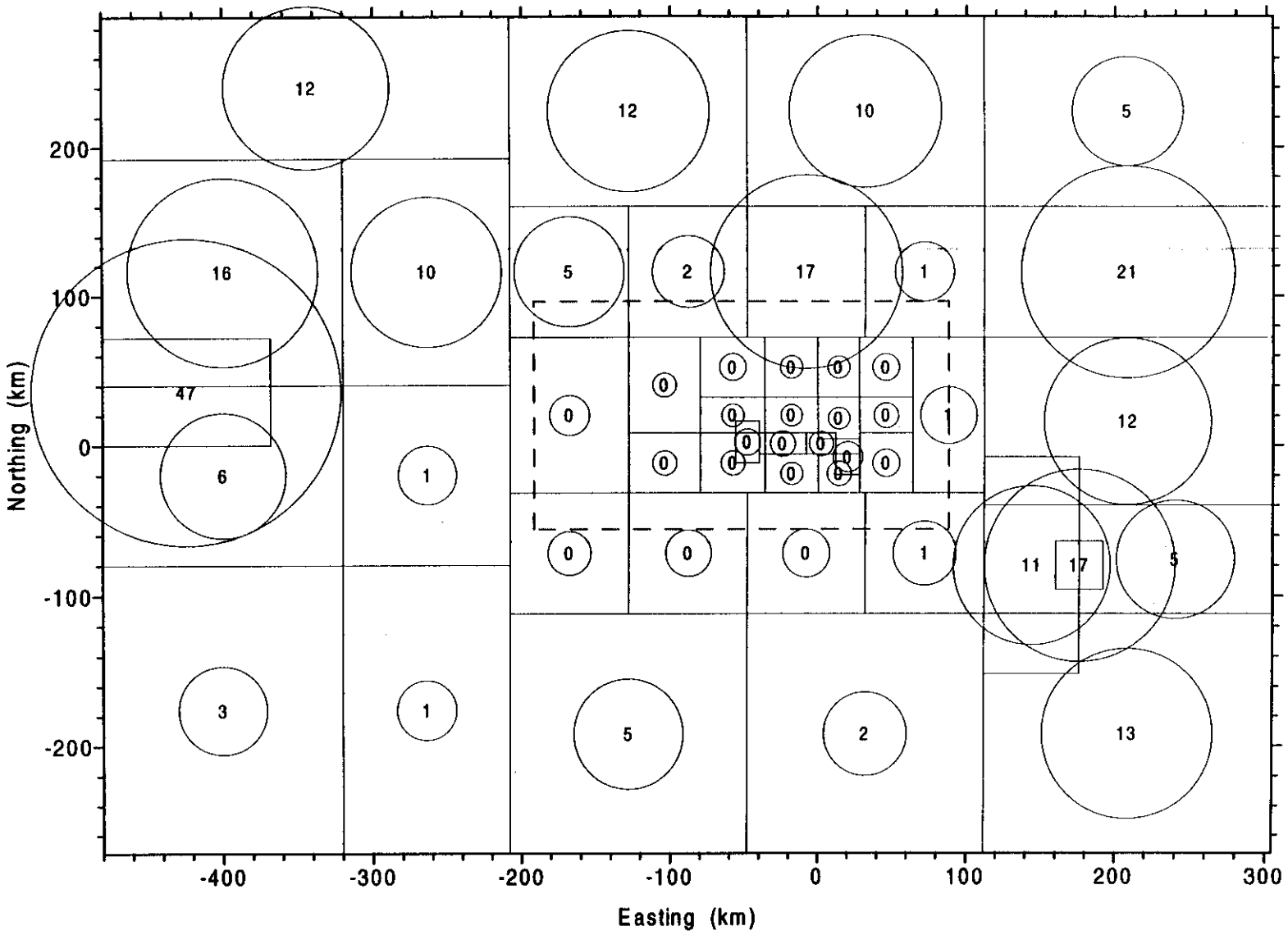


Figure B.2.2.10(b) Locations and strengths of CALPUFF-ready SO_x emissions (TPD) from area sources in the MZVS CALPUFF regional modeling domain. Zeroes indicate small and non-zero emissions below a cutoff threshold. Source regions are denoted by the rectangles, while source strengths are represented by circle size. The dashed inset indicates the coverage of the mesoscale domain.

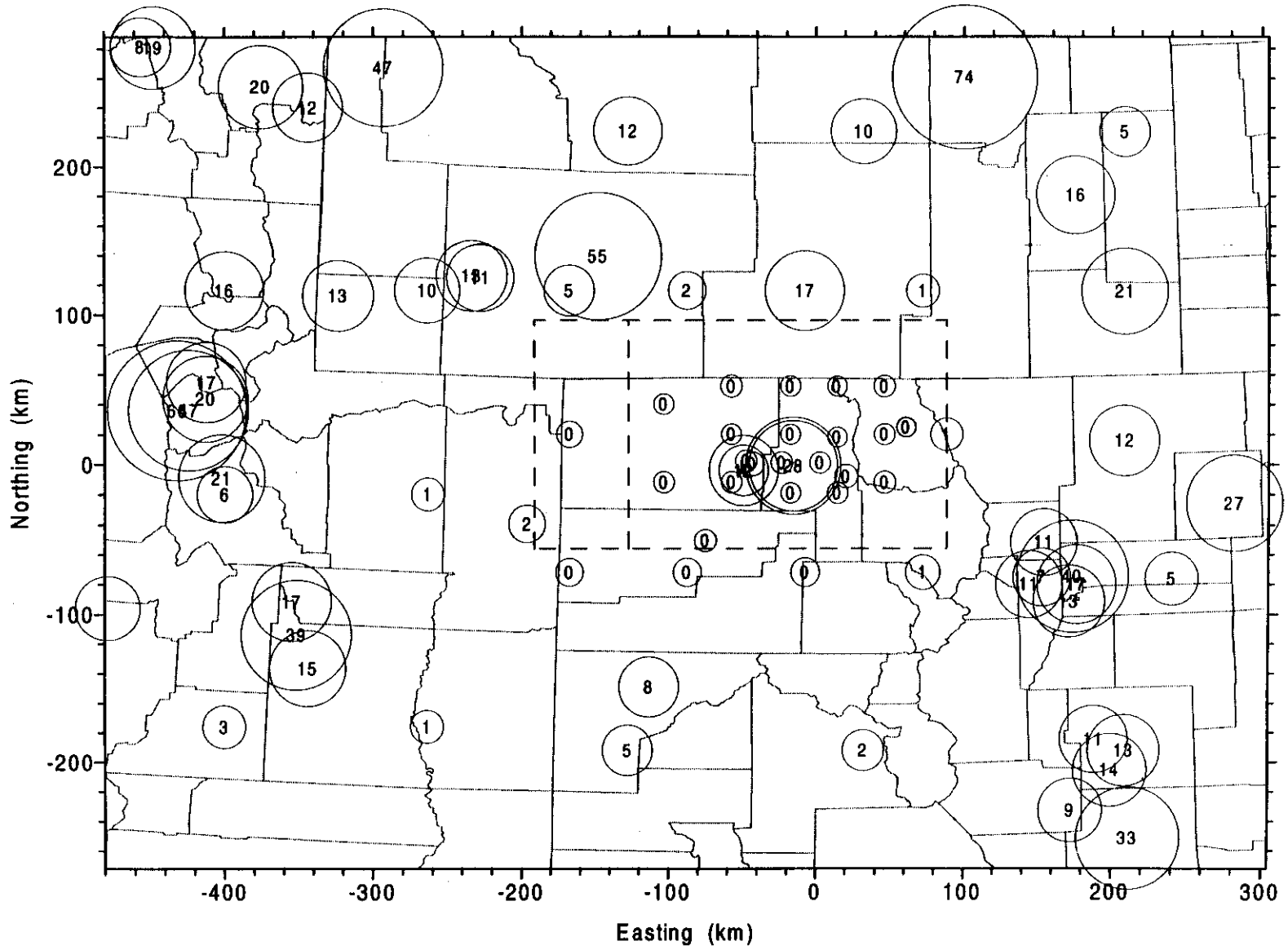


Figure B.2.2.10(c) Locations and strengths of CALPUFF-ready SO_x emissions (TPD) from both elevated point and area sources in the MZVS CALPUFF regional modeling domain. Zeroes indicate small and non-zero emissions below a cutoff threshold. The dashed inset indicates the coverage of the mesoscale domain.

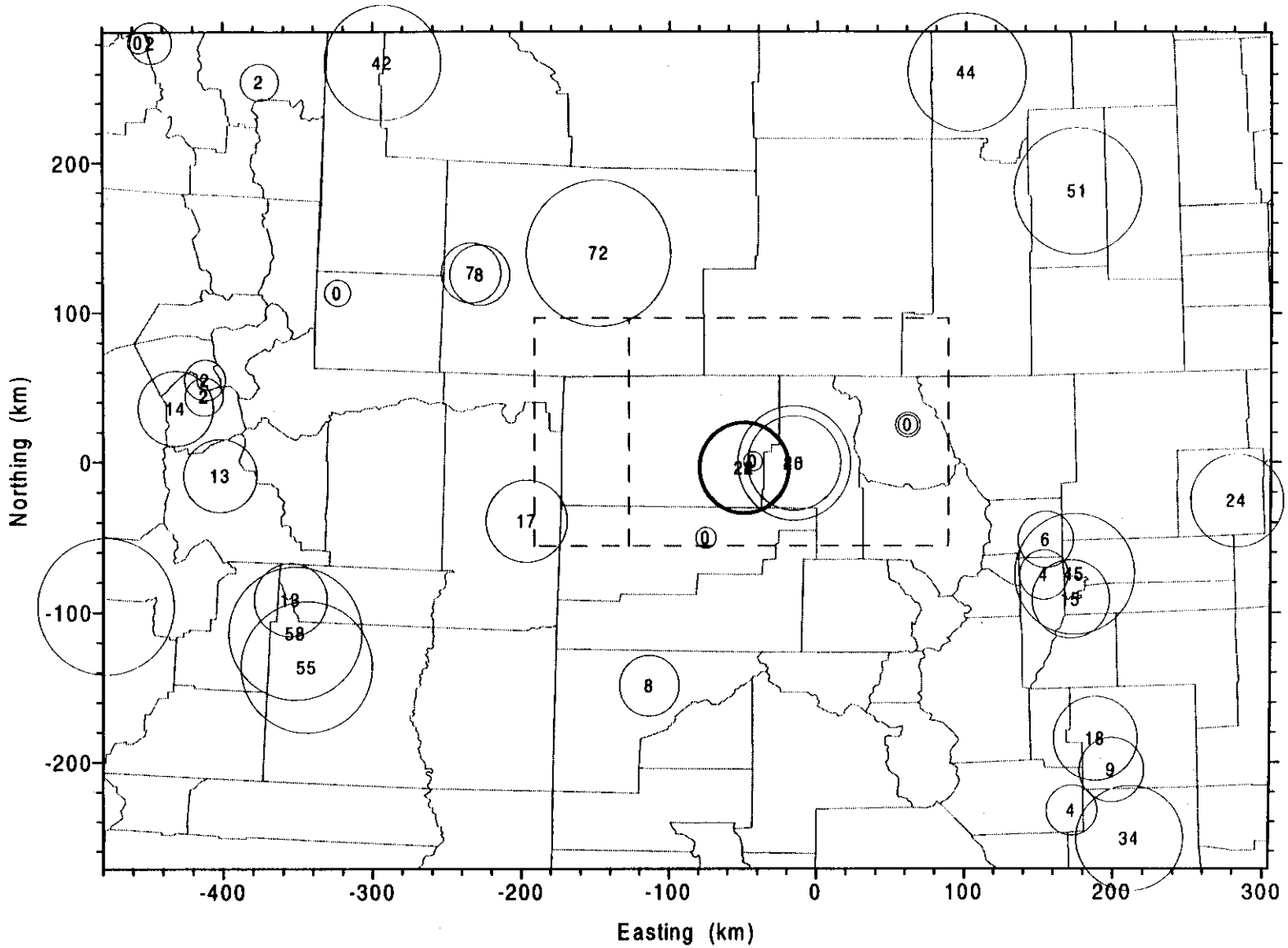


Figure B.2.2.11(a) Locations and strengths of CALPUFF-ready NO_x emissions (TPD) from elevated point sources in the MZVS CALPUFF regional modeling domain. The dashed inset indicates the coverage of the mesoscale domain.

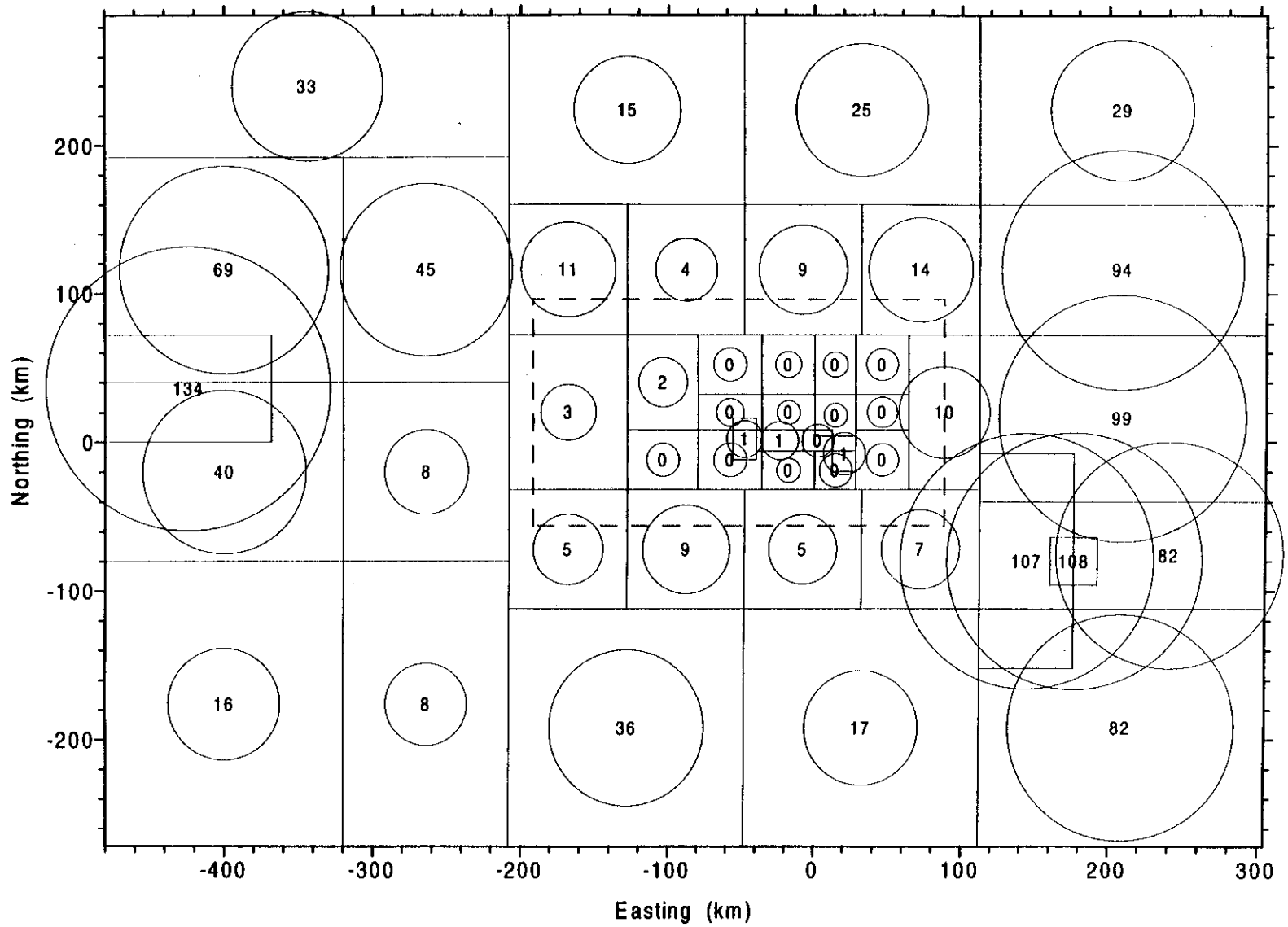


Figure B.2.2.11(b) Locations and strengths of CALPUFF-ready NO_x emissions (TPD) from area sources in the MZVS CALPUFF regional modeling domain. Zeroes indicate small and non-zero emissions below a cutoff threshold. Source regions are denoted by the rectangles, while source strengths are represented by circle size. The dashed inset indicates the coverage of the mesoscale domain.

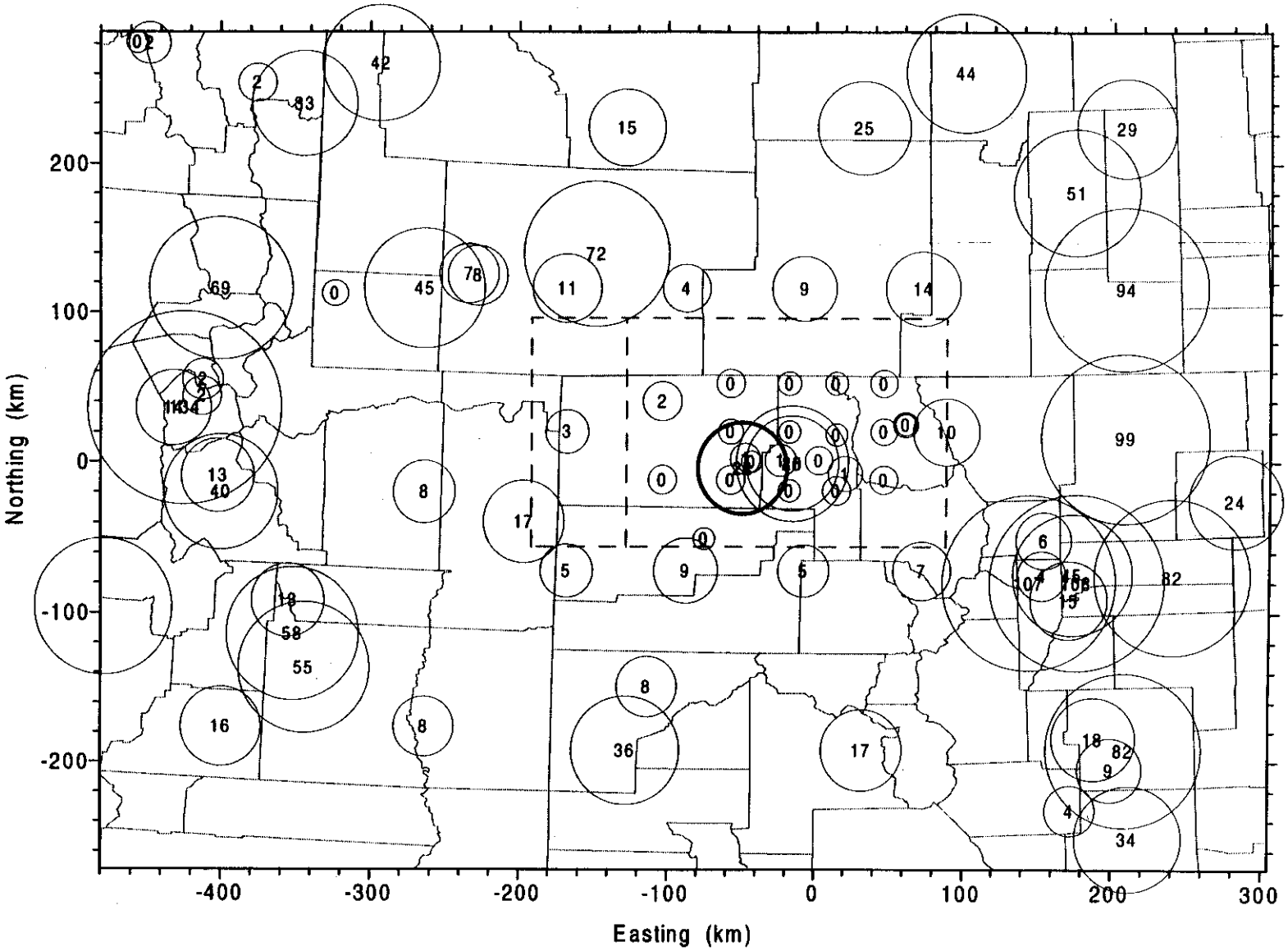
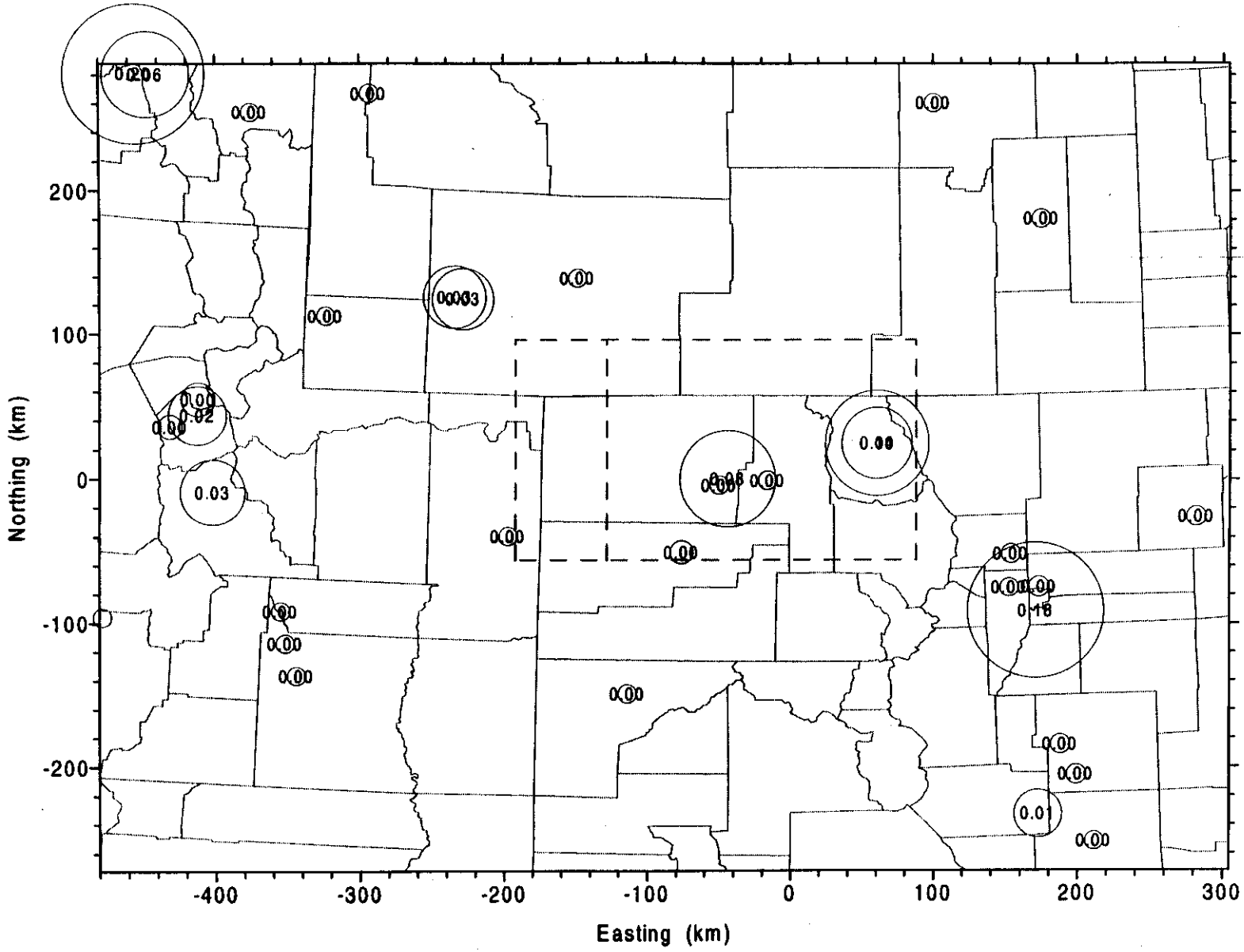


Figure B.2.2.11(c) Locations and strengths of CALPUFF-ready NO_x emissions (TPD) from both elevated point and area sources in the MZVS CALPUFF regional modeling domain. Zeroes indicate small and non-zero emissions below a cutoff threshold. The dashed inset indicates the coverage of the mesoscale domain.


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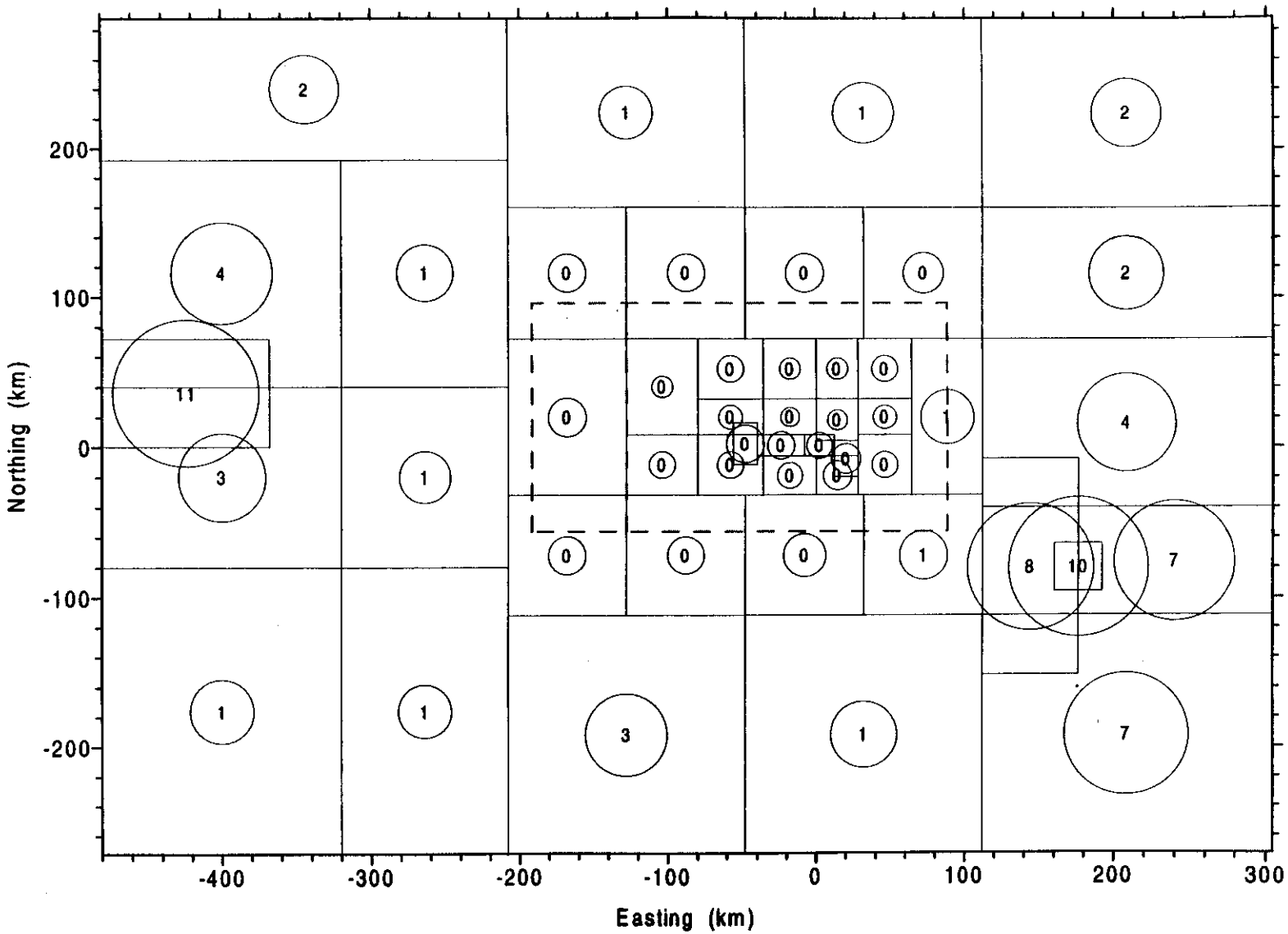


Figure B.2.2.12(b) Locations and strengths of CALPUFF-ready primary organic carbon emissions (TPD) from area sources in the MZVS CALPUFF regional modeling domain. Zeroes indicate small and non-zero emissions below a cutoff threshold. Source regions are denoted by the rectangles, while source strengths are represented by circle size. The dashed inset indicates the coverage of the mesoscale domain.

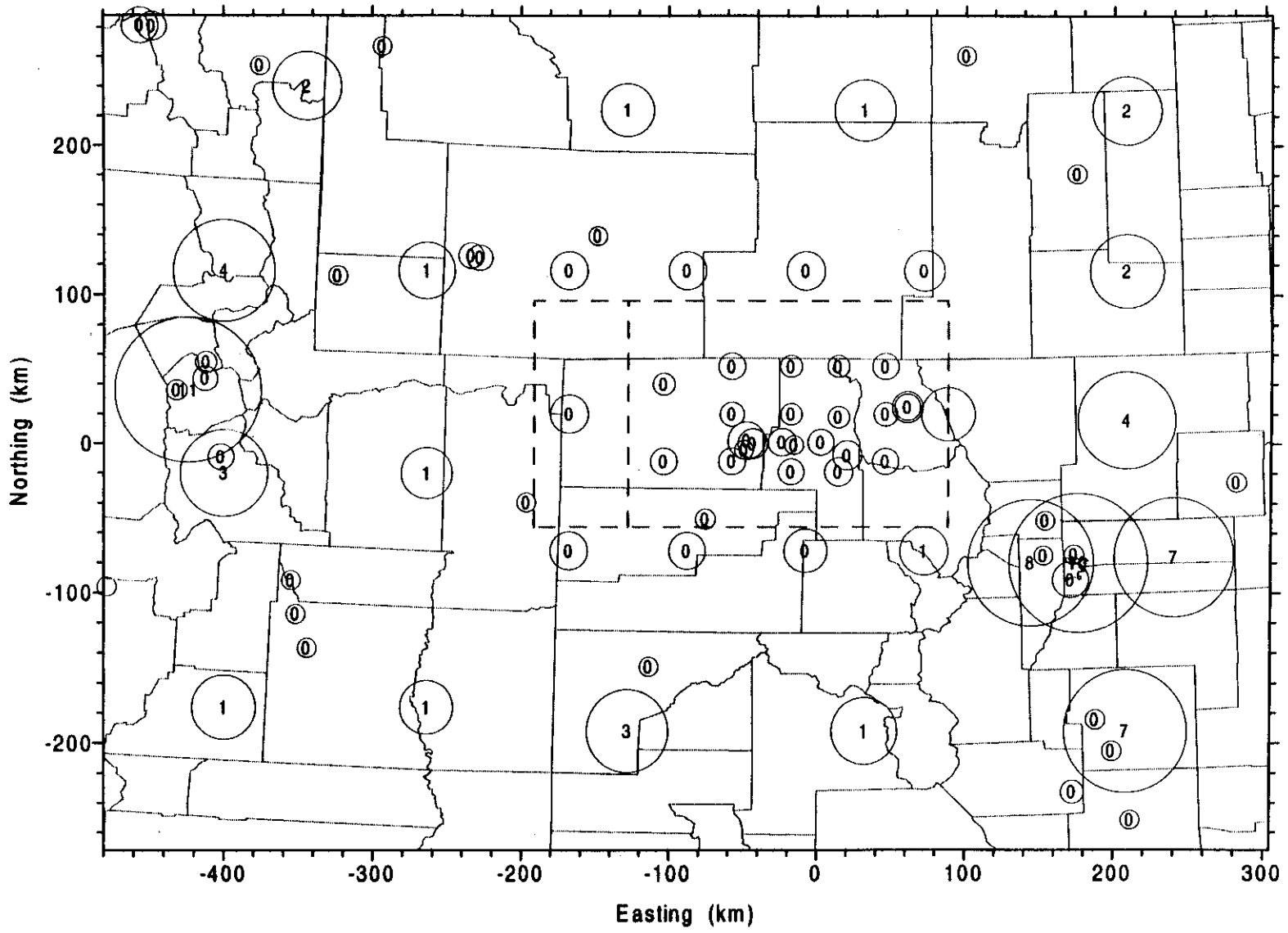


Figure B.2.2.12(c) Locations and strengths of CALPUFF-ready primary organic carbon emissions (TPD) from both elevated point and area sources in the MZVS CALPUFF regional modeling domain. Zeroes indicate small and non-zero emissions below a cutoff threshold. The dashed inset indicates the coverage of the mesoscale domain.

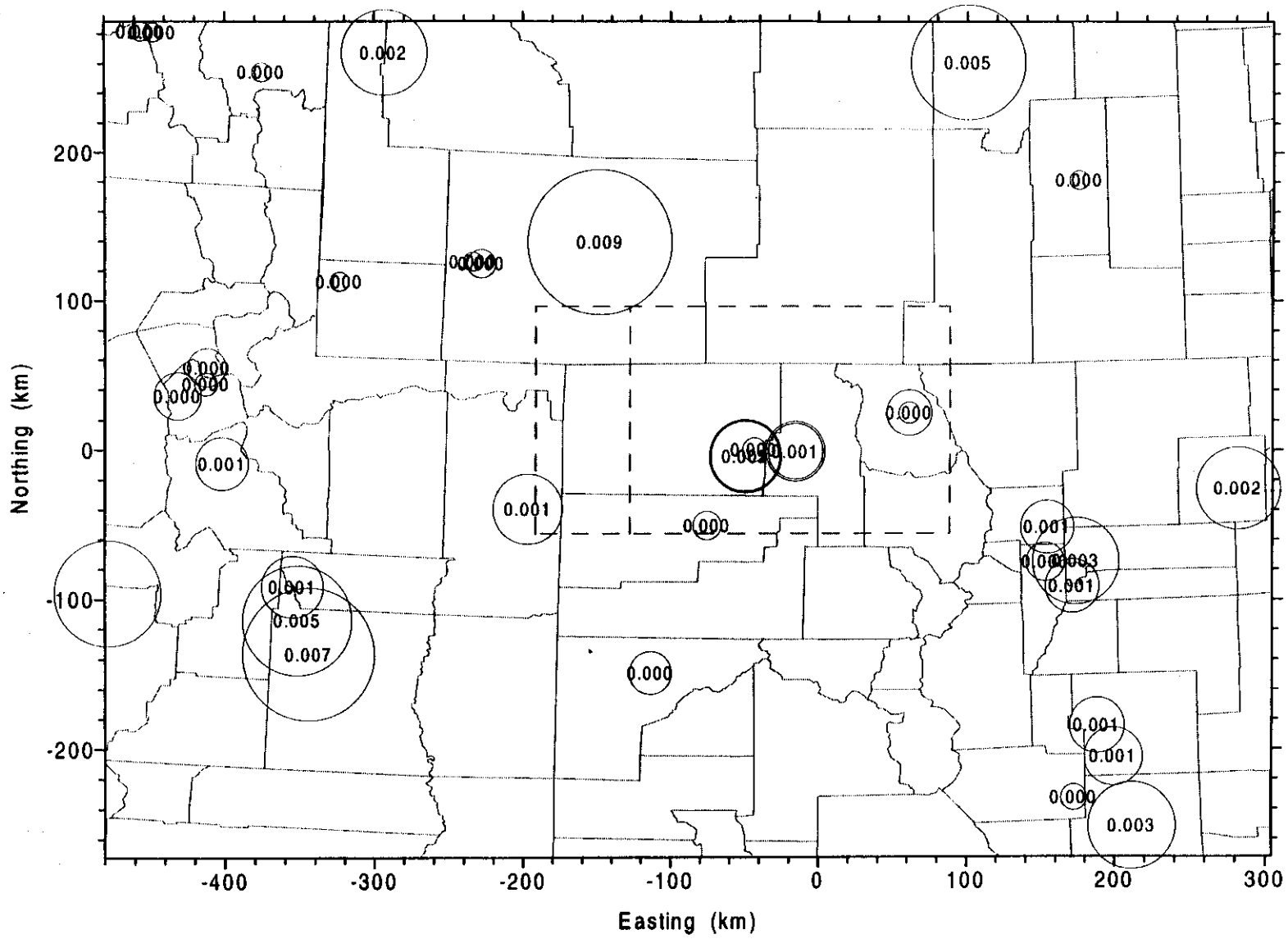


Figure B.2.2.13(a) Locations and strengths of CALPUFF-ready SOA emissions (TPD) from elevated point sources in the MZVS CALPUFF regional modeling domain. The dashed inset indicates the coverage of the mesoscale domain.

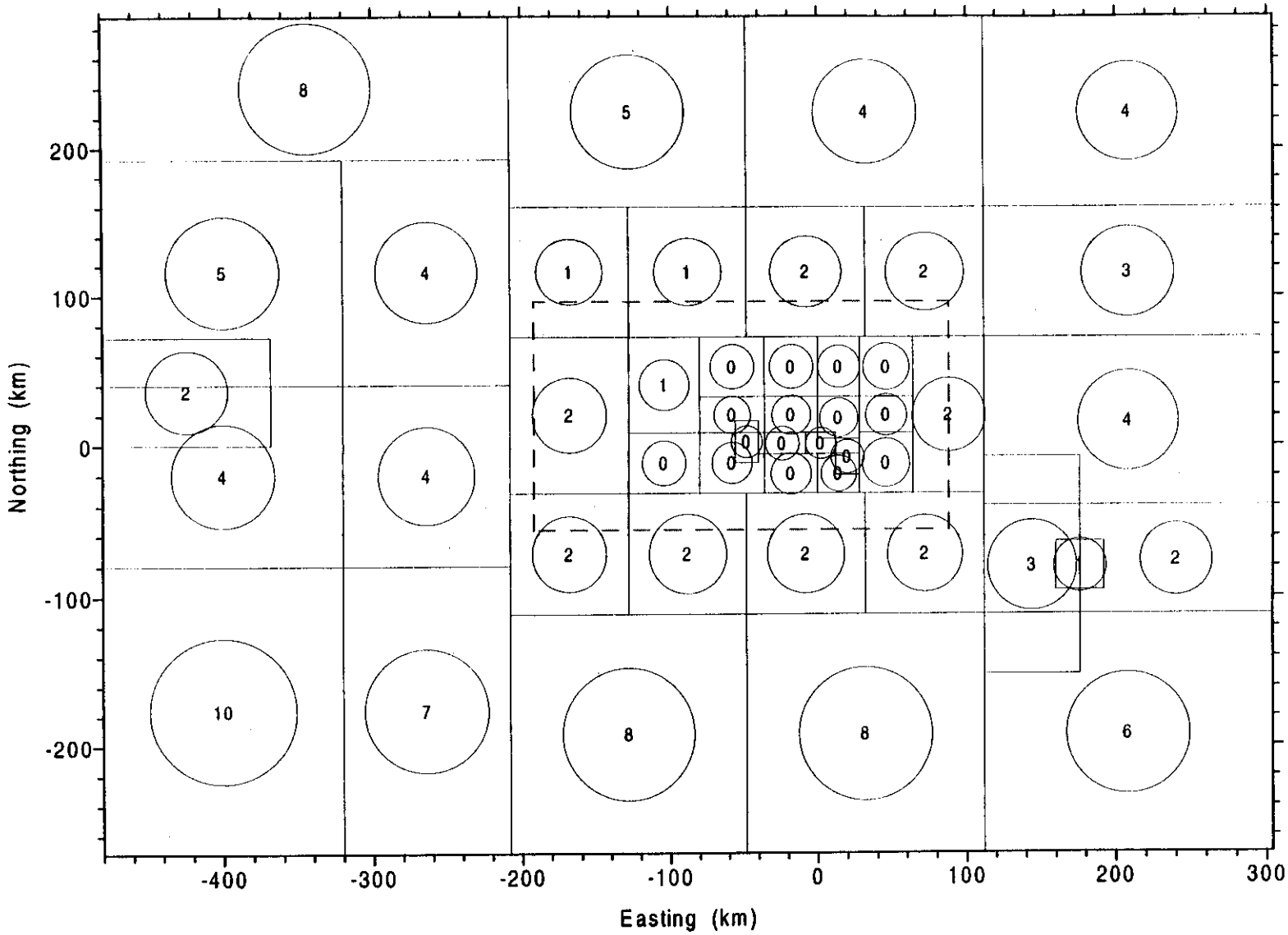


Figure B.2.2.13(b) Locations and strengths of CALPUFF-ready SOA emissions (TPD) from area sources in the MZVS CALPUFF regional modeling domain. Zeroes indicate small and non-zero emissions below a cutoff threshold. Source regions are denoted by the rectangles, while source strengths are represented by circle size. The dashed inset indicates the coverage of the mesoscale domain.

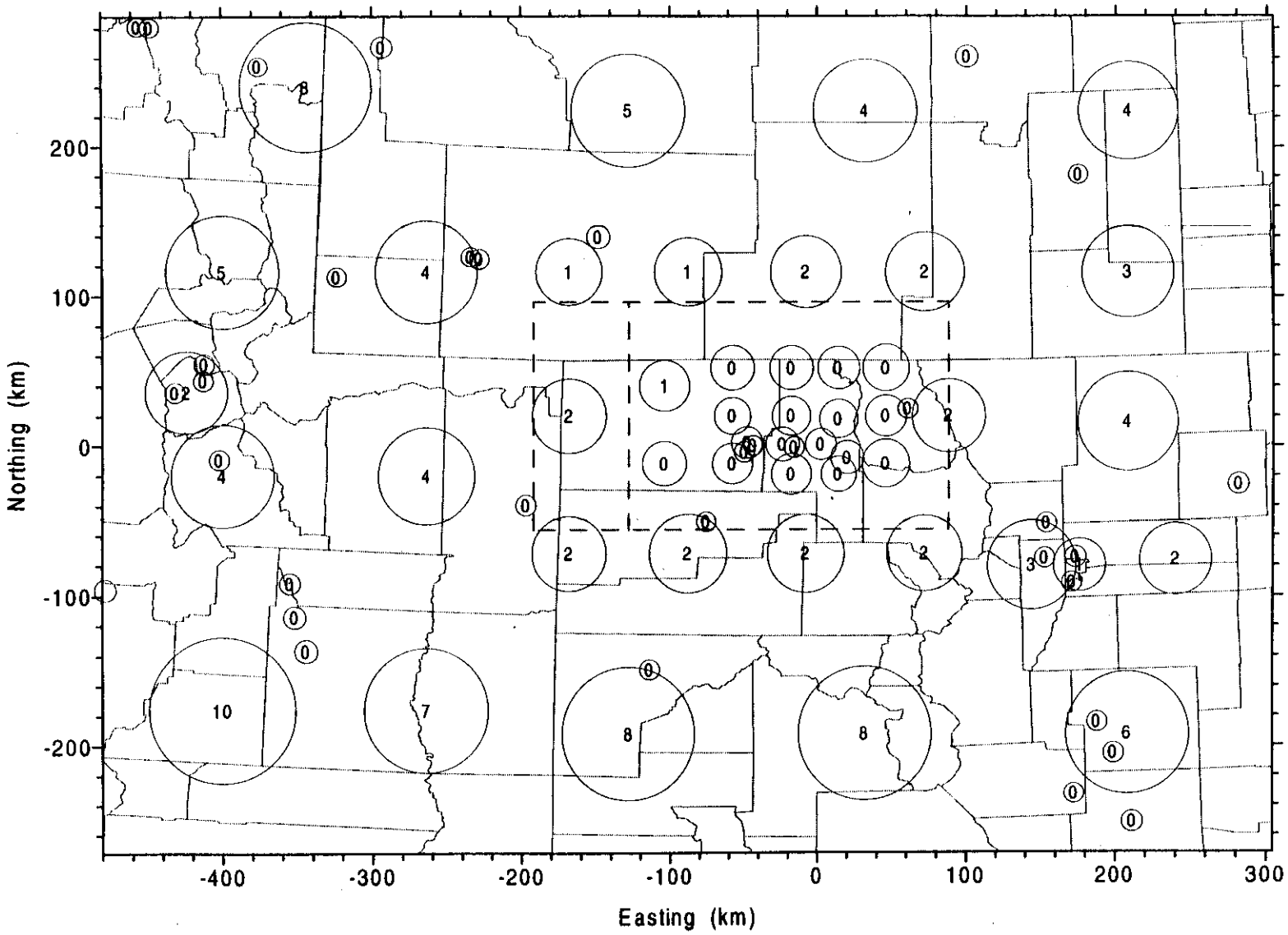


Figure B.2.2.13(c) Locations and strengths of CALPUFF-ready SOA emissions (TPD) from both elevated point and area sources in the MZVS CALPUFF regional modeling domain. Zeroes indicate small and non-zero emissions below a cutoff threshold. The dashed inset indicates the coverage of the mesoscale domain.

Lagrangian puff and plume-segment models. Details of sensitivity tests are presented in the next section.

In the standard configuration, CALPUFF was operated for the MZVS intensive modeling episodes in the following manner. The IWAQM recommended "elongated slug" option was not invoked, rather all puffs were modeled as classic circular Gaussian puffs (however, both slugs and puffs were specified in every-day inert SO_2 trajectory modeling). Elongated puffs, or slugs, are more appropriate for determining near-source (a few kilometers) pollutant levels as they are designed to improve sampling of small-scale puffs at small time scales. The slug option combines numerical integration techniques with several more calls to FORTRAN ERF functions than required by circular puffs. The increased CPU demands for slugs, coupled to the relatively long-range focus of MZVS visibility modeling, led to the development of a simpler circular puff approach. Horizontal cross-puff concentration profiles are continuously evolved by increasing the Gaussian standard deviation (or puff dispersion coefficient) based on downwind distance from the source and local stability/turbulence statistics. In the vertical, concentration profiles begin with a Gaussian shape defined by a separate dispersion coefficient, and allowed to expand in a similar manner. However, puffs trapped or fumigated into an evolving well-mixed boundary layer eventually take on a uniform vertical concentration profile.

CALPUFF offers several options to select how horizontal and vertical dispersion coefficients are calculated. The IWAQM recommendation is to calculate the coefficients from the micrometeorological variables generated by CALMET, rather than from Pasquill-Gifford-Turner growth curves. Other options include supplying CALPUFF with files containing measured turbulence statistics. Such data, even if available, would be too sparse for the spatial scales to be modeled. While considerable uncertainty is associated with the gridded turbulence/boundary layer parameters calculated by CALMET, this proved to be the most technically appropriate approach, and the IWAQM option was elected for both episodic and every-day SO_2 trajectory modeling.

The "shear-splitting" algorithm was chosen for the standard configuration of both episodic and every-day SO_2 trajectory modeling (even though IWAQM recommendation is not given for this option). From analyses of wind profiler data, it is quite obvious that nightly and morning vertical stratification over the Yampa Valley area generates significant valley circulations and drainage flows. Strong wind speed/direction changes are notable through the lowest 1,000 m at all profiler sites on most of the selected episode days. Lagrangian puff models are notorious for their inability of handling large shear across puff depths. CALPUFF allows puffs in highly sheared layers to split into several individual puffs that may be transported in separate directions at different speeds. While this approach obviously increases the puff load on the model, this option has the potential to improve CALPUFF representation of transport in complex terrain. Sensitivity tests for this option are discussed in the next section.

As a terrain-following model, CALPUFF regards the ground as a flat horizontal plane. Gridded winds generated by CALMET represent a flow field through complex terrain,

and therefore move puffs accordingly. However, ground-level sampling must be adjusted to account for effects such as puff impingement on undulating terrain and valley walls. CALPUFF offers three options for terrain adjustments. The IWAQM appears to recommend an ISC-like adjustment wherein terrain is not allowed to be higher than the effective stack height. CALPUFF offers a new approach based on a simplification of their Complex Terrain Sub-Grid model; however, it was evident from tests with the selection of this option that this approach was not yet fully available in the MZVS version of CALPUFF, nor had it been adequately tested.

In the MZVS modeling protocol, it was recommended that the standard CALPUFF configuration ignore terrain adjustments, mainly because of their impacts leading to further model uncertainty. Also, since terrain adjustments affect the position and orientation of puffs and the elevation of puffs with respect to ground-level receptors, it was not clear how the introduction of elevated receptors would be affected by any of these terrain adjustment options. Hence, no terrain adjustments to receptor heights was attempted. Resource constraints did not allow for a full set of sensitivity tests on the terrain options. However, it should be noted that adjustments to receptor heights due to terrain are simplistic and only affect concentrations sampled from "newer" puffs that retain a Gaussian structure in the vertical. Adjustments to receptor heights have no impacts for aged puffs that are diagnosed to be uniformly mixed in the vertical.

The list of species carried by CALPUFF was governed by the need to account for the various light-scattering (or absorbing) properties of PM constituents. The list includes SO_2, NO_x, $SO_4^=$, HNO_3, NO_3^-, primary $PM_{2.5}$ organic carbon (OC), $PM_{2.5}$ secondary organic aerosol (SOA), $PM_{2.5}$ elemental carbon (EC), and other primary $PM_{2.5}$ mass ($PPM_{2.5}$). Coarse mass was ignored from these analyses as it was assumed that its contribution to light scattering is negligible in the MZWA.

The standard chemistry package in CALPUFF uses the MESOPUFF II algorithm (MESOPUFF II is a precursor of CALPUFF). Sulfur dioxide is oxidized to sulfate, and nitrogen oxides are oxidized to nitrates. Daytime conversion rates for SO_x and NO_x are empirically parameterized in terms of ambient ozone and meteorological parameters; aqueous sulfate conversion is based upon a simple exponential function of relative humidity. Nighttime heterogeneous reaction rates are set at slow background rates, which are user-supplied, or set to model default values. The partition of nitrates between nitric acid and particulate nitrate are calculated for each time-step via an equilibrium calculation with background ammonia (note that ammonia is not explicitly modeled). As with NO_x oxidation, the total load of local sulfate, nitrate, and ammonia from overlapping puffs is required to perform the partitioning, which is a limitation of the model for source attribution analyses.

CALPUFF offers an option to supply hourly SO_x and NO_x oxidation rates via input file. Also, ambient ozone may be specified at a constant background value, or an input file containing hourly ozone measurements at monitoring sites may be specified. For the standard CALPUFF configuration, daytime free radical chemistry rates were determined internally, while nighttime heterogeneous rates were set to default. Data from which to

determine actual oxidation rates (daytime or nighttime) were inadequate to accurately provide a separate rates file. A sensitivity test to increase aqueous sulfate production is discussed in the next section. Chemistry was specified only for episodic applications of CALPUFF, not for every-day inert SO_2 trajectory analyses. Similarly, wet removal due to precipitation was calculated in the episodic cases, but not for the every-day SO_2 trajectory runs.

An input ozone file consisting of hourly ozone concentrations from the Hayden VOR site was supplied to the model. Hayden VOR is sited upon a bluff about 1,000 ft. above the floor of the Yampa Valley and 8 to 16 kilometers from the Hayden generating station. While this site provided a very reasonable characterization of the ozone in the area, it was occasionally impacted by generating station NO_x plumes (particularly during night and morning hours). However, the impact of the generating station plumes on the ozone monitor were fairly easy to identify as sudden reductions in hour-average ozone levels from 30 to 40 ppb to well below 10 to 20 ppb. These influences were usually limited to one to three hours duration, and were filled using linear interpolation in time from concentrations bounding the period of suppressed ozone. Note that other ozone sites in the regional modeling domain were urban-oriented (e.g., Denver, CO, and Salt Lake City, UT) and were inappropriate for characterization of almost the entire modeling domain which is more rural in nature. The CALPUFF default ozone value of 80 ppb was not appropriate for the MZWA region and was reduced to 40 ppb (the default value is used during periods of data gaps). The CALPUFF default value for background ammonia concentrations of 10 ppb was also considered far too high as a representative area-average. Measurements from the Buffalo Pass and Gilpin Creek sites were used to adjust ammonia concentration to episode and site-mean values.

The standard configuration has the option to include the effects of vertical wind shear in plume rise calculation. Most plume rise algorithms do not account for vertical wind shear. With the high degree of shear observed within 1,000 m of the Yampa Valley floor, the effects of shear on plume rise was considered to be important. The every-day inert SO_2 trajectory modeling calculated transitional plume rise, whereas the episodic modeling used final rise only.

Plumes from tall stacks may frequently interact with the capping inversion at the top of a mixed layer. A fraction of the plume mass may penetrate the inversion, and therefore be unavailable for immediate mixing to the ground. There is no apparent IWAQM recommendation for this option, possibly because its primary impact will likely be on near-source surface concentrations. However, it was invoked in the standard configuration.

B.2.2.4e Episodic CALPUFF Model Applications

The four 1995 MZVS episodes for which CALPUFF was applied include 09/17/95 to 09/21/95, 08/07/95 to 08/09/95, 10/07/95 to 10/19/95, and 08/21/95 to 08/27/95. For each episode, 12 individual CALPUFF simulations were undertaken representing 12 individual source types/regions. These included:

- 2 units from the Hayden generating station,

- 3 units from the Craig generating station,
- local emissions from Steamboat Springs,
- local emissions from other Yampa Valley sources,
- emissions from Denver,
- emissions from other Colorado regions (non-Yampa Valley, non-Denver),
- emissions from non-Colorado regions,
- emissions from fires, and
- emissions from coal-fired generating stations.

New CALPUFF postprocessing programs were written to compile concentration predictions from each of the 12 runs at all receptors to generate model performance statistics, source attribution matrices, and sight path extinction.

Model performance statistics and source attribution calculations were generated for two six-hour daytime periods for each day of the episode. Predictions of sulfate, nitrate, elemental carbon, organic carbon (primary plus secondary), other primary $PM_{2.5}$, and $PM_{2.5}$ mass were compared via several statistical measures to six-hour filter pack measurements of these species at the six MZVS receptor sites. After summing all nitrate mass from each source region, particulate nitrate was reevaluated for equilibrium with ambient measured sulfate and ammonia. $PM_{2.5}$ mass was taken from the sum of the measured chemical species, or alternatively from the measured gravimetric mean. "Other" non-carbonaceous primary $PM_{2.5}$ was calculated from $PM_{2.5}$ mass with sulfate, nitrate, elemental carbon, and organic carbon removed. If any of these species were missing, or if the result for other primary $PM_{2.5}$ was negative, this value was set to a missing flag.

Concentrations were translated to total extinction using species-dependent extinction efficiencies developed by the ELSIE modeling exercises and relative humidity extracted from the CALPUFF output VISB.OUT file. Total extinction for all analyses relating to CALPUFF-estimated source contributions, both at receptor sites and for all elevated sight-path receptors, included a nominal value of Rayleigh scattering of 10 Mm^{-1}. Use of a constant value for Rayleigh scattering simplified processing and allowed for a consistent baseline value enabling comparisons among sites. Six-hourly averaged source attributions to concentration and extinction for each of the species listed above were also calculated at the six receptor sites for all 12 source types/regions.

For sight paths, a "Base" mean extinction and Deciview (all sources contributing) were calculated for each daylight hour (6 AM to 6 PM) by integrating the extinction calculated from elevated receptors placed along the entire length of a given sight path. The estimated individual contributions of Craig and Hayden Units 1 and 2 to extinction along the

sight path was determined by removing their contribution to extinction at receptors within the MZWA only, and recalculating the total mean sight path extinction. For the six sight paths contained within the MZWA, contributions from these units were removed from all elevated receptors along these paths. For the four sight paths extending to landmarks outside the MZWA, contributions from these units were removed from the one to three elevated receptors located within the MZWA only, but left in for receptors outside the MZWA.

B.2.2.4f CALPUFF Model Sensitivity Tests

While sensitivity tests focusing on most of the available CALPUFF options were originally scheduled for the intensive modeling episode applications, time and budget constraints allowed just a few of these.

Puff Splitting in High Wind Shear Regimes: The standard episodic configuration included this important process. While completely coded and available for use in the MZVS version of CALPUFF, it was apparent that this option was so new that documentation explaining the parameters controlling puff splitting were not documented in the user's guide nor in the code. Also, while all other model parameters are adjustable through the unique and user-friendly CALPUFF.INP control file, all of the puff splitting parameters (except the flag to invoke this option) were set in data statements internally with no description on what they do. No attempt was made to alter these values for MZVS, although it is probable that these parameters could be better tuned for the conditions specific to the Yampa Valley.

Early sensitivity simulations were performed on the mesoscale domain with only emissions from Hayden and Craig generating stations. Runs with and without this option invoked should have given a good indication on how sensitive CALPUFF is to the unique conditions of the Yampa Valley flow regime. However, results with and without the puff splitting option were identical, indicating that: 1) the model parameters were not configured optimally for the conditions of Yampa Valley, leading to no puff splitting; 2) the model sees the puffs emanating from the generating stations as too "new" to be split (evidently, there are criteria to split puffs based on whether they have evolved into being well mixing through the boundary layer depth); or 3) the input meteorological fields do not adequately capture the relationships between mixed depth and vertical shear. From inspection of CALMET-derived meteorological fields, it was apparent that the CALMET wind fields indeed represented vertical shear well, and therefore the insensitivity to this option for these sources is most likely a combination of the first two points. Regardless of these findings, it was assumed that puffs from other sources may meet the criteria necessary to split puffs due to vertical shear, so the puff splitting option was invoked for all production runs of each episode.

CTDM Option for Complex Terrain Adjustments: The CALPUFF user's manual is unclear about this option, but suggests the use of CTDM-based "simple CALPUFF" terrain adjustment option to calibrate receptor elevations relative to puff centerline height, and to calculate terrain-enhanced puff dispersion to account for slope strain. Investigation of the CALPUFF model code revealed that while only the ISC (option 1) and the partial plume height correction (option 3) explicitly account for varying ground-level receptor elevations in

complex terrain, the CTDM option does not. However, this effect in CTDM may be indirectly accounted for in the routine that adjusts puff dispersion coefficients. Options 1 and 3 were not tested, because of complexities associated with incorporating elevated receptors for sight path calculations. When the CTDM option was invoked, the model took 16.5 times longer to run with elevated receptors, and 5 times longer without elevated receptors. Concentrations at the Buffalo Pass site were found to be all zero for the entirety of the simulation, suggesting a problem with the code. Therefore, no terrain adjustment was specified for the episodic or inert SO_2 trajectory modeling applications.

Chemical Mechanism: While the standard configuration utilized the MESOPUFF-II chemical mechanism, a sensitivity run was undertaken wherein the humidity-dependent sulfate production rates were significantly increased to levels that more adequately reflect in-cloud rates. Specifically, at 100% relative humidity, the CALPUFF parameterization yields a sulfate conversion rate of about 3% per hour. In the sensitivity test, the equation was altered to increase the function's slope for humidities above 70%, generating greater conversion rates that peak at about 30% per hour at 100% relative humidity.

An example of the effects of this change can be seen in Figure B.2.2.14, which displays a time series of sulfate at the Buffalo Pass site over the September episode. In this particular application only emissions from the Hayden and Craig generating stations were modeled on the mesoscale domain. Note that the single maximum peak of about 1.8 $\mu g/m^3$ on the afternoon of 09/18/95 (standard chemistry) has increased to about 3.8 $\mu g/m^3$ (test chemistry) and that a new peak of about similar magnitude is generated during the morning of 09/20/95. The major departures between standard and test chemistry runs are between the morning of 09/18/95 and evening of 09/19/95, and the afternoons of 09/20/95 and 09/21/95. The two-day increase in sulfate on 09/20/95 and 09/21/95 is likely due to fairly high humidity throughout the region for the duration of the period. In fact, rainfall was prevalent in the Yampa Valley during that period, so clouds were present. The minimum on the morning of 09/20/95 was due to rainfall in the area scavenging puff sulfate. The peaks in the afternoons of 09/20/95 and 09/21/95, however, were likely due to high morning humidities generating sulfate within the Yampa Valley SO_2 plumes and then being transported to Buffalo Pass in the afternoon. It was seen from these tests that sulfate rates vary substantially over time scales of hours to days and from episode to episode.

Sulfate from six-hour filter pack samples was compared with CALPUFF-estimated sulfate derived from all sources in the modeling region for the September episode. While on a site- and episode-average, basis CALPUFF predictions and filter pack measurements agree well, sulfate at Buffalo Pass was overestimated by 78%. Further, removing two high measured outliers from the filter pack data indicates an overall positive prediction bias. Increasing aqueous sulfate production rates would obviously and severely exacerbate the overestimation.

Wet Deposition: Wet scavenging of precursor gases and aerosols is the most efficient atmospheric removal mechanism. During rain events, proper determination of rain intensity, location, and duration are crucial to accurately simulate the distribution of pollutants in space

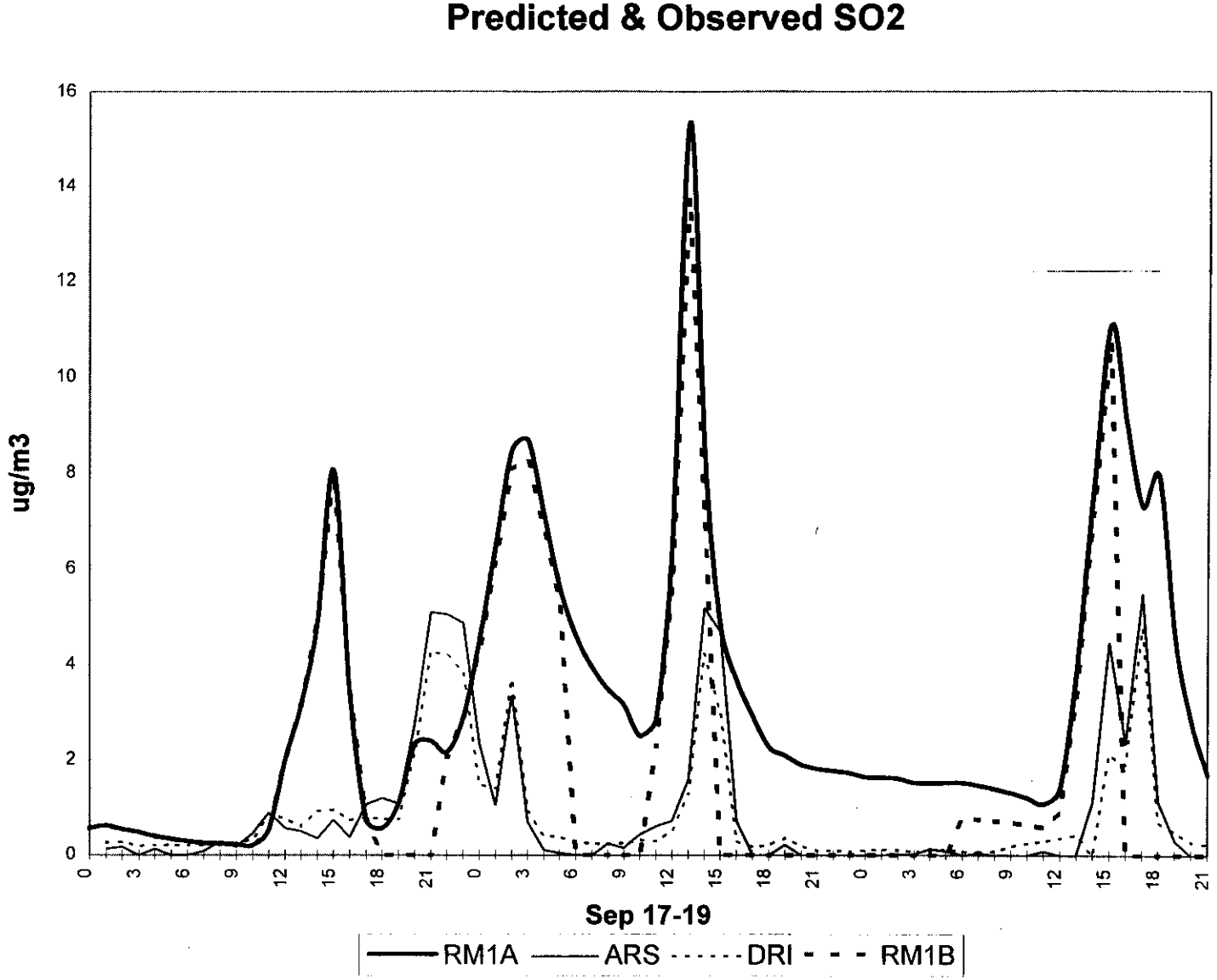


Figure B.2.2.14 Example of CALPUFF sensitivity to increased sulfate production for relative humidity greater than 70%. Heavy line (RS2-Buff) is hourly time series at Buffalo Pass for the standard CALPUFF chemical mechanism, whereas the thin line (RS3-Buff) is for modified chemistry. CALPUFF was applied on the 4 km mesoscale domain using emissions from Craig and Hayden only. Sulfate observations were not yet available at the time of this test.

and time. Analysis of measurement data and video indicates that rain was present in the MZWA and surrounding areas for many of the selected modeling episodes. The standard CALPUFF configuration included the wet deposition process utilizing available data. Sensitivity experiments were conducted with wet deposition turned off for the September episode. In these tests, only emissions from Hayden and Craig generating stations were modeled on the mesoscale domain. Wet scavenging affects both PM species and their precursors, so this process greatly affects PM model performance by removing sources of secondary PM as well as the PM itself. Uncertainties associated with wet scavenging thus lead to very large uncertainties in model performance evaluations.

As seen in Figure B.2.2.15, SO_2 is reduced to nearly zero during rain periods during the evening of 09/17/95, morning of 09/18/95, and most of 09/19/95. Similar effects were seen for sulfate. From the figure it is clear that inclusion of wet deposition improves SO_2 model performance for some periods (particularly on 09/19/95), while it does not impact the large overestimation in predicted SO_2 spikes. Inclusion of the wet deposition algorithm was essential to reduce the time- and space-average model predicted mass loading of all species (thereby improving time- and space- average performance statistics). However, error associated with: 1) translating 24-hour precipitation data to hourly gridded precipitation fields; 2) selection of parameter values related to wet scavenging rates; and 3) the simplistic yet necessary procedure of removing fractional mass from the entirety of each puff, leads to potentially significant error in the predicted temporal and spatial distribution of PM.

Dry Deposition: Dry deposition processes usually remove minute fractions of pollutant material from the lowest layers of the atmosphere at relatively slow rates (depending on species, and on atmospheric and surface conditions). Dry deposition did not have a significant impact on mesoscale simulations mainly because of the residence times of pollutants emitted on that grid. In fact, impacts due to dry deposition on the mesoscale domain were at or below the order of magnitude of model "noise". Dry deposition had a greater (yet still small) impact on regional simulations in which pollutant transport/residence times are much longer. While mesoscale CALPUFF tests were performed with and without dry deposition in some months as part of the every-day inert SO_2 trajectory modeling applications, no sensitivity to dry deposition was performed for the intensive episode applications on the regional grid.

An evaluation of general CALPUFF performance has been derived from the results of these and other minor CALPUFF sensitivity studies, and are summarized below:

- The model works best: 1) for direct or nearly direct source-receptor transport of primary species with well-characterized emission trends and strengths; and 2) away from complex terrain.

- The model is questionable: 1) when and where the characterization of precipitation patterns results in large uncertainty; 2) when and where vertical shear results in large uncertainty; 3) in the treatment of expansive area sources; 4) for those species in which emissions are very difficult to estimate (dust, SOA,

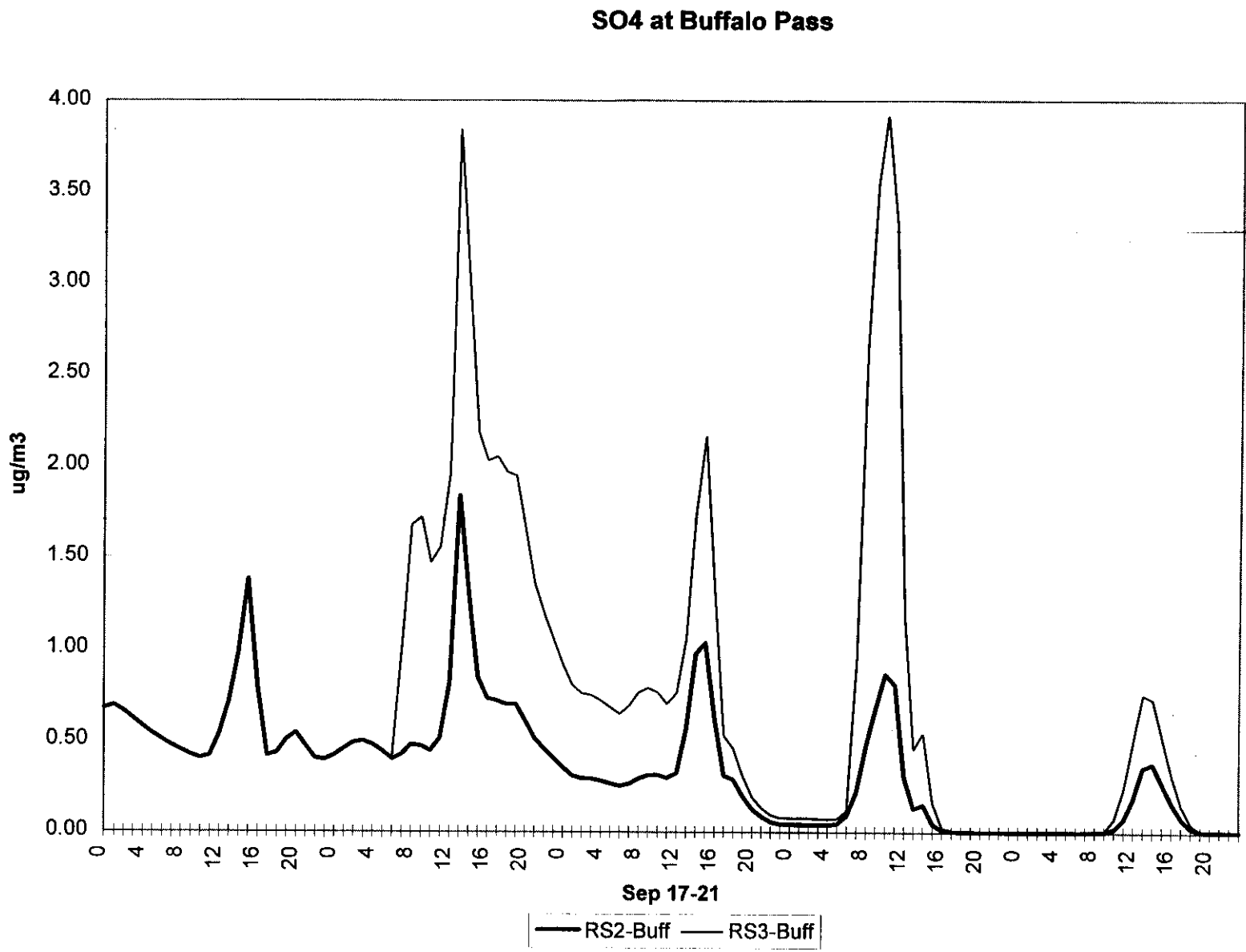


Figure B.2.2.15 Example of CALPUFF sensitivity to wet deposition for at Buffalo Pass. Heavy solid line (RM1A) is hourly SO_2 concentration without wet deposition; heavy dashed line (RM1B) is with wet deposition; the thin solid line (ARS) is measured SO_2 by ARS instruments; thin dashed line is measured SO_2 by DRI instruments. Predictions were made on the 4 km mesoscale domain using emissions from Hayden and Craig only.

fires); and 5) in the treatment of NO_x and nitrate equilibrium and chemistry of overlapping puffs.

- The model breaks down: 1) for large puffs advected by winds at centerpoint (inappropriate in complex terrain); 2) when and where surface-based relative humidity does not represent humidity at plume level or for deeply mixed puffs; and 3) in the treatment of in-cloud SO_x chemistry.

B.2.3 Comparison of Model Predictions and Filter Measurements

B.2.3.1 Statistical Evaluation for the Episode of 09/17/95 to 09/21/95

A statistical summary comparing six-hour average model-estimated and observed concentrations of $PM_{2.5}$ and sub-species is presented in Table B.2.3.1 for the September episode. Overall, the average $PM_{2.5}$ mass concentrations are overestimated by about 20%, varying from nearly 0% at the Hayden VOR site to 97% at Buffalo Pass. The spatial variation in the model's estimated $PM_{2.5}$ concentrations are relatively uniform among these sites (average values of 3.5 to 4.8 $\mu g/m^3$) compared to larger variations in the observed concentration distribution (average values of 1.9 to 4.8 $\mu g/m^3$). This is not an unexpected result due to the CALPUFF model's ability to provide small-scale variations in concentration distributions. Figure B.2.3.1a displays a scatter plot of CALPUFF model-estimated versus observed six-hour $PM_{2.5}$ mass concentrations. This figure illustrates the general tendency of the model to overestimate the $PM_{2.5}$ concentrations at sites near the MZWA (i.e., Buffalo Pass, Gilpin Creek) and underestimate or show little average bias at sites away from the MZWA (i.e., Hayden VOR, Hayden Waste Water, and Baggs). The bias overestimation (approximately 20% on average) would be even higher if not for the two elevated $PM_{2.5}$ measurements at the Hayden VOR and Hayden Waste Water sites on the sixth day (09/19/95) of the September episode (i.e., VOa6 and SWa6 in Figure B.2.3.1a).

Performance for $PM_{2.5}$ sulfate is rather similar to $PM_{2.5}$ mass, with an average overestimation of about 16% over all sites. However, on a site-by-site basis, the average error extends from a 17% underestimation at the Hayden Waste Water site to a 78% overestimation at the Buffalo Pass site. Again, fewer variations were found in model-estimated sulfate among the six sites as compared to the observations, although both are much less variable than $PM_{2.5}$ mass, as one would expect from the regional nature of secondary PM aerosols such as sulfate. A scatter plot of model-estimated and observed six-hour sulfate concentrations for the September episode is shown in Figure B.2.3.1b. At most sites and during most six-hour periods, there is a tendency of the model toward overestimating the observed sulfate values, especially at the sites closer to the MZWA. As was seen for the $PM_{2.5}$ mass concentration comparison, on the morning of the sixth day of the episode (09/19/95), there were large sulfate measurements at the two valley sites (i.e., Hayden VOR, Hayden Waste Water).

Performance statistics for ammonium nitrate are limited by the small number of filter pack measurements available for this period at just two sites (Buffalo Pass and Hayden

Table B.2.3.1
CALPUFF 6-Hour Average Model Performance Statistics for the 09/17/95 to 09/21/95 Episode

SPECIES= Total PM2.5

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	8.580	2.901	2.621	6.513	-9.999	8.580	8.429
Peak Estimated (ug/m3)	9.242	6.064	5.268	9.242	-9.999	7.945	8.389
Accuracy of Peak (%)	7.716	109.031	100.992	41.901	-9.999	-7.401	-0.475
Ratio Peak Est/Obs	1.077	2.090	2.010	1.419	-9.999	0.926	0.995
6-HOUR AVERAGE STATISTICS							
Number of Pairs	50	10	10	10	-99	10	10
Average Observed (ug/m3)	3.503	2.030	1.889	4.309	-9.999	4.470	4.818
Average Estimated (ug/m3)	4.234	3.995	3.494	4.203	-9.999	4.713	4.766
Bias (ug/m3)	0.731	1.964	1.605	-0.107	-9.999	0.243	-0.053
Ratio AvgEst/AvgObs	1.209	1.968	1.850	0.975	-9.999	1.054	0.989
Normalized Bias (%)	43.415	102.779	84.607	-2.392	-9.999	18.148	13.934
Fractional Bias (%)	22.131	61.977	52.722	-8.979	-9.999	6.169	-1.233
Gross Error (ug/m3)	1.744	1.964	1.637	1.474	-9.999	2.035	1.609
Normalized Gross Error	61.317	102.779	86.505	32.304	-9.999	43.709	41.288
Fractional Gross Error	45.320	61.977	54.714	33.506	-9.999	41.548	34.853

SPECIES= Ammonium Sulfate

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	6.240	1.592	1.534	1.852	-9.999	6.240	5.912
Peak Estimated (ug/m3)	2.691	2.381	2.406	2.691	-9.999	2.435	2.517
Accuracy of Peak (%)	-56.875	49.560	56.845	45.302	-9.999	-60.978	-57.426
Ratio Peak Est/Obs	0.431	1.496	1.568	1.453	-9.999	0.390	0.426
6-HOUR AVERAGE STATISTICS							
Number of Pairs	49	10	10	10	-99	9	10
Average Observed (ug/m3)	1.461	1.008	1.028	1.237	-9.999	2.089	2.007
Average Estimated (ug/m3)	1.696	1.795	1.620	1.659	-9.999	1.730	1.680
Bias (ug/m3)	0.235	0.787	0.592	0.422	-9.999	-0.360	-0.327
Ratio AvgEst/AvgObs	1.161	1.780	1.576	1.341	-9.999	0.828	0.837
Normalized Bias (%)	48.536	119.761	57.790	42.024	-9.999	6.194	12.679
Fractional Bias (%)	24.043	57.939	41.041	26.085	-9.999	-4.656	-3.065
Gross Error (ug/m3)	0.809	0.811	0.592	0.645	-9.999	0.900	1.104
Normalized Gross Error	64.481	121.378	57.790	55.386	-9.999	32.774	51.906
Fractional Gross Error	46.220	59.624	41.041	41.138	-9.999	35.670	52.571

SPECIES= Ammonium Nitrate

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	1.379	1.379	-9.999	-9.999	-9.999	-9.999	0.565
Peak Estimated (ug/m3)	1.467	0.910	-9.999	-9.999	-9.999	-9.999	1.467
Accuracy of Peak (%)	6.381	-34.010	-9.999	-9.999	-9.999	-9.999	159.646
Ratio Peak Est/Obs	1.064	0.660	-9.999	-9.999	-9.999	-9.999	2.596
6-HOUR AVERAGE STATISTICS							
Number of Pairs	18	9	-99	-99	-99	-99	9
Average Observed (ug/m3)	0.259	0.322	-9.999	-9.999	-9.999	-9.999	0.196
Average Estimated (ug/m3)	0.549	0.404	-9.999	-9.999	-9.999	-9.999	0.694
Bias (ug/m3)	0.290	0.082	-9.999	-9.999	-9.999	-9.999	0.498
Ratio AvgEst/AvgObs	2.119	1.254	-9.999	-9.999	-9.999	-9.999	3.541
Normalized Bias (%)	287.092	93.935	-9.999	-9.999	-9.999	-9.999	480.250
Fractional Bias (%)	35.684	6.241	-9.999	-9.999	-9.999	-9.999	65.126
Gross Error (ug/m3)	0.423	0.332	-9.999	-9.999	-9.999	-9.999	0.513
Normalized Gross Error	321.019	139.567	-9.999	-9.999	-9.999	-9.999	502.472
Fractional Gross Error	95.966	82.361	-9.999	-9.999	-9.999	-9.999	109.570

Table B.2.3.1 (continued)
CALPUFF 6-Hour Average Model Performance Statistics for the 09/17/95 to 09/21/95 Episode

SPECIES= Primary PM2.5 (Non EC&OC)

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	0.744	0.344	0.140	0.744	-9.999	0.555	0.725
Peak Estimated (ug/m3)	0.706	0.706	0.171	0.651	-9.999	0.695	0.685
Accuracy of Peak (%)	-5.108	105.233	22.143	-12.500	-9.999	25.225	-5.517
Ratio Peak Est/Obs	0.949	2.052	1.221	0.875	-9.999	1.252	0.945
6-HOUR AVERAGE STATISTICS							
Number of Pairs	38	10	2	9	-99	7	10
Average Observed (ug/m3)	0.299	0.152	0.140	0.290	-9.999	0.360	0.445
Average Estimated (ug/m3)	0.336	0.311	0.138	0.258	-9.999	0.426	0.407
Bias (ug/m3)	0.036	0.160	-0.002	-0.032	-9.999	0.066	-0.037
Ratio AvgEst/AvgObs	1.122	2.053	0.982	0.889	-9.999	1.182	0.916
Normalized Bias (%)	41.512	122.044	-1.786	12.283	-9.999	34.411	0.917
Fractional Bias (%)	12.666	60.510	-4.786	-9.984	-9.999	12.167	-10.952
Gross Error (ug/m3)	0.147	0.161	0.034	0.166	-9.999	0.163	0.128
Normalized Gross Error	69.273	123.111	23.929	60.296	-9.999	57.587	40.765
Fractional Gross Error	49.067	61.606	24.722	57.030	-9.999	43.583	38.071

SPECIES= Elemental Carbon (EC)

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	0.993	0.345	0.510	0.993	-9.999	0.863	0.650
Peak Estimated (ug/m3)	0.447	0.293	0.265	0.447	-9.999	0.407	0.419
Accuracy of Peak (%)	-54.985	-15.072	-48.039	-54.985	-9.999	-52.839	-35.538
Ratio Peak Est/Obs	0.450	0.849	0.520	0.450	-9.999	0.472	0.645
6-HOUR AVERAGE STATISTICS							
Number of Pairs	47	10	10	9	-99	8	10
Average Observed (ug/m3)	0.415	0.137	0.460	0.614	-9.999	0.484	0.412
Average Estimated (ug/m3)	0.158	0.145	0.127	0.157	-9.999	0.182	0.183
Bias (ug/m3)	-0.257	0.008	-0.333	-0.457	-9.999	-0.302	-0.230
Ratio AvgEst/AvgObs	0.380	1.060	0.276	0.256	-9.999	0.376	0.443
Normalized Bias (%)	-0.081	50.486	-71.446	-70.896	-9.999	152.358	-37.503
Fractional Bias (%)	-69.769	8.046	-117.231	-119.309	-9.999	-53.265	-68.741
Gross Error (ug/m3)	0.293	0.088	0.333	0.457	-9.999	0.337	0.275
Normalized Gross Error	102.110	89.426	71.446	70.896	-9.999	246.965	57.667
Fractional Gross Error	96.026	61.325	117.231	119.309	-9.999	101.625	84.087

SPECIES= Total Organic Aerosol (OC+SOA)

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	4.629	1.489	0.043	4.629	-9.999	4.499	4.328
Peak Estimated (ug/m3)	5.015	2.705	0.911	5.015	-9.999	4.609	4.768
Accuracy of Peak (%)	8.339	81.666	2018.605	8.339	-9.999	2.445	10.166
Ratio Peak Est/Obs	1.083	1.817	21.186	1.083	-9.999	1.024	1.102
6-HOUR AVERAGE STATISTICS							
Number of Pairs	42	10	2	10	-99	10	10
Average Observed (ug/m3)	1.896	0.792	0.043	2.696	-9.999	2.100	2.369
Average Estimated (ug/m3)	1.569	1.338	0.692	1.564	-9.999	1.752	1.796
Bias (ug/m3)	-0.328	0.546	0.649	-1.132	-9.999	-0.347	-0.573
Ratio AvgEst/AvgObs	0.827	1.689	16.081	0.580	-9.999	0.835	0.758
Normalized Bias (%)	150.380	392.569	1508.139	-44.583	-9.999	-3.781	-14.235
Fractional Bias (%)	-8.836	53.998	174.286	-67.987	-9.999	-21.359	-36.621
Gross Error (ug/m3)	1.044	0.722	0.649	1.313	-9.999	0.995	1.226
Normalized Gross Error	204.125	404.632	1508.139	50.850	-9.999	43.550	56.665
Fractional Gross Error	67.253	71.270	174.286	73.774	-9.999	44.677	57.882

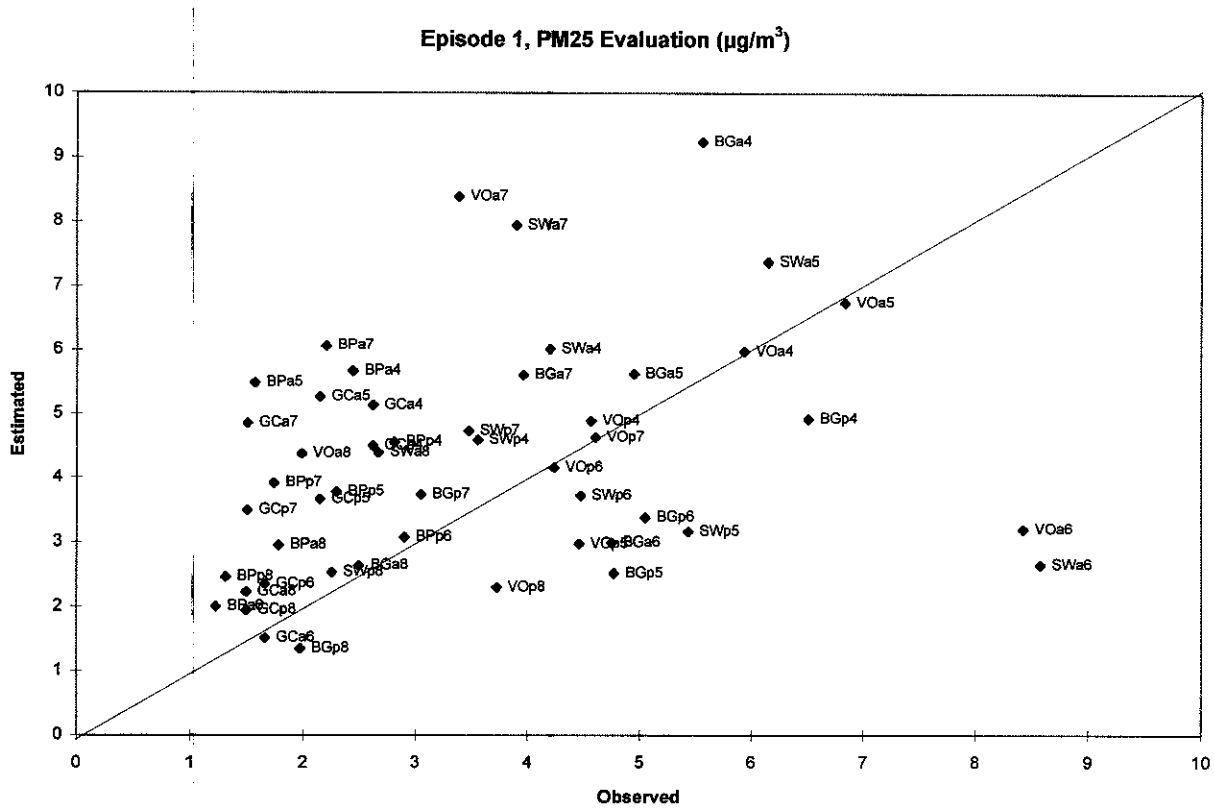


Figure B.2.3.1a. Scatterplot of predicted and observed 6-hour total $PM_{2.5}$ concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the September 17-21, 1995 episode.

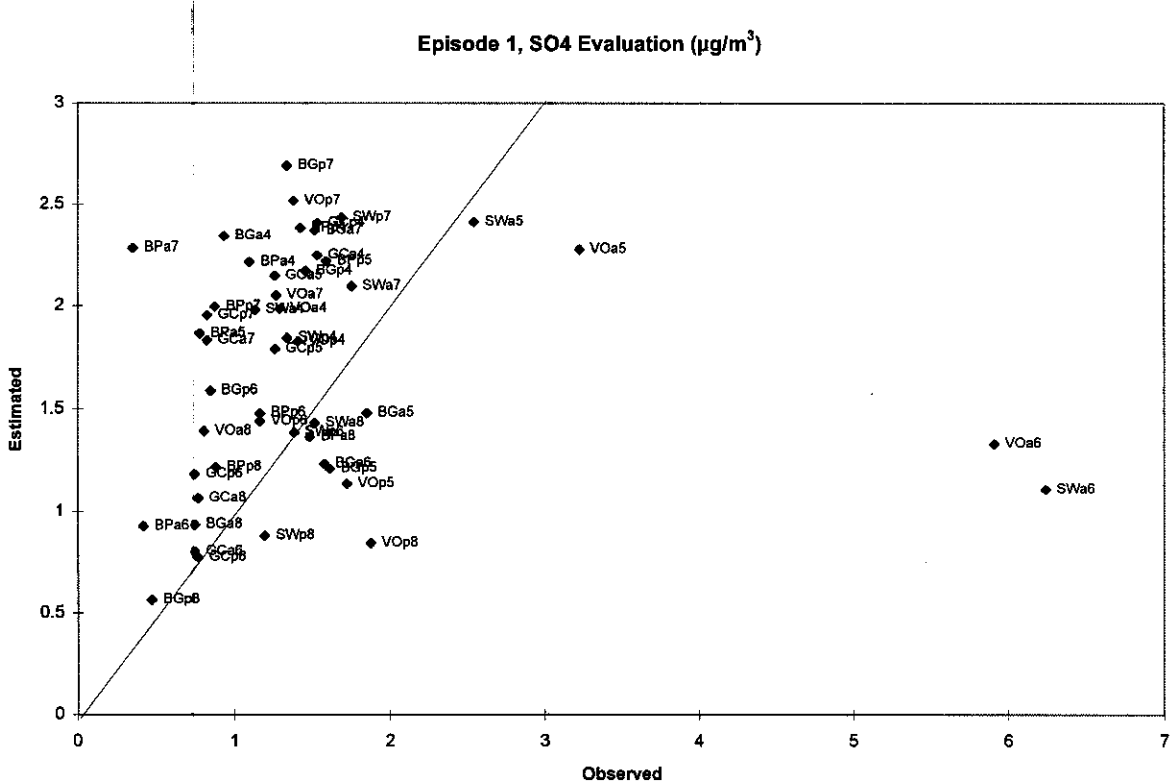


Figure B.2.3.1b. Scatterplot of predicted and observed 6-hour sulfate concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the September 17-21, 1995 episode.

VOR). Nevertheless, model performance suggests more than a 100% overestimation for nitrate (overestimations of 25% and 254% for the Buffalo Pass and Hayden VOR sites, respectively). Nitrate is the most difficult species to model as concentrations are crucially dependent on the equilibrium model used, available ammonia, and levels of sulfate present, all of which are associated with a high level of uncertainty. The necessity of modeling sources independently of each other also increases uncertainty in the equilibrium calculation. Figure B.2.3.1c displays a scatter plot of model-estimated and observed ammonium nitrate concentrations during the first MZVS episode. With the exception of one high ammonium nitrate measurement at the Buffalo Pass site during the morning on the seventh day (09/20/95) of the episode (BPa7) and two periods in which the estimated ammonium nitrate is zero (VOp7 and BPa8), the model is systematically overestimating the observed ammonium nitrate measurements.

Statistics for non-carbonaceous primary $PM_{2.5}$ indicate a 12% underestimation on average over all sites during the September episode. Non-carbonaceous primary $PM_{2.5}$ is dominated by geological material (e.g., fugitive dust) whose emissions are highly uncertain, subject to local influences, and whose impacts are very difficult to estimate using emissions-based models. Since this first episode was used to develop the CALMET/CALPUFF geological material calibration factors, which were kept unchanged for the other three MZVS modeling periods. Thus, the good agreement between the model estimated and observed average non-carbonaceous primary $PM_{2.5}$ is not a surprise. As seen in the scatter plot in Figure B.2.3.1d, although the model has been calibrated to minimize the average bias in the non-carbonaceous $PM_{2.5}$ concentrations, there is much scatter in the model-estimated and observed values reflecting the local variability of observed geological material impacts.

Model performance for $PM_{2.5}$ elemental carbon shows that the model drastically underestimates elemental carbon at four sites for which data are available (by 56 to 74%), yet model calculations were in good agreement with observations at the Buffalo Pass site (6% overestimation). Once again, the spatially uniform characteristics of the predictions (0.13 to 0.18 $\mu g/m^3$) do not match the large variations in elemental carbon measurements (0.14 to 0.61 $\mu g/m^3$). This is likely due to the fact that the bulk of elemental carbon is emitted from low-level area sources and fires, thus emitted into and transported by very expansive puffs that blanket entire areas of 100 km^2 or more. Reasons for the large underestimations are not obvious, but observations may reflect the effects of local sources (e.g., actual residential and camp-fire wood burning distributions and activity schedules) that are not well replicated by summer-mean emissions estimates. Also, observations may reflect the influence of complex Yampa Valley meteorological patterns that elevate local carbon concentrations in morning hours, while maintaining lower concentrations at ridge elevations such as Buffalo Pass. The scatter plot of model-estimated and observed elemental carbon is shown in Figure B.2.3.1e which clearly illustrates the tendency of the model to underestimate elemental carbon. The underestimation of elemental carbon is a common occurrence in PM modeling, suggesting that the emissions may be understated as well.

The calculations of total organic aerosol (primary OC + SOA) show underestimations of 16% to 42% at the three sites away from the MZWA, but almost a 70% overestimation at

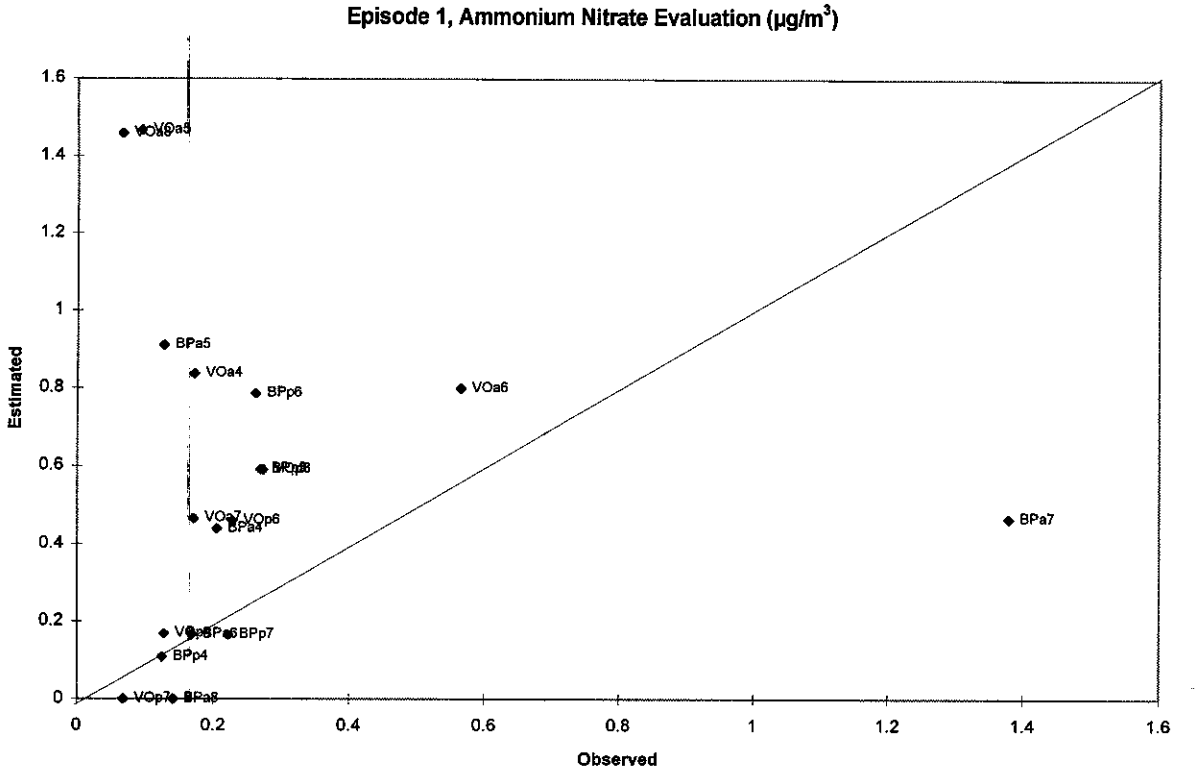


Figure B.2.3.1c. Scatterplot of predicted and observed 6-hour ammonium nitrate concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the September 17-21, 1995 episode.

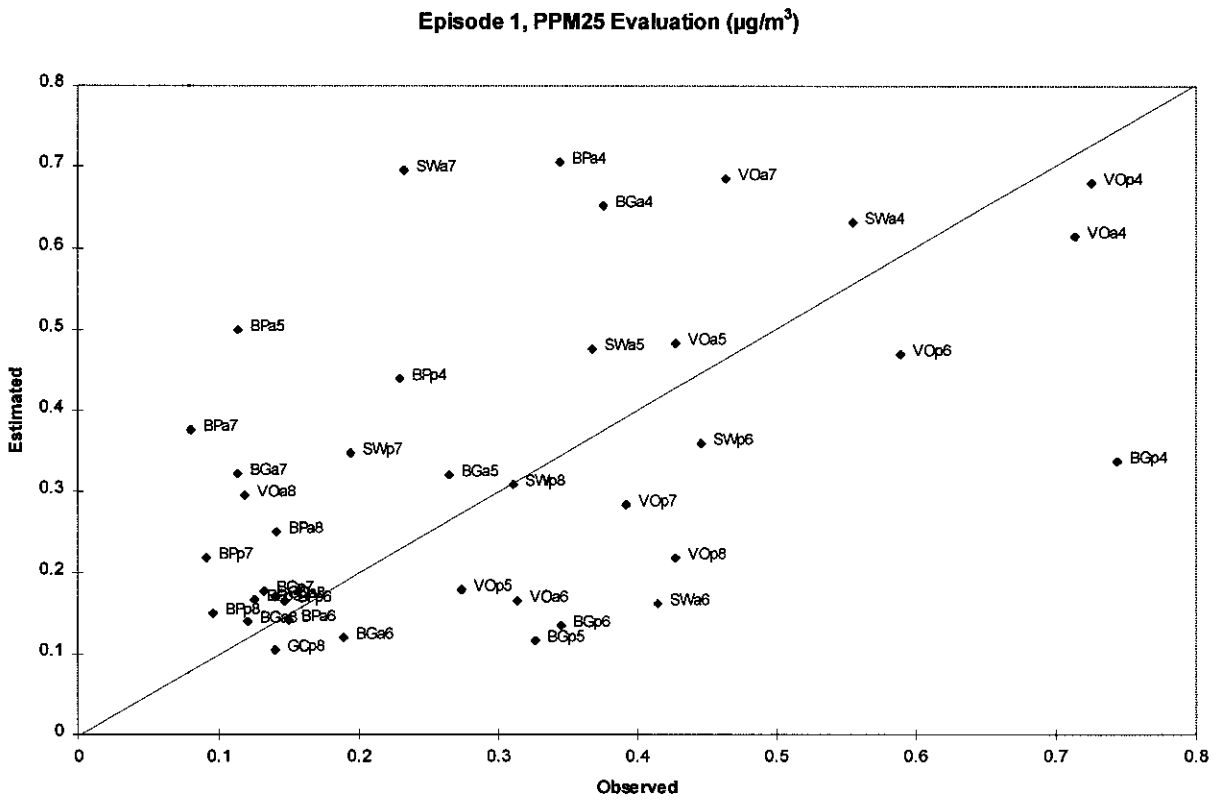


Figure B.2.3.1d. Scatterplot of predicted and observed 6-hour non-carbonaceous primary $PM_{2.5}$ concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the September 17-21, 1995 episode.

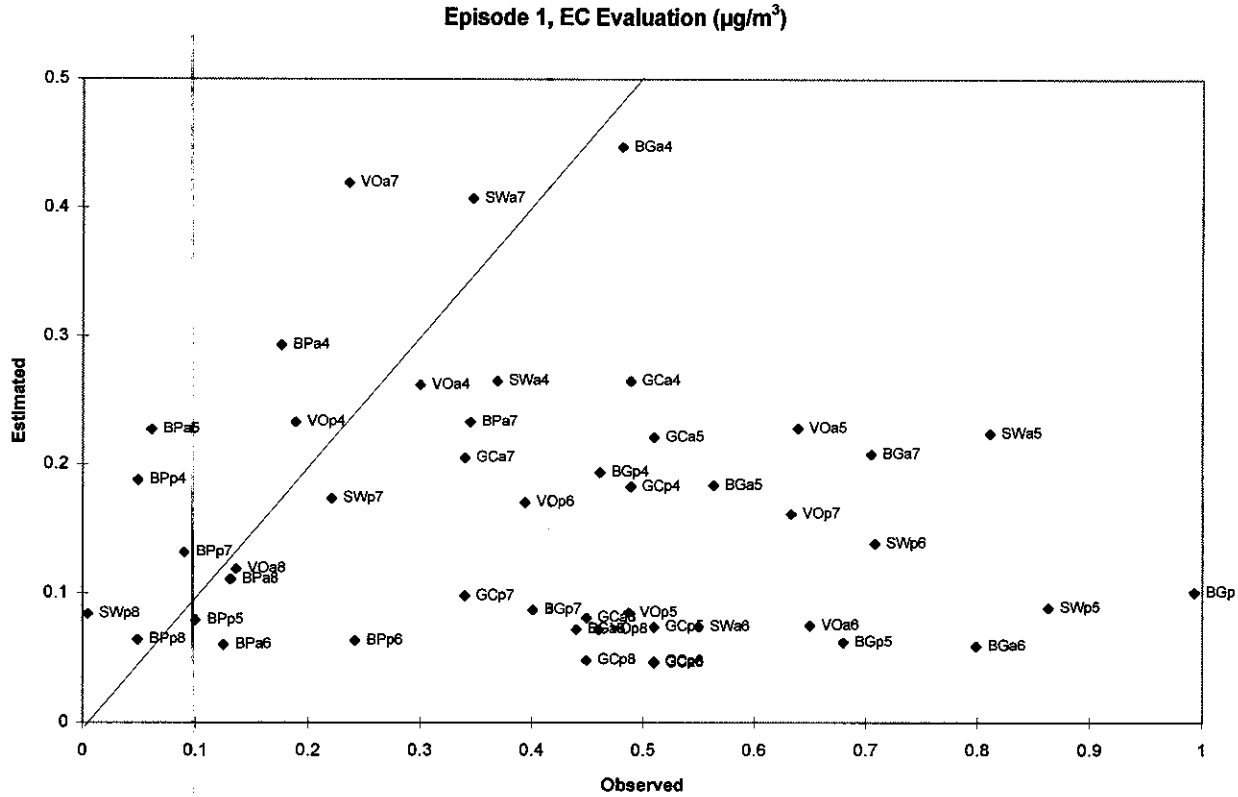


Figure B.2.3.1e. Scatterplot of predicted and observed 6-hour elemental carbon concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the September 17-21, 1995 episode.

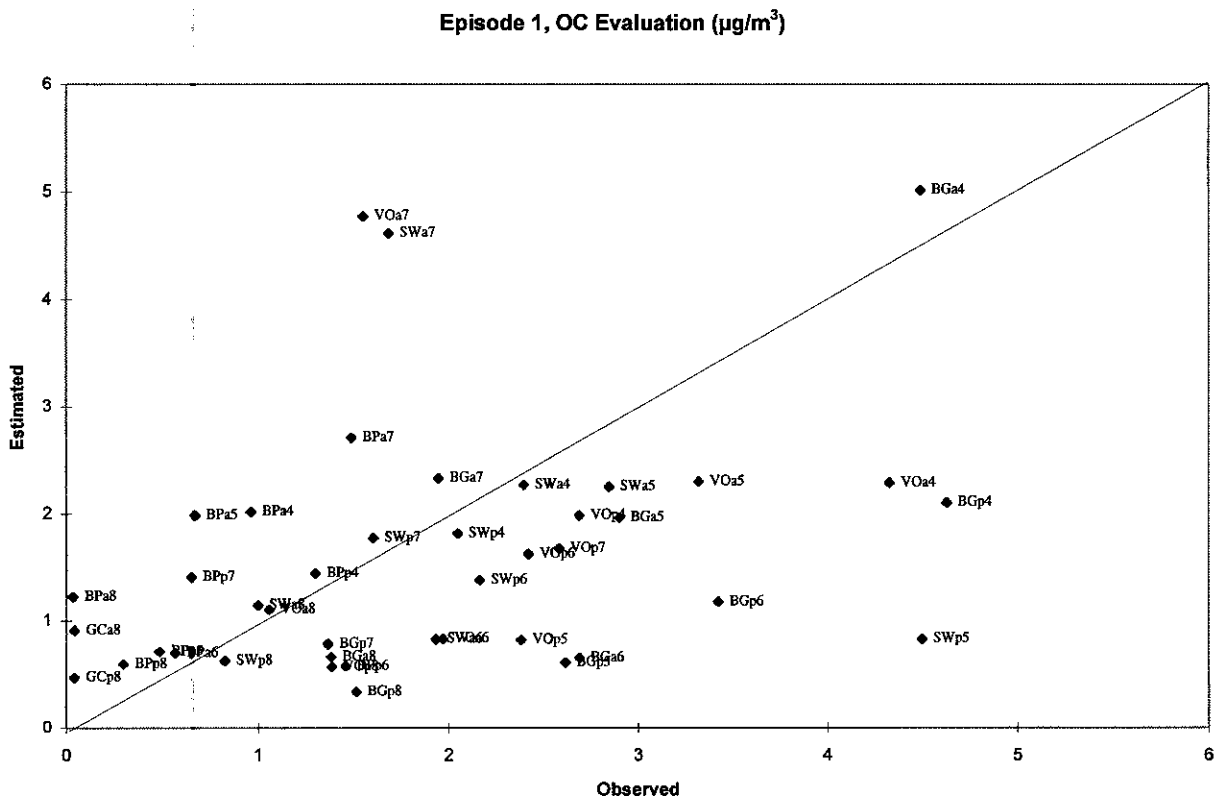


Figure B.2.3.1f. Scatterplot of predicted and observed 6-hour organic aerosol concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the September 17-21, 1995 episode.

the Buffalo Pass site (the Gilpin Creek site is an unfair test as only one 12-hour observation was available during this episode). Total organic aerosol contains the most uncertainty in terms of emissions because SOA is associated with processes that CALPUFF does not treat well, and primary OC contains a large fire-derived component (particularly for this episode) that is quite difficult to estimate. Procedures to estimate primary OC emissions from fires and "emissions" of SOA, along with their related uncertainties were discussed previously. Even with these uncertainties, as shown in the scatter plot in Figure B.2.3.1f, the model is able to estimate the magnitude and variability in the observed organic aerosols for this episode. The scatter plot illustrates a tendency for the model to overestimate the morning and underestimate the afternoon organic aerosol measurements which is consistent with the simplistic treatment of SOA used in the MZVS CALPUFF application, which assumed a uniform SOA conversion rate (50%) rather than a diurnally varying rate with much higher values during the day than at night.

Model performance for the September 17-21 episode indicates that CALPUFF shows some skill in reproducing the $PM_{2.5}$ mass on a site- and episode-average basis, but does not reproduce the spatial or temporal variations in the observations very well. With the exceptions of ammonium nitrate (overestimation) and elemental carbon (underestimation), the species comprising $PM_{2.5}$ as well as $PM_{2.5}$ mass are appear to be reasonably well modeled on a site- and episode-average basis.

B.2.3.2 Statistical Evaluation for the Episode of 08/07/95 to 08/09/95

A statistical summary comparing model-estimated and observed concentrations of $PM_{2.5}$ mass and chemical species is presented in Table B.2.3.2 for the first August episode. Model performance statistics for $PM_{2.5}$ mass indicate a consistent underestimation bias of 70%, varying from a 56% underestimation at the Juniper Mountain site to a 79% underestimation at the Baggs site. In contrast to the September episode, observed $PM_{2.5}$ levels are 2 to 3 $\mu g/m^3$ higher in this episode, and are fairly uniform across the six sites (the reason for the relatively small variation in underestimations). This suggests, from an observational standpoint, that the elevated $PM_{2.5}$ concentrations in this episode were much more regional in nature than in the September episode. Since this episode was marked by more organized and stronger westerly flow fields and much dryer conditions, sulfate production rates should be reduced and sulfate levels should be low. On the other hand, the absence of precipitation eliminates an efficient PM removal mechanism, which should maintain high PM concentrations.

A cursory comparison of observed species concentrations between the September episode and this episode shows that observed sulfate, nitrate, primary non-carbonaceous $PM_{2.5}$, and elemental carbon concentrations are equivalent or just slightly higher in this episode, but the substantial increase in $PM_{2.5}$ mass is attributable to a doubling of total organic aerosol to as much as 5.5 $\mu g/m^3$. In contrast, model-estimated concentrations for every species averaged over the six sites and over the episode are much lower in this episode than in the September episode by about a factor of two. Model underestimations range from an episode average (among all sites) of 11% for ammonium nitrate to 87% for elemental

Table B.2.3.2
CALPUFF 6-Hour Average Model Performance Statistics for the 08/07/95 to 08/09/95 Episode

SPECIES= Total PM2.5 Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	8.350	5.694	8.199	8.350	6.782	7.895	7.078
Peak Estimated (ug/m3)	3.951	2.989	2.993	2.567	3.951	3.271	3.520
Accuracy of Peak (%)	-52.683	-47.506	-63.496	-69.257	-41.743	-58.569	-50.268
Ratio Peak Est/Obs	0.473	0.525	0.365	0.307	0.583	0.414	0.497
6-HOUR AVERAGE STATISTICS							
Number of Pairs	36	6	6	6	6	6	6
Average Observed (ug/m3)	5.369	5.126	3.036	6.124	5.357	6.312	6.262
Average Estimated (ug/m3)	1.612	1.349	1.233	1.260	2.372	1.694	1.764
Bias (ug/m3)	-3.758	-3.777	-1.803	-4.863	-2.985	-4.618	-4.499
Ratio AvgEst/AvgObs	0.300	0.263	0.406	0.206	0.443	0.268	0.282
Normalized Bias (%)	-50.440	-73.952	44.500	-77.360	-53.487	-70.129	-72.213
Fractional Bias (%)	-96.344	-121.687	-9.469	-130.155	-82.292	-116.165	-118.297
Gross Error (ug/m3)	3.853	3.777	2.373	4.863	2.985	4.618	4.499
Normalized Gross Error	74.472	73.952	99.688	77.360	53.487	70.129	72.213
Fractional Gross Error	107.978	121.687	79.273	130.155	82.292	116.165	118.297

SPECIES= Ammonium Sulfate Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	2.298	2.019	1.758	2.037	2.163	2.298	2.250
Peak Estimated (ug/m3)	1.314	0.831	0.857	0.666	0.977	1.276	1.314
Accuracy of Peak (%)	-42.820	-58.841	-51.251	-67.305	-54.831	-44.473	-41.600
Ratio Peak Est/Obs	0.572	0.412	0.487	0.327	0.452	0.555	0.584
6-HOUR AVERAGE STATISTICS							
Number of Pairs	32	6	2	6	6	6	6
Average Observed (ug/m3)	1.513	1.451	1.758	1.352	1.340	1.705	1.637
Average Estimated (ug/m3)	0.442	0.389	0.591	0.357	0.403	0.495	0.517
Bias (ug/m3)	-1.071	-1.062	-1.167	-0.995	-0.937	-1.210	-1.120
Ratio AvgEst/AvgObs	0.292	0.268	0.336	0.264	0.301	0.290	0.316
Normalized Bias (%)	-59.544	-66.520	-66.354	-66.145	-45.083	-59.928	-57.776
Fractional Bias (%)	-107.610	-111.962	-103.169	-111.961	-98.915	-110.332	-106.360
Gross Error (ug/m3)	1.139	1.062	1.167	0.995	1.107	1.298	1.226
Normalized Gross Error	69.960	66.520	66.354	66.145	81.337	68.582	68.419
Fractional Gross Error	115.170	111.962	103.169	111.961	122.398	117.992	115.537

SPECIES= Ammonium Nitrate Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	0.637	-9.999	-9.999	-9.999	0.333	-9.999	0.637
Peak Estimated (ug/m3)	1.243	-9.999	-9.999	-9.999	0.843	-9.999	1.243
Accuracy of Peak (%)	95.133	-9.999	-9.999	-9.999	153.153	-9.999	95.133
Ratio Peak Est/Obs	1.951	-9.999	-9.999	-9.999	2.532	-9.999	1.951
6-HOUR AVERAGE STATISTICS							
Number of Pairs	8	-99	-99	-99	2	-99	6
Average Observed (ug/m3)	0.345	-9.999	-9.999	-9.999	0.260	-9.999	0.374
Average Estimated (ug/m3)	0.306	-9.999	-9.999	-9.999	0.444	-9.999	0.260
Bias (ug/m3)	-0.039	-9.999	-9.999	-9.999	0.185	-9.999	-0.114
Ratio AvgEst/AvgObs	0.886	-9.999	-9.999	-9.999	1.710	-9.999	0.695
Normalized Bias (%)	-3.639	-9.999	-9.999	-9.999	132.308	-9.999	-48.954
Fractional Bias (%)	-81.797	-9.999	-9.999	-9.999	-12.036	-9.999	-105.050
Gross Error (ug/m3)	0.355	-9.999	-9.999	-9.999	0.472	-9.999	0.316
Normalized Gross Error	115.123	-9.999	-9.999	-9.999	218.494	-9.999	80.665
Fractional Gross Error	129.758	-9.999	-9.999	-9.999	139.415	-9.999	126.539

Table B.2.3.2 (continued)
CALPUFF 6-Hour Average Model Performance Statistics for the 08/07/95 to 08/09/95 Episode

SPECIES= Primary PM2.5 (Non EC&OC)

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	1.769	1.769	0.392	1.287	0.850	1.187	1.594
Peak Estimated (ug/m3)	0.397	0.397	0.381	0.289	0.365	0.327	0.329
Accuracy of Peak (%)	-77.558	-77.558	-2.806	-77.545	-57.059	-72.452	-79.360
Ratio Peak Est/Obs	0.224	0.224	0.972	0.225	0.429	0.275	0.206
6-HOUR AVERAGE STATISTICS							
Number of Pairs	32	6	2	6	6	6	6
Average Observed (ug/m3)	0.841	1.037	0.392	0.929	0.570	0.898	0.921
Average Estimated (ug/m3)	0.176	0.157	0.248	0.117	0.192	0.190	0.198
Bias (ug/m3)	-0.665	-0.879	-0.144	-0.812	-0.378	-0.708	-0.723
Ratio AvgEst/AvgObs	0.209	0.152	0.633	0.126	0.336	0.211	0.215
Normalized Bias (%)	-72.972	-80.483	-36.735	-84.296	-58.501	-78.800	-74.857
Fractional Bias (%)	-124.410	-142.452	-56.058	-149.956	-94.423	-132.167	-125.838
Gross Error (ug/m3)	0.665	0.879	0.144	0.812	0.378	0.708	0.723
Normalized Gross Error	72.972	80.483	36.735	84.296	58.501	78.800	74.857
Fractional Gross Error	124.410	142.452	56.058	149.956	94.423	132.167	125.838

SPECIES= Elemental Carbon (EC)

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	1.749	0.733	1.749	1.312	0.817	0.706	0.715
Peak Estimated (ug/m3)	0.236	0.159	0.153	0.124	0.236	0.128	0.128
Accuracy of Peak (%)	-86.507	-78.308	-91.252	-90.549	-71.114	-81.870	-82.098
Ratio Peak Est/Obs	0.135	0.217	0.087	0.095	0.289	0.181	0.179
6-HOUR AVERAGE STATISTICS							
Number of Pairs	32	6	2	6	6	6	6
Average Observed (ug/m3)	0.609	0.364	1.749	0.554	0.701	0.543	0.503
Average Estimated (ug/m3)	0.079	0.064	0.101	0.058	0.127	0.068	0.071
Bias (ug/m3)	-0.530	-0.299	-1.648	-0.497	-0.575	-0.475	-0.432
Ratio AvgEst/AvgObs	0.130	0.177	0.057	0.104	0.181	0.125	0.141
Normalized Bias (%)	-1.443	345.795	-94.254	-67.972	-80.813	-86.837	-86.448
Fractional Bias (%)	-126.977	-40.212	-178.569	-130.796	-139.382	-154.634	-152.663
Gross Error (ug/m3)	0.538	0.331	1.648	0.503	0.575	0.475	0.432
Normalized Gross Error	154.340	456.586	94.254	81.043	80.813	86.837	86.448
Fractional Gross Error	150.350	153.942	178.569	141.724	139.382	154.634	152.663

SPECIES= Total Organic Aerosol (OC+SOA)

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	5.550	3.093	4.569	5.550	3.764	4.996	4.680
Peak Estimated (ug/m3)	2.920	1.403	1.362	1.372	2.920	1.376	1.382
Accuracy of Peak (%)	-47.387	-54.640	-70.190	-75.279	-22.423	-72.458	-70.470
Ratio Peak Est/Obs	0.526	0.454	0.298	0.247	0.776	0.275	0.295
6-HOUR AVERAGE STATISTICS							
Number of Pairs	32	6	2	6	6	6	6
Average Observed (ug/m3)	3.321	2.424	4.569	3.898	3.076	3.659	3.133
Average Estimated (ug/m3)	0.835	0.634	0.890	0.633	1.472	0.701	0.718
Bias (ug/m3)	-2.486	-1.790	-3.679	-3.265	-1.604	-2.959	-2.415
Ratio AvgEst/AvgObs	0.251	0.261	0.195	0.162	0.479	0.192	0.229
Normalized Bias (%)	-73.217	-74.373	-80.532	-82.403	-52.579	-78.723	-75.567
Fractional Bias (%)	-122.403	-121.138	-137.345	-142.696	-84.238	-133.658	-125.304
Gross Error (ug/m3)	2.486	1.791	3.679	3.265	1.604	2.958	2.415
Normalized Gross Error	73.217	74.373	80.532	82.403	52.579	78.723	75.567
Fractional Gross Error	122.403	121.138	137.345	142.696	84.238	133.658	125.304

carbon. The reductions in model-estimated sulfate for this episode is expected due to the much dryer conditions. Reductions of all species is likely due to the more organized flow patterns, which do not allow for PM loadings to build up as they apparently did in the weaker variable flow patterns characterizing the September episode. Also, the higher observed PM concentrations in this first August episode may be a result of sources outside of the regional modeling domain, which are not taken into account by the MZVS CALPUFF application (i.e., no boundary conditions are specified). It is important to reiterate that CALMET/CALPUFF options, parameter settings, and SOA, geological material, and fire emission adjustments were analyzed and chosen based on sensitivity tests to optimize performance for the September episode, and that those settings were carried through to all other episodes.

Scatter plots of model-estimated and observed $PM_{2.5}$ mass and chemical concentrations for the first August episode shown in Figure B.2.3.2 clearly illustrate that the model is underestimating the observed $PM_{2.5}$ concentrations for this episode. There is very little correlation between the model-estimated and observed PM species concentrations from this first August episode.

The model-estimated and observed chemical mass budgets for the three sites near the MZWA and for each six-hour period in the first August episode are shown in Table B.2.3.6. Even though the model fails to estimate the magnitude of the $PM_{2.5}$ species, it performs well in estimating the relative contribution of each chemical component to $PM_{2.5}$ mass. The model calculations and the observations both agree that organic aerosol is the most significant component to $PM_{2.5}$ mass, usually accounting for over 50% of the mass. Sulfate appears to be the next important chemical component, typically accounting for 20% to 40% of the mass. Sulfate is followed by other primary $PM_{2.5}$, (typically 10% to 20% of the mass) and then elemental carbon (3% to 16%). It appears that the consistent underestimation of all species leads to a reasonable representation of the mass budget (hence a confident extinction budget), even though the absolute magnitude of $PM_{2.5}$ mass and light extinction are not well replicated. However, this does not imply that the model will accurately estimate the relative impacts of different sources on $PM_{2.5}$ levels. In fact, the conceptual model for this episodes suggests that super-regional transport from source regions outside of the MZVS regional-scale modeling domain played a role in the high observed $PM_{2.5}$ concentrations. Care should be taken in the interpretation of the estimated relative contributions of source regions to $PM_{2.5}$, as the evaluation suggests that many of the emissions sources that contributed to the high $PM_{2.5}$ may not be included.

B.2.3.3 Statistical Evaluation for the Episode of 10/07/95 to 10/19/95

Table B.2.3.3 contains the model performance statistics for the episode of 10/07/95 to 10/19/95. The model performed reasonably in estimating the episode average $PM_{2.5}$ mass (within 6%). However, as shown by the high degree of scatter in the scatter plot in Figure B.2.3.3, the model was unable to estimate $PM_{2.5}$ mass at a given time and location. The highest $PM_{2.5}$ concentrations occur at the Gilpin Creek site on the ninth, tenth, and eleventh days of the October episode (i.e., 10/15/95 to 10/17/95) and the sixth day of the episode at

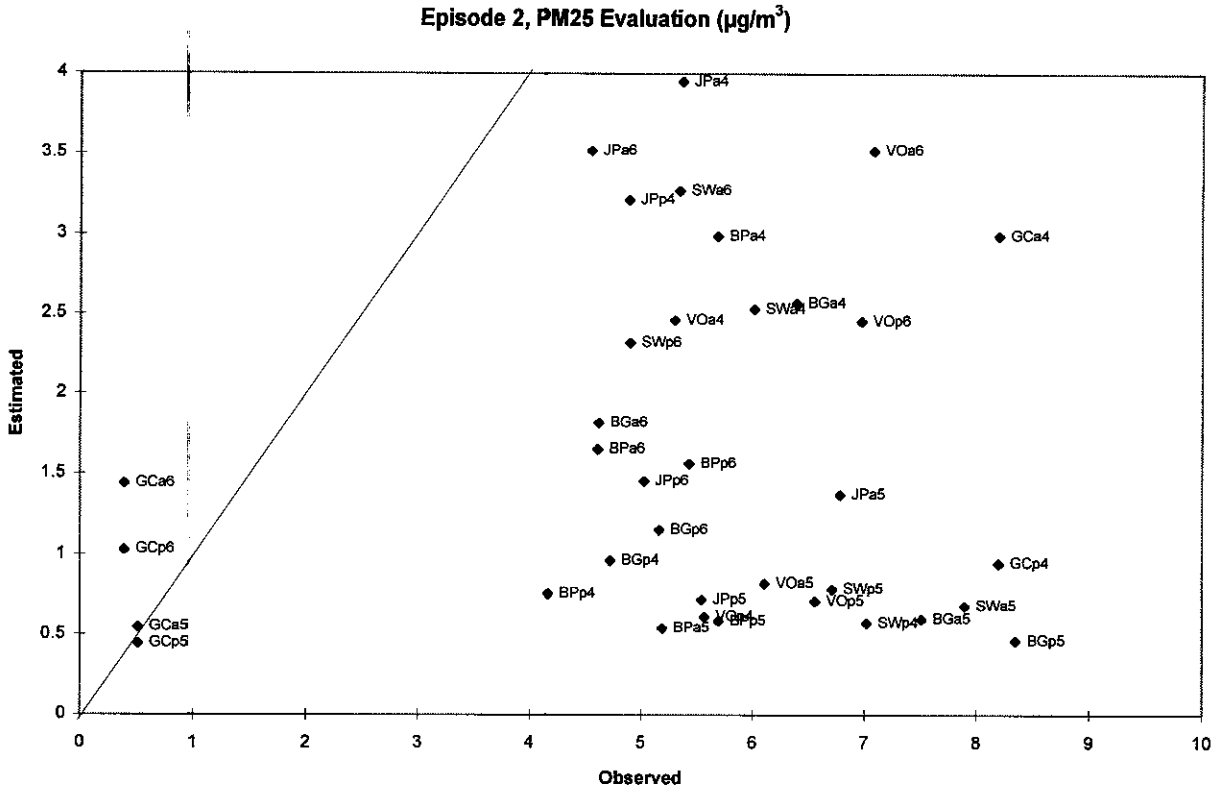


Figure B.2.3.2a. Scatterplot of predicted and observed 6-hour total $PM_{2.5}$ concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the August 7-9, 1995 episode.

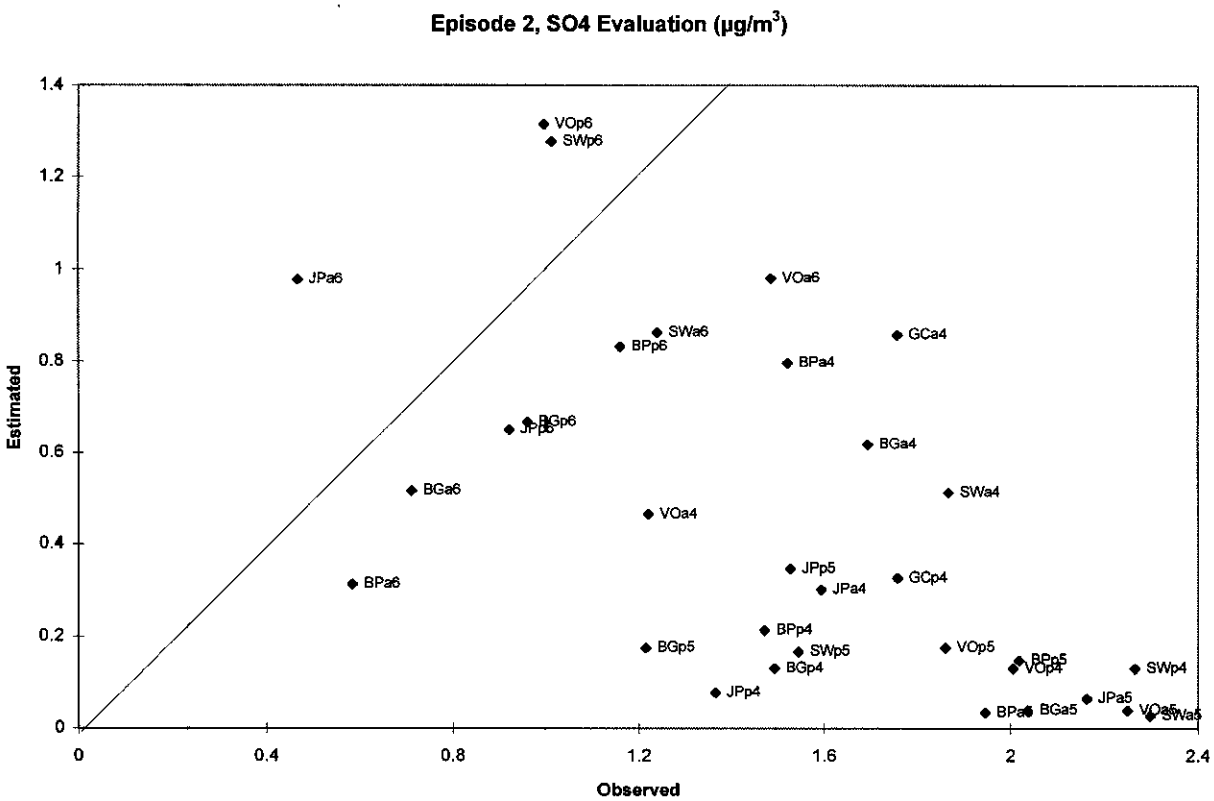


Figure B.2.3.2b. Scatterplot of predicted and observed 6-hour sulfate concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the August 7-9, 1995 episode.

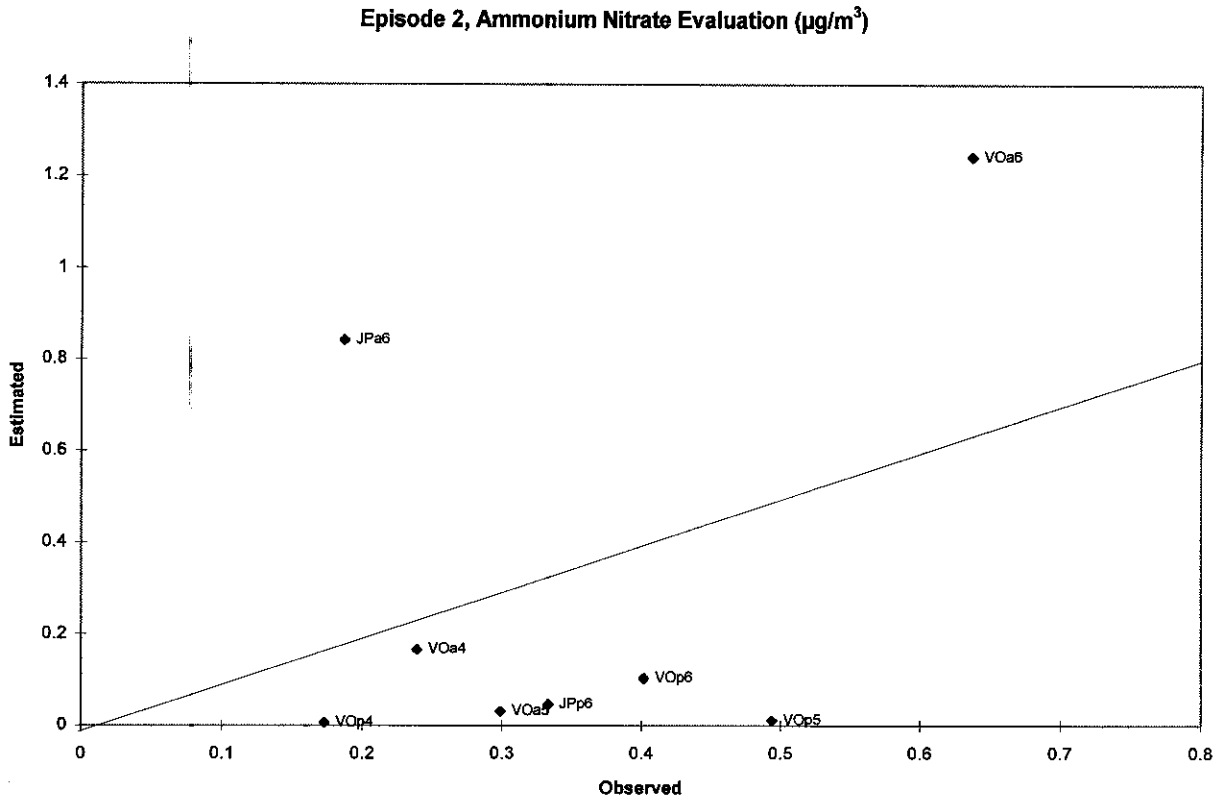


Figure B.2.3.2c. Scatterplot of predicted and observed 6-hour ammonium nitrate concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the August 7-9, 1995 episode.

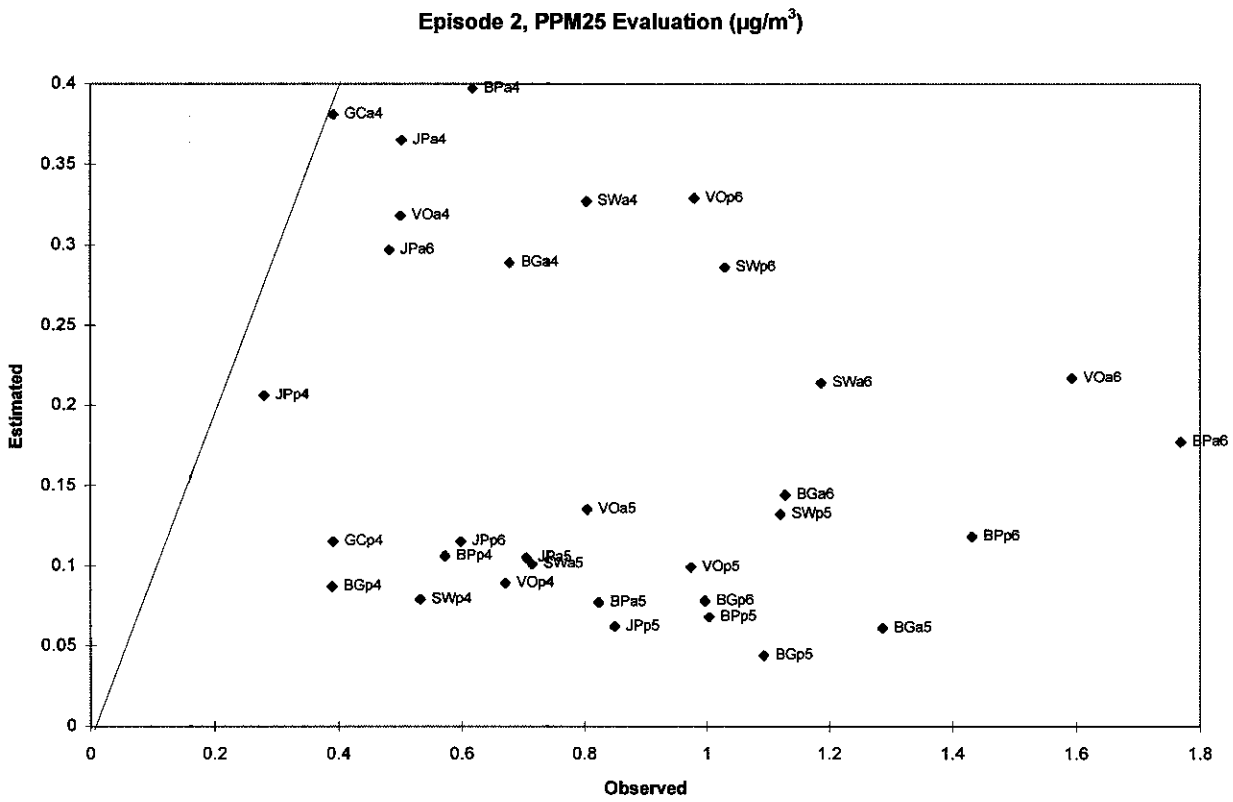


Figure B.2.3.2d. Scatterplot of predicted and observed 6-hour non-carbonaceous primary $PM_{2.5}$ concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the August 7-9, 1995 episode.

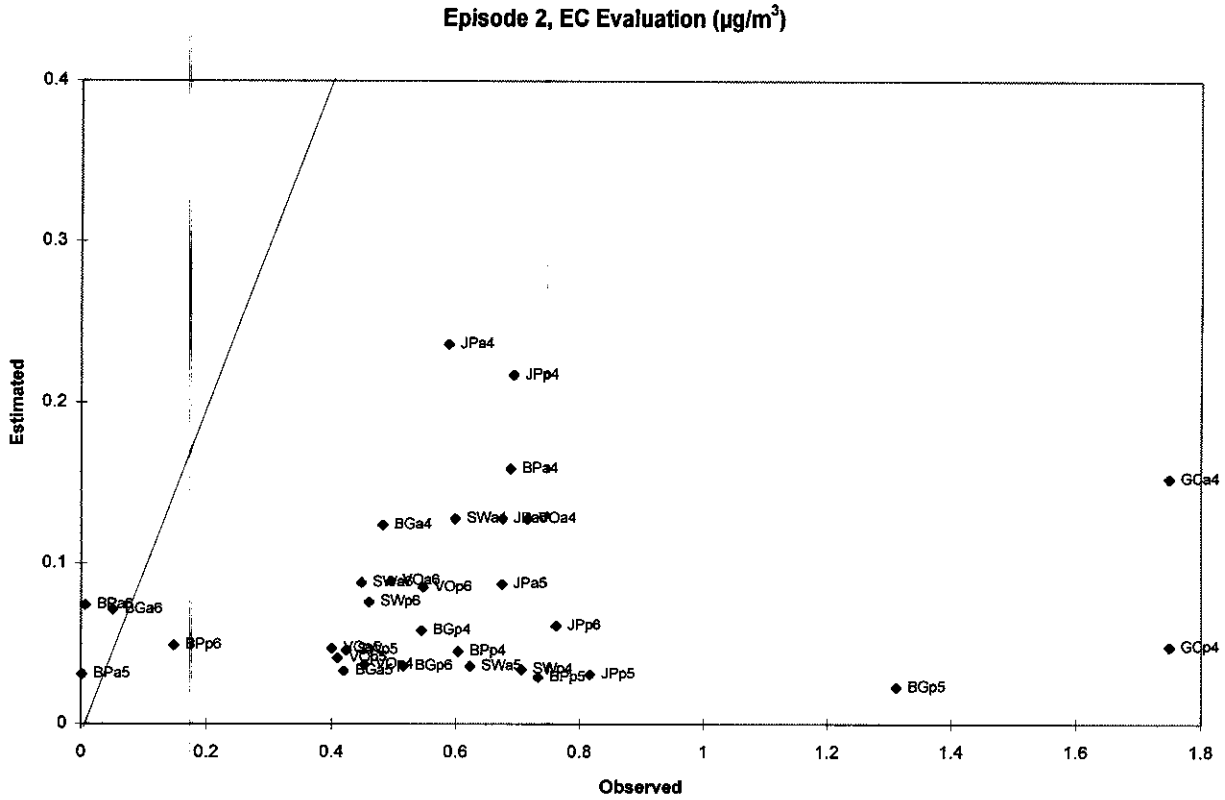


Figure B.2.3.2e. Scatterplot of predicted and observed 6-hour elemental carbon concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the August 7-9, 1995 episode.

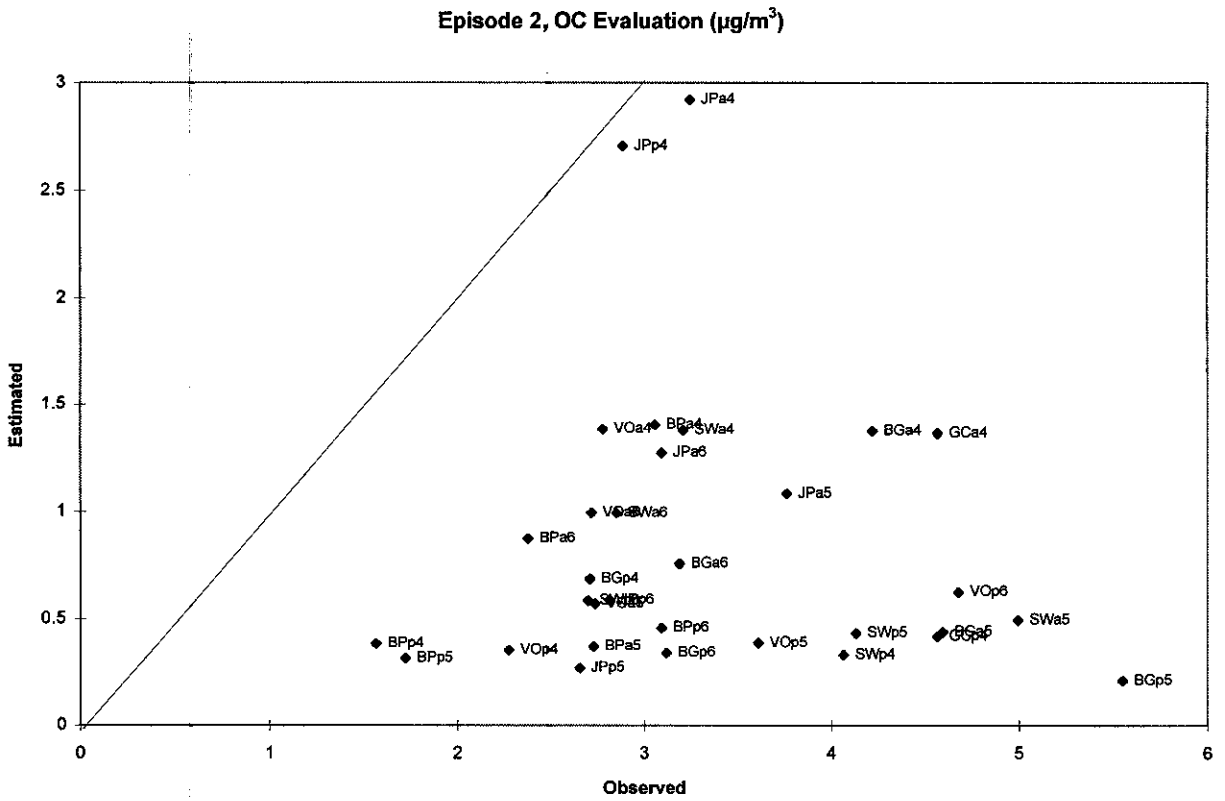


Figure B.2.3.2f. Scatterplot of predicted and observed 6-hour organic aerosol concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the August 7-9, 1995 episode.

Table B.2.3.3
CALPUFF 6-Hour Average Model Performance Statistics for the 10/07/95 to 10/19/95 Episode

SPECIES= Total PM2.5

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	7.969	7.969	7.181	4.492	5.679	4.444	6.108
Peak Estimated (ug/m3)	5.322	5.322	5.127	3.453	4.440	4.052	4.295
Accuracy of Peak (%)	-33.216	-33.216	-28.603	-23.130	-21.817	-8.821	-29.682
Ratio Peak Est/Obs	0.668	0.668	0.714	0.769	0.782	0.912	0.703
6-HOUR AVERAGE STATISTICS							
Number of Pairs	113	26	22	16	17	16	16
Average Observed (ug/m3)	2.815	2.124	3.728	2.585	2.414	2.775	3.379
Average Estimated (ug/m3)	2.655	3.169	3.033	2.028	2.547	2.296	2.403
Bias (ug/m3)	-0.160	1.045	-0.694	-0.557	0.133	-0.479	-0.975
Ratio AvgEst/AvgObs	0.943	1.492	0.814	0.784	1.055	0.827	0.711
Normalized Bias (%)	27.893	96.494	22.134	-4.067	34.194	-5.982	-16.523
Fractional Bias (%)	0.921	43.543	-1.026	-21.715	8.313	-18.851	-31.111
Gross Error (ug/m3)	1.582	2.017	1.856	1.196	1.520	1.104	1.431
Normalized Gross Error	67.409	115.436	62.964	47.925	68.042	41.413	40.286
Fractional Gross Error	56.950	72.155	53.170	52.317	59.351	46.690	49.782

SPECIES= Ammonium Sulfate

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	2.318	2.318	1.067	1.806	2.017	1.893	2.283
Peak Estimated (ug/m3)	2.275	2.275	1.596	1.627	1.560	1.414	1.427
Accuracy of Peak (%)	-1.855	-1.855	49.578	-9.911	-22.657	-25.304	-37.495
Ratio Peak Est/Obs	0.981	0.981	1.496	0.901	0.773	0.747	0.625
6-HOUR AVERAGE STATISTICS							
Number of Pairs	105	26	14	16	17	16	16
Average Observed (ug/m3)	0.781	0.685	0.614	0.734	0.832	0.981	0.874
Average Estimated (ug/m3)	0.943	1.110	0.968	0.809	0.934	0.871	0.864
Bias (ug/m3)	0.162	0.426	0.354	0.075	0.102	-0.110	-0.011
Ratio AvgEst/AvgObs	1.208	1.622	1.576	1.102	1.122	0.888	0.988
Normalized Bias (%)	60.431	119.398	64.253	47.763	36.805	20.909	38.557
Fractional Bias (%)	18.517	49.345	37.823	8.134	8.674	-12.459	3.342
Gross Error (ug/m3)	0.598	0.740	0.369	0.557	0.527	0.620	0.662
Normalized Gross Error	92.115	139.621	70.343	87.940	73.685	70.567	79.271
Fractional Gross Error	69.293	82.298	45.506	71.110	63.315	69.544	73.255

SPECIES= Ammonium Nitrate

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	0.986	0.986	-9.999	-9.999	0.644	-9.999	0.670
Peak Estimated (ug/m3)	1.362	1.362	-9.999	-9.999	0.951	-9.999	0.589
Accuracy of Peak (%)	38.134	38.134	-9.999	-9.999	47.671	-9.999	-12.090
Ratio Peak Est/Obs	1.381	1.381	-9.999	-9.999	1.477	-9.999	0.879
6-HOUR AVERAGE STATISTICS							
Number of Pairs	48	18	-99	-99	14	-99	16
Average Observed (ug/m3)	0.213	0.231	-9.999	-9.999	0.182	-9.999	0.221
Average Estimated (ug/m3)	0.361	0.531	-9.999	-9.999	0.301	-9.999	0.222
Bias (ug/m3)	0.148	0.300	-9.999	-9.999	0.119	-9.999	0.002
Ratio AvgEst/AvgObs	1.693	2.297	-9.999	-9.999	1.655	-9.999	1.007
Normalized Bias (%)	128.621	200.770	-9.999	-9.999	142.624	-9.999	35.202
Fractional Bias (%)	17.664	63.940	-9.999	-9.999	26.070	-9.999	-41.753
Gross Error (ug/m3)	0.273	0.373	-9.999	-9.999	0.248	-9.999	0.184
Normalized Gross Error	178.211	221.674	-9.999	-9.999	190.690	-9.999	118.395
Fractional Gross Error	102.930	91.655	-9.999	-9.999	105.508	-9.999	113.360

Table B.2.3.3 (continued)
CALPUFF 6-Hour Average Model Performance Statistics for the 10/07/95 to 10/19/95 Episode

SPECIES= Primary PM2.5 (Non EC&OC)

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	2.475	1.480	0.479	0.609	2.475	0.751	1.634
Peak Estimated (ug/m3)	0.738	0.738	0.363	0.377	0.492	0.602	0.612
Accuracy of Peak (%)	-70.182	-50.135	-24.217	-38.095	-80.121	-19.840	-62.546
Ratio Peak Est/Obs	0.298	0.499	0.758	0.619	0.199	0.802	0.375
6-HOUR AVERAGE STATISTICS							
Number of Pairs	92	24	6	14	17	16	15
Average Observed (ug/m3)	0.513	0.423	0.389	0.357	0.494	0.474	0.916
Average Estimated (ug/m3)	0.279	0.316	0.268	0.188	0.247	0.306	0.318
Bias (ug/m3)	-0.234	-0.107	-0.121	-0.170	-0.247	-0.168	-0.598
Ratio AvgEst/AvgObs	0.544	0.747	0.689	0.526	0.500	0.646	0.347
Normalized Bias (%)	-26.953	-0.466	-19.755	-43.652	-25.998	-26.516	-58.177
Fractional Bias (%)	-46.767	-17.299	-32.464	-62.516	-46.329	-42.668	-89.805
Gross Error (ug/m3)	0.288	0.224	0.172	0.176	0.299	0.219	0.605
Normalized Gross Error	47.305	44.011	43.497	45.637	44.207	46.303	60.231
Fractional Gross Error	61.634	47.079	49.971	64.373	61.488	57.402	91.713

SPECIES= Elemental Carbon (EC)

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	1.401	1.017	1.401	0.943	0.540	0.829	0.761
Peak Estimated (ug/m3)	0.308	0.308	0.253	0.155	0.196	0.235	0.225
Accuracy of Peak (%)	-78.016	-69.715	-81.941	-83.563	-63.704	-71.653	-70.434
Ratio Peak Est/Obs	0.220	0.303	0.181	0.164	0.363	0.283	0.296
6-HOUR AVERAGE STATISTICS							
Number of Pairs	101	26	12	14	17	16	16
Average Observed (ug/m3)	0.354	0.270	0.621	0.248	0.301	0.439	0.353
Average Estimated (ug/m3)	0.107	0.130	0.104	0.079	0.103	0.103	0.104
Bias (ug/m3)	-0.247	-0.141	-0.517	-0.169	-0.198	-0.336	-0.249
Ratio AvgEst/AvgObs	0.302	0.480	0.167	0.319	0.341	0.234	0.296
Normalized Bias (%)	-22.845	21.644	-34.630	-33.267	12.171	-71.868	-65.360
Fractional Bias (%)	-79.310	-37.251	-94.840	-72.877	-81.813	-116.808	-101.477
Gross Error (ug/m3)	0.265	0.194	0.531	0.176	0.206	0.336	0.249
Normalized Gross Error	89.372	99.563	90.292	68.978	129.006	71.868	65.360
Fractional Gross Error	100.637	83.476	124.670	90.837	101.981	116.808	101.477

SPECIES= Total Organic Aerosol (OC+SOA)

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	3.623	3.623	3.147	2.892	2.846	1.890	2.346
Peak Estimated (ug/m3)	2.071	2.071	1.287	1.295	1.784	1.831	1.780
Accuracy of Peak (%)	-42.837	-42.837	-59.104	-55.221	-37.316	-3.122	-24.126
Ratio Peak Est/Obs	0.572	0.572	0.409	0.448	0.627	0.969	0.759
6-HOUR AVERAGE STATISTICS							
Number of Pairs	94	24	6	15	17	16	16
Average Observed (ug/m3)	1.179	0.907	1.720	1.539	0.914	1.049	1.459
Average Estimated (ug/m3)	0.935	1.103	0.943	0.695	0.975	0.896	0.900
Bias (ug/m3)	-0.245	0.195	-0.777	-0.845	0.061	-0.153	-0.558
Ratio AvgEst/AvgObs	0.793	1.215	0.548	0.451	1.067	0.854	0.617
Normalized Bias (%)	42.315	117.867	-14.551	-38.435	69.698	45.180	-5.944
Fractional Bias (%)	-8.658	32.605	-38.313	-68.764	19.372	-3.395	-38.128
Gross Error (ug/m3)	0.771	0.804	1.029	0.975	0.736	0.471	0.767
Normalized Gross Error	98.009	149.231	57.924	65.387	104.752	92.285	65.353
Fractional Gross Error	71.882	78.574	66.260	85.077	73.664	57.340	64.229

the Buffalo Pass site (10/12/95). An examination of the scatter plots in Figure B.2.3.3 reveals that there are no individual chemical components that contribute greatly to these high $PM_{2.5}$ concentrations at the Gilpin Creek site, which suggests a bias in the gravimetric measurement, which is inconsistent with the sum of the chemical species. The variability of the average observed $PM_{2.5}$ mass across the measurement sites (2.1 to 3.7 $\mu g/m^3$) is more similar to the estimated variability (2.0 to 3.1 $\mu g/m^3$) than seen for the other episodes.

For this October episode, the model exhibits an average 20% overestimation for sulfate concentrations (Table B.2.3.3). As seen for the other episodes, the model tends to overestimate sulfate at the Buffalo Pass and Gilpin Creek sites near the MZWA by a significant amount (60%), but predict sulfate concentrations reasonably well on average at sites away from the MZWA (within 15%). The scatter plot (Figure B.2.3.3b) for model-estimated and observed sulfate concentrations illustrates a tendency of the model to overestimate sulfate concentrations, usually by more than 20%, with a few high observed outliers bringing the average overestimation down to around 20%.

The model does not perform well in calculating ammonium nitrate (69% overestimation), with the scatter plot having few data points near the perfect one-to-one line (Figure B.2.3.3c). The model is underestimating non-carbonaceous primary $PM_{2.5}$ by about 69% on average. The scatter plot confirms this overall underestimation tendency for this species (Figure B.2.3.3d). Again, the model/emissions for non-carbonaceous primary $PM_{2.5}$ were calibrated using the first (September) MZVS episode to minimize the bias for this species. The model performance results for this episode suggest that possibly a higher calibration factor could have been used.

As seen for the other episodes, the model is systematically underestimating elemental carbon (70% on average) and, on average, slightly underestimates organic carbon (21%). There are several higher than normal elemental and organic carbon measurements at the Gilpin Creek site, and to a lesser extent, the Buffalo Pass site, suggesting possible impacts of emissions from fires.

B.2.3.4 Statistical Evaluation for the Episode of 08/21/95 to 08/27/95

Statistical performance measures and scatter plots of model-estimated and observed PM concentrations for the second August episode are given in Table B.2.3.4 and Figure B.2.3.4, respectively. The model performance results for the episode of 08/21/95 to 08/27/95 are similar to what was seen for the episode of 08/07/95 to 08/09/95 – a systematic underestimation of almost all PM components. Total $PM_{2.5}$, sulfate, other primary PM, EC, and OC are underestimated on average by, respectively, 63%, 59%, 62%, 88%, and 74%, whereas the average overestimation of ammonium nitrate is 75%. The ammonium nitrate overestimation may be related to the underestimation of sulfate; the model is predicting that less ammonia will be held by the sulfate resulting in more ammonia available to form ammonium nitrate.

The scatter plots of model-estimated and observed six-hour PM concentrations also illustrate the general underestimation tendency. Again note that there are high observed

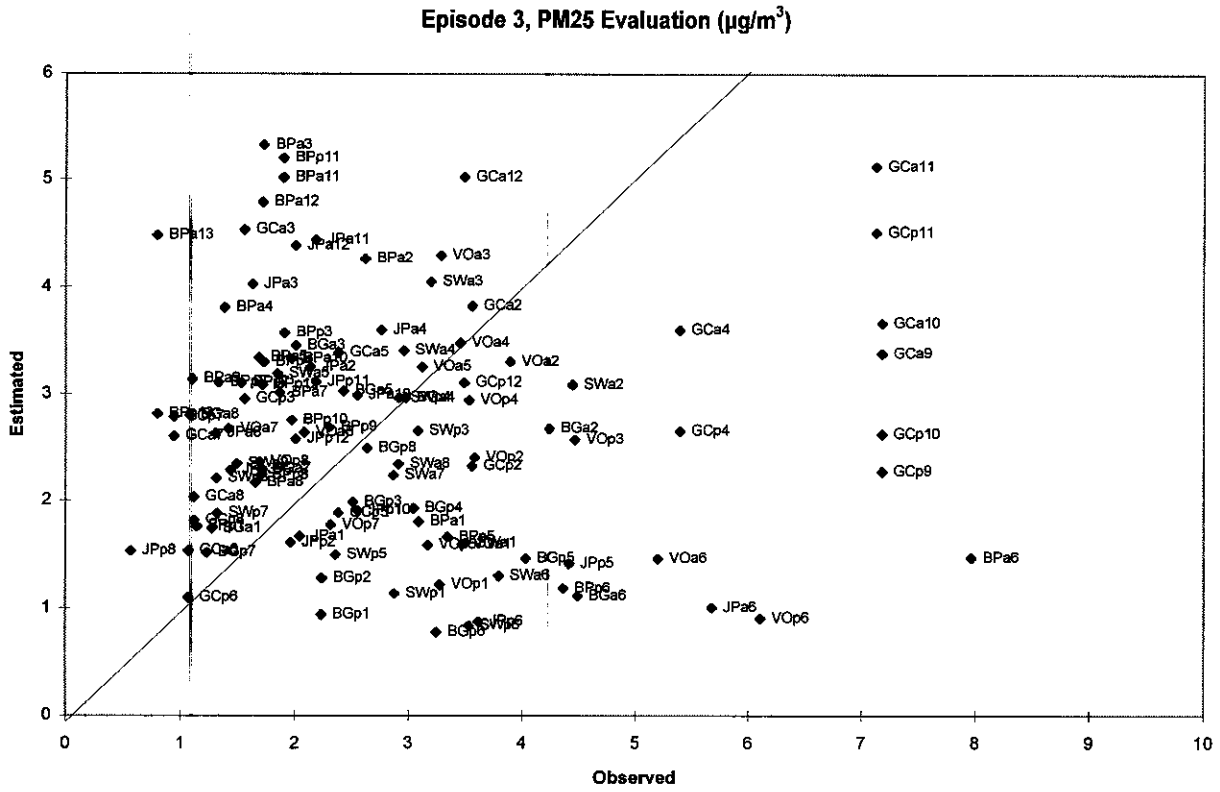


Figure B.2.3.3a. Scatterplot of predicted and observed 6-hour total $PM_{2.5}$ concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the October 7-19, 1995 episode.

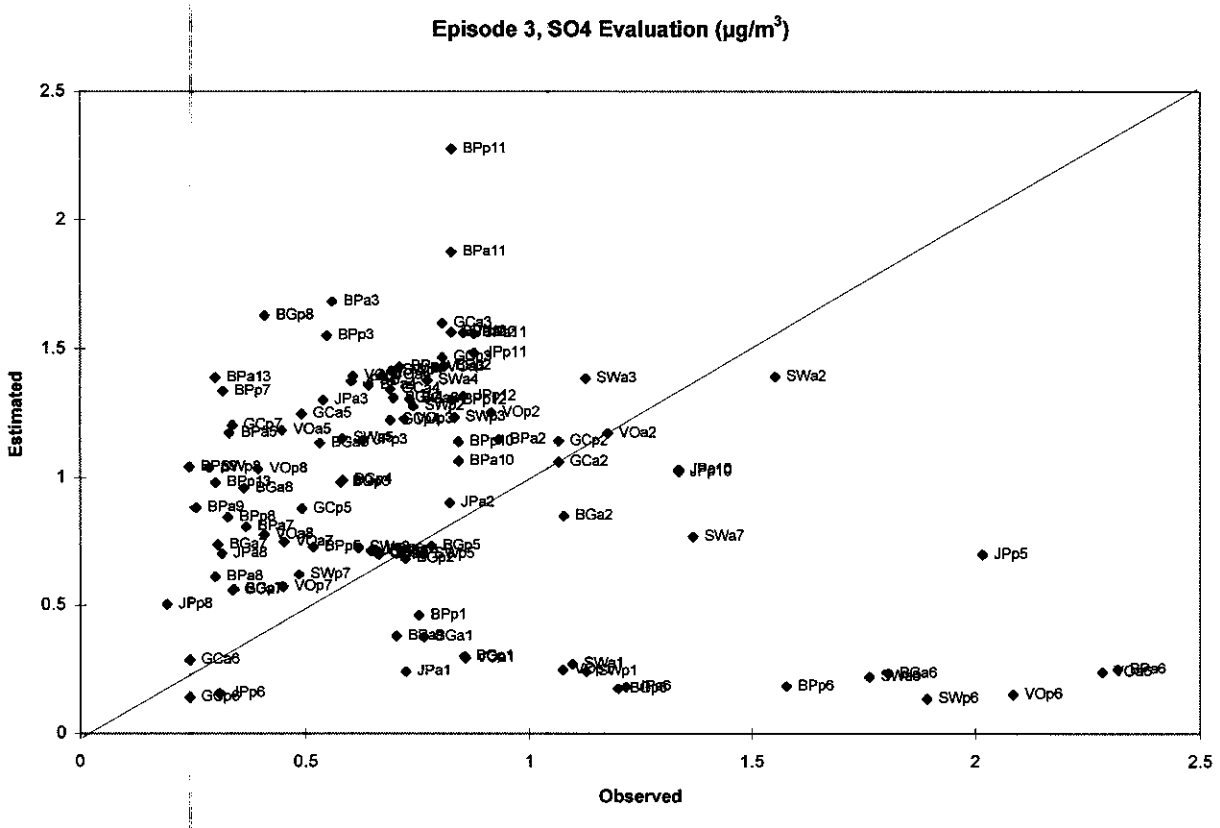


Figure B.2.3.3b. Scatterplot of predicted and observed 6-hour sulfate concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the October 7-19, 1995 episode.

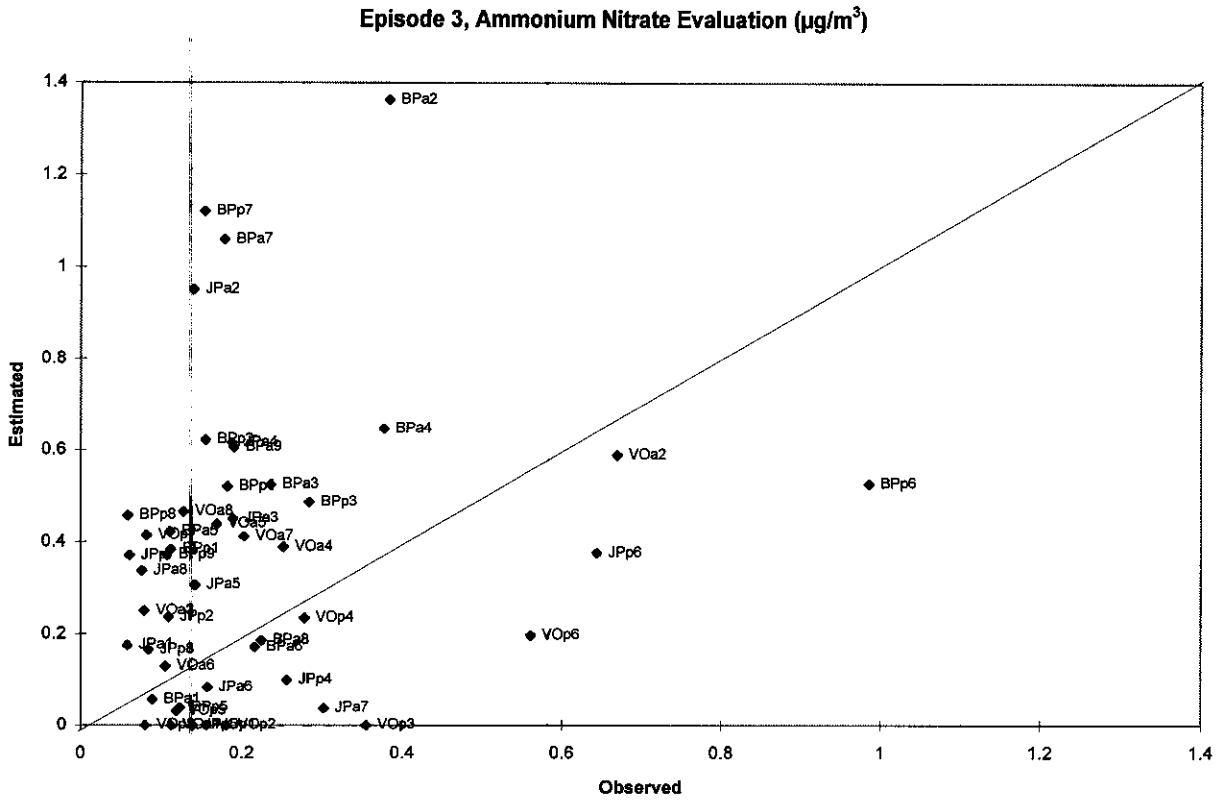


Figure B.2.3.3c. Scatterplot of predicted and observed 6-hour ammonium nitrate concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the October 7-19, 1995 episode.

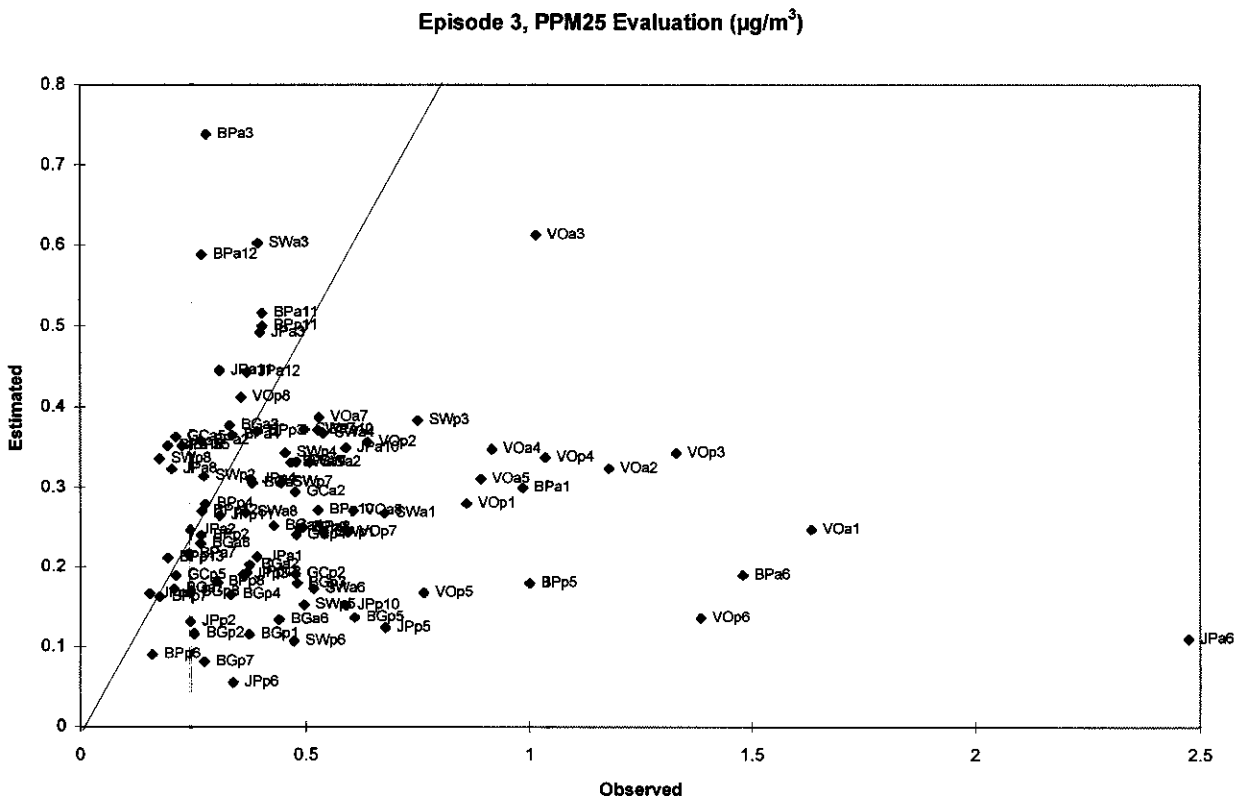


Figure B.2.3.3d. Scatterplot of predicted and observed 6-hour non-carbonaceous primary $PM_{2.5}$ concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the October 7-19, 1995 episode.

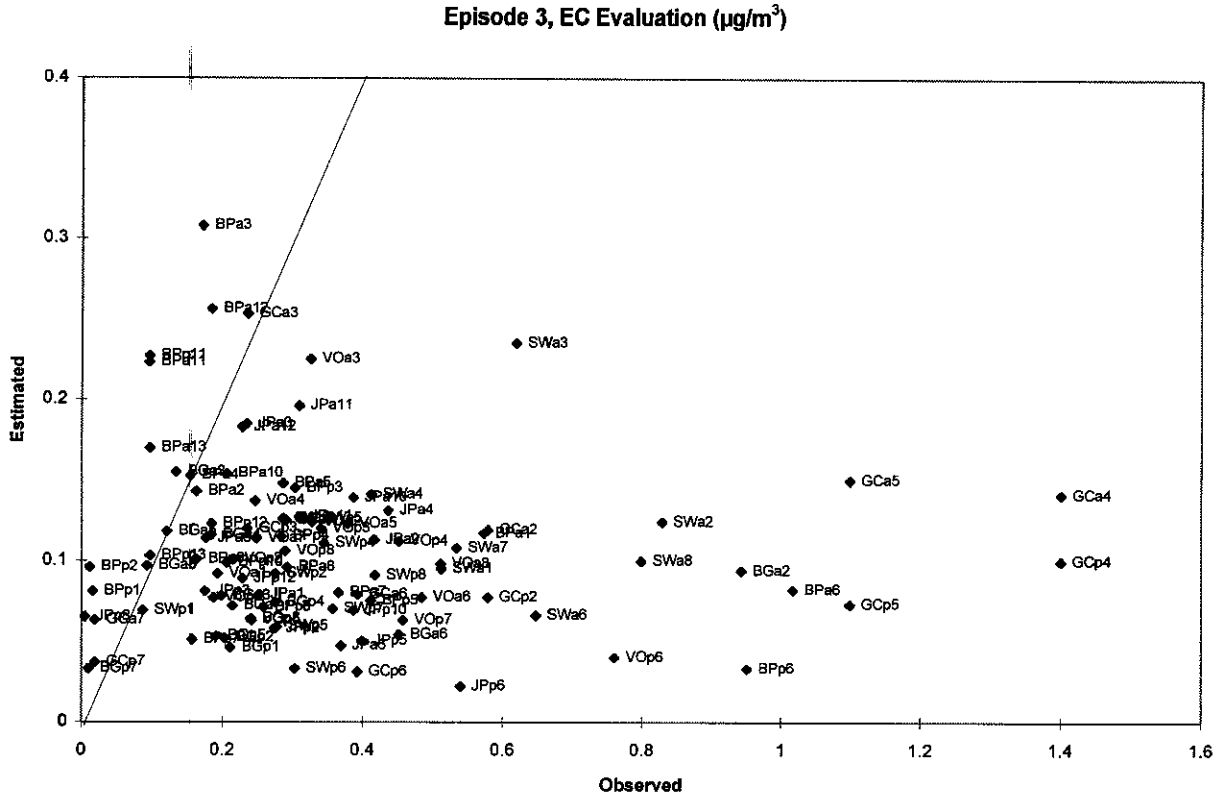


Figure B.2.3.3e. Scatterplot of predicted and observed 6-hour elemental carbon concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the October 7-19, 1995 episode.

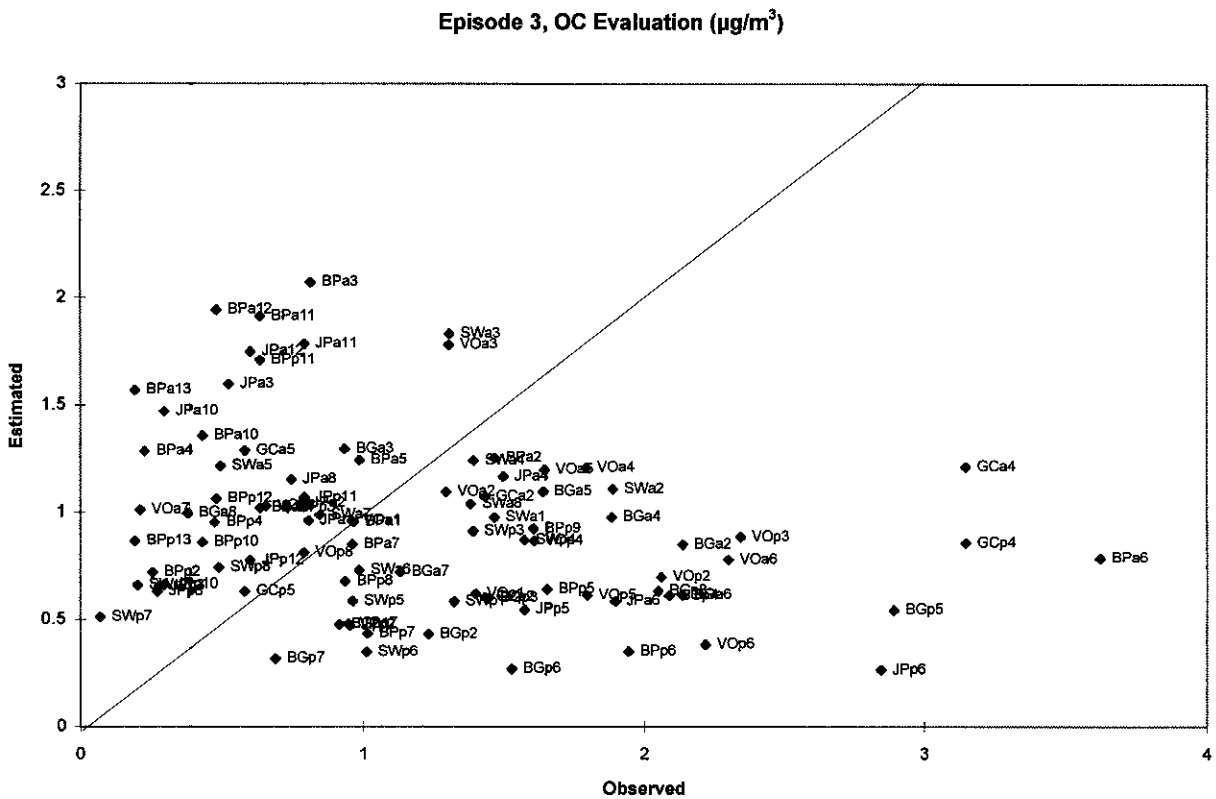


Figure B.2.3.3f. Scatterplot of predicted and observed 6-hour organic aerosol concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the October 7-19, 1995 episode.

Table B.2.3.4
CALPUFF 6-Hour Average Model Performance Statistics for the 08/21/95 to 08/27/95 Episode

SPECIES= Total PM2.5

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	9.114	9.114	7.069	6.793	4.707	7.496	7.989
Peak Estimated (ug/m3)	4.101	4.101	3.820	2.854	2.999	3.934	3.519
Accuracy of Peak (%)	-55.003	-55.003	-45.961	-57.986	-36.286	-47.519	-55.952
Ratio Peak Est/Obs	0.450	0.450	0.540	0.420	0.637	0.525	0.440
6-HOUR AVERAGE STATISTICS							
Number of Pairs	75	14	14	12	9	12	14
Average Observed (ug/m3)	4.870	4.436	4.103	5.313	3.565	5.301	6.164
Average Estimated (ug/m3)	1.790	1.650	1.643	1.787	1.164	2.187	2.141
Bias (ug/m3)	-3.081	-2.786	-2.460	-3.526	-2.402	-3.114	-4.023
Ratio AvgEst/AvgObs	0.367	0.372	0.400	0.336	0.326	0.413	0.347
Normalized Bias (%)	-59.963	-59.598	-49.998	-66.584	-64.823	-55.270	-65.514
Fractional Bias (%)	-92.792	-91.768	-80.852	-102.467	-104.451	-82.098	-99.136
Gross Error (ug/m3)	3.125	2.786	2.697	3.526	2.402	3.114	4.023
Normalized Gross Error	61.573	59.598	58.623	66.584	64.823	55.270	65.514
Fractional Gross Error	94.178	91.768	88.276	102.467	104.451	82.098	99.136

SPECIES= Ammonium Sulfate

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	2.888	2.839	2.045	2.267	1.795	2.599	2.888
Peak Estimated (ug/m3)	1.706	1.438	1.706	1.675	0.897	1.388	1.540
Accuracy of Peak (%)	-40.928	-49.348	-16.577	-26.114	-50.028	-46.595	-46.676
Ratio Peak Est/Obs	0.591	0.507	0.834	0.739	0.500	0.534	0.533
6-HOUR AVERAGE STATISTICS							
Number of Pairs	74	14	14	12	8	12	14
Average Observed (ug/m3)	1.706	1.621	1.412	1.736	1.429	1.886	2.066
Average Estimated (ug/m3)	0.702	0.512	0.572	0.876	0.303	0.943	0.897
Bias (ug/m3)	-1.004	-1.110	-0.839	-0.860	-1.125	-0.942	-1.170
Ratio AvgEst/AvgObs	0.412	0.316	0.405	0.504	0.212	0.500	0.434
Normalized Bias (%)	-56.599	-63.373	-57.438	-46.858	-76.545	-46.684	-54.437
Fractional Bias (%)	-90.886	-108.432	-91.944	-71.933	-135.547	-69.545	-81.300
Gross Error (ug/m3)	1.018	1.151	0.867	0.865	1.125	0.942	1.170
Normalized Gross Error	57.687	67.013	59.293	47.153	76.545	46.684	54.437
Fractional Gross Error	91.874	111.660	93.685	72.226	135.547	69.545	81.300

SPECIES= Ammonium Nitrate

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	0.463	0.233	-9.999	-9.999	0.143	-9.999	0.463
Peak Estimated (ug/m3)	0.827	0.321	-9.999	-9.999	0.827	-9.999	0.630
Accuracy of Peak (%)	78.618	37.768	-9.999	-9.999	478.322	-9.999	36.069
Ratio Peak Est/Obs	1.786	1.378	-9.999	-9.999	5.783	-9.999	1.361
6-HOUR AVERAGE STATISTICS							
Number of Pairs	29	10	-99	-99	6	-99	13
Average Observed (ug/m3)	0.155	0.120	-9.999	-9.999	0.080	-9.999	0.216
Average Estimated (ug/m3)	0.272	0.160	-9.999	-9.999	0.350	-9.999	0.321
Bias (ug/m3)	0.117	0.040	-9.999	-9.999	0.270	-9.999	0.105
Ratio AvgEst/AvgObs	1.754	1.329	-9.999	-9.999	4.381	-9.999	1.487
Normalized Bias (%)	580.438	42.744	-9.999	-9.999	2510.658	-9.999	103.179
Fractional Bias (%)	36.427	11.856	-9.999	-9.999	89.051	-9.999	31.039
Gross Error (ug/m3)	0.181	0.090	-9.999	-9.999	0.311	-9.999	0.190
Normalized Gross Error	610.813	79.284	-9.999	-9.999	2539.329	-9.999	129.598
Fractional Gross Error	79.497	62.968	-9.999	-9.999	139.358	-9.999	64.584

Table B.2.3.4 (continued)
CALPUFF 6-Hour Average Model Performance Statistics for the 08/21/95 to 08/27/95 Episode

SPECIES= Primary PM2.5 (Non EC&OC)

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	3.675	3.675	0.315	0.287	0.633	0.699	1.219
Peak Estimated (ug/m3)	0.537	0.537	0.462	0.274	0.254	0.436	0.426
Accuracy of Peak (%)	-85.388	-85.388	46.667	-4.530	-59.874	-37.625	-65.053
Ratio Peak Est/Obs	0.146	0.146	1.467	0.955	0.401	0.624	0.349
6-HOUR AVERAGE STATISTICS							
Number of Pairs	72	12	14	12	8	12	14
Average Observed (ug/m3)	0.469	0.922	0.228	0.216	0.229	0.427	0.710
Average Estimated (ug/m3)	0.180	0.186	0.170	0.125	0.128	0.212	0.233
Bias (ug/m3)	-0.289	-0.735	-0.057	-0.091	-0.102	-0.215	-0.477
Ratio AvgEst/AvgObs	0.384	0.202	0.748	0.579	0.557	0.497	0.328
Normalized Bias (%)	-44.291	-58.878	-24.348	-41.731	-23.357	-46.569	-63.937
Fractional Bias (%)	-69.337	-102.012	-39.421	-58.531	-42.239	-66.888	-98.093
Gross Error (ug/m3)	0.302	0.745	0.102	0.091	0.131	0.215	0.477
Normalized Gross Error	52.080	71.073	43.823	41.731	41.077	46.569	63.937
Fractional Gross Error	75.435	110.940	54.858	58.531	56.708	66.888	98.093

SPECIES= Elemental Carbon (EC)

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	1.342	0.534	1.342	1.069	0.746	0.864	0.672
Peak Estimated (ug/m3)	0.209	0.209	0.180	0.102	0.075	0.156	0.149
Accuracy of Peak (%)	-84.426	-60.861	-86.587	-90.458	-89.946	-81.944	-77.827
Ratio Peak Est/Obs	0.156	0.391	0.134	0.095	0.101	0.181	0.222
6-HOUR AVERAGE STATISTICS							
Number of Pairs	73	13	14	12	8	12	14
Average Observed (ug/m3)	0.526	0.283	0.887	0.507	0.490	0.467	0.479
Average Estimated (ug/m3)	0.061	0.071	0.065	0.044	0.044	0.067	0.068
Bias (ug/m3)	-0.465	-0.212	-0.822	-0.463	-0.445	-0.400	-0.411
Ratio AvgEst/AvgObs	0.116	0.251	0.074	0.087	0.091	0.143	0.142
Normalized Bias (%)	-83.250	-67.394	-91.289	-89.910	-90.757	-80.183	-82.567
Fractional Bias (%)	-148.672	-114.115	-169.063	-164.050	-166.753	-139.174	-144.999
Gross Error (ug/m3)	0.465	0.213	0.822	0.463	0.445	0.400	0.411
Normalized Gross Error	83.408	68.277	91.289	89.910	90.757	80.183	82.567
Fractional Gross Error	148.825	114.973	169.063	164.050	166.753	139.174	144.999

SPECIES= Total Organic Aerosol (OC+SOA)

Statistic	All	BUFPAS	GILPCR	BAGGS	JUNMTN	SEWAGE	HAYVOR
PEAK PERFORMANCE STATISTICS							
Peak Observed (ug/m3)	4.959	3.526	4.409	4.413	2.385	4.959	4.815
Peak Estimated (ug/m3)	1.488	1.488	1.364	1.081	0.946	1.364	1.331
Accuracy of Peak (%)	-69.994	-57.799	-69.063	-75.504	-60.335	-72.494	-72.357
Ratio Peak Est/Obs	0.300	0.422	0.309	0.245	0.397	0.275	0.276
6-HOUR AVERAGE STATISTICS							
Number of Pairs	74	14	14	12	8	12	14
Average Observed (ug/m3)	2.579	2.070	1.694	3.552	1.978	2.877	3.229
Average Estimated (ug/m3)	0.604	0.653	0.614	0.502	0.545	0.644	0.633
Bias (ug/m3)	-1.975	-1.417	-1.081	-3.051	-1.433	-2.233	-2.596
Ratio AvgEst/AvgObs	0.234	0.315	0.362	0.141	0.276	0.224	0.196
Normalized Bias (%)	5.835	-61.167	349.684	-85.718	-71.646	-73.425	-80.328
Fractional Bias (%)	-106.546	-97.648	-30.766	-151.128	-114.653	-121.943	-135.181
Gross Error (ug/m3)	2.054	1.431	1.480	3.051	1.433	2.233	2.596
Normalized Gross Error	143.982	63.945	439.426	85.718	71.646	73.425	80.328
Fractional Gross Error	122.853	100.180	114.430	151.128	114.653	121.943	135.181

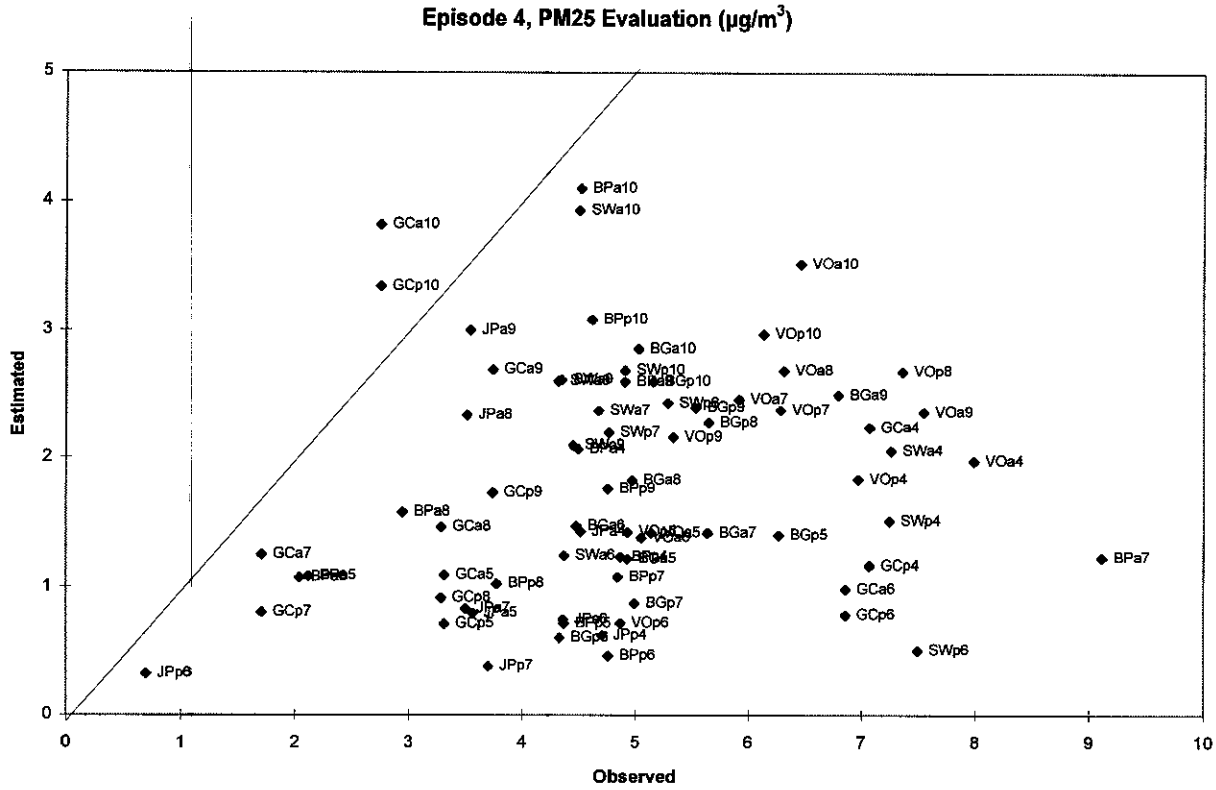


Figure B.2.3.4a. Scatterplot of predicted and observed 6-hour total $PM_{2.5}$ concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the August 21-27, 1995 episode.

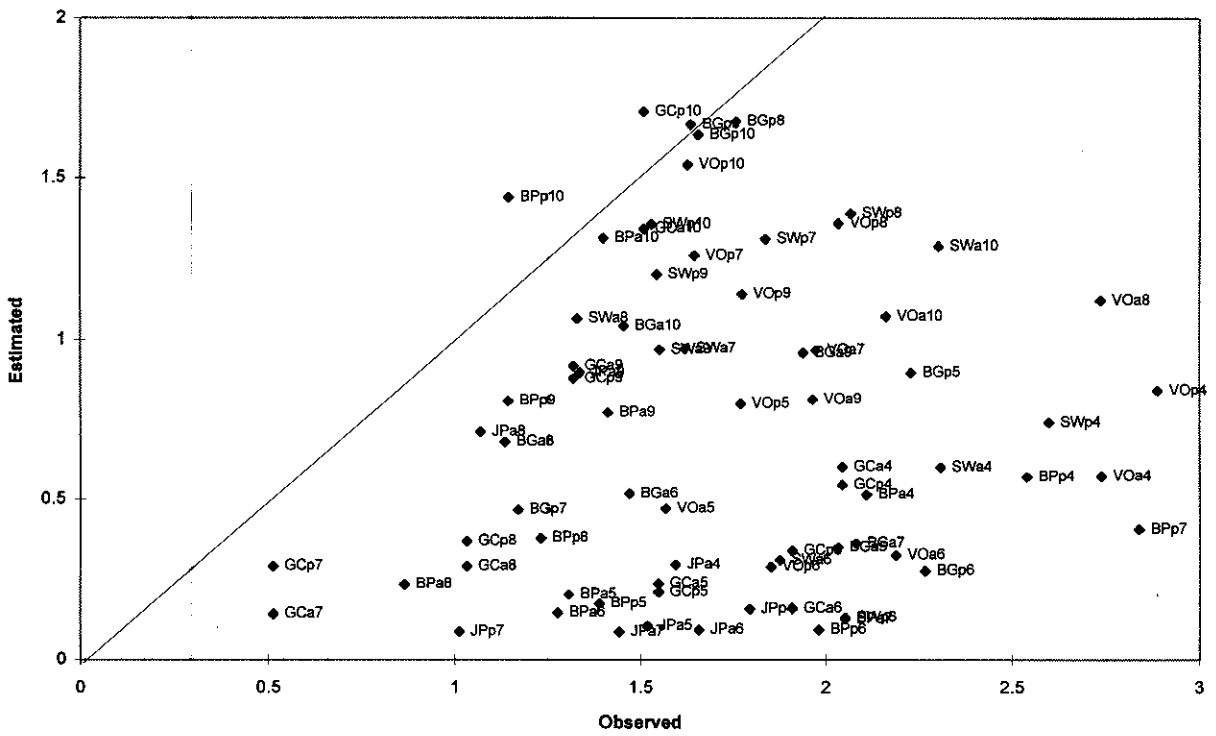


Figure B.2.3.4b. Scatterplot of predicted and observed 6-hour sulfate concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the August 21-27, 1995 episode.

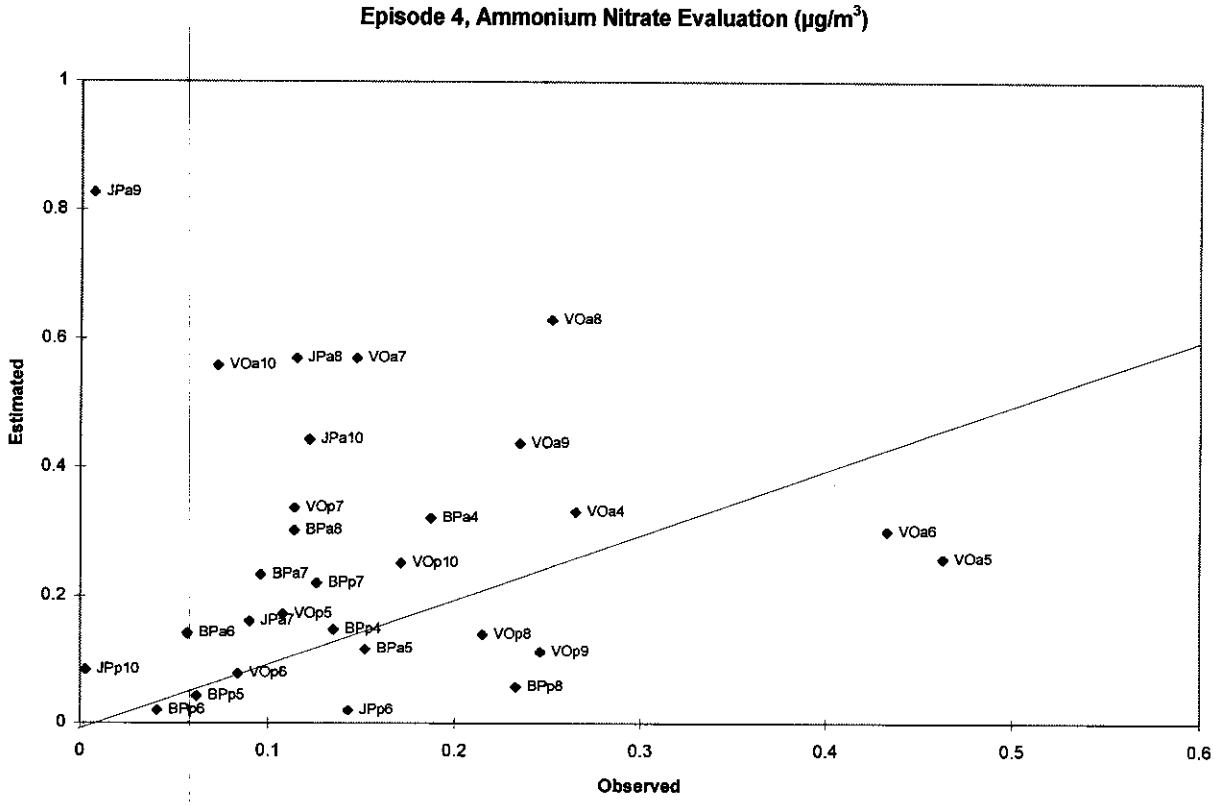


Figure B.2.3.4c. Scatterplot of predicted and observed 6-hour ammonium nitrate concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the August 21-27, 1995 episode.

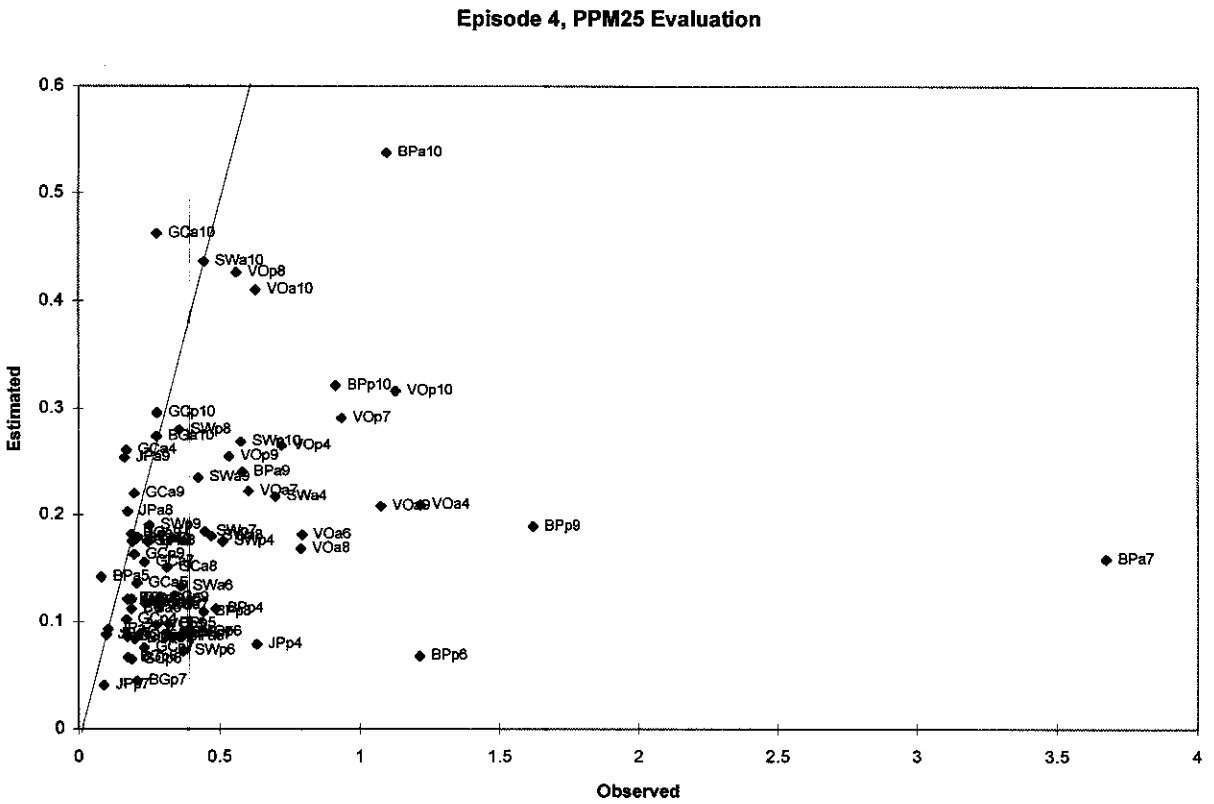


Figure B.2.3.4d. Scatterplot of predicted and observed 6-hour non-carbonaceous primary $PM_{2.5}$ concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the August 21-27, 1995 episode.

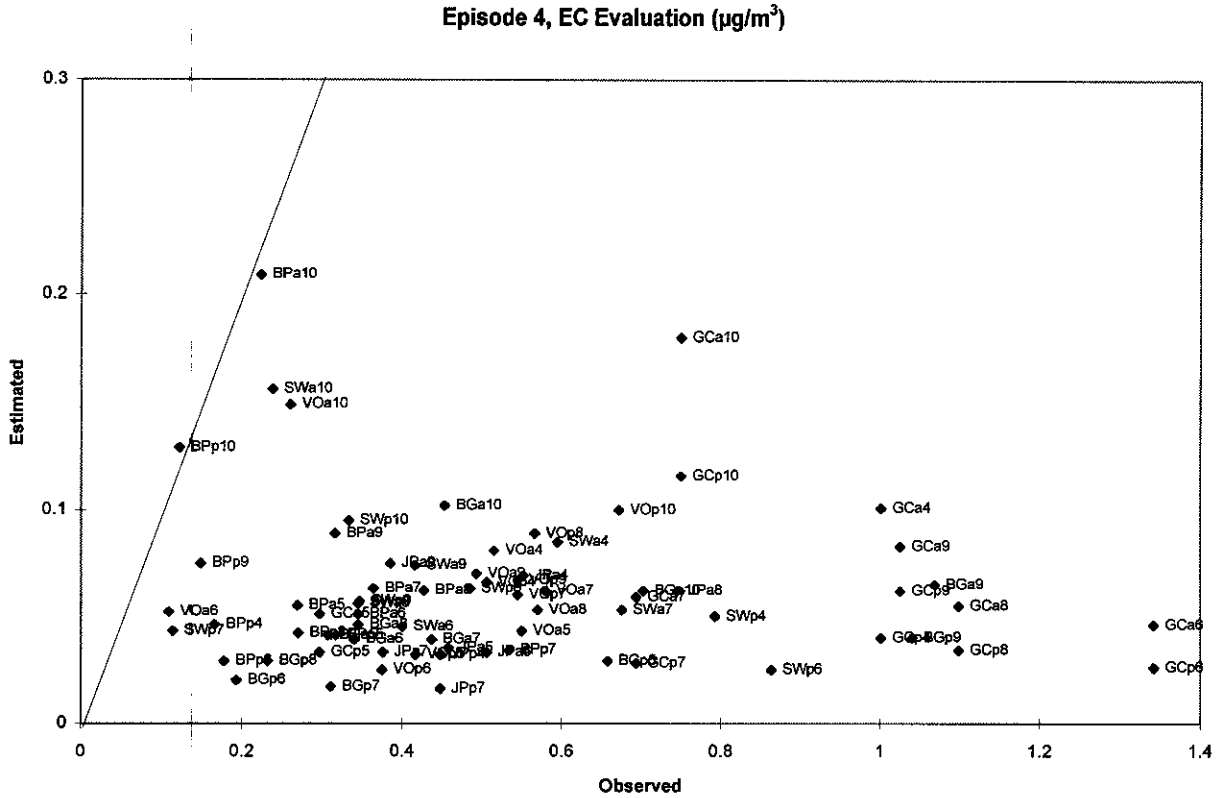


Figure B.2.3.4e. Scatterplot of predicted and observed 6-hour elemental carbon concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the August 21-27, 1995 episode.

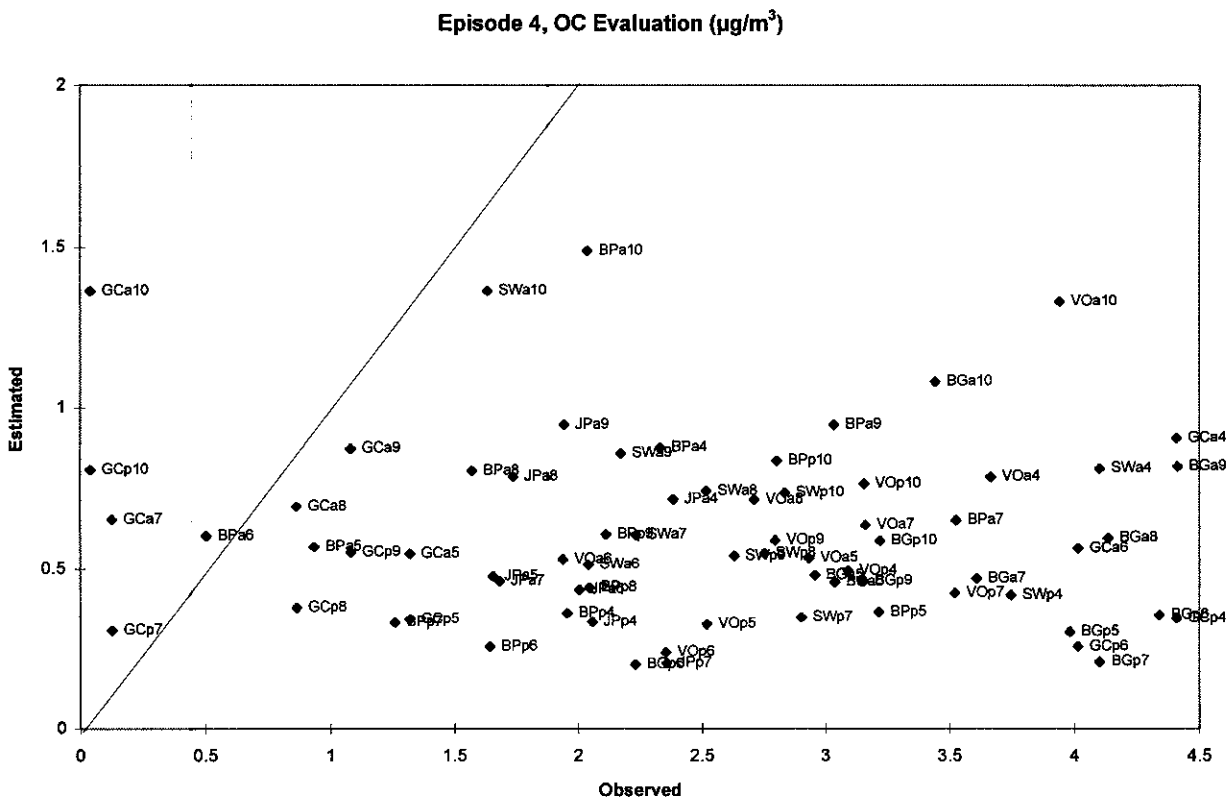


Figure B.2.3.4f. Scatterplot of predicted and observed 6-hour organic aerosol concentrations at the five MZVS sites (BP=Buffalo Pass, GC=Gilpin Creek, BG=Baggs, VO=Hayden VOR, SW=Hayden Sewage, and JP=Juniper Mountain) for the August 21-27, 1995 episode.

elemental carbon and organic carbon concentrations on some days at the Gilpin Creek site (e.g., GCa6) which suggest impacts from fires.

B.2.3.5 Model-Estimated and Observed Chemical Composition of $PM_{2.5}$ and Light Extinction in the MZWA

Table B.2.3.5 through B.2.3.8 compare the model-estimated and observed six-hour chemical composition to $PM_{2.5}$ mass concentrations and light extinction at the Buffalo Pass, Gilpin Creek, and Mad Creek receptors in or in the immediate vicinity of the wilderness area for the four episodes. The Gilpin Creek 12-hour observations are displayed as two identical six-hour observations for comparison purposes. The observed $PM_{2.5}$ organic aerosol measurement does not distinguish between primary organic aerosol ($OC_{2.5}$) and secondary organic aerosol (SOA), thus the organic aerosol measurement has been split 50/50 for comparison with the model-estimated values, which do make such a distinction.

Episode of 09/17/95 to 09/21/95: At the Buffalo Pass site for the September episode, CALPUFF overestimates the observed $PM_{2.5}$ mass for almost every six-hour period. The CALPUFF sulfate estimates are always higher than what was observed during this episode, with the exception of the morning measurement on 09/21/95. However, the model-estimated and observed percent contributions of sulfate to $PM_{2.5}$ mass are remarkably similar, to within 10% in most cases and always within 20% (Table B.2.3.5a). Both the model estimations and observations suggest that sulfate is usually a large contributor to the $PM_{2.5}$ mass at the Buffalo Pass site, typically 35% to 55%.

The model usually overestimates the observed ammonium nitrate concentrations at the Buffalo Pass site, but, except for a few outliers, both the model estimations and observations suggest that ammonium nitrate is a minor component (usually < 10% to 25%) of the $PM_{2.5}$ mass. The exception to this is on the morning of 09/20/95, during which the measurements suggest that over 60% of the $PM_{2.5}$ is due to nitrate. This appears to be very atypical.

Both the model and measurements suggest that non-carbonaceous primary $PM_{2.5}$ ($PPM_{2.5}$) is a minor component to $PM_{2.5}$ mass at the Buffalo Pass site during the September episode (usually < 10%). There is a lot of variability in both the model-estimated and observed values for this species. Given that geological material is a major factor for this species, the high variability is not surprising.

The model underestimation of elemental carbon ($EC_{2.5}$) is also reflected in the PM chemical mass budgets. During most periods at the Buffalo Pass site, with the exception of the mornings of 09/19/95 and 09/20/95 during which the observed $EC_{2.5}$ contributed 10% and 16% of the observed total $PM_{2.5}$, respectively, both the model and measurements suggest that $EC_{2.5}$ is a minor contributor (< 10%) to the $PM_{2.5}$ mass during this episode.

The interpretation of the modeled and observed chemical contribution due to organic aerosols is confounded since the measurements are unable to distinguish between primary and secondary organic aerosols. Generally, the model estimations and observations suggest

that organic aerosols are significant contributors (approximately 20% to 40%) to $PM_{2.5}$ mass – the modeled values being larger in magnitude at the Buffalo Pass site, but a smaller percentage contributor to $PM_{2.5}$ mass. There are some exceptions to this general trend, such as the morning of 09/20/95 when organic aerosols contributed 64% to the observed $PM_{2.5}$. mass.

The measured and modeled results of the chemical contribution to light extinction at the Buffalo Pass site during the September episode (Table B.2.3.5b) are similar, with the exception that the introduction of Rayleigh scattering reduces the percent contribution of all species and the contribution of species with more efficient light scattering (e.g., sulfate) is raised relative to those that are less efficient (e.g., $PPM_{2.5}$).

Table B.2.3.5c displays the model-estimated and observed chemical composition of $PM_{2.5}$ at the Gilpin Creek site during the September episode. Note that the 12-hour average measurements have been split in two for comparison with the six-hour modeled values. At the Gilpin Creek site, the model tends to systematically overestimate the observed $PM_{2.5}$ mass. Sulfate is overestimated by the model, however, comparisons of the observed and estimated contribution of sulfate to $PM_{2.5}$ mass are quite close; both suggest that sulfate at the Gilpin Creek site is a significant contributor (50% to 55%) of $PM_{2.5}$ mass.

Because of large amounts of missing observations, or observations near the threshold of the instruments, comparisons of the contributions of other species to $PM_{2.5}$ mass are difficult to interpret. These missing observed values also mean that total light extinction can not be calculated at the Gilpin Creek site (Table B.2.3.5d).

Finally, the results of the modeled chemical composition of the $PM_{2.5}$ mass and light extinction at the Mad Creek lower elevation receptor in the southwestern corner of the MZWA are shown in Tables B.2.3.5e and B.2.3.5f. The model-estimated relative contribution of different chemical species to $PM_{2.5}$ mass is very similar to what was seen at the Buffalo Pass site. The lack of observations at this site inhibits the interpretation of whether this is correct or not.

Episode of 08/07/95 to 08/09/95: Table B.2.3.6 summarizes the model-estimated and observed chemical composition of the $PM_{2.5}$ mass at the three receptor sites in or near the MZWA during the first August episode. Although CALPUFF is exhibiting serious model performance problems toward underestimating almost every single component of the $PM_{2.5}$, the model-estimated relative contributions of different chemical components to $PM_{2.5}$ mass are remarkably close to the observed contributions for most of the sampling periods. With the exception of three periods (estimated on the morning of 08/08/95, observed on the morning of 08/09/95, and estimated on the afternoon of 08/09/95), both the model-estimated and observed values suggest that approximately 20% to 30% of the $PM_{2.5}$ mass at the Buffalo Pass site is due to sulfate during this episode. Elemental carbon is usually a small component (usually $< 10\%$) of the $PM_{2.5}$ mass. Both the model and observations agree that organic aerosols (combined primary OC plus SOA) are the most significant components of $PM_{2.5}$ mass at the Buffalo Pass site for the first August episode. The model suggest that secondary organic aerosols are a larger component that primary organic aerosols. Because of missing

species ($PPM_{2.5}$) and the serious model underestimations, the results for extinction cannot be estimated.

Although the model systematically underestimates almost all chemical species, it provides a more accurate assessment of the relative contribution of different chemical components to $PM_{2.5}$ mass. However, even if the relative contributions of different chemical species to $PM_{2.5}$ mass are well represented by the model, this does not imply that the model will accurately estimate the relative impacts of different sources on $PM_{2.5}$ levels. In fact, the conceptual model for this episode suggests that super-regional transport from source regions outside of the MZVS regional-scale modeling domain played a role in the high observed $PM_{2.5}$ concentrations. Care should be taken in the interpretation of even the estimated relative contributions of source regions to $PM_{2.5}$ since the evaluation suggests that many of the emissions sources that contributed to the high $PM_{2.5}$ may not be included.

Episode of 10/07/95 to 10/19/95: Table B.2.3.7 summarizes the model-estimated and observed chemical compositions and relative contributions to $PM_{2.5}$ mass at the three sites in or near the MZWA for the October episode. The relative contributions of sulfate to $PM_{2.5}$ mass range from 20% to 66% at the Buffalo Pass site. In general, the model tends to have a higher contribution of sulfate to the $PM_{2.5}$ mass; however, modeled contributions are usually within 10% to 20% of what was observed. Both the model-estimated and observed values suggest that ammonium nitrate is a larger contributor to $PM_{2.5}$ mass at the Buffalo Pass site for the October episode than for the previous episodes, although the model generally overestimates ammonium nitrate contributions relative to the observations.

The model-estimated and observed contributions of non-carbonaceous $PM_{2.5}$ to $PM_{2.5}$ mass are quite variable, with the observed contributions usually ranging from 10% to 30% while the estimated contributions range from 5% to 15%. The model estimates that elemental carbon is a minor contributor (< 6%) to $PM_{2.5}$ mass whereas the observations suggest much more variability in the elemental carbon contributions (ranging from 1% to 26%).

Both the model-estimated and observed values suggest that organic aerosols are usually significant (20% to 60%) components of $PM_{2.5}$ mass and are usually the largest components of any chemical species. The model frequently suggests that secondary organic aerosols may contribute twice as much as primary organic carbon to the total organic aerosols. Care should be taken in this interpretation given the simplistic treatment of secondary organic aerosols in the MZVS CALPUFF modeling and the lack of measurements capable of confirming or denying this finding.

The results for the mass budget at the Gilpin Creek and Mad Creek sites are similar to what was discussed for the Buffalo Pass site above, except that missing observational data at the Gilpin Creek site and a lack of any observed data at the Mad Creek site make the results more difficult to verify and interpret.

Episode of 08/21/95 to 08/27/95: Like the episode of 08/07/95 to 08/09/95, all chemical components, except ammonium nitrate, are significantly underestimated by

CALPUFF for this episode (Table B.2.3.8). The model-estimated ammonium nitrate levels are small at the Buffalo Pass site (< 0.55 $\mu g/m^3$), but because the $PM_{2.5}$ mass is very low, ammonium nitrate can still make a significant contribution to $PM_{2.5}$ mass (as high as 21%). Thus, the model usually estimates a lower contribution by sulfate to $PM_{2.5}$ mass (10% to 30%) than observed (20% to 60%).

The observed contribution of non-carbonaceous $PM_{2.5}$ to $PM_{2.5}$ mass varies from 4% to 34%, whereas the model-estimated contribution is much more stable, varying from 8% to 15%. Similarly, the model estimated contribution of elemental carbon to $PM_{2.5}$ mass is lower and much less variable (3% to 6%) than observed (3% to 17%). Both the model-estimated and observed values usually agree that elemental carbon is a minor contributor (< 10%) to $PM_{2.5}$ mass at the Buffalo Pass site for the second August episode.

As seen for the other episodes, organic aerosols are usually the biggest contributors to $PM_{2.5}$ mass at the Buffalo Pass site. However, during some sampling periods, sulfate is a larger contributor. Again, the model suggests that more organic aerosol is secondary rather than primary in origin, but it is difficult to confirm.

The model results for Gilpin Creek and Mad Creek are similar to what is seen at Buffalo Pass and missing observations inhibit the interpretation of the observed chemical mass balance at these two sites.

B.2.3.6 Estimated Source Attributions at Five MZVS Filter Sites

Tables B.2.3.11a and B.2.3.11b display CALPUFF-estimated source contributions to six-hour average $PM_{2.5}$, total light extinction (with the nominal value of 10 Mm^{-1}), and concentration/extinction by species for two of the filter pack sites nearest the MZWA (Buffalo Pass and Gilpin Creek). The tables also present results for the Mad Creek receptor. For comparison purposes, six-hour concentrations from filter pack measurements are also presented, along with extinction estimated from the filter pack measurements using identical extinction efficiencies as applied to estimated concentrations. Source attributions are presented for all 12 source regions/types modeled with CALPUFF, and present results from each six-hour daylight period (0600-1200, and 1200-1800 MST) of all four intensive modeling episodes. A summary of these tables is presented in Section 7.7 of this report.

Table B.2.3.5a
Observed and CALPUFF Estimated Chemical Composition of $PM_{2.5}$ Concentrations ($\mu g/m^3$) and Percent Contribution to Total $PM_{2.5}$ at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total PM2.5	
	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)
Sep. 17 am Observed	1.10	45	0.20	8	0.34	14	0.18	7	0.48	20	0.48	20	2.44	100
Sep. 17 am Predicted	2.21	39	0.44	8	0.71	12	0.29	5	0.98	17	1.04	18	5.67	100
Sep. 17 pm Observed	1.43	51	0.12	4	0.23	8	0.05	2	0.65	23	0.65	23	2.81	100
Sep. 17 pm Predicted	2.38	52	0.11	2	0.44	10	0.19	4	0.77	17	0.67	15	4.56	100
Sep. 18 am Observed	0.78	50	0.13	8	0.11	7	0.06	4	0.34	21	0.34	21	1.57	100
Sep. 18 am Predicted	1.86	34	0.91	17	0.50	9	0.23	4	1.07	20	0.91	17	5.49	100
Sep. 18 pm Observed	1.59	69	0.27	12	0.12	5	0.10	4	0.24	11	0.24	11	2.30	100
Sep. 18 pm Predicted	2.22	59	0.59	16	0.17	4	0.08	2	0.39	10	0.33	9	3.77	100
Sep. 19 am Observed	0.42	34	0.17	14	0.15	12	0.12	10	0.28	23	0.28	23	1.23	100
Sep. 19 am Predicted	0.93	46	0.17	8	0.14	7	0.06	3	0.21	10	0.49	25	2.00	100
Sep. 19 pm Observed	1.17	40	0.26	9	0.15	5	0.24	8	0.73	25	0.73	25	2.90	100
Sep. 19 pm Predicted	1.48	48	0.79	26	0.17	5	0.06	2	0.31	10	0.27	9	3.07	100
Sep. 20 am Observed	0.35	16	1.38	63	0.08	4	0.34	16	0.74	34	0.74	34	2.20	100
Sep. 20 am Predicted	2.28	38	0.47	8	0.38	6	0.23	4	1.80	30	0.91	15	6.06	100
Sep. 20 pm Observed	0.88	50	0.22	13	0.09	5	0.09	5	0.33	19	0.33	19	1.74	100
Sep. 20 pm Predicted	2.00	51	0.17	4	0.22	6	0.13	3	0.95	24	0.46	12	3.91	100
Sep. 21 am Observed	1.49	83	0.14	8	0.14	8	0.13	7	0.02	1	0.02	1	1.78	100
Sep. 21 am Predicted	1.37	46	0.00	0	0.25	8	0.11	4	0.45	15	0.77	26	2.95	100
Sep. 21 pm Observed	0.88	67	0.00	-99	0.10	7	0.05	4	0.15	11	0.15	11	1.32	100
Sep. 21 pm Predicted	1.22	50	0.43	17	0.15	6	0.06	3	0.23	9	0.37	15	2.46	100

Table B.2.3.5b
Observed and CALPUFF Estimated Chemical Composition of Extinction (Mm^{-1})
and Percent Contribution to Total Extinction at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total B_{ext}	
Date	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)
Sep. 17 am Observed	2.29	13	0.46	3	0.54	3	1.61	9	1.53	9	1.53	9	17.95	100
Sep. 17 am Predicted	4.61	18	0.99	4	1.10	4	2.67	10	3.12	12	3.30	13	25.79	100
Sep. 17 pm Observed	2.98	16	0.28	2	0.36	2	0.45	2	2.07	11	2.07	11	18.20	100
Sep. 17 pm Predicted	4.97	22	0.25	1	0.68	3	1.71	8	2.45	11	2.14	10	22.20	100
Sep. 18 am Observed	12.04	36	1.99	6	0.56	2	0.55	2	4.26	13	4.26	13	33.66	100
Sep. 18 am Predicted	28.82	35	14.23	17	2.43	3	2.06	2	13.62	16	11.62	14	82.78	100
Sep. 18 pm Observed	24.61	53	4.20	9	0.61	1	0.91	2	3.09	7	3.09	7	46.51	100
Sep. 18 pm Predicted	34.29	53	9.25	14	0.81	1	0.72	1	4.95	8	4.16	6	64.19	100
Sep. 19 am Observed	4.44	19	1.82	8	0.55	2	1.14	5	2.63	11	2.63	11	23.19	100
Sep. 19 am Predicted	9.82	34	1.80	6	0.52	2	0.55	2	1.93	7	4.53	16	29.14	100
Sep. 19 pm Observed	4.37	18	1.03	4	0.29	1	2.20	9	3.18	13	3.18	13	24.24	100
Sep. 19 pm Predicted	5.54	25	3.08	14	0.33	1	0.57	3	1.33	6	1.20	5	22.04	100
Sep. 20 am Observed	5.47	9	21.56	36	0.39	1	3.14	5	9.46	16	9.46	16	59.48	100
Sep. 20 am Predicted	35.29	39	7.31	8	1.83	2	2.12	2	22.82	25	11.55	13	90.93	100
Sep. 20 pm Observed	13.56	37	3.47	9	0.44	1	0.82	2	4.14	11	4.14	11	36.58	100
Sep. 20 pm Predicted	30.84	49	2.59	4	1.06	2	1.20	2	12.06	19	5.80	9	63.55	100
Sep. 21 am Observed	12.12	48	1.18	5	0.43	2	1.19	5	0.14	1	0.14	1	25.19	100
Sep. 21 am Predicted	11.14	35	0.00	0	0.77	2	1.01	3	3.39	11	5.80	18	32.10	100
Sep. 21 pm Observed	5.30	0	0.00	-99	0.24	0	0.45	0	0.89	0	0.89	0	0.00	-99
Sep. 21 pm Predicted	7.33	30	2.64	11	0.38	2	0.59	2	1.37	6	2.22	9	24.53	100

Table B.2.3.5c
Observed and CALPUFF Estimated Chemical Composition of $PM_{2.5}$ Concentrations ($\mu g/m^3$) and Percent Contribution to Total $PM_{2.5}$ at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total PM2.5	
Date	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)
Sep. 17 am Observed	1.53	59	0.00	-99	0.00	-99	0.49	19	0.00	-99	0.00	-99	2.62	100
Sep. 17 am Predicted	2.25	44	0.10	2	0.63	12	0.26	5	0.88	17	1.02	20	5.14	100
Sep. 17 pm Observed	1.53	59	0.00	-99	0.00	-99	0.49	19	0.00	-99	0.00	-99	2.62	100
Sep. 17 pm Predicted	2.41	53	0.00	0	0.43	10	0.18	4	0.80	18	0.68	15	4.50	100
Sep. 18 am Observed	1.26	59	0.00	-99	0.00	-99	0.51	24	0.00	-99	0.00	-99	2.15	100
Sep. 18 am Predicted	2.15	41	0.41	8	0.48	9	0.22	4	1.13	21	0.89	17	5.27	100
Sep. 18 pm Observed	1.26	59	0.00	-99	0.00	-99	0.51	24	0.00	-99	0.00	-99	2.15	100
Sep. 18 pm Predicted	1.79	49	0.94	26	0.15	4	0.07	2	0.38	10	0.33	9	3.66	100
Sep. 19 am Observed	0.75	45	0.00	-99	0.00	-99	0.51	31	0.00	-99	0.00	-99	1.66	100
Sep. 19 am Predicted	0.80	53	0.00	0	0.11	7	0.05	3	0.16	11	0.39	26	1.51	100
Sep. 19 pm Observed	0.75	45	0.00	-99	0.00	-99	0.51	31	0.00	-99	0.00	-99	1.66	100
Sep. 19 pm Predicted	1.18	50	0.53	23	0.10	4	0.05	2	0.25	11	0.24	10	2.35	100
Sep. 20 am Observed	0.83	55	0.00	-99	0.00	-99	0.34	23	0.00	-99	0.00	-99	1.51	100
Sep. 20 am Predicted	1.83	38	0.04	1	0.31	6	0.20	4	1.58	33	0.89	18	4.86	100
Sep. 20 pm Observed	0.83	55	0.00	-99	0.00	-99	0.34	23	0.00	-99	0.00	-99	1.51	100
Sep. 20 pm Predicted	1.95	56	0.23	7	0.17	5	0.10	3	0.60	17	0.45	13	3.49	100
Sep. 21 am Observed	0.77	51	0.00	-99	0.14	9	0.45	30	0.02	1	0.02	1	1.50	100
Sep. 21 am Predicted	1.07	48	0.00	0	0.17	8	0.08	4	0.31	14	0.60	27	2.23	100
Sep. 21 pm Observed	0.77	51	0.00	-99	0.14	9	0.45	30	0.02	1	0.02	1	1.50	100
Sep. 21 pm Predicted	0.77	40	0.54	28	0.10	5	0.05	2	0.16	8	0.32	16	1.94	100

Table B.2.3.5d
Observed and CALPUFF Estimated Chemical Composition of Extinction (Mm^{-1})
and Percent Contribution to Total Extinction at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total B_{ext}	
	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)
Sep. 17 am Observed	3.23	0	0.00	-99	0.00	-99	4.45	0	0.00	-99	0.00	-99	0.00	-99
Sep. 17 am Predicted	4.74	19	0.23	1	0.98	4	2.41	10	2.81	12	3.26	13	24.43	100
Sep. 17 pm Observed	2.88	0	0.00	-99	0.00	-99	4.45	0	0.00	-99	0.00	-99	0.00	-99
Sep. 17 pm Predicted	4.51	21	0.00	0	0.65	3	1.66	8	2.43	11	2.06	10	21.30	100
Sep. 18 am Observed	12.60	0	0.00	-99	0.00	-99	4.64	0	0.00	-99	0.00	-99	0.00	-99
Sep. 18 am Predicted	21.43	38	4.12	7	1.67	3	2.01	4	9.94	17	7.84	14	57.02	100
Sep. 18 pm Observed	8.76	0	0.00	-99	0.00	-99	4.64	0	0.00	-99	0.00	-99	0.00	-99
Sep. 18 pm Predicted	12.42	36	6.71	19	0.41	1	0.67	2	2.50	7	2.22	6	34.93	100
Sep. 19 am Observed	4.24	0	0.00	-99	0.00	-99	4.64	0	0.00	-99	0.00	-99	0.00	-99
Sep. 19 am Predicted	4.56	25	0.00	0	0.26	1	0.41	2	0.91	5	2.25	12	18.40	100
Sep. 19 pm Observed	1.97	0	0.00	-99	0.00	-99	4.64	0	0.00	-99	0.00	-99	0.00	-99
Sep. 19 pm Predicted	3.13	18	1.50	9	0.17	1	0.43	3	0.89	5	0.85	5	16.97	100
Sep. 20 am Observed	8.94	0	0.00	-99	0.00	-99	3.10	0	0.00	-99	0.00	-99	0.00	-99
Sep. 20 am Predicted	19.81	35	0.41	1	1.17	2	1.86	3	14.87	26	8.33	15	56.45	100
Sep. 20 pm Observed	4.19	0	0.00	-99	0.00	-99	3.10	0	0.00	-99	0.00	-99	0.00	-99
Sep. 20 pm Predicted	9.91	35	1.20	4	0.39	1	0.89	3	3.17	11	2.37	8	27.92	100
Sep. 21 am Observed	3.47	0	0.00	-99	0.30	0	4.09	0	0.11	0	0.11	0	0.00	-99
Sep. 21 am Predicted	4.80	24	0.00	0	0.37	2	0.74	4	1.52	7	2.95	14	20.38	100
Sep. 21 pm Observed	1.95	0	0.00	-99	0.23	0	4.09	0	0.08	0	0.08	0	0.00	-99
Sep. 21 pm Predicted	1.96	13	1.47	9	0.17	1	0.43	3	0.55	3	1.11	7	15.69	100

Table B.2.3.5e
Observed and CALPUFF Estimated Chemical Composition of $PM_{2.5}$ Concentrations ($\mu g/m^3$) and Percent Contribution to Total $PM_{2.5}$ at Mad Creek for the 09/17/95 to 09/21/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total PM2.5	
	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)
Sep. 17 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 17 am Predicted	2.19	40	0.44	8	0.66	12	0.27	5	0.95	17	1.04	19	5.55	100
Sep. 17 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 17 pm Predicted	2.53	53	0.11	2	0.46	10	0.19	4	0.86	18	0.66	14	4.80	100
Sep. 18 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 18 am Predicted	2.15	37	0.93	16	0.48	8	0.22	4	1.15	20	0.91	16	5.84	100
Sep. 18 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 18 pm Predicted	1.89	56	0.58	17	0.15	4	0.07	2	0.39	11	0.32	10	3.41	100
Sep. 19 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 19 am Predicted	0.92	47	0.16	8	0.13	7	0.06	3	0.21	11	0.45	23	1.93	100
Sep. 19 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 19 pm Predicted	1.42	48	0.64	21	0.17	6	0.07	2	0.40	13	0.28	9	2.97	100
Sep. 20 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 20 am Predicted	2.11	34	0.44	7	0.39	6	0.25	4	2.08	33	0.94	15	6.21	100
Sep. 20 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 20 pm Predicted	2.09	53	0.17	4	0.21	5	0.13	3	0.92	23	0.46	12	3.97	100
Sep. 21 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 21 am Predicted	1.33	48	0.00	0	0.23	8	0.10	4	0.40	14	0.72	26	2.79	100
Sep. 21 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 21 pm Predicted	1.04	48	0.42	19	0.13	6	0.06	3	0.20	9	0.34	16	2.19	100

Table B.2.3.5f
Observed and CALPUFF Estimated Chemical Composition of Extinction (Mm^{-1})
and Percent Contribution to Total Extinction at Mad Creek for the 09/17/95 to 09/21/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total B_{ext}	
	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)
Sep. 17 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 17 am Predicted	4.21	17	0.92	4	1.00	4	2.49	10	2.91	12	3.19	13	24.72	100
Sep. 17 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 17 pm Predicted	4.89	22	0.23	1	0.70	3	1.71	8	2.63	12	2.03	9	22.20	100
Sep. 18 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 18 am Predicted	11.46	28	5.12	12	1.13	3	2.02	5	6.31	15	5.00	12	41.04	100
Sep. 18 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 18 pm Predicted	9.04	34	2.86	11	0.34	1	0.68	3	1.97	7	1.65	6	26.54	100
Sep. 19 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 19 am Predicted	3.65	20	0.68	4	0.27	1	0.52	3	0.95	5	2.06	11	18.13	100
Sep. 19 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 19 pm Predicted	3.29	18	1.60	9	0.28	2	0.62	3	1.34	7	0.93	5	18.05	100
Sep. 20 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 20 am Predicted	23.26	33	4.93	7	1.48	2	2.31	3	19.85	28	9.01	13	70.85	100
Sep. 20 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 20 pm Predicted	15.28	40	1.25	3	0.59	2	1.16	3	6.32	17	3.19	8	37.79	100
Sep. 21 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 21 am Predicted	8.17	31	0.00	0	0.60	2	0.93	4	2.45	9	4.39	17	26.54	100
Sep. 21 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Sep. 21 pm Predicted	3.37	19	1.45	8	0.25	1	0.52	3	0.78	4	1.37	8	17.73	100

Table B.2.3.6a
Observed and CALPUFF Estimated Chemical Composition of $PM_{2.5}$ Concentrations ($\mu g/m^3$)
and Percent Contribution to Total $PM_{2.5}$ at Buffalo Pass for the 08/07/95 to 08/09/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total PM2.5	
	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)
Aug. 7 am Observed	1.52	27	0.00	-99	0.62	11	0.69	12	1.53	27	1.53	27	5.68	100
Aug. 7 am Predicted	0.80	27	0.24	8	0.40	13	0.16	5	0.53	18	0.87	29	2.99	100
Aug. 7 pm Observed	1.47	35	0.00	-99	0.57	14	0.60	15	0.78	19	0.78	19	4.16	100
Aug. 7 pm Predicted	0.21	28	0.01	1	0.11	14	0.05	6	0.16	21	0.23	30	0.76	100
Aug. 8 am Observed	1.95	38	0.00	-99	0.82	16	0.00	0	1.36	26	1.36	26	5.19	100
Aug. 8 am Predicted	0.03	6	0.03	6	0.08	14	0.03	6	0.08	14	0.29	54	0.54	100
Aug. 8 pm Observed	2.02	35	0.00	-99	1.00	18	0.73	13	0.86	15	0.86	15	5.69	100
Aug. 8 pm Predicted	0.15	25	0.03	5	0.07	12	0.03	5	0.17	28	0.15	26	0.59	100
Aug. 9 am Observed	0.58	13	0.00	-99	1.77	38	0.01	0	1.19	26	1.19	26	4.61	100
Aug. 9 am Predicted	0.31	19	0.22	13	0.18	11	0.07	4	0.21	13	0.66	40	1.65	100
Aug. 9 pm Observed	1.16	21	0.00	-99	1.43	26	0.15	3	1.55	29	1.55	29	5.42	100
Aug. 9 pm Predicted	0.83	53	0.11	7	0.12	8	0.05	3	0.16	10	0.30	19	1.56	100

Table B.2.3.6b
Observed and CALPUFF Estimated Chemical Composition of Extinction (Mm^{-1})
and Percent Contribution to Total Extinction at Buffalo Pass for the 08/07/95 to 08/09/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total B_{ext}	
	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)
Aug. 7 am Observed	3.04	0	0.00	-99	0.95	0	6.26	0	4.77	0	4.77	0	0.00	-99
Aug. 7 am Predicted	1.59	9	0.51	3	0.61	3	1.44	8	1.66	9	2.71	15	18.53	100
Aug. 7 pm Observed	2.92	0	0.00	-99	0.88	0	5.50	0	2.43	0	2.43	0	0.00	-99
Aug. 7 pm Predicted	0.42	3	0.02	0	0.16	1	0.41	3	0.49	4	0.71	6	12.21	100
Aug. 8 am Observed	4.41	0	0.00	-99	1.33	0	0.01	0	4.52	0	4.52	0	0.00	-99
Aug. 8 am Predicted	0.08	1	0.08	1	0.12	1	0.28	2	0.26	2	0.97	8	11.78	100
Aug. 8 pm Observed	4.45	0	0.00	-99	1.60	0	6.67	0	2.81	0	2.81	0	0.00	-99
Aug. 8 pm Predicted	0.32	3	0.06	1	0.11	1	0.26	2	0.54	5	0.49	4	11.79	100
Aug. 9 am Observed	1.12	0	0.00	-99	2.69	0	0.06	0	3.64	0	3.64	0	0.00	-99
Aug. 9 am Predicted	0.60	4	0.46	3	0.27	2	0.67	5	0.65	4	2.02	14	14.67	100
Aug. 9 pm Observed	2.17	0	0.00	-99	2.16	0	1.35	0	4.69	0	4.69	0	0.00	-99
Aug. 9 pm Predicted	1.56	11	0.22	2	0.18	1	0.45	3	0.47	3	0.92	7	13.79	100

Table B.2.3.6c
Observed and CALPUFF Estimated Chemical Composition of $PM_{2.5}$ Concentrations ($\mu g/m^3$) and Percent Contribution to Total $PM_{2.5}$ at Gilpin Creek for the 08/07/95 to 08/09/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total PM2.5	
	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)
Aug. 7 am Observed	1.76	21	0.00	-99	0.39	5	1.75	21	2.28	28	2.28	28	8.20	100
Aug. 7 am Predicted	0.86	29	0.24	8	0.38	13	0.15	5	0.55	19	0.81	27	2.99	100
Aug. 7 pm Observed	1.76	21	0.00	-99	0.39	5	1.75	21	2.28	28	2.28	28	8.20	100
Aug. 7 pm Predicted	0.33	34	0.04	4	0.12	12	0.05	5	0.18	19	0.24	25	0.95	100
Aug. 8 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.51	100
Aug. 8 am Predicted	0.06	12	0.06	11	0.07	12	0.03	5	0.06	12	0.27	49	0.55	100
Aug. 8 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.51	100
Aug. 8 pm Predicted	0.09	19	0.01	3	0.05	12	0.02	5	0.12	27	0.15	34	0.44	100
Aug. 9 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.39	100
Aug. 9 am Predicted	0.29	20	0.22	15	0.14	10	0.06	4	0.18	12	0.55	38	1.44	100
Aug. 9 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.39	100
Aug. 9 pm Predicted	0.50	48	0.03	3	0.09	8	0.04	4	0.11	11	0.26	26	1.03	100

Table B.2.3.6d
Observed and CALPUFF Estimated Chemical Composition of Extinction (Mm^{-1}) and Percent Contribution to Total Extinction at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total B_{ext}	
	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)
Aug. 7 am Observed	3.43	0	0.00	-99	0.60	0	15.92	0	7.05	0	7.05	0	0.00	-99
Aug. 7 am Predicted	1.67	9	0.51	3	0.58	3	1.40	8	1.71	9	2.49	14	18.36	100
Aug. 7 pm Observed	3.25	0	0.00	-99	0.59	0	15.92	0	6.89	0	6.89	0	0.00	-99
Aug. 7 pm Predicted	0.60	5	0.08	1	0.17	1	0.43	3	0.54	4	0.72	6	12.55	100
Aug. 8 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 8 am Predicted	0.13	1	0.13	1	0.10	1	0.23	2	0.20	2	0.84	7	11.64	100
Aug. 8 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 8 pm Predicted	0.17	1	0.03	0	0.08	1	0.21	2	0.37	3	0.47	4	11.32	100
Aug. 9 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 9 am Predicted	0.58	4	0.48	3	0.22	2	0.57	4	0.56	4	1.70	12	14.10	100
Aug. 9 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 9 pm Predicted	0.90	7	0.06	0	0.13	1	0.34	3	0.34	3	0.79	6	12.55	100

Table B.2.3.6e
Observed and CALPUFF Estimated Chemical Composition of $PM_{2.5}$ Concentrations ($\mu g/m^3$) and Percent Contribution to Total $PM_{2.5}$ at Mad Creek for the 08/07/95 to 08/09/95 Episode

Sulfate		Nitrate	PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total PM2.5					
Date			ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)
Aug.	7	am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug.	7	am Predicted	0.75	26	0.22	8	0.37	13	0.15	5	0.51	17	0.91	31	2.91	100
Aug.	7	pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug.	7	pm Predicted	0.35	38	0.03	3	0.10	11	0.04	5	0.15	16	0.24	26	0.92	100
Aug.	8	am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug.	8	am Predicted	0.14	18	0.06	8	0.09	12	0.03	4	0.08	11	0.35	46	0.75	100
Aug.	8	pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug.	8	pm Predicted	0.12	22	0.01	3	0.07	12	0.03	5	0.18	32	0.14	25	0.54	100
Aug.	9	am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug.	9	am Predicted	0.33	20	0.23	14	0.17	10	0.07	4	0.21	13	0.66	39	1.67	100
Aug.	9	pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug.	9	pm Predicted	0.79	55	0.05	4	0.12	8	0.05	3	0.15	10	0.28	19	1.44	100

Table B.2.3.6f
Observed and CALPUFF Estimated Chemical Composition of Extinction (Mm^{-1}) and Percent Contribution to Total Extinction at Mad Creek for the 08/07/95 to 08/09/95 Episode

			Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total B_{ext}	
Date			Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)
Aug.	7	am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug.	7	am Predicted	1.42	8	0.47	3	0.57	3	1.34	7	1.55	9	2.78	15	18.12	100
Aug.	7	pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug.	7	pm Predicted	0.63	5	0.06	0	0.16	1	0.39	3	0.45	4	0.71	6	12.40	100
Aug.	8	am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug.	8	am Predicted	0.27	2	0.13	1	0.14	1	0.30	2	0.26	2	1.09	9	12.20	100
Aug.	8	pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug.	8	pm Predicted	0.23	2	0.03	0	0.10	1	0.26	2	0.54	5	0.42	4	11.57	100
Aug.	9	am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug.	9	am Predicted	0.62	4	0.47	3	0.26	2	0.67	5	0.64	4	2.00	14	14.68	100
Aug.	9	pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug.	9	pm Predicted	1.38	10	0.10	1	0.17	1	0.42	3	0.44	3	0.82	6	13.34	100

Table B.2.3.7a

Observed and CALPUFF Estimated Chemical Composition of $PM_{2.5}$ Concentrations ($\mu g/m^3$) and Percent Contribution to Total $PM_{2.5}$ at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total PM2.5					
	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)
Oct. 7 am	Observed			0.70	23	0.09	3	0.99	32	0.57	19	0.48	16	0.48	16	3.09	100
Oct. 7 am	Predicted			0.38	21	0.06	3	0.30	17	0.12	6	0.33	18	0.62	34	1.81	100
Oct. 7 pm	Observed			0.75	66	0.11	10	0.00	-99	0.02	1	0.00	-99	0.00	-99	1.14	100
Oct. 7 pm	Predicted			0.46	26	0.38	22	0.22	13	0.08	5	0.23	13	0.38	21	1.76	100
Oct. 8 am	Observed			0.93	36	0.38	15	0.27	10	0.16	6	0.73	28	0.73	28	2.62	100
Oct. 8 am	Predicted			1.15	27	1.36	32	0.36	8	0.14	3	0.37	9	0.88	21	4.26	100
Oct. 8 pm	Observed			0.81	61	0.16	12	0.27	20	0.01	1	0.13	10	0.13	10	1.33	100
Oct. 8 pm	Predicted			1.43	46	0.62	20	0.24	8	0.10	3	0.26	8	0.46	15	3.11	100
Oct. 9 am	Observed			0.56	32	0.24	14	0.28	16	0.17	10	0.41	24	0.41	24	1.73	100
Oct. 9 am	Predicted			1.68	32	0.52	10	0.74	14	0.31	6	0.90	17	1.17	22	5.32	100
Oct. 9 pm	Observed			0.55	29	0.28	15	0.39	21	0.30	16	0.37	19	0.37	19	1.91	100
Oct. 9 pm	Predicted			1.55	43	0.49	14	0.37	10	0.14	4	0.41	12	0.61	17	3.57	100
Oct. 10 am	Observed			0.64	46	0.38	27	0.34	24	0.15	11	0.11	8	0.11	8	1.39	100
Oct. 10 am	Predicted			1.36	36	0.65	17	0.37	10	0.15	4	0.41	11	0.88	23	3.81	100
Oct. 10 pm	Observed			0.71	41	0.18	11	0.28	16	0.28	16	0.24	14	0.24	14	1.73	100
Oct. 10 pm	Predicted			1.43	43	0.52	16	0.28	8	0.12	3	0.31	9	0.65	20	3.30	100
Oct. 11 am	Observed			0.33	20	0.11	7	0.22	13	0.29	17	0.49	29	0.49	29	1.69	100
Oct. 11 am	Predicted			1.17	35	0.42	13	0.35	11	0.15	4	0.40	12	0.84	25	3.34	100
Oct. 11 pm	Observed			0.52	15	0.12	4	1.00	30	0.41	12	0.83	25	0.83	25	3.34	100
Oct. 11 pm	Predicted			0.73	44	0.04	2	0.18	11	0.08	5	0.20	12	0.44	26	1.66	100
Oct. 12 am	Observed			2.32	29	0.22	3	1.48	19	1.02	13	1.81	23	1.81	23	7.97	100
Oct. 12 am	Predicted			0.25	17	0.17	12	0.19	13	0.08	6	0.21	14	0.57	39	1.47	100
Oct. 12 pm	Observed			1.58	36	0.99	23	0.16	4	0.95	22	0.97	22	0.97	22	4.37	100
Oct. 12 pm	Predicted			0.18	15	0.53	45	0.09	8	0.03	3	0.08	7	0.27	23	1.18	100
Oct. 13 am	Observed			0.37	20	0.18	10	0.24	13	0.37	20	0.48	26	0.48	26	1.87	100
Oct. 13 am	Predicted			0.81	27	1.06	35	0.22	7	0.08	3	0.18	6	0.67	22	3.01	100
Oct. 13 pm	Observed			0.32	21	0.15	10	0.18	11	0.16	10	0.51	33	0.51	33	1.53	100
Oct. 13 pm	Predicted			1.34	43	1.12	36	0.16	5	0.05	2	0.13	4	0.30	10	3.10	100
Oct. 14 am	Observed			0.30	18	0.22	14	0.49	30	0.29	18	0.32	19	0.32	19	1.66	100
Oct. 14 am	Predicted			0.61	28	0.19	9	0.25	12	0.10	4	0.23	11	0.79	36	2.16	100
Oct. 14 pm	Observed			0.33	19	0.06	3	0.30	18	0.26	15	0.47	28	0.47	28	1.70	100
Oct. 14 pm	Predicted			0.84	38	0.46	21	0.18	8	0.07	3	0.18	8	0.50	22	2.23	100
Oct. 15 am	Observed			0.26	23	0.19	17	0.00	-99	0.29	26	0.00	-99	0.00	-99	1.10	100
Oct. 15 am	Predicted			0.88	28	0.61	19	0.31	10	0.12	4	0.32	10	0.89	28	3.14	100
Oct. 15 pm	Observed			0.24	11	0.11	5	0.49	21	0.16	7	0.80	35	0.80	35	2.30	100
Oct. 15 pm	Predicted			1.04	39	0.37	14	0.25	9	0.10	4	0.26	10	0.66	25	2.68	100
Oct. 16 am	Observed			0.84	43	0.00	-99	0.53	27	0.21	10	0.22	11	0.22	11	1.97	100
Oct. 16 am	Predicted			1.06	32	0.38	12	0.37	11	0.15	5	0.41	12	0.94	28	3.33	100
Oct. 16 pm	Observed			0.84	43	0.00	-99	0.53	27	0.21	10	0.22	11	0.22	11	1.97	100
Oct. 16 pm	Predicted			1.14	41	0.38	14	0.27	10	0.10	4	0.31	11	0.56	20	2.75	100
Oct. 17 am	Observed			0.83	43	0.00	-99	0.40	21	0.10	5	0.32	17	0.32	17	1.90	100
Oct. 17 am	Predicted			1.87	37	0.49	10	0.52	10	0.22	4	0.69	14	1.22	24	5.02	100
Oct. 17 pm	Observed			0.83	43	0.00	-99	0.40	21	0.10	5	0.32	17	0.32	17	1.90	100
Oct. 17 pm	Predicted			2.28	44	0.49	9	0.50	10	0.23	4	0.85	16	0.86	17	5.20	100
Oct. 18 am	Observed			0.83	48	0.00	-99	0.27	16	0.18	11	0.24	14	0.24	14	1.72	100
Oct. 18 am	Predicted			1.56	33	0.44	9	0.59	12	0.26	5	0.77	16	1.17	25	4.79	100
Oct. 18 pm	Observed			0.83	48	0.00	-99	0.27	16	0.18	11	0.24	14	0.24	14	1.72	100
Oct. 18 pm	Predicted			1.30	42	0.33	11	0.27	9	0.12	4	0.48	16	0.58	19	3.09	100
Oct. 19 am	Observed			0.30	38	0.00	-99	0.19	24	0.10	12	0.10	12	0.10	12	0.80	100
Oct. 19 am	Predicted			1.39	31	1.00	22	0.35	8	0.17	4	0.71	16	0.86	19	4.48	100
Oct. 19 pm	Observed			0.30	38	0.00	-99	0.19	24	0.10	12	0.10	12	0.10	12	0.80	100
Oct. 19 pm	Predicted			0.98	35	0.65	23	0.21	8	0.10	4	0.41	14	0.46	16	2.81	100

Table B.2.3.7b
Observed and CALPUFF Estimated Chemical Composition of Extinction (Mm^{-1})
and Percent Contribution to Total Extinction at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total B_{ext}	
	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)
Oct. 7 am Observed	1.49	7	0.21	1	1.55	7	5.22	24	1.55	7	1.55	7	21.57	100
Oct. 7 am Predicted	0.80	5	0.13	1	0.47	3	1.07	7	1.07	7	2.00	13	15.53	100
Oct. 7 pm Observed	1.61	0	0.26	0	0.00	-99	0.14	0	0.00	-99	0.00	-99	0.00	-99
Oct. 7 pm Predicted	0.98	7	0.89	6	0.35	2	0.74	5	0.75	5	1.22	8	14.93	100
Oct. 8 am Observed	6.32	21	2.66	9	0.73	2	1.48	5	4.79	16	4.79	16	30.77	100
Oct. 8 am Predicted	7.78	21	9.48	25	0.97	3	1.30	3	2.44	6	5.74	15	37.72	100
Oct. 8 pm Observed	1.66	12	0.35	3	0.42	3	0.11	1	0.40	3	0.40	3	13.34	100
Oct. 8 pm Predicted	2.94	16	1.39	8	0.37	2	0.88	5	0.83	5	1.45	8	17.86	100
Oct. 9 am Observed	1.31	8	0.59	4	0.45	3	1.55	9	1.37	8	1.37	8	16.64	100
Oct. 9 am Predicted	3.91	15	1.32	5	1.20	5	2.80	11	3.03	12	3.93	15	26.18	100
Oct. 9 pm Observed	1.15	7	0.65	4	0.61	4	2.76	16	1.17	7	1.17	7	17.51	100
Oct. 9 pm Predicted	3.25	17	1.11	6	0.58	3	1.32	7	1.31	7	1.95	10	19.52	100
Oct. 10 am Observed	1.49	10	0.94	6	0.55	4	1.41	9	0.38	3	0.38	3	15.14	100
Oct. 10 am Predicted	3.15	15	1.62	8	0.59	3	1.39	7	1.36	6	2.95	14	21.06	100
Oct. 10 pm Observed	1.48	9	0.41	3	0.43	3	2.58	16	0.75	5	0.75	5	16.41	100
Oct. 10 pm Predicted	2.98	16	1.18	6	0.44	2	1.05	6	0.98	5	2.06	11	18.69	100
Oct. 11 am Observed	0.65	4	0.24	1	0.35	2	2.60	15	1.53	9	1.53	9	16.91	100
Oct. 11 am Predicted	2.32	12	0.91	5	0.54	3	1.35	7	1.24	7	2.62	14	18.99	100
Oct. 11 pm Observed	0.98	5	0.26	1	1.52	7	3.74	17	2.53	12	2.53	12	21.55	100
Oct. 11 pm Predicted	1.38	10	0.08	1	0.27	2	0.69	5	0.61	4	1.34	9	14.38	100
Oct. 12 am Observed	5.75	14	0.58	1	2.46	6	9.26	23	6.28	15	6.28	15	40.60	100
Oct. 12 am Predicted	0.62	4	0.46	3	0.31	2	0.75	5	0.73	5	1.98	13	14.84	100
Oct. 12 pm Observed	16.06	26	10.22	16	0.57	1	8.65	14	8.71	14	8.71	14	62.92	100
Oct. 12 pm Predicted	1.85	9	5.46	26	0.32	2	0.30	1	0.75	4	2.39	11	21.07	100
Oct. 13 am Observed	1.51	7	0.76	4	0.49	2	3.33	16	2.22	11	2.22	11	20.53	100
Oct. 13 am Predicted	3.31	14	4.54	20	0.44	2	0.72	3	0.84	4	3.09	13	22.95	100
Oct. 13 pm Observed	0.71	4	0.37	2	0.28	2	1.43	9	1.68	10	1.68	10	16.15	100
Oct. 13 pm Predicted	3.01	17	2.73	15	0.26	1	0.46	3	0.43	2	1.00	6	17.89	100
Oct. 14 am Observed	0.61	4	0.50	3	0.76	5	2.66	16	1.00	6	1.00	6	16.52	100
Oct. 14 am Predicted	1.24	8	0.41	3	0.39	2	0.87	5	0.73	5	2.47	15	16.12	100
Oct. 14 pm Observed	0.69	4	0.14	1	0.47	3	2.35	14	1.50	9	1.50	9	16.64	100
Oct. 14 pm Predicted	1.78	11	1.05	7	0.28	2	0.65	4	0.56	4	1.60	10	15.93	100
Oct. 15 am Observed	0.52	0	0.42	0	0.00	-99	2.64	0	0.00	-99	0.00	-99	0.00	-99
Oct. 15 am Predicted	1.80	10	1.35	7	0.48	3	1.14	6	1.01	5	2.81	15	18.59	100
Oct. 15 pm Observed	0.47	3	0.23	1	0.74	4	1.49	8	2.47	14	2.47	14	17.86	100
Oct. 15 pm Predicted	2.02	12	0.79	5	0.38	2	0.92	5	0.81	5	2.03	12	16.93	100
Oct. 16 am Observed	1.60	0	0.00	-99	0.80	0	1.88	0	0.66	0	0.66	0	0.00	-99
Oct. 16 am Predicted	2.03	11	0.80	4	0.56	3	1.40	7	1.26	7	2.88	15	18.93	100
Oct. 16 pm Observed	1.65	0	0.00	-99	0.81	0	1.88	0	0.67	0	0.67	0	0.00	-99
Oct. 16 pm Predicted	2.23	13	0.81	5	0.41	2	0.90	5	0.94	6	1.72	10	17.02	100
Oct. 17 am Observed	1.95	0	0.00	-99	0.66	0	0.87	0	1.07	0	1.07	0	0.00	-99
Oct. 17 am Predicted	4.42	18	1.25	5	0.84	3	2.03	8	2.33	9	4.13	17	25.01	100
Oct. 17 pm Observed	1.72	0	0.00	-99	0.63	0	0.87	0	1.01	0	1.01	0	0.00	-99
Oct. 17 pm Predicted	4.75	20	1.11	5	0.78	3	2.06	9	2.69	11	2.75	11	24.14	100
Oct. 18 am Observed	1.76	0	0.00	-99	0.42	0	1.68	0	0.77	0	0.77	0	0.00	-99
Oct. 18 am Predicted	3.32	14	1.01	4	0.92	4	2.33	10	2.47	10	3.77	16	23.83	100
Oct. 18 pm Observed	1.71	0	0.00	-99	0.42	0	1.68	0	0.76	0	0.76	0	0.00	-99
Oct. 18 pm Predicted	2.68	15	0.74	4	0.42	2	1.12	6	1.52	8	1.85	10	18.34	100
Oct. 19 am Observed	0.76	0	0.00	-99	0.32	0	0.88	0	0.34	0	0.34	0	0.00	-99
Oct. 19 am Predicted	3.50	15	2.70	11	0.59	2	1.55	7	2.48	10	3.01	13	23.82	100
Oct. 19 pm Observed	0.57	0	0.00	-99	0.30	0	0.88	0	0.29	0	0.29	0	0.00	-99
Oct. 19 pm Predicted	1.88	11	1.37	8	0.32	2	0.93	5	1.24	7	1.41	8	17.14	100

Table B.2.3.7c
Observed and CALPUFF Estimated Chemical Composition of $PM_{2.5}$ Concentrations ($\mu g/m^3$) and Percent Contribution to Total $PM_{2.5}$ at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total PM2.5	
	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)
Oct. 7 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 7 am Predicted	0.37	21	0.06	3	0.28	16	0.11	6	0.30	17	0.65	37	1.76	100
Oct. 7 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 7 pm Predicted	0.45	28	0.39	24	0.18	11	0.07	4	0.18	11	0.37	23	1.64	100
Oct. 8 am Observed	1.07	30	0.00	-99	0.48	13	0.58	16	0.72	20	0.72	20	3.56	100
Oct. 8 am Predicted	1.06	28	1.28	33	0.29	8	0.12	3	0.31	8	0.77	20	3.83	100
Oct. 8 pm Observed	1.07	30	0.00	-99	0.48	13	0.58	16	0.72	20	0.72	20	3.56	100
Oct. 8 pm Predicted	1.14	49	0.31	13	0.19	8	0.08	3	0.20	9	0.40	17	2.32	100
Oct. 9 am Observed	0.81	52	0.00	-99	0.00	-99	0.23	15	0.00	-99	0.00	-99	1.56	100
Oct. 9 am Predicted	1.60	35	0.23	5	0.62	14	0.25	6	0.72	16	1.12	25	4.53	100
Oct. 9 pm Observed	0.81	52	0.00	-99	0.00	-99	0.23	15	0.00	-99	0.00	-99	1.56	100
Oct. 9 pm Predicted	1.47	50	0.17	6	0.30	10	0.12	4	0.33	11	0.56	19	2.95	100
Oct. 10 am Observed	0.69	13	0.00	-99	0.48	9	1.40	26	1.57	29	1.57	29	5.39	100
Oct. 10 am Predicted	1.34	37	0.57	16	0.33	9	0.14	4	0.37	10	0.84	23	3.60	100
Oct. 10 pm Observed	0.69	13	0.00	-99	0.48	9	1.40	26	1.57	29	1.57	29	5.39	100
Oct. 10 pm Predicted	1.22	46	0.23	9	0.24	9	0.10	4	0.26	10	0.60	22	2.65	100
Oct. 11 am Observed	0.49	21	0.00	-99	0.21	9	1.10	46	0.29	12	0.29	12	2.38	100
Oct. 11 am Predicted	1.25	37	0.34	10	0.36	11	0.15	4	0.41	12	0.88	26	3.39	100
Oct. 11 pm Observed	0.49	21	0.00	-99	0.21	9	1.10	46	0.29	12	0.29	12	2.38	100
Oct. 11 pm Predicted	0.88	47	0.11	6	0.19	10	0.07	4	0.20	10	0.44	23	1.88	100
Oct. 12 am Observed	0.24	23	0.00	-99	0.00	-99	0.39	37	0.00	-99	0.00	-99	1.07	100
Oct. 12 am Predicted	0.29	19	0.21	14	0.20	13	0.08	5	0.21	14	0.56	36	1.53	100
Oct. 12 pm Observed	0.24	23	0.00	-99	0.00	-99	0.39	37	0.00	-99	0.00	-99	1.07	100
Oct. 12 pm Predicted	0.14	13	0.50	45	0.09	8	0.03	3	0.08	7	0.26	24	1.10	100
Oct. 13 am Observed	0.34	36	0.00	-99	0.00	-99	0.02	2	0.00	-99	0.00	-99	0.94	100
Oct. 13 am Predicted	0.56	21	1.10	42	0.16	6	0.06	2	0.14	5	0.58	22	2.60	100
Oct. 13 pm Observed	0.34	36	0.00	-99	0.00	-99	0.02	2	0.00	-99	0.00	-99	0.94	100
Oct. 13 pm Predicted	1.20	43	1.08	39	0.11	4	0.04	1	0.08	3	0.28	10	2.78	100
Oct. 14 am Observed	0.66	59	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	1.12	100
Oct. 14 am Predicted	0.70	34	0.00	0	0.24	12	0.09	5	0.22	11	0.79	39	2.03	100
Oct. 14 pm Observed	0.66	59	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	1.12	100
Oct. 14 pm Predicted	0.71	39	0.25	14	0.16	9	0.06	3	0.14	8	0.49	27	1.81	100
Oct. 15 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	7.18	100
Oct. 15 am Predicted	1.04	31	0.63	19	0.32	9	0.12	4	0.31	9	0.95	28	3.38	100
Oct. 15 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	7.18	100
Oct. 15 pm Predicted	0.92	40	0.14	6	0.23	10	0.09	4	0.24	10	0.66	29	2.27	100
Oct. 16 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	7.18	100
Oct. 16 am Predicted	1.20	33	0.41	11	0.40	11	0.16	4	0.43	12	1.06	29	3.67	100
Oct. 16 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	7.18	100
Oct. 16 pm Predicted	1.06	40	0.27	10	0.23	9	0.10	4	0.43	16	0.55	21	2.62	100
Oct. 17 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	7.13	100
Oct. 17 am Predicted	1.93	38	0.49	9	0.51	10	0.22	4	0.72	14	1.25	24	5.13	100
Oct. 17 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	7.13	100
Oct. 17 pm Predicted	1.89	42	0.48	11	0.43	10	0.20	4	0.70	15	0.81	18	4.51	100
Oct. 18 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	3.49	100
Oct. 18 am Predicted	1.72	34	0.44	9	0.61	12	0.26	5	0.81	16	1.19	24	5.02	100
Oct. 18 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	3.49	100
Oct. 18 pm Predicted	1.35	43	0.37	12	0.24	8	0.12	4	0.47	15	0.56	18	3.11	100
Oct. 19 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 19 am Predicted	1.26	34	0.95	25	0.27	7	0.13	4	0.43	11	0.71	19	3.76	100
Oct. 19 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 19 pm Predicted	0.91	39	0.49	21	0.17	7	0.08	3	0.29	12	0.41	17	2.35	100

Table B.2.3.7d
Observed and CALPUFF Estimated Chemical Composition of Extinction (Mm^{-1}) and Percent Contribution to Total Extinction at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total B_{ext}	
	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)
Oct. 7 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 7 am Predicted	0.79	5	0.13	1	0.44	3	0.98	6	0.95	6	2.07	13	15.37	100
Oct. 7 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 7 pm Predicted	0.97	7	0.90	6	0.28	2	0.61	4	0.59	4	1.19	8	14.54	100
Oct. 8 am Observed	7.23	0	0.00	-99	1.30	0	5.27	0	4.68	0	4.68	0	0.00	-99
Oct. 8 am Predicted	7.19	21	8.91	25	0.80	2	1.09	3	2.00	6	5.00	14	34.98	100
Oct. 8 pm Observed	2.19	0	0.00	-99	0.74	0	5.27	0	2.27	0	2.27	0	0.00	-99
Oct. 8 pm Predicted	2.35	15	0.69	4	0.30	2	0.70	4	0.65	4	1.26	8	15.95	100
Oct. 9 am Observed	1.88	0	0.00	-99	0.00	-99	2.14	0	0.00	-99	0.00	-99	0.00	-99
Oct. 9 am Predicted	3.72	16	0.57	2	1.00	4	2.30	10	2.43	10	3.75	16	23.77	100
Oct. 9 pm Observed	1.69	0	0.00	-99	0.00	-99	2.14	0	0.00	-99	0.00	-99	0.00	-99
Oct. 9 pm Predicted	3.08	17	0.40	2	0.47	3	1.09	6	1.05	6	1.80	10	17.89	100
Oct. 10 am Observed	1.60	0	0.00	-99	0.78	0	12.75	0	5.27	0	5.27	0	0.00	-99
Oct. 10 am Predicted	3.12	15	1.43	7	0.54	3	1.29	6	1.23	6	2.83	14	20.42	100
Oct. 10 pm Observed	1.44	0	0.00	-99	0.75	0	12.75	0	5.01	0	5.01	0	0.00	-99
Oct. 10 pm Predicted	2.55	15	0.53	3	0.38	2	0.91	5	0.83	5	1.89	11	17.09	100
Oct. 11 am Observed	0.97	0	0.00	-99	0.32	0	10.00	0	0.90	0	0.90	0	0.00	-99
Oct. 11 am Predicted	2.47	13	0.73	4	0.56	3	1.37	7	1.26	7	2.74	14	19.13	100
Oct. 11 pm Observed	0.94	0	0.00	-99	0.32	0	10.00	0	0.89	0	0.89	0	0.00	-99
Oct. 11 pm Predicted	1.67	11	0.24	2	0.29	2	0.66	4	0.60	4	1.33	9	14.78	100
Oct. 12 am Observed	0.60	0	0.00	-99	0.00	-99	3.57	0	0.00	-99	0.00	-99	0.00	-99
Oct. 12 am Predicted	0.71	5	0.56	4	0.32	2	0.72	5	0.72	5	1.93	13	14.96	100
Oct. 12 pm Observed	2.47	0	0.00	-99	0.00	-99	3.57	0	0.00	-99	0.00	-99	0.00	-99
Oct. 12 pm Predicted	1.43	7	5.15	25	0.31	2	0.28	1	0.69	3	2.37	12	20.23	100
Oct. 13 am Observed	1.39	0	0.00	-99	0.00	-99	0.17	0	0.00	-99	0.00	-99	0.00	-99
Oct. 13 am Predicted	2.29	11	4.69	22	0.34	2	0.58	3	0.64	3	2.70	13	21.24	100
Oct. 13 pm Observed	0.76	0	0.00	-99	0.00	-99	0.17	0	0.00	-99	0.00	-99	0.00	-99
Oct. 13 pm Predicted	2.71	16	2.62	15	0.17	1	0.33	2	0.28	2	0.92	5	17.03	100
Oct. 14 am Observed	1.35	0	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 14 am Predicted	1.41	9	0.00	0	0.37	2	0.83	5	0.68	4	2.48	16	15.77	100
Oct. 14 pm Observed	1.40	0	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 14 pm Predicted	1.49	10	0.57	4	0.25	2	0.56	4	0.46	3	1.58	11	14.92	100
Oct. 15 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 15 am Predicted	2.13	11	1.41	7	0.49	3	1.13	6	0.99	5	3.00	16	19.15	100
Oct. 15 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 15 pm Predicted	1.77	11	0.29	2	0.36	2	0.85	5	0.73	5	2.02	13	16.01	100
Oct. 16 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 16 am Predicted	2.29	12	0.86	4	0.60	3	1.46	7	1.31	7	3.25	16	19.78	100
Oct. 16 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 16 pm Predicted	2.07	12	0.57	3	0.35	2	0.90	5	1.32	8	1.69	10	16.90	100
Oct. 17 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 17 am Predicted	4.56	18	1.24	5	0.83	3	2.03	8	2.44	10	4.24	17	25.33	100
Oct. 17 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 17 pm Predicted	3.95	18	1.10	5	0.68	3	1.82	8	2.22	10	2.57	12	22.33	100
Oct. 18 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 18 am Predicted	3.65	15	1.02	4	0.95	4	2.37	10	2.60	11	3.82	16	24.40	100
Oct. 18 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 18 pm Predicted	2.79	15	0.83	5	0.38	2	1.05	6	1.50	8	1.77	10	18.31	100
Oct. 19 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 19 am Predicted	3.18	15	2.57	12	0.46	2	1.20	6	1.50	7	2.47	12	21.38	100
Oct. 19 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 19 pm Predicted	1.74	11	1.03	7	0.25	2	0.75	5	0.89	6	1.24	8	15.90	100

Table B.2.3.7e
Observed and CALPUFF Estimated Chemical Composition of $PM_{2.5}$ Concentrations ($\mu g/m^3$) and Percent Contribution to Total $PM_{2.5}$ at Mad Creek for the 10/07/95 to 10/19/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total PM2.5	
	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)
Oct. 7 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 7 am Predicted	0.34	20	0.06	3	0.26	16	0.10	6	0.28	17	0.61	37	1.66	100
Oct. 7 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 7 pm Predicted	0.46	27	0.31	18	0.24	14	0.08	5	0.23	13	0.38	22	1.69	100
Oct. 8 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 8 am Predicted	1.12	27	1.36	33	0.31	8	0.13	3	0.33	8	0.82	20	4.06	100
Oct. 8 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 8 pm Predicted	1.63	51	0.62	20	0.21	7	0.08	3	0.22	7	0.41	13	3.17	100
Oct. 9 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 9 am Predicted	1.56	32	0.52	11	0.65	13	0.27	5	0.77	16	1.12	23	4.89	100
Oct. 9 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 9 pm Predicted	1.51	45	0.47	14	0.32	10	0.13	4	0.35	11	0.57	17	3.36	100
Oct. 10 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 10 am Predicted	1.36	37	0.61	16	0.34	9	0.14	4	0.37	10	0.87	23	3.70	100
Oct. 10 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 10 pm Predicted	1.38	48	0.31	11	0.25	9	0.10	4	0.27	9	0.59	20	2.90	100
Oct. 11 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 11 am Predicted	1.16	36	0.41	13	0.32	10	0.14	4	0.36	11	0.83	26	3.21	100
Oct. 11 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 11 pm Predicted	0.77	45	0.05	3	0.18	11	0.07	4	0.19	11	0.45	26	1.71	100
Oct. 12 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 12 am Predicted	0.29	18	0.23	14	0.22	13	0.08	5	0.22	13	0.62	37	1.66	100
Oct. 12 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 12 pm Predicted	0.24	18	0.60	45	0.10	8	0.03	2	0.09	7	0.26	20	1.33	100
Oct. 13 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 13 am Predicted	1.28	36	1.06	30	0.23	6	0.08	2	0.19	5	0.68	19	3.52	100
Oct. 13 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 13 pm Predicted	1.31	44	1.07	36	0.16	5	0.05	2	0.12	4	0.30	10	3.02	100
Oct. 14 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 14 am Predicted	0.61	29	0.19	9	0.24	11	0.09	4	0.22	10	0.76	36	2.10	100
Oct. 14 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 14 pm Predicted	1.18	46	0.53	20	0.17	7	0.07	3	0.16	6	0.48	19	2.59	100
Oct. 15 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 15 am Predicted	0.88	29	0.60	20	0.29	10	0.12	4	0.30	10	0.88	29	3.07	100
Oct. 15 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 15 pm Predicted	1.01	42	0.19	8	0.23	10	0.09	4	0.24	10	0.63	26	2.39	100
Oct. 16 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 16 am Predicted	1.07	32	0.39	12	0.35	11	0.14	4	0.39	12	0.96	29	3.31	100
Oct. 16 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 16 pm Predicted	1.11	43	0.28	11	0.25	9	0.09	4	0.34	13	0.54	21	2.62	100
Oct. 17 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 17 am Predicted	1.85	38	0.49	10	0.48	10	0.21	4	0.65	13	1.20	25	4.87	100
Oct. 17 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 17 pm Predicted	1.97	41	0.47	10	0.44	9	0.22	4	0.97	20	0.80	16	4.87	100
Oct. 18 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 18 am Predicted	1.54	33	0.44	9	0.55	12	0.24	5	0.72	15	1.20	26	4.68	100
Oct. 18 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 18 pm Predicted	1.34	39	0.31	9	0.27	8	0.14	4	0.80	23	0.57	17	3.44	100
Oct. 19 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 19 am Predicted	1.37	31	0.97	22	0.34	8	0.17	4	0.75	17	0.81	18	4.41	100
Oct. 19 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 19 pm Predicted	0.97	37	0.55	21	0.19	7	0.10	4	0.41	15	0.42	16	2.65	100

Table B.2.3.7f
Observed and CALPUFF Estimated Chemical Composition of Extinction (Mm^{-1}) and Percent Contribution to Total Extinction at Mad Creek for the 10/07/95 to 10/19/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total B_{ext}	
	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)
Oct. 7 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 7 am Predicted	0.68	5	0.12	1	0.41	3	0.93	6	0.89	6	1.92	13	14.96	100
Oct. 7 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 7 pm Predicted	0.85	6	0.62	4	0.36	3	0.70	5	0.68	5	1.13	8	14.34	100
Oct. 8 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 8 am Predicted	3.19	14	4.12	18	0.55	2	1.17	5	1.22	5	3.06	13	23.31	100
Oct. 8 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 8 pm Predicted	2.97	17	1.25	7	0.32	2	0.75	4	0.66	4	1.23	7	17.17	100
Oct. 9 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 9 am Predicted	3.09	13	1.14	5	0.99	4	2.43	10	2.40	10	3.50	15	23.55	100
Oct. 9 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 9 pm Predicted	2.81	15	0.96	5	0.49	3	1.15	6	1.07	6	1.73	9	18.21	100
Oct. 10 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 10 am Predicted	2.70	14	1.32	7	0.53	3	1.31	7	1.16	6	2.69	14	19.71	100
Oct. 10 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 10 pm Predicted	2.64	15	0.65	4	0.38	2	0.93	5	0.82	5	1.81	11	17.23	100
Oct. 11 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 11 am Predicted	2.23	12	0.87	5	0.49	3	1.23	7	1.10	6	2.54	14	18.46	100
Oct. 11 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 11 pm Predicted	1.35	9	0.10	1	0.27	2	0.64	4	0.55	4	1.33	9	14.23	100
Oct. 12 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 12 am Predicted	0.68	4	0.57	4	0.35	2	0.76	5	0.73	5	2.05	14	15.15	100
Oct. 12 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 12 pm Predicted	0.98	6	2.52	16	0.21	1	0.30	2	0.40	3	1.21	8	15.61	100
Oct. 13 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 13 am Predicted	3.29	16	2.91	14	0.38	2	0.73	4	0.66	3	2.40	12	20.37	100
Oct. 13 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 13 pm Predicted	2.46	15	2.20	13	0.24	1	0.44	3	0.38	2	0.90	5	16.61	100
Oct. 14 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 14 am Predicted	1.12	7	0.38	2	0.35	2	0.83	5	0.66	4	2.28	15	15.62	100
Oct. 14 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 14 pm Predicted	2.17	14	1.07	7	0.26	2	0.60	4	0.48	3	1.45	9	16.03	100
Oct. 15 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 15 am Predicted	1.67	9	1.25	7	0.45	2	1.07	6	0.91	5	2.69	15	18.04	100
Oct. 15 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 15 pm Predicted	1.80	11	0.37	2	0.34	2	0.83	5	0.70	4	1.87	12	15.90	100
Oct. 16 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 16 am Predicted	1.94	10	0.78	4	0.53	3	1.32	7	1.16	6	2.88	15	18.62	100
Oct. 16 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 16 pm Predicted	1.97	12	0.54	3	0.37	2	0.87	5	1.00	6	1.60	10	16.34	100
Oct. 17 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 17 am Predicted	3.73	16	1.08	5	0.74	3	1.90	8	2.03	9	3.75	16	23.23	100
Oct. 17 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 17 pm Predicted	3.60	16	0.94	4	0.66	3	1.96	9	2.90	13	2.41	11	22.46	100
Oct. 18 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 18 am Predicted	2.88	13	0.89	4	0.84	4	2.18	10	2.18	10	3.65	16	22.63	100
Oct. 18 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 18 pm Predicted	2.43	13	0.63	3	0.41	2	1.30	7	2.38	13	1.71	9	18.85	100
Oct. 19 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 19 am Predicted	2.76	13	2.12	10	0.52	2	1.54	7	2.34	11	2.53	12	21.81	100
Oct. 19 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Oct. 19 pm Predicted	1.67	10	1.05	6	0.29	2	0.88	5	1.18	7	1.24	8	16.32	100

Table B.2.3.8a
Observed and CALPUFF Estimated Chemical Composition of $PM_{2.5}$ Concentrations ($\mu g/m^3$) and Percent Contribution to Total $PM_{2.5}$ at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total PM2.5	
	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)
Aug. 21 am Observed	2.11	47	0.19	4	0.00	-99	0.00	-99	1.17	26	1.17	26	4.49	100
Aug. 21 am Predicted	0.51	25	0.32	16	0.26	12	0.10	5	0.29	14	0.59	28	2.07	100
Aug. 21 pm Observed	2.54	52	0.14	3	0.49	10	0.17	3	0.98	20	0.98	20	4.87	100
Aug. 21 pm Predicted	0.57	46	0.15	12	0.11	9	0.05	4	0.13	10	0.23	19	1.24	100
Aug. 22 am Observed	1.31	62	0.15	7	0.08	4	0.27	13	0.47	22	0.47	22	2.12	100
Aug. 22 am Predicted	0.20	19	0.12	11	0.14	13	0.05	5	0.16	14	0.41	38	1.08	100
Aug. 22 pm Observed	1.39	32	0.06	1	0.32	7	0.32	7	1.61	37	1.61	37	4.37	100
Aug. 22 pm Predicted	0.17	24	0.04	6	0.10	14	0.04	6	0.11	15	0.25	35	0.72	100
Aug. 23 am Observed	1.28	63	0.06	3	0.00	-99	0.34	17	0.25	12	0.25	12	2.04	100
Aug. 23 am Predicted	0.14	14	0.14	13	0.13	12	0.05	5	0.13	12	0.47	44	1.07	100
Aug. 23 pm Observed	1.98	42	0.04	1	1.22	26	0.18	4	0.82	17	0.82	17	4.76	100
Aug. 23 pm Predicted	0.09	20	0.02	4	0.07	15	0.03	6	0.08	16	0.18	39	0.47	100
Aug. 24 am Observed	2.05	23	0.10	1	3.67	40	0.36	4	1.76	19	1.76	19	9.11	100
Aug. 24 am Predicted	0.13	10	0.23	19	0.16	13	0.06	5	0.17	13	0.49	39	1.23	100
Aug. 24 pm Observed	2.84	59	0.13	3	0.38	8	0.53	11	0.63	13	0.63	13	4.84	100
Aug. 24 pm Predicted	0.40	37	0.22	20	0.09	8	0.03	3	0.09	8	0.25	23	1.08	100
Aug. 25 am Observed	0.87	29	0.11	4	0.24	8	0.43	15	0.79	27	0.79	27	2.94	100
Aug. 25 am Predicted	0.23	15	0.30	19	0.17	11	0.06	4	0.16	10	0.64	41	1.58	100
Aug. 25 pm Observed	1.23	33	0.23	6	0.44	12	0.27	7	1.02	27	1.02	27	3.77	100
Aug. 25 pm Predicted	0.38	37	0.06	6	0.11	11	0.04	4	0.10	10	0.34	33	1.02	100
Aug. 26 am Observed	1.41	29	0.00	-99	0.58	12	0.32	6	1.52	31	1.52	31	4.91	100
Aug. 26 am Predicted	0.77	30	0.55	21	0.24	9	0.09	3	0.24	9	0.71	27	2.60	100
Aug. 26 pm Observed	1.14	24	0.00	-99	1.62	34	0.15	3	1.06	22	1.06	22	4.75	100
Aug. 26 pm Predicted	0.81	46	0.08	5	0.19	11	0.08	4	0.21	12	0.40	23	1.76	100
Aug. 27 am Observed	1.40	31	0.00	-99	1.10	24	0.22	5	1.02	23	1.02	23	4.51	100
Aug. 27 am Predicted	1.31	32	0.55	14	0.54	13	0.21	5	0.65	16	0.84	20	4.10	100
Aug. 27 pm Observed	1.15	25	0.00	-99	0.92	20	0.12	3	1.40	30	1.40	30	4.61	100
Aug. 27 pm Predicted	1.44	47	0.36	12	0.32	10	0.13	4	0.39	13	0.44	14	3.08	100

Table B.2.3.8b
Observed and CALPUFF Estimated Chemical Composition of Extinction (Mm^{-1})
and Percent Contribution to Total Extinction at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total B_{ext}	
	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)
Aug. 21 am Observed	12.20	0	1.12	0	0.00	-99	0.00	-99	6.78	0	6.78	0	0.00	-99
Aug. 21 am Predicted	2.96	14	1.91	9	0.64	3	0.93	4	1.68	8	3.41	16	21.52	100
Aug. 21 pm Observed	7.92	28	0.44	2	0.89	3	1.51	5	3.83	13	3.83	13	28.42	100
Aug. 21 pm Predicted	1.77	12	0.48	3	0.20	1	0.42	3	0.51	4	0.91	6	14.30	100
Aug. 22 am Observed	7.86	29	0.94	3	0.21	1	2.45	9	2.80	10	2.80	10	27.06	100
Aug. 22 am Predicted	1.21	7	0.72	4	0.36	2	0.50	3	0.93	6	2.47	15	16.19	100
Aug. 22 pm Observed	4.69	15	0.22	1	0.60	2	2.88	9	6.60	21	6.60	21	31.59	100
Aug. 22 pm Predicted	0.58	5	0.15	1	0.19	1	0.37	3	0.46	4	1.04	8	12.78	100
Aug. 23 am Observed	6.64	0	0.31	0	0.00	-99	3.14	0	1.36	0	1.36	0	0.00	-99
Aug. 23 am Predicted	0.76	5	0.76	5	0.31	2	0.47	3	0.73	5	2.53	16	15.55	100
Aug. 23 pm Observed	11.79	32	0.25	1	3.06	8	1.62	4	4.88	13	4.88	13	36.48	100
Aug. 23 pm Predicted	0.56	4	0.12	1	0.17	1	0.26	2	0.44	4	1.09	9	12.64	100
Aug. 24 am Observed	27.45	28	1.30	1	15.97	16	3.31	3	19.79	20	19.79	20	97.60	100
Aug. 24 am Predicted	1.68	7	3.16	13	0.69	3	0.58	2	1.85	8	5.46	23	23.41	100
Aug. 24 pm Observed	11.20	34	0.52	2	0.77	2	4.86	15	2.84	9	2.84	9	33.03	100
Aug. 24 pm Predicted	1.59	11	0.91	6	0.18	1	0.31	2	0.39	3	1.11	8	14.49	100
Aug. 25 am Observed	2.91	12	0.40	2	0.46	2	3.89	16	3.21	13	3.21	13	24.09	100
Aug. 25 am Predicted	0.78	5	1.07	7	0.33	2	0.57	4	0.66	4	2.63	16	16.04	100
Aug. 25 pm Observed	2.85	12	0.58	2	0.72	3	2.46	10	3.42	15	3.42	15	23.46	100
Aug. 25 pm Predicted	0.87	7	0.14	1	0.18	1	0.38	3	0.35	3	1.12	9	13.05	100
Aug. 26 am Observed	3.15	0	0.00	-99	0.93	0	2.87	0	4.99	0	4.99	0	0.00	-99
Aug. 26 am Predicted	1.72	10	1.33	8	0.38	2	0.81	5	0.77	4	2.34	13	17.35	100
Aug. 26 pm Observed	2.32	0	0.00	-99	2.51	0	1.36	0	3.32	0	3.32	0	0.00	-99
Aug. 26 pm Predicted	1.64	11	0.18	1	0.29	2	0.68	5	0.65	4	1.26	9	14.70	100
Aug. 27 am Observed	3.44	0	0.00	-99	1.81	0	2.03	0	3.51	0	3.51	0	0.00	-99
Aug. 27 am Predicted	3.23	14	1.46	6	0.89	4	1.90	8	2.24	10	2.89	13	22.61	100
Aug. 27 pm Observed	2.82	0	0.00	-99	1.51	0	1.11	0	4.84	0	4.84	0	0.00	-99
Aug. 27 pm Predicted	3.54	19	0.95	5	0.53	3	1.17	6	1.35	7	1.53	8	19.08	100

Table B.2.3.8c
Observed and CALPUFF Estimated Chemical Composition of $PM_{2.5}$ Concentrations ($\mu g/m^3$) and Percent Contribution to Total $PM_{2.5}$ at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total PM2.5	
Date	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)
Aug. 21 am Observed	2.05	29	0.00	-99	0.17	2	1.00	14	2.20	31	2.20	31	7.07	100
Aug. 21 am Predicted	0.60	27	0.37	16	0.26	12	0.10	5	0.29	13	0.62	28	2.24	100
Aug. 21 pm Observed	2.05	29	0.00	-99	0.17	2	1.00	14	2.20	31	2.20	31	7.07	100
Aug. 21 pm Predicted	0.54	47	0.14	12	0.10	9	0.04	3	0.11	9	0.23	20	1.17	100
Aug. 22 am Observed	1.55	47	0.00	-99	0.21	6	0.30	9	0.66	20	0.66	20	3.31	100
Aug. 22 am Predicted	0.23	22	0.12	11	0.14	12	0.05	5	0.15	13	0.40	37	1.09	100
Aug. 22 pm Observed	1.55	47	0.00	-99	0.21	6	0.30	9	0.66	20	0.66	20	3.31	100
Aug. 22 pm Predicted	0.21	29	0.04	6	0.09	12	0.03	5	0.09	12	0.25	36	0.71	100
Aug. 23 am Observed	1.91	28	0.00	-99	0.19	3	1.34	20	2.01	29	2.01	29	6.86	100
Aug. 23 am Predicted	0.16	16	0.09	10	0.12	12	0.05	5	0.12	12	0.44	45	0.98	100
Aug. 23 pm Observed	1.91	28	0.00	-99	0.19	3	1.34	20	2.01	29	2.01	29	6.86	100
Aug. 23 pm Predicted	0.34	43	0.10	13	0.06	8	0.03	3	0.06	8	0.19	25	0.79	100
Aug. 24 am Observed	0.51	30	0.00	-99	0.23	14	0.69	41	0.06	4	0.06	4	1.71	100
Aug. 24 am Predicted	0.14	11	0.24	19	0.16	12	0.06	5	0.16	12	0.50	40	1.25	100
Aug. 24 pm Observed	0.51	30	0.00	-99	0.23	14	0.69	41	0.06	4	0.06	4	1.71	100
Aug. 24 pm Predicted	0.29	36	0.10	12	0.08	9	0.03	3	0.07	8	0.24	30	0.80	100
Aug. 25 am Observed	1.03	31	0.00	-99	0.31	10	1.10	33	0.43	13	0.43	13	3.28	100
Aug. 25 am Predicted	0.29	20	0.28	19	0.15	10	0.05	4	0.14	9	0.56	38	1.47	100
Aug. 25 pm Observed	1.03	31	0.00	-99	0.31	10	1.10	33	0.43	13	0.43	13	3.28	100
Aug. 25 pm Predicted	0.37	40	0.05	5	0.09	10	0.03	4	0.08	9	0.30	33	0.91	100
Aug. 26 am Observed	1.32	35	0.00	-99	0.20	5	1.03	27	0.54	14	0.54	14	3.74	100
Aug. 26 am Predicted	0.92	34	0.60	22	0.22	8	0.08	3	0.22	8	0.66	24	2.69	100
Aug. 26 pm Observed	1.32	35	0.00	-99	0.20	5	1.03	27	0.54	14	0.54	14	3.74	100
Aug. 26 pm Predicted	0.88	51	0.08	4	0.16	9	0.06	4	0.17	10	0.38	22	1.73	100
Aug. 27 am Observed	1.51	55	0.00	-99	0.28	10	0.75	27	0.02	1	0.02	1	2.75	100
Aug. 27 am Predicted	1.34	35	0.47	12	0.46	12	0.18	5	0.54	14	0.82	22	3.82	100
Aug. 27 pm Observed	1.51	55	0.00	-99	0.28	10	0.75	27	0.02	1	0.02	1	2.75	100
Aug. 27 pm Predicted	1.71	51	0.42	12	0.30	9	0.12	3	0.35	10	0.46	14	3.34	100

Table B.2.3.8d
Observed and CALPUFF Estimated Chemical Composition of Extinction (Mm^{-1}) and Percent Contribution to Total Extinction at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total B_{ext}	
	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)
Aug. 21 am Observed	5.81	0	0.00	-99	0.30	0	9.12	0	8.20	0	8.20	0	0.00	-99
Aug. 21 am Predicted	1.71	10	1.12	6	0.46	3	0.92	5	1.07	6	2.31	13	17.57	100
Aug. 21 pm Observed	4.47	0	0.00	-99	0.27	0	9.12	0	7.18	0	7.18	0	0.00	-99
Aug. 21 pm Predicted	1.19	9	0.32	2	0.16	1	0.37	3	0.36	3	0.76	6	13.16	100
Aug. 22 am Observed	4.63	0	0.00	-99	0.37	0	2.70	0	2.53	0	2.53	0	0.00	-99
Aug. 22 am Predicted	0.70	5	0.39	3	0.24	2	0.47	3	0.56	4	1.53	11	13.89	100
Aug. 22 pm Observed	3.51	0	0.00	-99	0.33	0	2.70	0	2.19	0	2.19	0	0.00	-99
Aug. 22 pm Predicted	0.47	4	0.11	1	0.14	1	0.30	2	0.29	2	0.84	7	12.16	100
Aug. 23 am Observed	5.63	0	0.00	-99	0.34	0	12.21	0	7.62	0	7.62	0	0.00	-99
Aug. 23 am Predicted	0.47	3	0.30	2	0.22	2	0.41	3	0.45	3	1.69	12	13.53	100
Aug. 23 pm Observed	5.03	0	0.00	-99	0.32	0	12.21	0	7.17	0	7.17	0	0.00	-99
Aug. 23 pm Predicted	0.89	7	0.28	2	0.11	1	0.24	2	0.23	2	0.69	6	12.44	100
Aug. 24 am Observed	1.91	0	0.00	-99	0.46	0	6.32	0	0.28	0	0.28	0	0.00	-99
Aug. 24 am Predicted	0.53	3	0.93	6	0.31	2	0.54	4	0.68	4	2.17	14	15.16	100
Aug. 24 pm Observed	1.73	0	0.00	-99	0.44	0	6.32	0	0.26	0	0.26	0	0.00	-99
Aug. 24 pm Predicted	0.98	8	0.35	3	0.14	1	0.26	2	0.28	2	0.99	8	12.99	100
Aug. 25 am Observed	3.79	0	0.00	-99	0.61	0	10.00	0	1.86	0	1.86	0	0.00	-99
Aug. 25 am Predicted	1.06	7	1.07	7	0.29	2	0.50	3	0.60	4	2.39	15	15.91	100
Aug. 25 pm Observed	2.12	0	0.00	-99	0.49	0	10.00	0	1.37	0	1.37	0	0.00	-99
Aug. 25 pm Predicted	0.75	6	0.10	1	0.14	1	0.31	2	0.25	2	0.95	8	12.49	100
Aug. 26 am Observed	3.07	0	0.00	-99	0.32	0	9.33	0	1.81	0	1.81	0	0.00	-99
Aug. 26 am Predicted	2.13	12	1.50	8	0.36	2	0.75	4	0.72	4	2.21	12	17.67	100
Aug. 26 pm Observed	2.46	0	0.00	-99	0.30	0	9.33	0	1.64	0	1.64	0	0.00	-99
Aug. 26 pm Predicted	1.63	11	0.16	1	0.25	2	0.56	4	0.50	4	1.16	8	14.27	100
Aug. 27 am Observed	3.65	0	0.00	-99	0.46	0	6.82	0	0.07	0	0.07	0	0.00	-99
Aug. 27 am Predicted	3.25	15	1.23	6	0.76	4	1.64	8	1.85	9	2.81	13	21.53	100
Aug. 27 pm Observed	3.45	0	0.00	-99	0.45	0	6.82	0	0.07	0	0.07	0	0.00	-99
Aug. 27 pm Predicted	3.89	20	1.03	5	0.48	2	1.06	6	1.16	6	1.52	8	19.14	100

Table B.2.3.8e

Observed and CALPUFF Estimated Chemical Composition of $PM_{2.5}$ concentrations ($\mu g/m^3$) and Percent Contribution to Total $PM_{2.5}$ at Mad Creek for the 08/21/95 to 08/27/95 Episode

	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total PM2.5	
Date	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)	ug/m3	(%)
Aug. 21 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 21 am Predicted	0.51	26	0.32	16	0.23	12	0.09	5	0.26	13	0.58	29	1.99	100
Aug. 21 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 21 pm Predicted	0.92	58	0.17	11	0.11	7	0.04	3	0.11	7	0.24	15	1.60	100
Aug. 22 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 22 am Predicted	0.19	19	0.11	11	0.13	13	0.05	5	0.14	14	0.41	39	1.03	100
Aug. 22 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 22 pm Predicted	0.27	34	0.05	6	0.09	12	0.04	5	0.10	13	0.25	31	0.79	100
Aug. 23 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 23 am Predicted	0.19	18	0.14	13	0.12	11	0.05	4	0.12	11	0.44	42	1.05	100
Aug. 23 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 23 pm Predicted	0.37	49	0.02	3	0.07	9	0.03	4	0.07	10	0.19	26	0.75	100
Aug. 24 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 24 am Predicted	0.12	10	0.18	16	0.14	13	0.06	5	0.14	13	0.48	43	1.12	100
Aug. 24 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 24 pm Predicted	0.72	53	0.19	14	0.09	7	0.03	2	0.08	6	0.23	17	1.34	100
Aug. 25 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 25 am Predicted	0.26	17	0.28	19	0.16	10	0.06	4	0.14	9	0.61	40	1.50	100
Aug. 25 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 25 pm Predicted	0.48	43	0.05	5	0.10	10	0.04	3	0.09	9	0.33	30	1.10	100
Aug. 26 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 26 am Predicted	0.80	32	0.54	21	0.22	9	0.08	3	0.20	8	0.67	27	2.51	100
Aug. 26 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 26 pm Predicted	0.89	50	0.08	5	0.17	9	0.06	4	0.17	10	0.39	22	1.77	100
Aug. 27 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 27 am Predicted	1.23	32	0.53	14	0.48	13	0.18	5	0.56	15	0.83	22	3.81	100
Aug. 27 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 27 pm Predicted	2.02	54	0.51	14	0.30	8	0.12	3	0.35	9	0.46	12	3.75	100

Table B.2.3.8f
Observed and CALPUFF Estimated Chemical Composition of Extinction (Mm^{-1}) and Percent Contribution to Total Extinction at Mad Creek for the 08/21/95 to 08/27/95 Episode

Date	Sulfate		Nitrate		PPM2.5		EC2.5		OC2.5[1]		SOA[1]		Total B_{ext}	
	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)	Mm^{-1}	(%)
Aug. 21 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 21 am Predicted	1.32	8	0.88	5	0.40	2	0.84	5	0.93	6	2.05	12	16.42	100
Aug. 21 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 21 pm Predicted	2.04	14	0.42	3	0.17	1	0.38	3	0.37	3	0.79	6	14.17	100
Aug. 22 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 22 am Predicted	0.56	4	0.35	3	0.23	2	0.45	3	0.53	4	1.53	11	13.65	100
Aug. 22 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 22 pm Predicted	0.60	5	0.11	1	0.15	1	0.34	3	0.33	3	0.81	7	12.33	100
Aug. 23 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 23 am Predicted	0.49	4	0.38	3	0.20	1	0.41	3	0.41	3	1.57	12	13.45	100
Aug. 23 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 23 pm Predicted	1.15	9	0.06	1	0.12	1	0.25	2	0.28	2	0.76	6	12.63	100
Aug. 24 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 24 am Predicted	0.37	3	0.61	4	0.26	2	0.51	4	0.58	4	1.92	14	14.26	100
Aug. 24 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 24 pm Predicted	2.00	14	0.55	4	0.16	1	0.29	2	0.30	2	0.86	6	14.16	100
Aug. 25 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 25 am Predicted	0.74	5	0.86	6	0.28	2	0.51	3	0.53	3	2.26	15	15.17	100
Aug. 25 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 25 pm Predicted	0.98	8	0.12	1	0.16	1	0.35	3	0.30	2	1.04	8	12.96	100
Aug. 26 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 26 am Predicted	1.84	11	1.33	8	0.35	2	0.71	4	0.68	4	2.22	13	17.13	100
Aug. 26 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 26 pm Predicted	1.64	11	0.17	1	0.25	2	0.58	4	0.53	4	1.19	8	14.35	100
Aug. 27 am Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 27 am Predicted	2.75	13	1.28	6	0.76	4	1.67	8	1.84	9	2.74	13	21.04	100
Aug. 27 pm Observed	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99	0.00	-99
Aug. 27 pm Predicted	4.09	21	1.13	6	0.47	2	1.05	5	1.10	6	1.45	8	19.28	100

Table B.2.3.9a

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

[This table also presents six-hour concentrations from filter measurements, as well as extinction estimated from the filter measurements using identical extinction efficiencies as applied to predicted concentrations. Source attributions are presented for all 12 source regions/types modeled with CALPUFF, and present results from each six-hour daylight period (0600-1200, and 1200-1800 LST).]

Buffalo Pass
CONCENTRATION 0600-1200 95/ 9/17

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.099		0.205		0.344		0.176		0.962		0.962		2.442	
Estimated w/ fires	2.214	101.4	0.439	114.0	0.706	105.4	0.293	66.4	0.982	2.0	1.037	7.8	5.671	132.2
Estimated w/o fires	2.214	101.4	0.435	112.2	0.696	102.6	0.282	59.7	0.832	-13.5	1.037	7.8	5.497	125.1
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.617	27.9	0.069	15.8	0.052	7.3	0.015	5.1	0.043	4.4	0.213	20.5	1.009	17.8
Craig 1-3	0.182	8.2	0.033	7.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.216	3.8
Craig 1-2	0.140	6.3	0.022	5.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.163	2.9
Craig 1	0.065	2.9	0.011	2.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.077	1.4
Craig 2	0.075	3.4	0.011	2.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.086	1.5
Craig 3	0.042	1.9	0.011	2.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.053	0.9
Hayden 1-2	0.431	19.4	0.031	7.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.462	8.2
Hayden 1	0.211	9.5	0.020	4.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.231	4.1
Hayden 2	0.220	9.9	0.011	2.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.232	4.1
Steamboat Springs	0.001	0.0	0.001	0.2	0.004	0.6	0.003	0.9	0.007	0.7	0.009	0.9	0.024	0.4
Other Yampa Valley	0.003	0.1	0.004	1.0	0.046	6.5	0.012	4.2	0.036	3.7	0.204	19.7	0.307	5.4
Non-Yampa Valley	1.597	72.1	0.366	83.3	0.645	91.3	0.267	90.8	0.789	80.4	0.824	79.5	4.488	79.1
Denver	0.435	19.7	0.064	14.5	0.087	12.3	0.046	15.6	0.142	14.5	0.008	0.8	0.781	13.8
Colorado w/ Denver	1.007	45.5	0.307	69.8	0.578	81.9	0.233	79.3	0.726	74.0	0.619	59.7	3.470	61.2
Non-Colorado	0.590	26.6	0.060	13.6	0.066	9.4	0.034	11.6	0.063	6.4	0.205	19.8	1.017	17.9
Coal-fired PP	1.322	59.7	0.113	25.7	0.003	0.4	0.000	0.0	0.000	0.0	0.000	0.0	1.438	25.4
All other sources	0.892	40.3	0.327	74.3	0.703	99.6	0.293	100.0	0.982	100.0	1.037	100.0	4.233	74.6
Fires	0.000	0.0	0.004	0.9	0.009	1.3	0.012	4.0	0.149	15.2	0.000	0.0	0.174	3.1

Table B.2.3.9a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/ 9/17 6-hour average RH: 40%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.286		0.464		0.536		1.605		3.060		3.060		17.951	
Estimated w/ fires	4.605	101.4	0.993	114.0	1.102	105.4	2.671	66.4	3.121	2.0	3.297	7.8	25.788	43.7
Estimated w/o fires	4.605	101.4	0.984	112.2	1.087	102.6	2.563	59.7	2.646	-13.5	3.297	7.8	25.182	40.3
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.283	27.9	0.157	15.8	0.081	7.3	0.137	5.1	0.138	4.4	0.677	20.5	2.472	9.6
Craig 1-3	0.379	8.2	0.075	7.6	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.455	1.8
Craig 1-2	0.292	6.3	0.050	5.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.343	1.3
Craig 1	0.136	2.9	0.026	2.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.162	0.6
Craig 2	0.156	3.4	0.024	2.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.181	0.7
Craig 3	0.087	1.9	0.025	2.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.112	0.4
Hayden 1-2	0.896	19.4	0.070	7.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.967	3.7
Hayden 1	0.438	9.5	0.045	4.5	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.483	1.9
Hayden 2	0.457	9.9	0.025	2.5	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.483	1.9
Steamboat Springs	0.002	0.0	0.002	0.2	0.007	0.6	0.024	0.9	0.022	0.7	0.028	0.9	0.084	0.3
Other Yampa Valley	0.007	0.1	0.010	1.0	0.072	6.5	0.113	4.2	0.116	3.7	0.649	19.7	0.966	3.7
Non-Yampa Valley	3.322	72.1	0.827	83.3	1.006	91.3	2.426	90.8	2.509	80.4	2.619	79.5	12.710	49.3
Denver	0.905	19.7	0.144	14.5	0.135	12.3	0.417	15.6	0.451	14.5	0.025	0.8	2.078	8.1
Colorado w/ Denver	2.095	45.5	0.693	69.8	0.903	81.9	2.118	79.3	2.309	74.0	1.968	59.7	10.085	39.1
Non-Colorado	1.227	26.6	0.135	13.6	0.103	9.4	0.309	11.6	0.199	6.4	0.652	19.8	2.625	10.2
Coal-fired PP	2.751	59.7	0.255	25.7	0.005	0.4	0.000	0.0	0.000	0.0	0.001	0.0	3.011	11.7
All other sources	1.855	40.3	0.738	74.3	1.097	99.6	2.671	100.0	3.121	100.0	3.296	100.0	22.777	88.3
Fires	0.000	0.0	0.009	0.9	0.015	1.3	0.108	4.0	0.475	15.2	0.000	0.0	0.606	2.3

Buffalo Pass
CONCENTRATION 1200-1800 95/ 9/17

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.426		0.125		0.229		0.049		1.299		1.299		2.813	
Estimated w/ fires	2.381	66.9	0.109	-13.1	0.438	91.4	0.188	280.3	0.771	-40.7	0.671	-48.3	4.558	62.0
Estimated w/o fires	2.381	66.9	0.107	-14.6	0.419	83.1	0.164	232.1	0.471	-63.8	0.671	-48.3	4.213	49.8

Table B.2.3.9a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.109	46.6	0.076	70.2	0.080	18.2	0.024	12.8	0.064	8.3	0.201	29.9	1.554	34.1
Craig 1-3	0.209	8.8	0.014	12.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.224	4.9
Craig 1-2	0.168	7.1	0.010	9.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.179	3.9
Craig 1	0.081	3.4	0.006	5.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.086	1.9
Craig 2	0.088	3.7	0.004	4.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.093	2.0
Craig 3	0.041	1.7	0.004	3.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.045	1.0
Hayden 1-2	0.894	37.5	0.058	53.6	0.003	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.955	21.0
Hayden 1	0.453	19.0	0.033	30.2	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.487	10.7
Hayden 2	0.440	18.5	0.025	23.4	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.468	10.3
Steamboat Springs	0.002	0.1	0.002	2.0	0.012	2.7	0.007	3.5	0.018	2.3	0.021	3.1	0.061	1.3
Other Yampa Valley	0.005	0.2	0.002	1.7	0.064	14.6	0.017	9.3	0.046	6.0	0.179	26.7	0.313	6.9
Non-Yampa Valley	1.272	53.4	0.031	28.1	0.339	77.4	0.140	74.5	0.407	52.8	0.471	70.1	2.659	58.3
Denver	0.300	12.6	0.004	3.5	0.039	8.9	0.020	10.7	0.063	8.2	0.003	0.5	0.430	9.4
Colorado w/ Denver	0.720	30.2	0.023	21.6	0.296	67.7	0.119	63.1	0.367	47.6	0.343	51.2	1.868	41.0
Non-Colorado	0.552	23.2	0.007	6.6	0.043	9.8	0.021	11.4	0.040	5.2	0.127	19.0	0.791	17.4
Coal-fired PP	1.675	70.4	0.076	70.2	0.006	1.3	0.000	0.0	0.000	0.0	0.000	0.1	1.758	38.6
All other sources	0.706	29.6	0.032	29.8	0.432	98.7	0.188	100.0	0.771	100.0	0.671	99.9	2.800	61.4
Fires	0.000	0.0	0.002	1.6	0.019	4.3	0.024	12.7	0.300	38.9	0.000	0.0	0.344	7.6

Buffalo Pass
EXTINCTION 1200-1800 95/ 9/17 6-hour average RH: 41%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.977		0.283		0.357		0.450		4.136		4.136		18.203	
Estimated w/ fires	4.970	66.9	0.246	-13.1	0.684	91.4	1.709	280.3	2.454	-40.7	2.138	-48.3	22.201	22.0
Estimated w/o fires	4.970	66.9	0.242	-14.6	0.654	83.1	1.493	232.1	1.499	-63.8	2.138	-48.3	20.996	15.3
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	2.315	46.6	0.173	70.2	0.125	18.2	0.218	12.8	0.203	8.3	0.639	29.9	3.673	16.5
Craig 1-3	0.436	8.8	0.032	12.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.470	2.1
Craig 1-2	0.351	7.1	0.023	9.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.375	1.7
Craig 1	0.168	3.4	0.013	5.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.181	0.8
Craig 2	0.183	3.7	0.010	4.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.194	0.9
Craig 3	0.085	1.7	0.009	3.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.094	0.4
Hayden 1-2	1.865	37.5	0.132	53.6	0.005	0.8	0.000	0.0	0.000	0.0	0.000	0.0	2.002	9.0
Hayden 1	0.945	19.0	0.074	30.2	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	1.022	4.6
Hayden 2	0.919	18.5	0.058	23.4	0.003	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.980	4.4

Table B.2.3.9a (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

Steamboat Springs	0.003	0.1	0.005	2.0	0.018	2.7	0.060	3.5	0.057	2.3	0.067	3.1	0.211	0.9
Other Yampa Valley	0.010	0.2	0.004	1.7	0.100	14.6	0.159	9.3	0.146	6.0	0.571	26.7	0.991	4.5
Non-Yampa Valley	2.655	53.4	0.069	28.1	0.529	77.4	1.274	74.5	1.296	52.8	1.499	70.1	7.322	33.0
Denver	0.627	12.6	0.009	3.5	0.061	8.9	0.184	10.7	0.200	8.2	0.011	0.5	1.091	4.9
Colorado w/ Denver	1.502	30.2	0.053	21.6	0.463	67.7	1.079	63.1	1.169	47.6	1.094	51.2	5.359	24.1
Non-Colorado	1.153	23.2	0.016	6.6	0.067	9.8	0.195	11.4	0.127	5.2	0.405	19.0	1.963	8.8
Coal-fired PP	3.496	70.4	0.173	70.2	0.009	1.3	0.000	0.0	0.000	0.0	0.001	0.1	3.679	16.6
All other sources	1.473	29.6	0.073	29.8	0.675	98.7	1.709	100.0	2.454	100.0	2.137	99.9	18.522	83.4
Fires	0.000	0.0	0.004	1.6	0.030	4.3	0.217	12.7	0.955	38.9	0.000	0.0	1.205	5.4

Buffalo Pass
CONCENTRATION 0600-1200 95/ 9/18

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.779		0.127		0.114		0.061		0.670		0.670		1.572	
Estimated w/ fires	1.864	139.3	0.910	615.1	0.500	338.0	0.227	273.0	1.072	59.8	0.914	36.4	5.486	248.9
Estimated w/o fires	1.864	139.3	0.844	563.2	0.464	306.4	0.182	198.8	0.503	-24.9	0.914	36.4	4.771	203.4
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.633	34.0	0.519	57.0	0.085	16.9	0.024	10.7	0.062	5.8	0.290	31.7	1.613	29.4
Craig 1-3	0.169	9.1	0.201	22.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.371	6.8
Craig 1-2	0.148	7.9	0.142	15.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.291	5.3
Craig 1	0.071	3.8	0.067	7.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.138	2.5
Craig 2	0.077	4.1	0.075	8.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.153	2.8
Craig 3	0.021	1.1	0.059	6.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.081	1.5
Hayden 1-2	0.458	24.6	0.287	31.6	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.746	13.6
Hayden 1	0.247	13.2	0.195	21.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.443	8.1
Hayden 2	0.211	11.3	0.092	10.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.304	5.5
Steamboat Springs	0.002	0.1	0.011	1.2	0.011	2.2	0.006	2.5	0.015	1.4	0.033	3.6	0.077	1.4
Other Yampa Valley	0.005	0.3	0.020	2.2	0.071	14.2	0.018	8.2	0.047	4.4	0.257	28.1	0.419	7.6
Non-Yampa Valley	1.231	66.0	0.325	35.7	0.379	75.8	0.157	69.4	0.441	41.2	0.624	68.3	3.157	57.6
Denver	0.277	14.8	0.023	2.5	0.052	10.5	0.025	11.1	0.080	7.4	0.005	0.5	0.461	8.4
Colorado w/ Denver	0.698	37.4	0.186	20.5	0.327	65.5	0.131	57.8	0.390	36.4	0.463	50.6	2.195	40.0
Non-Colorado	0.533	28.6	0.139	15.2	0.052	10.4	0.026	11.6	0.051	4.7	0.161	17.7	0.962	17.5
Coal-fired PP	1.073	57.6	0.530	58.2	0.004	0.7	0.000	0.0	0.000	0.0	0.000	0.0	1.606	29.3
All other sources	0.791	42.4	0.380	41.8	0.496	99.3	0.227	100.0	1.072	100.0	0.914	100.0	3.880	70.7
Fires	0.000	0.0	0.066	7.3	0.036	7.2	0.045	19.9	0.568	53.0	0.000	0.0	0.715	13.0

Table B.2.3.9a (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/ 9/18 6-hour average RH: 95%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	12.042		1.989		0.555		0.553		8.521		8.521		33.661	
Estimated w/ fires	28.815	139.3	14.226	615.1	2.429	338.0	2.064	273.0	13.621	59.8	11.623	36.4	82.777	145.9
Estimated w/o fires	28.815	139.3	13.193	563.2	2.254	306.4	1.653	198.8	6.399	-24.9	11.623	36.4	73.936	119.7
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	9.789	34.0	8.115	57.0	0.412	16.9	0.221	10.7	0.792	5.8	3.686	31.7	23.015	27.8
Craig 1-3	2.612	9.1	3.148	22.1	0.004	0.2	0.000	0.0	0.000	0.0	0.002	0.0	5.766	7.0
Craig 1-2	2.284	7.9	2.220	15.6	0.004	0.2	0.000	0.0	0.000	0.0	0.001	0.0	4.509	5.4
Craig 1	1.092	3.8	1.041	7.3	0.002	0.1	0.000	0.0	0.000	0.0	0.000	0.0	2.136	2.6
Craig 2	1.192	4.1	1.179	8.3	0.002	0.1	0.000	0.0	0.000	0.0	0.001	0.0	2.373	2.9
Craig 3	0.328	1.1	0.928	6.5	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0	1.258	1.5
Hayden 1-2	7.075	24.6	4.488	31.6	0.008	0.3	0.000	0.0	0.000	0.0	0.001	0.0	11.573	14.0
Hayden 1	3.816	13.2	3.049	21.4	0.004	0.2	0.000	0.0	0.000	0.0	0.000	0.0	6.870	8.3
Hayden 2	3.259	11.3	1.439	10.1	0.004	0.2	0.000	0.0	0.000	0.0	0.000	0.0	4.702	5.7
Steamboat Springs	0.026	0.1	0.172	1.2	0.053	2.2	0.052	2.5	0.191	1.4	0.415	3.6	0.910	1.1
Other Yampa Valley	0.076	0.3	0.306	2.2	0.346	14.2	0.168	8.2	0.601	4.4	3.268	28.1	4.766	5.8
Non-Yampa Valley	19.025	66.0	5.079	35.7	1.842	75.8	1.432	69.4	5.607	41.2	7.936	68.3	40.922	49.4
Denver	4.279	14.8	0.355	2.5	0.254	10.5	0.229	11.1	1.011	7.4	0.058	0.5	6.185	7.5
Colorado w/ Denver	10.784	37.4	2.910	20.5	1.590	65.5	1.192	57.8	4.961	36.4	5.884	50.6	27.321	33.0
Non-Colorado	8.242	28.6	2.169	15.2	0.252	10.4	0.240	11.6	0.646	4.7	2.052	17.7	13.601	16.4
Coal-fired PP	16.587	57.6	8.284	58.2	0.017	0.7	0.000	0.0	0.000	0.0	0.003	0.0	24.892	30.1
All other sources	12.228	42.4	5.942	41.8	2.412	99.3	2.064	100.0	13.621	100.0	11.619	100.0	57.885	69.9
Fires	0.000	0.0	1.032	7.3	0.175	7.2	0.411	19.9	7.222	53.0	0.000	0.0	8.840	10.7

Buffalo Pass
CONCENTRATION 1200-1800 95/ 9/18

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.592		0.269		0.125		0.100		0.486		0.486		2.297	
Estimated w/ fires	2.218	39.3	0.592	120.3	0.167	33.7	0.079	-20.8	0.389	-19.9	0.327	-32.7	3.773	64.2
Estimated w/o fires	2.218	39.3	0.577	114.7	0.152	21.8	0.061	-39.5	0.153	-68.5	0.327	-32.7	3.488	51.8

Table B.2.3.9a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.434	64.7	0.507	85.7	0.042	24.9	0.011	14.3	0.029	7.4	0.100	30.4	2.123	56.3
Craig 1-3	0.386	17.4	0.191	32.3	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.579	15.3
Craig 1-2	0.352	15.9	0.134	22.6	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.487	12.9
Craig 1	0.176	7.9	0.063	10.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.240	6.4
Craig 2	0.176	7.9	0.070	11.9	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.247	6.5
Craig 3	0.034	1.5	0.058	9.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.092	2.4
Hayden 1-2	1.045	47.1	0.305	51.6	0.003	1.5	0.000	0.0	0.000	0.0	0.000	0.0	1.352	35.8
Hayden 1	0.516	23.3	0.199	33.6	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.716	19.0
Hayden 2	0.529	23.8	0.106	17.9	0.001	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.636	16.9
Steamboat Springs	0.001	0.0	0.003	0.5	0.004	2.2	0.002	2.6	0.006	1.5	0.007	2.1	0.022	0.6
Other Yampa Valley	0.003	0.1	0.007	1.2	0.034	20.6	0.009	11.7	0.023	5.9	0.093	28.3	0.170	4.5
Non-Yampa Valley	0.783	35.3	0.070	11.8	0.111	66.1	0.049	62.0	0.125	32.0	0.228	69.6	1.365	36.2
Denver	0.077	3.5	0.003	0.5	0.009	5.5	0.005	5.7	0.014	3.7	0.001	0.2	0.109	2.9
Colorado w/ Denver	0.241	10.9	0.024	4.0	0.076	45.6	0.032	40.2	0.091	23.4	0.123	37.7	0.587	15.6
Non-Colorado	0.542	24.5	0.046	7.7	0.034	20.5	0.017	21.9	0.033	8.6	0.104	31.9	0.778	20.6
Coal-fired PP	1.694	76.4	0.511	86.4	0.004	2.6	0.000	0.0	0.000	0.0	0.000	0.1	2.209	58.6
All other sources	0.524	23.6	0.081	13.6	0.163	97.4	0.079	100.0	0.389	100.0	0.327	99.9	1.564	41.4
Fires	0.000	0.0	0.015	2.6	0.015	9.0	0.019	23.6	0.236	60.6	0.000	0.0	0.285	7.6

Buffalo Pass
EXTINCTION 1200-1800 95/ 9/18 6-hour average RH: 95%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	24.612		4.201		0.607		0.911		6.182		6.182		46.513	
Estimated w/ fires	34.286	39.3	9.254	120.3	0.813	33.7	0.722	-20.8	4.949	-19.9	4.162	-32.7	64.186	38.0
Estimated w/o fires	34.286	39.3	9.017	114.7	0.740	21.8	0.551	-39.5	1.949	-68.5	4.162	-32.7	60.706	30.5
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	22.175	64.7	7.928	85.7	0.203	24.9	0.103	14.3	0.366	7.4	1.266	30.4	32.041	49.9
Craig 1-3	5.967	17.4	2.994	32.3	0.005	0.6	0.000	0.0	0.000	0.0	0.002	0.0	8.968	14.0
Craig 1-2	5.447	15.9	2.089	22.6	0.004	0.6	0.000	0.0	0.000	0.0	0.001	0.0	7.541	11.7
Craig 1	2.724	7.9	0.990	10.7	0.002	0.2	0.000	0.0	0.000	0.0	0.001	0.0	3.717	5.8
Craig 2	2.723	7.9	1.099	11.9	0.002	0.3	0.000	0.0	0.000	0.0	0.001	0.0	3.825	6.0
Craig 3	0.520	1.5	0.905	9.8	0.000	0.1	0.000	0.0	0.000	0.0	0.001	0.0	1.426	2.2
Hayden 1-2	16.151	47.1	4.771	51.6	0.012	1.5	0.000	0.0	0.000	0.0	0.001	0.0	20.935	32.6
Hayden 1	7.977	23.3	3.110	33.6	0.006	0.7	0.000	0.0	0.000	0.0	0.001	0.0	11.093	17.3
Hayden 2	8.174	23.8	1.661	17.9	0.007	0.8	0.000	0.0	0.000	0.0	0.001	0.0	9.842	15.3

Table B.2.3.9a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

Steamboat Springs	0.009	0.0	0.049	0.5	0.018	2.2	0.019	2.6	0.073	1.5	0.086	2.1	0.254	0.4
Other Yampa Valley	0.048	0.1	0.115	1.2	0.167	20.6	0.085	11.7	0.292	5.9	1.176	28.3	1.883	2.9
Non-Yampa Valley	12.111	35.3	1.089	11.8	0.537	66.1	0.448	62.0	1.584	32.0	2.897	69.6	18.666	29.1
Denver	1.194	3.5	0.042	0.5	0.045	5.5	0.041	5.7	0.182	3.7	0.010	0.2	1.515	2.4
Colorado w/ Denver	3.725	10.9	0.372	4.0	0.371	45.6	0.290	40.2	1.159	23.4	1.569	37.7	7.486	11.7
Non-Colorado	8.386	24.5	0.717	7.7	0.166	20.5	0.158	21.9	0.425	8.6	1.328	31.9	11.180	17.4
Coal-fired PP	26.183	76.4	7.991	86.4	0.021	2.6	0.000	0.0	0.000	0.0	0.004	0.1	34.199	53.3
All other sources	8.104	23.6	1.263	13.6	0.792	97.4	0.722	100.0	4.949	100.0	4.159	99.9	29.988	46.7
Fires	0.000	0.0	0.237	2.6	0.073	9.0	0.171	23.6	3.000	60.6	0.000	0.0	3.480	5.4

Buffalo Pass
CONCENTRATION 0600-1200 95/ 9/19

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.419		0.169		0.150		0.125		0.568		0.568		1.229	
Estimated w/ fires	0.927	121.2	0.167	-0.8	0.142	-5.0	0.060	-51.9	0.209	-63.2	0.490	-13.8	1.995	62.3
Estimated w/o fires	0.927	121.2	0.161	-4.7	0.138	-8.0	0.054	-56.5	0.136	-76.0	0.490	-13.8	1.906	55.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.399	43.1	0.072	42.9	0.036	24.9	0.011	18.2	0.027	12.8	0.177	36.2	0.722	36.2
Craig 1-3	0.094	10.2	0.020	12.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.114	5.7
Craig 1-2	0.085	9.2	0.014	8.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.099	5.0
Craig 1	0.044	4.8	0.007	4.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.052	2.6
Craig 2	0.041	4.4	0.007	4.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.048	2.4
Craig 3	0.009	1.0	0.006	3.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.015	0.7
Hayden 1-2	0.302	32.6	0.044	26.4	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.347	17.4
Hayden 1	0.164	17.8	0.032	18.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.196	9.8
Hayden 2	0.138	14.9	0.013	7.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.151	7.6
Steamboat Springs	0.001	0.1	0.002	1.2	0.007	4.6	0.004	6.3	0.010	4.6	0.016	3.2	0.038	1.9
Other Yampa Valley	0.002	0.2	0.006	3.3	0.029	20.1	0.007	11.9	0.017	8.3	0.162	33.0	0.222	11.1
Non-Yampa Valley	0.527	56.9	0.089	53.2	0.102	71.8	0.043	72.3	0.109	52.4	0.312	63.8	1.184	59.4
Denver	0.012	1.3	0.002	1.1	0.002	1.4	0.001	1.6	0.003	1.4	0.000	0.0	0.020	1.0
Colorado w/ Denver	0.069	7.5	0.046	27.6	0.067	47.2	0.026	42.8	0.071	34.2	0.210	42.9	0.489	24.5
Non-Colorado	0.458	49.5	0.043	25.7	0.035	24.7	0.018	29.5	0.038	18.3	0.102	20.9	0.695	34.8
Coal-fired PP	0.532	57.5	0.071	42.5	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.604	30.3
All other sources	0.394	42.5	0.096	57.5	0.142	99.4	0.060	100.0	0.209	100.0	0.490	100.0	1.390	69.7
Fires	0.000	0.0	0.007	3.9	0.005	3.2	0.006	9.6	0.073	34.7	0.000	0.0	0.089	4.5

Table B.2.3.9a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/ 9/19 6-hour average RH: 92%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	4.437		1.818		0.549		1.136		5.252		5.252		23.191	
Estimated w/ fires	9.816	121.2	1.803	-0.8	0.521	-5.0	0.547	-51.9	1.930	-63.2	4.526	-13.8	29.143	25.7
Estimated w/o fires	9.816	121.2	1.733	-4.7	0.505	-8.0	0.494	-56.5	1.260	-76.0	4.526	-13.8	28.333	22.2
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	4.230	43.1	0.773	42.9	0.130	24.9	0.099	18.2	0.248	12.8	1.638	36.2	7.118	24.4
Craig 1-3	0.997	10.2	0.216	12.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	1.214	4.2
Craig 1-2	0.902	9.2	0.152	8.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	1.055	3.6
Craig 1	0.470	4.8	0.078	4.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.548	1.9
Craig 2	0.432	4.4	0.075	4.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.507	1.7
Craig 3	0.095	1.0	0.064	3.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.159	0.5
Hayden 1-2	3.204	32.6	0.475	26.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	3.681	12.6
Hayden 1	1.743	17.8	0.340	18.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	2.083	7.1
Hayden 2	1.462	14.9	0.135	7.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	1.598	5.5
Steamboat Springs	0.006	0.1	0.022	1.2	0.024	4.6	0.034	6.3	0.088	4.6	0.144	3.2	0.318	1.1
Other Yampa Valley	0.022	0.2	0.060	3.3	0.105	20.1	0.065	11.9	0.160	8.3	1.494	33.0	1.906	6.5
Non-Yampa Valley	5.586	56.9	0.960	53.2	0.375	71.8	0.395	72.3	1.012	52.4	2.887	63.8	11.215	38.5
Denver	0.131	1.3	0.020	1.1	0.007	1.4	0.008	1.6	0.027	1.4	0.002	0.0	0.196	0.7
Colorado w/ Denver	0.732	7.5	0.497	27.6	0.246	47.2	0.234	42.8	0.659	34.2	1.941	42.9	4.309	14.8
Non-Colorado	4.854	49.5	0.462	25.7	0.129	24.7	0.161	29.5	0.353	18.3	0.947	20.9	6.906	23.7
Coal-fired PP	5.640	57.5	0.767	42.5	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	6.411	22.0
All other sources	4.176	42.5	1.036	57.5	0.518	99.4	0.547	100.0	1.930	100.0	4.525	100.0	22.732	78.0
Fires	0.000	0.0	0.070	3.9	0.017	3.2	0.052	9.6	0.670	34.7	0.000	0.0	0.810	2.8

Buffalo Pass
CONCENTRATION 1200-1800 95/ 9/19

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.167		0.262		0.147		0.242		1.459		1.459		2.901	
Estimated w/ fires	1.480	26.8	0.786	199.9	0.166	13.2	0.063	-74.0	0.305	-79.1	0.274	-81.2	3.073	5.9
Estimated w/o fires	1.480	26.8	0.774	195.3	0.155	5.7	0.049	-79.7	0.132	-90.9	0.274	-81.2	2.864	-1.3

Table B.2.3.9a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.881	59.5	0.646	82.2	0.089	53.8	0.020	32.5	0.064	20.9	0.095	34.7	1.795	58.4
Craig 1-3	0.187	12.6	0.159	20.2	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.1	0.347	11.3
Craig 1-2	0.163	11.0	0.111	14.1	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.275	9.0
Craig 1	0.067	4.5	0.035	4.5	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.103	3.4
Craig 2	0.096	6.5	0.075	9.6	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.172	5.6
Craig 3	0.024	1.6	0.048	6.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.072	2.3
Hayden 1-2	0.688	46.5	0.467	59.5	0.004	2.6	0.000	0.0	0.000	0.0	0.000	0.1	1.160	37.7
Hayden 1	0.378	25.6	0.321	40.9	0.002	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.702	22.8
Hayden 2	0.310	20.9	0.146	18.6	0.002	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.458	14.9
Steamboat Springs	0.001	0.0	0.009	1.2	0.006	3.5	0.003	5.3	0.009	3.0	0.010	3.8	0.039	1.3
Other Yampa Valley	0.005	0.3	0.011	1.4	0.078	47.0	0.017	27.1	0.054	17.8	0.084	30.8	0.249	8.1
Non-Yampa Valley	0.599	40.5	0.128	16.2	0.066	39.6	0.029	45.7	0.069	22.5	0.179	65.3	1.068	34.8
Denver	0.007	0.4	0.002	0.3	0.001	0.4	0.000	0.5	0.001	0.3	0.000	0.0	0.011	0.3
Colorado w/ Denver	0.054	3.7	0.055	7.0	0.039	23.4	0.015	24.5	0.040	13.1	0.110	40.1	0.314	10.2
Non-Colorado	0.544	36.8	0.072	9.2	0.027	16.2	0.013	21.2	0.029	9.5	0.069	25.3	0.755	24.6
Coal-fired PP	1.069	72.3	0.639	81.3	0.006	3.8	0.000	0.0	0.000	0.0	0.000	0.1	1.715	55.8
All other sources	0.410	27.7	0.147	18.7	0.160	96.2	0.063	100.0	0.305	100.0	0.274	99.9	1.358	44.2
Fires	0.000	0.0	0.012	1.5	0.011	6.6	0.014	21.8	0.173	56.6	0.000	0.0	0.209	6.8

Buffalo Pass
EXTINCTION 1200-1800 95/ 9/19 6-hour average RH: 75%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	4.367		1.028		0.289		2.198		6.363		6.363		24.244	
Estimated w/ fires	5.536	26.8	3.082	199.9	0.327	13.2	0.571	-74.0	1.330	-79.1	1.195	-81.2	22.042	-9.1
Estimated w/o fires	5.536	26.8	3.035	195.3	0.305	5.7	0.447	-79.7	0.577	-90.9	1.195	-81.2	21.095	-13.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	3.295	59.5	2.535	82.2	0.176	53.8	0.185	32.5	0.277	20.9	0.414	34.7	6.883	31.2
Craig 1-3	0.700	12.6	0.623	20.2	0.002	0.7	0.000	0.0	0.000	0.0	0.001	0.1	1.326	6.0
Craig 1-2	0.611	11.0	0.434	14.1	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	1.048	4.8
Craig 1	0.252	4.5	0.139	4.5	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.391	1.8
Craig 2	0.360	6.5	0.295	9.6	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.656	3.0
Craig 3	0.089	1.6	0.189	6.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.278	1.3
Hayden 1-2	2.574	46.5	1.833	59.5	0.009	2.6	0.000	0.0	0.000	0.0	0.001	0.1	4.417	20.0
Hayden 1	1.415	25.6	1.260	40.9	0.004	1.3	0.000	0.0	0.000	0.0	0.000	0.0	2.680	12.2
Hayden 2	1.159	20.9	0.573	18.6	0.004	1.3	0.000	0.0	0.000	0.0	0.000	0.0	1.737	7.9

Table B.2.3.9a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

Steamboat Springs	0.003	0.0	0.036	1.2	0.011	3.5	0.031	5.3	0.040	3.0	0.045	3.8	0.166	0.8
Other Yampa Valley	0.018	0.3	0.043	1.4	0.153	47.0	0.155	27.1	0.237	17.8	0.368	30.8	0.975	4.4
Non-Yampa Valley	2.241	40.5	0.500	16.2	0.129	39.6	0.261	45.7	0.300	22.5	0.781	65.3	4.212	19.1
Denver	0.024	0.4	0.009	0.3	0.001	0.4	0.003	0.5	0.004	0.3	0.000	0.0	0.042	0.2
Colorado w/ Denver	0.204	3.7	0.217	7.0	0.077	23.4	0.140	24.5	0.174	13.1	0.479	40.1	1.290	5.9
Non-Colorado	2.037	36.8	0.283	9.2	0.053	16.2	0.121	21.2	0.126	9.5	0.302	25.3	2.922	13.3
Coal-fired PP	4.001	72.3	2.507	81.3	0.012	3.8	0.000	0.0	0.000	0.0	0.002	0.1	6.521	29.6
All other sources	1.535	27.7	0.576	18.7	0.315	96.2	0.571	100.0	1.330	100.0	1.194	99.9	15.520	70.4
Fires	0.000	0.0	0.047	1.5	0.022	6.6	0.125	21.8	0.753	56.6	0.000	0.0	0.947	4.3

Buffalo Pass
CONCENTRATION 0600-1200 95/ 9/20

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.354		1.379		0.080		0.345		1.489		1.489		2.204	
Estimated w/ fires	2.283	545.3	0.467	-66.1	0.376	370.7	0.233	-32.4	1.796	20.6	0.909	-38.9	6.064	175.1
Estimated w/o fires	2.283	545.3	0.398	-71.1	0.279	249.6	0.112	-67.5	0.272	-81.7	0.909	-38.9	4.253	93.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.719	31.5	0.249	53.3	0.074	19.8	0.022	9.3	0.053	2.9	0.284	31.3	1.401	23.1
Craig 1-3	0.201	8.8	0.105	22.5	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.308	5.1
Craig 1-2	0.184	8.0	0.081	17.3	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.266	4.4
Craig 1	0.088	3.9	0.044	9.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.133	2.2
Craig 2	0.095	4.2	0.037	7.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.133	2.2
Craig 3	0.018	0.8	0.024	5.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.042	0.7
Hayden 1-2	0.515	22.5	0.134	28.6	0.003	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.652	10.8
Hayden 1	0.242	10.6	0.072	15.5	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.315	5.2
Hayden 2	0.273	12.0	0.061	13.1	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.337	5.6
Steamboat Springs	0.001	0.0	0.002	0.5	0.008	2.0	0.005	1.9	0.012	0.7	0.016	1.8	0.044	0.7
Other Yampa Valley	0.002	0.1	0.008	1.7	0.062	16.6	0.017	7.3	0.041	2.3	0.267	29.4	0.398	6.6
Non-Yampa Valley	1.564	68.5	0.149	31.9	0.205	54.5	0.090	38.8	0.219	12.2	0.625	68.7	2.852	47.0
Denver	0.002	0.1	0.001	0.3	0.003	0.8	0.002	0.8	0.006	0.3	0.000	0.0	0.015	0.2
Colorado w/ Denver	0.084	3.7	0.041	8.9	0.100	26.6	0.038	16.4	0.101	5.6	0.316	34.7	0.680	11.2
Non-Colorado	1.480	64.8	0.108	23.0	0.104	27.8	0.052	22.4	0.118	6.6	0.309	34.0	2.172	35.8
Coal-fired PP	1.221	53.5	0.286	61.1	0.007	2.0	0.000	0.0	0.000	0.0	0.000	0.1	1.515	25.0
All other sources	1.061	46.5	0.182	38.9	0.368	98.0	0.233	100.0	1.796	100.0	0.909	99.9	4.549	75.0
Fires	0.000	0.0	0.069	14.8	0.097	25.7	0.121	51.9	1.524	84.9	0.000	0.0	1.811	29.9

Table B.2.3.9a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/ 9/20 6-hour average RH: 95%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	5.470		21.562		0.388		3.137		18.922		18.922		59.477	
Estimated w/ fires	35.293	545.3	7.311	-66.1	1.826	370.7	2.120	-32.4	22.823	20.6	11.554	-38.9	90.928	52.9
Estimated w/o fires	35.293	545.3	6.227	-71.1	1.356	249.6	1.019	-67.5	3.454	-81.7	11.554	-38.9	68.904	15.8
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	11.111	31.5	3.895	53.3	0.362	19.8	0.197	9.3	0.672	2.9	3.611	31.3	19.846	21.8
Craig 1-3	3.109	8.8	1.642	22.5	0.007	0.4	0.000	0.0	0.000	0.0	0.003	0.0	4.760	5.2
Craig 1-2	2.837	8.0	1.267	17.3	0.006	0.3	0.000	0.0	0.000	0.0	0.002	0.0	4.112	4.5
Craig 1	1.362	3.9	0.687	9.4	0.003	0.2	0.000	0.0	0.000	0.0	0.001	0.0	2.052	2.3
Craig 2	1.475	4.2	0.580	7.9	0.003	0.2	0.000	0.0	0.000	0.0	0.001	0.0	2.060	2.3
Craig 3	0.272	0.8	0.375	5.1	0.001	0.0	0.000	0.0	0.000	0.0	0.001	0.0	0.648	0.7
Hayden 1-2	7.957	22.5	2.094	28.6	0.015	0.8	0.000	0.0	0.000	0.0	0.002	0.0	10.068	11.1
Hayden 1	3.734	10.6	1.133	15.5	0.006	0.3	0.000	0.0	0.000	0.0	0.001	0.0	4.874	5.4
Hayden 2	4.223	12.0	0.961	13.1	0.009	0.5	0.000	0.0	0.000	0.0	0.001	0.0	5.194	5.7
Steamboat Springs	0.012	0.0	0.035	0.5	0.037	2.0	0.041	1.9	0.151	0.7	0.209	1.8	0.486	0.5
Other Yampa Valley	0.032	0.1	0.123	1.7	0.303	16.6	0.156	7.3	0.521	2.3	3.398	29.4	4.532	5.0
Non-Yampa Valley	24.183	68.5	2.332	31.9	0.994	54.5	0.822	38.8	2.783	12.2	7.943	68.7	39.057	43.0
Denver	0.038	0.1	0.022	0.3	0.015	0.8	0.016	0.8	0.070	0.3	0.004	0.0	0.165	0.2
Colorado w/ Denver	1.296	3.7	0.647	8.9	0.486	26.6	0.347	16.4	1.284	5.6	4.015	34.7	8.076	8.9
Non-Colorado	22.887	64.8	1.685	23.0	0.508	27.8	0.475	22.4	1.499	6.6	3.928	34.0	30.982	34.1
Coal-fired PP	18.884	53.5	4.467	61.1	0.036	2.0	0.000	0.0	0.000	0.0	0.006	0.1	23.394	25.7
All other sources	16.409	46.5	2.844	38.9	1.789	98.0	2.120	100.0	22.823	100.0	11.548	99.9	67.534	74.3
Fires	0.000	0.0	1.084	14.8	0.470	25.7	1.101	51.9	19.369	84.9	0.000	0.0	22.024	24.2

Buffalo Pass
CONCENTRATION 1200-1800 95/ 9/20

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.877		0.222		0.091		0.090		0.652		0.652		1.744	
Estimated w/ fires	1.995	127.4	0.166	-25.3	0.218	138.6	0.132	45.8	0.949	45.6	0.457	-29.9	3.915	124.5
Estimated w/o fires	1.995	127.4	0.136	-38.7	0.168	84.1	0.069	-23.2	0.165	-74.7	0.457	-29.9	2.990	71.5

Table B.2.3.9a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.150	7.5	0.029	17.7	0.046	21.0	0.013	9.8	0.032	3.4	0.109	23.8	0.379	9.7
Craig 1-3	0.011	0.5	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.3
Craig 1-2	0.010	0.5	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.011	0.3
Craig 1	0.004	0.2	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.1
Craig 2	0.006	0.3	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.2
Craig 3	0.001	0.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.137	6.9	0.024	14.3	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.161	4.1
Hayden 1	0.095	4.8	0.020	11.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.115	2.9
Hayden 2	0.042	2.1	0.004	2.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.046	1.2
Steamboat Springs	0.000	0.0	0.000	0.1	0.002	0.9	0.001	0.9	0.003	0.3	0.003	0.7	0.010	0.3
Other Yampa Valley	0.002	0.1	0.004	2.2	0.043	19.8	0.012	9.0	0.029	3.0	0.105	23.1	0.195	5.0
Non-Yampa Valley	1.845	92.5	0.107	64.4	0.122	56.2	0.056	42.9	0.133	14.0	0.348	76.2	2.611	66.7
Denver	0.001	0.0	0.000	0.2	0.001	0.4	0.000	0.3	0.001	0.1	0.000	0.0	0.004	0.1
Colorado w/ Denver	0.034	1.7	0.011	6.4	0.034	15.7	0.014	10.4	0.036	3.8	0.113	24.7	0.241	6.2
Non-Colorado	1.810	90.8	0.096	58.1	0.088	40.5	0.043	32.4	0.097	10.2	0.235	51.5	2.370	60.5
Coal-fired PP	0.877	44.0	0.077	46.4	0.005	2.3	0.000	0.0	0.000	0.0	0.000	0.1	0.960	24.5
All other sources	1.117	56.0	0.089	53.6	0.213	97.7	0.132	100.0	0.949	100.0	0.456	99.9	2.955	75.5
Fires	0.000	0.0	0.030	17.9	0.050	22.8	0.062	47.3	0.784	82.6	0.000	0.0	0.925	23.6

Buffalo Pass
EXTINCTION 1200-1800 95/ 9/20 6-hour average RH: 95%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	13.562		3.468		0.444		0.821		8.283		8.283		36.578	
Estimated w/ fires	30.838	127.4	2.591	-25.3	1.059	138.6	1.197	45.8	12.057	45.6	5.805	-29.9	63.546	73.7
Estimated w/o fires	30.838	127.4	2.127	-38.7	0.817	84.1	0.630	-23.2	2.094	-74.7	5.805	-29.9	52.311	43.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	2.317	7.5	0.457	17.7	0.222	21.0	0.117	9.8	0.406	3.4	1.384	23.8	4.904	7.7
Craig 1-3	0.168	0.5	0.026	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.194	0.3
Craig 1-2	0.153	0.5	0.019	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.172	0.3
Craig 1	0.061	0.2	0.008	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.069	0.1
Craig 2	0.092	0.3	0.012	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.103	0.2
Craig 3	0.015	0.0	0.006	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.021	0.0
Hayden 1-2	2.120	6.9	0.371	14.3	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	2.493	3.9
Hayden 1	1.472	4.8	0.309	11.9	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	1.783	2.8
Hayden 2	0.647	2.1	0.062	2.4	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.711	1.1

Table B.2.3.9a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

Steamboat Springs	0.002	0.0	0.004	0.1	0.010	0.9	0.010	0.9	0.041	0.3	0.043	0.7	0.110	0.2
Other Yampa Valley	0.028	0.1	0.057	2.2	0.210	19.8	0.107	9.0	0.365	3.0	1.340	23.1	2.108	3.3
Non-Yampa Valley	28.521	92.5	1.670	64.4	0.595	56.2	0.513	42.9	1.687	14.0	4.421	76.2	37.407	58.9
Denver	0.015	0.0	0.006	0.2	0.004	0.4	0.004	0.3	0.018	0.1	0.001	0.0	0.048	0.1
Colorado w/ Denver	0.532	1.7	0.165	6.4	0.166	15.7	0.125	10.4	0.453	3.8	1.432	24.7	2.873	4.5
Non-Colorado	27.989	90.8	1.505	58.1	0.429	40.5	0.388	32.4	1.234	10.2	2.989	51.5	34.534	54.3
Coal-fired PP	13.565	44.0	1.202	46.4	0.024	2.3	0.000	0.0	0.000	0.0	0.003	0.1	14.795	23.3
All other sources	17.273	56.0	1.389	53.6	1.034	97.7	1.197	100.0	12.057	100.0	5.802	99.9	48.751	76.7
Fires	0.000	0.0	0.464	17.9	0.242	22.8	0.566	47.3	9.963	82.6	0.000	0.0	11.235	17.7

Buffalo Pass
CONCENTRATION 0600-1200 95/ 9/21

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.485		0.141		0.141		0.131		0.036		0.036		1.785	
Estimated w/ fires	1.365	-8.1	0.000	-100.0	0.250	77.8	0.111	-15.0	0.451	999.9	0.773	999.9	2.950	65.3
Estimated w/o fires	1.365	-8.1	0.000	-100.0	0.236	67.7	0.093	-28.7	0.226	521.1	0.773	999.9	2.693	50.9
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.028	2.1	0.000	0.0	0.080	32.0	0.021	18.7	0.054	12.0	0.333	43.1	0.516	17.5
Craig 1-3	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 1-2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.024	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.024	0.8
Hayden 1	0.020	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.020	0.7
Hayden 2	0.004	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.1
Steamboat Springs	0.001	0.0	0.000	0.0	0.007	2.7	0.004	3.6	0.010	2.2	0.016	2.0	0.037	1.3
Other Yampa Valley	0.002	0.2	0.000	0.0	0.073	29.3	0.017	15.0	0.044	9.8	0.318	41.1	0.454	15.4
Non-Yampa Valley	1.337	97.9	0.000	0.0	0.156	62.3	0.073	65.2	0.172	38.1	0.439	56.9	2.177	73.8
Denver	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.001	0.0
Colorado w/ Denver	0.019	1.4	0.000	0.0	0.039	15.7	0.015	13.2	0.039	8.6	0.124	16.1	0.236	8.0
Non-Colorado	1.318	96.5	0.000	0.0	0.117	46.6	0.058	52.0	0.133	29.6	0.315	40.8	1.941	65.8
Coal-fired PP	0.535	39.2	0.000	0.0	0.003	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.538	18.2
All other sources	0.830	60.8	0.000	100.0	0.248	98.9	0.111	100.0	0.451	100.0	0.773	100.0	2.412	81.8
Fires	0.000	0.0	0.000	0.0	0.014	5.7	0.018	16.1	0.225	49.9	0.000	0.0	0.257	8.7

Table B.2.3.9a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/ 9/21 6-hour average RH: 90%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	12.116		1.177		0.431		1.190		0.273		0.273		25.188	
Estimated w/ fires	11.138	-8.1	0.000	-100.0	0.766	77.8	1.011	-15.0	3.386	999.9	5.803	999.9	32.104	27.5
Estimated w/o fires	11.138	-8.1	0.000	-100.0	0.722	67.7	0.849	-28.7	1.696	521.1	5.803	999.9	30.208	19.9
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.228	2.1	0.000	0.0	0.245	32.0	0.189	18.7	0.405	12.0	2.503	43.1	3.570	11.1
Craig 1-3	0.010	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.0
Craig 1-2	0.009	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.0
Craig 1	0.004	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.0
Craig 2	0.005	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.0
Craig 3	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.195	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.195	0.6
Hayden 1	0.161	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.162	0.5
Hayden 2	0.034	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.034	0.1
Steamboat Springs	0.005	0.0	0.000	0.0	0.020	2.7	0.037	3.6	0.075	2.2	0.118	2.0	0.256	0.8
Other Yampa Valley	0.018	0.2	0.000	0.0	0.224	29.3	0.152	15.0	0.330	9.8	2.385	41.1	3.109	9.7
Non-Yampa Valley	10.909	97.9	0.000	0.0	0.477	62.3	0.660	65.2	1.291	38.1	3.300	56.9	16.637	51.8
Denver	0.003	0.0	0.000	0.0	0.000	0.1	0.001	0.1	0.002	0.0	0.000	0.0	0.006	0.0
Colorado w/ Denver	0.157	1.4	0.000	0.0	0.120	15.7	0.133	13.2	0.290	8.6	0.934	16.1	1.635	5.1
Non-Colorado	10.752	96.5	0.000	0.0	0.357	46.6	0.526	52.0	1.001	29.6	2.366	40.8	15.002	46.7
Coal-fired PP	4.363	39.2	0.000	0.0	0.009	1.1	0.000	0.0	0.000	0.0	0.001	0.0	4.373	13.6
All other sources	6.774	60.8	0.000	100.0	0.757	98.9	1.011	100.0	3.386	100.0	5.802	100.0	27.731	86.4
Fires	0.000	0.0	0.000	0.0	0.044	5.7	0.163	16.1	1.690	49.9	0.000	0.0	1.896	5.9

Buffalo Pass
CONCENTRATION 1200-1800 95/ 9/21

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.882		-99.000		0.096		0.049		0.298		0.298		1.315	
Estimated w/ fires	1.219	38.2	0.427	-99.0	0.151	57.9	0.064	30.8	0.228	-23.4	0.371	24.5	2.461	87.2
Estimated w/o fires	1.219	38.2	0.417	-99.0	0.145	52.0	0.057	16.4	0.139	-53.3	0.371	24.5	2.349	78.7

Table B.2.3.9a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.330	27.0	0.219	51.3	0.057	37.6	0.016	24.7	0.041	18.1	0.150	40.4	0.812	33.0
Craig 1-3	0.005	0.4	0.003	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.3
Craig 1-2	0.004	0.3	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.3
Craig 1	0.002	0.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.1
Craig 2	0.003	0.2	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.2
Craig 3	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.322	26.4	0.199	46.6	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.522	21.2
Hayden 1	0.282	23.2	0.185	43.3	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.468	19.0
Hayden 2	0.040	3.3	0.014	3.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.054	2.2
Steamboat Springs	0.001	0.0	0.004	1.0	0.005	3.1	0.003	4.0	0.007	3.2	0.008	2.2	0.028	1.1
Other Yampa Valley	0.002	0.2	0.012	2.9	0.051	33.7	0.013	20.7	0.034	14.8	0.142	38.2	0.255	10.3
Non-Yampa Valley	0.890	73.0	0.198	46.4	0.089	58.7	0.041	64.3	0.098	42.9	0.221	59.6	1.536	62.4
Denver	0.001	0.1	0.000	0.1	0.000	0.1	0.000	0.1	0.000	0.1	0.000	0.0	0.002	0.1
Colorado w/ Denver	0.031	2.5	0.057	13.4	0.032	21.4	0.014	21.7	0.036	15.7	0.064	17.2	0.234	9.5
Non-Colorado	0.859	70.4	0.141	32.9	0.056	37.3	0.027	42.6	0.062	27.2	0.157	42.4	1.302	52.9
Coal-fired PP	0.656	53.8	0.241	56.5	0.003	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.900	36.6
All other sources	0.563	46.2	0.185	43.5	0.149	98.3	0.064	100.0	0.228	100.0	0.371	100.0	1.560	63.4
Fires	0.000	0.0	0.010	2.4	0.006	3.7	0.007	11.0	0.089	39.0	0.000	0.0	0.112	4.5

Buffalo Pass
EXTINCTION 1200-1800 95/ 9/21 6-hour average RH: 86%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	5.304		-99.000		0.242		0.449		1.781		1.781		-99.000	
Estimated w/ fires	7.332	38.2	2.644	-99.0	0.382	57.9	0.587	30.8	1.365	-23.4	2.217	24.5	24.526	-99.0
Estimated w/o fires	7.332	38.2	2.580	-99.0	0.368	52.0	0.522	16.4	0.832	-53.3	2.217	24.5	23.852	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.983	27.0	1.355	51.3	0.144	37.6	0.145	24.7	0.246	18.1	0.896	40.4	4.769	19.4
Craig 1-3	0.028	0.4	0.020	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.047	0.2
Craig 1-2	0.025	0.3	0.017	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.042	0.2
Craig 1	0.009	0.1	0.006	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.015	0.1
Craig 2	0.016	0.2	0.010	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.027	0.1
Craig 3	0.002	0.0	0.003	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.0
Hayden 1-2	1.937	26.4	1.233	46.6	0.003	0.7	0.000	0.0	0.000	0.0	0.000	0.0	3.173	12.9
Hayden 1	1.698	23.2	1.144	43.3	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	2.845	11.6
Hayden 2	0.239	3.3	0.089	3.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.328	1.3

Table B.2.3.9a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 09/17/95 to 09/21/95 Episode

Steamboat Springs	0.003	0.0	0.026	1.0	0.012	3.1	0.023	4.0	0.044	3.2	0.049	2.2	0.157	0.6
Other Yampa Valley	0.015	0.2	0.077	2.9	0.129	33.7	0.122	20.7	0.202	14.8	0.847	38.2	1.391	5.7
Non-Yampa Valley	5.349	73.0	1.225	46.4	0.224	58.7	0.377	64.3	0.586	42.9	1.321	59.6	9.083	37.0
Denver	0.006	0.1	0.002	0.1	0.000	0.1	0.001	0.1	0.001	0.1	0.000	0.0	0.010	0.0
Colorado w/ Denver	0.185	2.5	0.355	13.4	0.082	21.4	0.127	21.7	0.215	15.7	0.382	17.2	1.346	5.5
Non-Colorado	5.164	70.4	0.870	32.9	0.143	37.3	0.250	42.6	0.371	27.2	0.939	42.4	7.737	31.5
Coal-fired PP	3.946	53.8	1.495	56.5	0.006	1.7	0.000	0.0	0.000	0.0	0.001	0.0	5.448	22.2
All other sources	3.386	46.2	1.149	43.5	0.376	98.3	0.587	100.0	1.365	100.0	2.216	100.0	19.078	77.8
Fires	0.000	0.0	0.063	2.4	0.014	3.7	0.064	11.0	0.532	39.0	0.000	0.0	0.674	2.7

Table B.2.3.9b

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

[This table also presents six-hour concentrations from filter measurements, as well as extinction estimated from the filter measurements using identical extinction efficiencies as applied to predicted concentrations. Source attributions are presented for all 12 source regions/types modeled with CALPUFF, and present results from each six-hour daylight period (0600-1200, and 1200-1800 LST).]

Gilpin Creek
CONCENTRATION 0600-1200 95/ 9/17

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.534		-99.000		-99.000		0.489		-99.000		-99.000		2.621	
Estimated w/ fires	2.247	46.4	0.100	-99.0	0.626	-99.0	0.265	-45.8	0.880	-99.0	1.019	-99.0	5.136	96.0
Estimated w/o fires	2.247	46.4	0.098	-99.0	0.616	-99.0	0.253	-48.3	0.725	-99.0	1.019	-99.0	4.958	89.2
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.672	29.9	0.020	20.0	0.047	7.4	0.012	4.7	0.038	4.3	0.200	19.6	0.989	19.2
Craig 1-3	0.211	9.4	0.010	9.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.222	4.3
Craig 1-2	0.165	7.3	0.006	6.5	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.172	3.3
Craig 1	0.077	3.4	0.003	3.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.080	1.6
Craig 2	0.088	3.9	0.003	3.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.092	1.8
Craig 3	0.046	2.1	0.003	3.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.050	1.0
Hayden 1-2	0.457	20.3	0.009	8.9	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.467	9.1
Hayden 1	0.227	10.1	0.006	6.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.234	4.6
Hayden 2	0.230	10.2	0.003	3.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.233	4.5
Steamboat Springs	0.001	0.0	0.000	0.1	0.001	0.2	0.001	0.3	0.002	0.2	0.003	0.3	0.007	0.1
Other Yampa Valley	0.003	0.1	0.001	1.1	0.044	7.0	0.012	4.4	0.036	4.1	0.197	19.3	0.292	5.7
Non-Yampa Valley	1.575	70.1	0.079	78.8	0.570	91.0	0.240	90.7	0.687	78.1	0.819	80.4	3.970	77.3
Denver	0.359	16.0	0.013	13.3	0.077	12.3	0.041	15.6	0.128	14.5	0.007	0.7	0.625	12.2
Colorado w/ Denver	0.838	37.3	0.060	60.7	0.487	77.8	0.198	74.6	0.609	69.3	0.551	54.1	2.743	53.4
Non-Colorado	0.737	32.8	0.018	18.1	0.083	13.2	0.043	16.1	0.078	8.9	0.268	26.3	1.227	23.9
Coal-fired PP	1.349	60.0	0.029	29.0	0.003	0.5	0.000	0.0	0.000	0.0	0.000	0.0	1.381	26.9
All other sources	0.898	40.0	0.071	71.0	0.623	99.5	0.265	100.0	0.880	100.0	1.019	100.0	3.755	73.1
Fires	0.000	0.0	0.001	1.2	0.010	1.6	0.012	4.6	0.155	17.6	0.000	0.0	0.178	3.5

Table B.2.3.9b (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/ 9/17 6-hour average RH: 42%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	3.234		-99.000		-99.000		4.449		-99.000		-99.000		-99.000	
Estimated w/ fires	4.736	46.4	0.228	-99.0	0.982	-99.0	2.411	-45.8	2.814	-99.0	3.260	-99.0	24.430	-99.0
Estimated w/o fires	4.736	46.4	0.225	-99.0	0.966	-99.0	2.299	-48.3	2.319	-99.0	3.260	-99.0	23.805	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.417	29.9	0.046	20.0	0.073	7.4	0.113	4.7	0.121	4.3	0.639	19.6	2.408	9.9
Craig 1-3	0.445	9.4	0.022	9.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.469	1.9
Craig 1-2	0.348	7.3	0.015	6.5	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.364	1.5
Craig 1	0.162	3.4	0.007	3.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.169	0.7
Craig 2	0.186	3.9	0.008	3.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.194	0.8
Craig 3	0.098	2.1	0.008	3.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.105	0.4
Hayden 1-2	0.964	20.3	0.020	8.9	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.986	4.0
Hayden 1	0.479	10.1	0.014	6.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.494	2.0
Hayden 2	0.484	10.2	0.007	3.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.492	2.0
Steamboat Springs	0.001	0.0	0.000	0.1	0.002	0.2	0.007	0.3	0.006	0.2	0.009	0.3	0.025	0.1
Other Yampa Valley	0.007	0.1	0.003	1.1	0.069	7.0	0.106	4.4	0.114	4.1	0.630	19.3	0.928	3.8
Non-Yampa Valley	3.319	70.1	0.180	78.8	0.893	91.0	2.187	90.7	2.198	78.1	2.621	80.4	11.398	46.7
Denver	0.757	16.0	0.030	13.3	0.121	12.3	0.376	15.6	0.408	14.5	0.023	0.7	1.715	7.0
Colorado w/ Denver	1.765	37.3	0.138	60.7	0.763	77.8	1.797	74.6	1.949	69.3	1.763	54.1	8.177	33.5
Non-Colorado	1.553	32.8	0.041	18.1	0.130	13.2	0.389	16.1	0.249	8.9	0.858	26.3	3.221	13.2
Coal-fired PP	2.843	60.0	0.066	29.0	0.005	0.5	0.000	0.0	0.000	0.0	0.001	0.0	2.916	11.9
All other sources	1.893	40.0	0.162	71.0	0.976	99.5	2.411	100.0	2.814	100.0	3.259	100.0	21.515	88.1
Fires	0.000	0.0	0.003	1.2	0.015	1.6	0.112	4.6	0.495	17.6	0.000	0.0	0.625	2.6

Gilpin Creek
CONCENTRATION 1200-1800 95/ 9/17

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.534		-99.000		-99.000		0.489		-99.000		-99.000		2.621	
Estimated w/ fires	2.406	56.8	0.000	-99.0	0.431	-99.0	0.183	-62.7	0.801	-99.0	0.678	-99.0	4.498	71.6
Estimated w/o fires	2.406	56.8	0.000	-99.0	0.408	-99.0	0.153	-68.6	0.433	-99.0	0.678	-99.0	4.078	55.6

Table B.2.3.9b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.106	46.0	0.000	0.0	0.095	22.0	0.022	11.9	0.062	7.7	0.208	30.7	1.492	33.2
Craig 1-3	0.335	13.9	0.000	0.0	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.337	7.5
Craig 1-2	0.278	11.5	0.000	0.0	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.279	6.2
Craig 1	0.134	5.6	0.000	0.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.135	3.0
Craig 2	0.143	6.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.144	3.2
Craig 3	0.057	2.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.058	1.3
Hayden 1-2	0.763	31.7	0.000	0.0	0.003	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.766	17.0
Hayden 1	0.415	17.3	0.000	0.0	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.417	9.3
Hayden 2	0.348	14.4	0.000	0.0	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.349	7.8
Steamboat Springs	0.001	0.0	0.000	0.0	0.003	0.6	0.001	0.8	0.004	0.5	0.006	0.8	0.014	0.3
Other Yampa Valley	0.007	0.3	0.000	0.0	0.088	20.3	0.020	11.2	0.058	7.2	0.202	29.8	0.375	8.3
Non-Yampa Valley	1.300	54.0	0.000	0.0	0.313	72.6	0.132	72.1	0.371	46.4	0.469	69.3	2.586	57.5
Denver	0.256	10.7	0.000	0.0	0.036	8.4	0.019	10.5	0.060	7.5	0.003	0.5	0.375	8.3
Colorado w/ Denver	0.623	25.9	0.000	0.0	0.260	60.3	0.105	57.3	0.322	40.2	0.308	45.4	1.618	36.0
Non-Colorado	0.677	28.1	0.000	0.0	0.053	12.3	0.027	14.7	0.049	6.1	0.162	23.9	0.967	21.5
Coal-fired PP	1.668	69.4	0.000	0.0	0.006	1.5	0.000	0.0	0.000	0.0	0.000	0.1	1.675	37.2
All other sources	0.737	30.6	0.000	100.0	0.425	98.5	0.183	100.0	0.801	100.0	0.677	99.9	2.823	62.8
Fires	0.000	0.0	0.000	0.0	0.023	5.4	0.029	16.0	0.368	45.9	0.000	0.0	0.420	9.3

Gilpin Creek
EXTINCTION 1200-1800 95/ 9/17 6-hour average RH: 28%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.875		-99.000		-99.000		4.449		-99.000		-99.000		-99.000	
Estimated w/ fires	4.508	56.8	0.000	-99.0	0.651	-99.0	1.661	-62.7	2.428	-99.0	2.055	-99.0	21.304	-99.0
Estimated w/o fires	4.508	56.8	0.000	-99.0	0.616	-99.0	1.396	-68.6	1.313	-99.0	2.055	-99.0	19.888	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	2.072	46.0	0.000	0.0	0.143	22.0	0.198	11.9	0.187	7.7	0.631	30.7	3.232	15.2
Craig 1-3	0.628	13.9	0.000	0.0	0.002	0.3	0.000	0.0	0.000	0.0	0.001	0.0	0.631	3.0
Craig 1-2	0.520	11.5	0.000	0.0	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.523	2.5
Craig 1	0.251	5.6	0.000	0.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.252	1.2
Craig 2	0.269	6.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.270	1.3
Craig 3	0.108	2.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.108	0.5
Hayden 1-2	1.429	31.7	0.000	0.0	0.005	0.7	0.000	0.0	0.000	0.0	0.000	0.0	1.435	6.7
Hayden 1	0.778	17.3	0.000	0.0	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.781	3.7
Hayden 2	0.651	14.4	0.000	0.0	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.654	3.1

Table B.2.3.9b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

Steamboat Springs	0.002	0.0	0.000	0.0	0.004	0.6	0.013	0.8	0.011	0.5	0.017	0.8	0.047	0.2
Other Yampa Valley	0.013	0.3	0.000	0.0	0.132	20.3	0.185	11.2	0.176	7.2	0.613	29.8	1.119	5.3
Non-Yampa Valley	2.436	54.0	0.000	0.0	0.473	72.6	1.197	72.1	1.126	46.4	1.424	69.3	6.656	31.2
Denver	0.481	10.7	0.000	0.0	0.055	8.4	0.175	10.5	0.181	7.5	0.010	0.5	0.902	4.2
Colorado w/ Denver	1.168	25.9	0.000	0.0	0.393	60.3	0.953	57.3	0.977	40.2	0.933	45.4	4.424	20.8
Non-Colorado	1.268	28.1	0.000	0.0	0.080	12.3	0.245	14.7	0.149	6.1	0.490	23.9	2.232	10.5
Coal-fired PP	3.126	69.4	0.000	0.0	0.009	1.5	0.000	0.0	0.000	0.0	0.001	0.1	3.137	14.7
All other sources	1.382	30.6	0.000	100.0	0.642	98.5	1.661	100.0	2.428	100.0	2.053	99.9	18.166	85.3
Fires	0.000	0.0	0.000	0.0	0.035	5.4	0.266	16.0	1.115	45.9	0.000	0.0	1.416	6.6

Gilpin Creek
CONCENTRATION 0600-1200 95/ 9/18

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.262		-99.000		-99.000		0.510		-99.000		-99.000		2.152	
Estimated w/ fires	2.146	70.1	0.405	-99.0	0.477	-99.0	0.221	-56.7	1.128	-99.0	0.890	-99.0	5.268	144.7
Estimated w/o fires	2.146	70.1	0.374	-99.0	0.434	-99.0	0.167	-67.2	0.456	-99.0	0.890	-99.0	4.468	107.6
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.878	40.9	0.250	61.7	0.084	17.7	0.021	9.4	0.054	4.8	0.287	32.2	1.573	29.9
Craig 1-3	0.212	9.9	0.085	21.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.298	5.7
Craig 1-2	0.185	8.6	0.060	14.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.246	4.7
Craig 1	0.088	4.1	0.029	7.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.117	2.2
Craig 2	0.097	4.5	0.031	7.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.129	2.4
Craig 3	0.027	1.2	0.025	6.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.052	1.0
Hayden 1-2	0.659	30.7	0.155	38.1	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.816	15.5
Hayden 1	0.336	15.7	0.099	24.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.436	8.3
Hayden 2	0.323	15.0	0.055	13.6	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.379	7.2
Steamboat Springs	0.001	0.1	0.002	0.5	0.004	0.8	0.002	0.9	0.005	0.5	0.009	1.0	0.023	0.4
Other Yampa Valley	0.006	0.3	0.008	2.0	0.077	16.2	0.019	8.5	0.048	4.3	0.277	31.1	0.436	8.3
Non-Yampa Valley	1.268	59.1	0.124	30.6	0.350	73.4	0.147	66.4	0.402	35.6	0.604	67.8	2.894	54.9
Denver	0.248	11.6	0.007	1.7	0.046	9.7	0.022	10.2	0.071	6.3	0.004	0.5	0.399	7.6
Colorado w/ Denver	0.624	29.1	0.060	14.7	0.287	60.2	0.114	51.8	0.341	30.3	0.396	44.5	1.822	34.6
Non-Colorado	0.644	30.0	0.064	15.9	0.063	13.2	0.032	14.6	0.061	5.4	0.208	23.3	1.072	20.3
Coal-fired PP	1.320	61.5	0.258	63.7	0.004	0.9	0.000	0.0	0.000	0.0	0.000	0.0	1.583	30.0
All other sources	0.826	38.5	0.147	36.3	0.472	99.1	0.221	100.0	1.128	100.0	0.890	100.0	3.685	70.0
Fires	0.000	0.0	0.031	7.8	0.043	9.0	0.053	24.2	0.673	59.6	0.000	0.0	0.800	15.2

Table B.2.3.9b (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/ 9/18 6-hour average RH: 92%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	12.599		-99.000		-99.000		4.639		-99.000		-99.000		-99.000	
Estimated w/ fires	21.431	70.1	4.117	-99.0	1.674	-99.0	2.009	-56.7	9.942	-99.0	7.845	-99.0	57.018	-99.0
Estimated w/o fires	21.431	70.1	3.798	-99.0	1.524	-99.0	1.523	-67.2	4.014	-99.0	7.845	-99.0	50.135	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	8.766	40.9	2.539	61.7	0.296	17.7	0.189	9.4	0.473	4.8	2.527	32.2	14.790	25.9
Craig 1-3	2.114	9.9	0.868	21.1	0.003	0.2	0.000	0.0	0.000	0.0	0.001	0.0	2.987	5.2
Craig 1-2	1.846	8.6	0.612	14.9	0.003	0.2	0.000	0.0	0.000	0.0	0.001	0.0	2.462	4.3
Craig 1	0.881	4.1	0.293	7.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	1.175	2.1
Craig 2	0.965	4.5	0.319	7.7	0.002	0.1	0.000	0.0	0.000	0.0	0.000	0.0	1.287	2.3
Craig 3	0.268	1.2	0.257	6.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.525	0.9
Hayden 1-2	6.577	30.7	1.571	38.1	0.008	0.5	0.000	0.0	0.000	0.0	0.001	0.0	8.156	14.3
Hayden 1	3.354	15.7	1.010	24.5	0.004	0.2	0.000	0.0	0.000	0.0	0.000	0.0	4.369	7.7
Hayden 2	3.223	15.0	0.560	13.6	0.004	0.3	0.000	0.0	0.000	0.0	0.000	0.0	3.788	6.6
Steamboat Springs	0.011	0.1	0.019	0.5	0.013	0.8	0.018	0.9	0.047	0.5	0.082	1.0	0.190	0.3
Other Yampa Valley	0.064	0.3	0.080	2.0	0.272	16.2	0.171	8.5	0.426	4.3	2.443	31.1	3.456	6.1
Non-Yampa Valley	12.666	59.1	1.259	30.6	1.228	73.4	1.334	66.4	3.541	35.6	5.317	67.8	25.345	44.5
Denver	2.479	11.6	0.071	1.7	0.162	9.7	0.204	10.2	0.626	6.3	0.036	0.5	3.579	6.3
Colorado w/ Denver	6.233	29.1	0.605	14.7	1.007	60.2	1.041	51.8	3.007	30.3	3.489	44.5	15.382	27.0
Non-Colorado	6.433	30.0	0.654	15.9	0.221	13.2	0.293	14.6	0.534	5.4	1.828	23.3	9.963	17.5
Coal-fired PP	13.182	61.5	2.621	63.7	0.016	0.9	0.000	0.0	0.000	0.0	0.003	0.0	15.822	27.7
All other sources	8.249	38.5	1.496	36.3	1.658	99.1	2.009	100.0	9.942	100.0	7.842	100.0	41.197	72.3
Fires	0.000	0.0	0.319	7.8	0.150	9.0	0.486	24.2	5.928	59.6	0.000	0.0	6.883	12.1

Gilpin Creek
CONCENTRATION 1200-1800 95/ 9/18

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.262		-99.000		-99.000		0.510		-99.000		-99.000		2.152	
Estimated w/ fires	1.789	41.7	0.942	-99.0	0.147	-99.0	0.074	-85.5	0.376	-99.0	0.334	-99.0	3.662	70.1
Estimated w/o fires	1.789	41.7	0.906	-99.0	0.131	-99.0	0.054	-89.3	0.129	-99.0	0.334	-99.0	3.344	55.4

Table B.2.3.9b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.924	51.7	0.729	77.4	0.025	17.2	0.006	8.4	0.012	3.2	0.103	30.9	1.800	49.2
Craig 1-3	0.328	18.3	0.365	38.7	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.694	19.0
Craig 1-2	0.299	16.7	0.250	26.6	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.550	15.0
Craig 1	0.155	8.6	0.126	13.4	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.281	7.7
Craig 2	0.145	8.1	0.124	13.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.269	7.4
Craig 3	0.029	1.6	0.115	12.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.144	3.9
Hayden 1-2	0.593	33.2	0.351	37.2	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.945	25.8
Hayden 1	0.290	16.2	0.232	24.6	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.523	14.3
Hayden 2	0.303	16.9	0.119	12.6	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.423	11.5
Steamboat Springs	0.000	0.0	0.001	0.1	0.000	0.2	0.000	0.2	0.000	0.1	0.001	0.3	0.003	0.1
Other Yampa Valley	0.002	0.1	0.013	1.3	0.023	15.8	0.006	8.2	0.012	3.1	0.102	30.6	0.158	4.3
Non-Yampa Valley	0.865	48.3	0.177	18.8	0.106	72.1	0.048	65.1	0.117	31.2	0.231	69.1	1.544	42.2
Denver	0.067	3.8	0.005	0.5	0.008	5.6	0.004	5.5	0.013	3.4	0.001	0.2	0.098	2.7
Colorado w/ Denver	0.208	11.7	0.045	4.8	0.065	44.3	0.027	37.0	0.078	20.8	0.103	30.9	0.527	14.4
Non-Colorado	0.656	36.7	0.132	14.0	0.041	27.8	0.021	28.1	0.039	10.4	0.128	38.2	1.016	27.7
Coal-fired PP	1.201	67.2	0.757	80.3	0.003	1.8	0.000	0.0	0.000	0.0	0.000	0.1	1.961	53.5
All other sources	0.587	32.8	0.186	19.7	0.144	98.2	0.074	100.0	0.376	100.0	0.334	99.9	1.701	46.5
Fires	0.000	0.0	0.036	3.8	0.016	10.6	0.020	26.5	0.247	65.6	0.000	0.0	0.318	8.7

Gilpin Creek
EXTINCTION 1200-1800 95/ 9/18 6-hour average RH: 88%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	8.761		-99.000		-99.000		4.639		-99.000		-99.000		-99.000	
Estimated w/ fires	12.419	41.7	6.714	-99.0	0.406	-99.0	0.672	-85.5	2.497	-99.0	2.220	-99.0	34.927	-99.0
Estimated w/o fires	12.419	41.7	6.455	-99.0	0.362	-99.0	0.494	-89.3	0.859	-99.0	2.220	-99.0	32.809	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	6.416	51.7	5.196	77.4	0.070	17.2	0.057	8.4	0.081	3.2	0.686	30.9	12.505	35.8
Craig 1-3	2.277	18.3	2.601	38.7	0.002	0.5	0.000	0.0	0.000	0.0	0.001	0.0	4.881	14.0
Craig 1-2	2.078	16.7	1.783	26.6	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	3.863	11.1
Craig 1	1.074	8.6	0.897	13.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	1.972	5.6
Craig 2	1.004	8.1	0.886	13.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	1.890	5.4
Craig 3	0.199	1.6	0.818	12.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	1.018	2.9
Hayden 1-2	4.120	33.2	2.499	37.2	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	6.623	19.0
Hayden 1	2.017	16.2	1.652	24.6	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	3.670	10.5
Hayden 2	2.104	16.9	0.848	12.6	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	2.953	8.5

Table B.2.3.9b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

Steamboat Springs	0.002	0.0	0.005	0.1	0.001	0.2	0.002	0.2	0.003	0.1	0.006	0.3	0.019	0.1
Other Yampa Valley	0.016	0.1	0.090	1.3	0.064	15.8	0.055	8.2	0.078	3.1	0.679	30.6	0.982	2.8
Non-Yampa Valley	6.003	48.3	1.259	18.8	0.293	72.1	0.438	65.1	0.779	31.2	1.534	69.1	10.305	29.5
Denver	0.468	3.8	0.035	0.5	0.023	5.6	0.037	5.5	0.085	3.4	0.005	0.2	0.653	1.9
Colorado w/ Denver	1.447	11.7	0.323	4.8	0.180	44.3	0.249	37.0	0.519	20.8	0.686	30.9	3.403	9.7
Non-Colorado	4.556	36.7	0.937	14.0	0.113	27.8	0.189	28.1	0.260	10.4	0.847	38.2	6.902	19.8
Coal-fired PP	8.342	67.2	5.390	80.3	0.007	1.8	0.000	0.0	0.000	0.0	0.001	0.1	13.740	39.3
All other sources	4.077	32.8	1.323	19.7	0.398	98.2	0.672	100.0	2.497	100.0	2.218	99.9	21.187	60.7
Fires	0.000	0.0	0.258	3.8	0.043	10.6	0.178	26.5	1.638	65.6	0.000	0.0	2.118	6.1

Gilpin Creek
CONCENTRATION 0600-1200 95/ 9/19

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.747		-99.000		-99.000		0.510		-99.000		-99.000		1.665	
Estimated w/ fires	0.804	7.6	0.000	-99.0	0.107	-99.0	0.046	-91.1	0.159	-99.0	0.392	-99.0	1.507	-9.5
Estimated w/o fires	0.804	7.6	0.000	-99.0	0.103	-99.0	0.041	-92.0	0.097	-99.0	0.392	-99.0	1.437	-13.7
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.254	31.7	0.000	0.0	0.020	18.9	0.004	8.9	0.009	5.6	0.137	34.9	0.425	28.2
Craig 1-3	0.068	8.5	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.068	4.5
Craig 1-2	0.061	7.6	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.061	4.1
Craig 1	0.032	3.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.032	2.1
Craig 2	0.030	3.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.030	2.0
Craig 3	0.007	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.4
Hayden 1-2	0.185	23.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.185	12.3
Hayden 1	0.098	12.3	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.099	6.5
Hayden 2	0.086	10.7	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.086	5.7
Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.3	0.000	0.3	0.000	0.3	0.001	0.2	0.002	0.1
Other Yampa Valley	0.001	0.2	0.000	0.0	0.020	18.4	0.004	8.6	0.009	5.4	0.136	34.7	0.170	11.3
Non-Yampa Valley	0.549	68.3	0.000	0.0	0.083	77.5	0.037	80.4	0.088	55.7	0.255	65.1	1.013	67.2
Denver	0.010	1.3	0.000	0.0	0.002	1.6	0.001	1.8	0.003	1.6	0.000	0.0	0.015	1.0
Colorado w/ Denver	0.057	7.1	0.000	0.0	0.045	42.2	0.017	38.3	0.048	30.4	0.136	34.8	0.304	20.2
Non-Colorado	0.493	61.3	0.000	0.0	0.038	35.2	0.019	42.1	0.040	25.3	0.119	30.3	0.708	47.0
Coal-fired PP	0.400	49.8	0.000	0.0	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.401	26.6
All other sources	0.403	50.2	0.000	100.0	0.106	99.4	0.046	100.0	0.159	100.0	0.392	100.0	1.106	73.4
Fires	0.000	0.0	0.000	0.0	0.004	3.6	0.005	10.7	0.061	38.7	0.000	0.0	0.070	4.7

Table B.2.3.9b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/ 9/19 6-hour average RH: 85%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	4.237		-99.000		-99.000		4.639		-99.000		-99.000		-99.000	
Estimated w/ fires	4.560	7.6	0.000	-99.0	0.262	-99.0	0.414	-91.1	0.911	-99.0	2.250	-99.0	18.397	-99.0
Estimated w/o fires	4.560	7.6	0.000	-99.0	0.253	-99.0	0.370	-92.0	0.559	-99.0	2.250	-99.0	17.991	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.443	31.7	0.000	0.0	0.050	18.9	0.037	8.9	0.051	5.6	0.786	34.9	2.367	12.9
Craig 1-3	0.387	8.5	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.387	2.1
Craig 1-2	0.348	7.6	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.349	1.9
Craig 1	0.179	3.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.179	1.0
Craig 2	0.169	3.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.169	0.9
Craig 3	0.038	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.038	0.2
Hayden 1-2	1.047	23.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	1.048	5.7
Hayden 1	0.559	12.3	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.559	3.0
Hayden 2	0.489	10.7	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.489	2.7
Steamboat Springs	0.001	0.0	0.000	0.0	0.001	0.3	0.001	0.3	0.002	0.3	0.004	0.2	0.010	0.1
Other Yampa Valley	0.008	0.2	0.000	0.0	0.048	18.4	0.035	8.6	0.049	5.4	0.781	34.7	0.922	5.0
Non-Yampa Valley	3.116	68.3	0.000	0.0	0.203	77.5	0.333	80.4	0.508	55.7	1.464	65.1	5.624	30.6
Denver	0.058	1.3	0.000	0.0	0.004	1.6	0.007	1.8	0.015	1.6	0.001	0.0	0.085	0.5
Colorado w/ Denver	0.322	7.1	0.000	0.0	0.111	42.2	0.158	38.3	0.277	30.4	0.782	34.8	1.650	9.0
Non-Colorado	2.794	61.3	0.000	0.0	0.092	35.2	0.174	42.1	0.231	25.3	0.682	30.3	3.974	21.6
Coal-fired PP	2.272	49.8	0.000	0.0	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	2.273	12.4
All other sources	2.288	50.2	0.000	100.0	0.261	99.4	0.414	100.0	0.911	100.0	2.250	100.0	16.123	87.6
Fires	0.000	0.0	0.000	0.0	0.010	3.6	0.044	10.7	0.352	38.7	0.000	0.0	0.406	2.2

Gilpin Creek
CONCENTRATION 1200-1800 95/ 9/19

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.747		-99.000		-99.000		0.510		-99.000		-99.000		1.665	
Estimated w/ fires	1.184	58.5	0.533	-99.0	0.100	-99.0	0.047	-90.7	0.248	-99.0	0.238	-99.0	2.350	41.1
Estimated w/o fires	1.184	58.5	0.511	-99.0	0.089	-99.0	0.034	-93.4	0.079	-99.0	0.238	-99.0	2.135	28.2

Table B.2.3.9b (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.525	44.3	0.304	57.1	0.031	31.4	0.007	15.7	0.018	7.3	0.083	34.8	0.968	41.2
Craig 1-3	0.099	8.3	0.068	12.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.167	7.1
Craig 1-2	0.085	7.2	0.047	8.8	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.132	5.6
Craig 1	0.040	3.4	0.022	4.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.062	2.6
Craig 2	0.045	3.8	0.025	4.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.070	3.0
Craig 3	0.014	1.2	0.021	3.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.034	1.5
Hayden 1-2	0.424	35.8	0.224	42.0	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.648	27.6
Hayden 1	0.227	19.2	0.149	28.0	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.376	16.0
Hayden 2	0.197	16.6	0.074	14.0	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.271	11.6
Steamboat Springs	0.000	0.0	0.001	0.3	0.000	0.3	0.000	0.4	0.000	0.2	0.001	0.3	0.003	0.1
Other Yampa Valley	0.002	0.2	0.011	2.1	0.030	30.3	0.007	15.3	0.018	7.1	0.082	34.4	0.150	6.4
Non-Yampa Valley	0.659	55.7	0.207	38.9	0.058	57.8	0.026	55.9	0.061	24.6	0.156	65.2	1.167	49.7
Denver	0.005	0.4	0.002	0.4	0.001	0.5	0.000	0.6	0.001	0.3	0.000	0.0	0.009	0.4
Colorado w/ Denver	0.045	3.8	0.067	12.5	0.028	27.8	0.011	24.2	0.029	11.9	0.076	31.7	0.256	10.9
Non-Colorado	0.614	51.9	0.141	26.4	0.030	30.0	0.015	31.7	0.031	12.7	0.080	33.5	0.911	38.8
Coal-fired PP	0.751	63.4	0.319	59.9	0.002	1.6	0.000	0.0	0.000	0.0	0.000	0.0	1.071	45.6
All other sources	0.433	36.6	0.214	40.1	0.098	98.4	0.047	100.0	0.248	100.0	0.238	100.0	1.278	54.4
Fires	0.000	0.0	0.021	4.0	0.011	10.7	0.013	28.4	0.169	68.1	0.000	0.0	0.214	9.1

Gilpin Creek
EXTINCTION 1200-1800 95/ 9/19 6-hour average RH: 59%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.972		-99.000		-99.000		4.639		-99.000		-99.000		-99.000	
Estimated w/ fires	3.126	58.5	1.502	-99.0	0.169	-99.0	0.430	-90.7	0.887	-99.0	0.853	-99.0	16.968	-99.0
Estimated w/o fires	3.126	58.5	1.442	-99.0	0.151	-99.0	0.308	-93.4	0.283	-99.0	0.853	-99.0	16.163	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.386	44.3	0.857	57.1	0.053	31.4	0.067	15.7	0.064	7.3	0.297	34.8	2.725	16.1
Craig 1-3	0.261	8.3	0.191	12.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.453	2.7
Craig 1-2	0.225	7.2	0.133	8.8	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.358	2.1
Craig 1	0.106	3.4	0.062	4.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.167	1.0
Craig 2	0.119	3.8	0.071	4.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.190	1.1
Craig 3	0.036	1.2	0.059	3.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.095	0.6
Hayden 1-2	1.119	35.8	0.631	42.0	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	1.750	10.3
Hayden 1	0.599	19.2	0.421	28.0	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	1.021	6.0
Hayden 2	0.519	16.6	0.210	14.0	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.730	4.3

Table B.2.3.9b (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

Steamboat Springs	0.001	0.0	0.004	0.3	0.001	0.3	0.002	0.4	0.002	0.2	0.003	0.3	0.011	0.1
Other Yampa Valley	0.006	0.2	0.031	2.1	0.051	30.3	0.066	15.3	0.063	7.1	0.294	34.4	0.511	3.0
Non-Yampa Valley	1.740	55.7	0.585	38.9	0.098	57.8	0.241	55.9	0.218	24.6	0.556	65.2	3.438	20.3
Denver	0.014	0.4	0.006	0.4	0.001	0.5	0.002	0.6	0.003	0.3	0.000	0.0	0.026	0.2
Colorado w/ Denver	0.118	3.8	0.188	12.5	0.047	27.8	0.104	24.2	0.106	11.9	0.270	31.7	0.833	4.9
Non-Colorado	1.622	51.9	0.397	26.4	0.051	30.0	0.136	31.7	0.113	12.7	0.286	33.5	2.605	15.4
Coal-fired PP	1.983	63.4	0.899	59.9	0.003	1.6	0.000	0.0	0.000	0.0	0.000	0.0	2.885	17.0
All other sources	1.143	36.6	0.603	40.1	0.167	98.4	0.430	100.0	0.887	100.0	0.853	100.0	14.083	83.0
Fires	0.000	0.0	0.060	4.0	0.018	10.7	0.122	28.4	0.605	68.1	0.000	0.0	0.805	4.7

Gilpin Creek
CONCENTRATION 0600-1200 95/ 9/20

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.827		-99.000		-99.000		0.340		-99.000		-99.000		1.508	
Estimated w/ fires	1.832	121.7	0.037	-99.0	0.315	-99.0	0.205	-39.9	1.581	-99.0	0.886	-99.0	4.856	222.1
Estimated w/o fires	1.832	121.7	0.029	-99.0	0.229	-99.0	0.096	-71.7	0.217	-99.0	0.886	-99.0	3.289	118.1
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.131	7.2	0.007	19.1	0.041	13.1	0.010	5.0	0.020	1.2	0.271	30.6	0.481	9.9
Craig 1-3	0.042	2.3	0.003	7.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.045	0.9
Craig 1-2	0.038	2.1	0.002	6.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.041	0.8
Craig 1	0.018	1.0	0.001	3.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.020	0.4
Craig 2	0.020	1.1	0.001	2.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.021	0.4
Craig 3	0.004	0.2	0.001	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.1
Hayden 1-2	0.087	4.8	0.003	8.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.091	1.9
Hayden 1	0.037	2.0	0.002	4.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.039	0.8
Hayden 2	0.051	2.8	0.002	4.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.052	1.1
Steamboat Springs	0.000	0.0	0.000	0.1	0.000	0.2	0.000	0.1	0.001	0.0	0.001	0.1	0.003	0.1
Other Yampa Valley	0.001	0.1	0.001	2.3	0.040	12.8	0.010	4.8	0.019	1.2	0.270	30.5	0.342	7.0
Non-Yampa Valley	1.701	92.8	0.022	59.1	0.187	59.4	0.086	42.1	0.198	12.5	0.615	69.4	2.809	57.8
Denver	0.001	0.0	0.000	0.0	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.002	0.0
Colorado w/ Denver	0.061	3.3	0.004	9.7	0.069	21.8	0.026	12.9	0.067	4.3	0.232	26.1	0.459	9.4
Non-Colorado	1.639	89.5	0.018	49.4	0.119	37.7	0.060	29.2	0.130	8.2	0.383	43.3	2.350	48.4
Coal-fired PP	0.699	38.1	0.014	37.3	0.004	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.717	14.8
All other sources	1.133	61.9	0.023	62.7	0.311	98.7	0.205	100.0	1.581	100.0	0.886	100.0	4.140	85.2
Fires	0.000	0.0	0.008	21.8	0.087	27.4	0.108	52.9	1.364	86.3	0.000	0.0	1.567	32.3

Table B.2.3.9b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/ 9/20 6-hour average RH: 93%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	8.938		-99.000		-99.000		3.097		-99.000		-99.000		-99.000	
Estimated w/ fires	19.812	121.7	0.411	-99.0	1.171	-99.0	1.862	-39.9	14.867	-99.0	8.327	-99.0	56.450	-99.0
Estimated w/o fires	19.812	121.7	0.321	-99.0	0.850	-99.0	0.876	-71.7	2.043	-99.0	8.327	-99.0	42.230	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.420	7.2	0.079	19.1	0.154	13.1	0.093	5.0	0.186	1.2	2.549	30.6	4.479	7.9
Craig 1-3	0.456	2.3	0.032	7.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.490	0.9
Craig 1-2	0.413	2.1	0.025	6.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.439	0.8
Craig 1	0.200	1.0	0.013	3.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.213	0.4
Craig 2	0.213	1.1	0.012	2.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.226	0.4
Craig 3	0.043	0.2	0.007	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.051	0.1
Hayden 1-2	0.946	4.8	0.036	8.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.984	1.7
Hayden 1	0.399	2.0	0.019	4.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.418	0.7
Hayden 2	0.547	2.8	0.017	4.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.565	1.0
Steamboat Springs	0.001	0.0	0.001	0.1	0.002	0.2	0.003	0.1	0.007	0.0	0.009	0.1	0.022	0.0
Other Yampa Valley	0.016	0.1	0.010	2.3	0.150	12.8	0.090	4.8	0.179	1.2	2.539	30.5	2.983	5.3
Non-Yampa Valley	18.393	92.8	0.243	59.1	0.696	59.4	0.784	42.1	1.857	12.5	5.779	69.4	27.751	49.2
Denver	0.009	0.0	0.000	0.0	0.001	0.1	0.001	0.1	0.004	0.0	0.000	0.0	0.016	0.0
Colorado w/ Denver	0.662	3.3	0.040	9.7	0.255	21.8	0.241	12.9	0.632	4.3	2.177	26.1	4.007	7.1
Non-Colorado	17.730	89.5	0.203	49.4	0.441	37.7	0.543	29.2	1.226	8.2	3.602	43.3	23.745	42.1
Coal-fired PP	7.555	38.1	0.153	37.3	0.015	1.3	0.000	0.0	0.000	0.0	0.002	0.0	7.724	13.7
All other sources	12.258	61.9	0.258	62.7	1.156	98.7	1.862	100.0	14.867	100.0	8.325	100.0	48.725	86.3
Fires	0.000	0.0	0.090	21.8	0.321	27.4	0.986	52.9	12.823	86.3	0.000	0.0	14.220	25.2

Gilpin Creek
CONCENTRATION 1200-1800 95/ 9/20

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.827		-99.000		-99.000		0.340		-99.000		-99.000		1.508	
Estimated w/ fires	1.953	136.4	0.229	-99.0	0.168	-99.0	0.098	-71.2	0.596	-99.0	0.446	-99.0	3.491	131.5
Estimated w/o fires	1.953	136.4	0.201	-99.0	0.139	-99.0	0.062	-81.9	0.136	-99.0	0.446	-99.0	2.936	94.7

Table B.2.3.9b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.033	1.7	0.011	4.9	0.019	11.1	0.005	5.1	0.008	1.3	0.097	21.8	0.173	4.9
Craig 1-3	0.003	0.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.1
Craig 1-2	0.003	0.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.1
Craig 1	0.001	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 2	0.002	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.1
Craig 3	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.029	1.5	0.007	3.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.036	1.0
Hayden 1	0.019	1.0	0.006	2.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.025	0.7
Hayden 2	0.010	0.5	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.011	0.3
Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Other Yampa Valley	0.001	0.0	0.003	1.4	0.019	11.1	0.005	5.1	0.008	1.3	0.097	21.8	0.133	3.8
Non-Yampa Valley	1.921	98.3	0.189	82.6	0.120	71.5	0.057	57.6	0.128	21.5	0.348	78.2	2.763	79.2
Denver	0.000	0.0	0.000	0.1	0.000	0.1	0.000	0.1	0.000	0.1	0.000	0.0	0.001	0.0
Colorado w/ Denver	0.025	1.3	0.012	5.2	0.023	13.8	0.010	9.9	0.025	4.1	0.079	17.8	0.174	5.0
Non-Colorado	1.895	97.0	0.178	77.5	0.097	57.7	0.047	47.7	0.104	17.4	0.269	60.4	2.589	74.2
Coal-fired PP	0.816	41.8	0.103	44.9	0.005	3.0	0.000	0.0	0.000	0.0	0.000	0.1	0.924	26.5
All other sources	1.137	58.2	0.126	55.1	0.163	97.0	0.098	100.0	0.596	100.0	0.445	99.9	2.567	73.5
Fires	0.000	0.0	0.029	12.5	0.029	17.4	0.037	37.3	0.461	77.2	0.000	0.0	0.555	15.9

Gilpin Creek
EXTINCTION 1200-1800 95/ 9/20 6-hour average RH: 83%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	4.192		-99.000		-99.000		3.097		-99.000		-99.000		-99.000	
Estimated w/ fires	9.907	136.4	1.204	-99.0	0.386	-99.0	0.893	-71.2	3.167	-99.0	2.366	-99.0	27.924	-99.0
Estimated w/o fires	9.907	136.4	1.053	-99.0	0.319	-99.0	0.560	-81.9	0.722	-99.0	2.366	-99.0	24.928	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.166	1.7	0.059	4.9	0.043	11.1	0.046	5.1	0.041	1.3	0.516	21.8	0.871	3.1
Craig 1-3	0.017	0.2	0.003	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.020	0.1
Craig 1-2	0.016	0.2	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.018	0.1
Craig 1	0.007	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.0
Craig 2	0.008	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.0
Craig 3	0.002	0.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Hayden 1-2	0.145	1.5	0.039	3.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.184	0.7
Hayden 1	0.097	1.0	0.031	2.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.128	0.5
Hayden 2	0.049	0.5	0.007	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.056	0.2

Table B.2.3.9b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Other Yampa Valley	0.003	0.0	0.017	1.4	0.043	11.1	0.046	5.1	0.041	1.3	0.516	21.8	0.667	2.4
Non-Yampa Valley	9.741	98.3	0.995	82.6	0.276	71.5	0.514	57.6	0.680	21.5	1.850	78.2	14.056	50.3
Denver	0.002	0.0	0.001	0.1	0.000	0.1	0.001	0.1	0.002	0.1	0.000	0.0	0.006	0.0
Colorado w/ Denver	0.128	1.3	0.062	5.2	0.053	13.8	0.088	9.9	0.131	4.1	0.421	17.8	0.884	3.2
Non-Colorado	9.613	97.0	0.933	77.5	0.223	57.7	0.426	47.7	0.550	17.4	1.429	60.4	13.172	47.2
Coal-fired PP	4.140	41.8	0.540	44.9	0.011	3.0	0.000	0.0	0.000	0.0	0.001	0.1	4.693	16.8
All other sources	5.767	58.2	0.664	55.1	0.375	97.0	0.893	100.0	3.167	100.0	2.365	99.9	23.231	83.2
Fires	0.000	0.0	0.151	12.5	0.067	17.4	0.333	37.3	2.446	77.2	0.000	0.0	2.996	10.7

Gilpin Creek
CONCENTRATION 0600-1200 95/ 9/21

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.770		-99.000		0.140		0.449		0.043		0.043		1.498	
Estimated w/ fires	1.065	38.2	0.000	-99.0	0.171	22.7	0.081	-81.9	0.310	619.3	0.601	999.9	2.228	48.7
Estimated w/o fires	1.065	38.2	0.000	-99.0	0.162	15.9	0.069	-84.6	0.159	269.5	0.601	999.9	2.055	37.2
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.006	0.6	0.000	0.0	0.033	19.0	0.007	8.2	0.014	4.6	0.231	38.5	0.291	13.0
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.005	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.2
Hayden 1	0.004	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.2
Hayden 2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.1	0.000	0.1	0.000	0.0	0.001	0.0
Other Yampa Valley	0.001	0.1	0.000	0.0	0.032	19.0	0.007	8.1	0.014	4.5	0.231	38.4	0.285	12.8
Non-Yampa Valley	1.059	99.4	0.000	0.0	0.129	75.4	0.062	77.0	0.145	46.8	0.370	61.5	1.765	79.2
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.014	1.3	0.000	0.0	0.021	12.1	0.008	10.0	0.021	6.9	0.062	10.3	0.126	5.6
Non-Colorado	1.045	98.2	0.000	0.0	0.108	63.3	0.054	67.0	0.124	39.9	0.308	51.2	1.639	73.6
Coal-fired PP	0.356	33.5	0.000	0.0	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.358	16.1
All other sources	0.708	66.5	0.000	100.0	0.170	99.0	0.081	100.0	0.310	100.0	0.601	100.0	1.870	83.9
Fires	0.000	0.0	0.000	0.0	0.010	5.6	0.012	14.7	0.151	48.6	0.000	0.0	0.172	7.7

Table B.2.3.9b (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/ 9/21 6-hour average RH: 80%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	3.475		-99.000		0.302		4.086		0.212		0.212		-99.000	
Estimated w/ fires	4.801	38.2	0.000	-99.0	0.370	22.7	0.738	-81.9	1.521	619.3	2.949	999.9	20.380	-99.0
Estimated w/o fires	4.801	38.2	0.000	-99.0	0.349	15.9	0.629	-84.6	0.782	269.5	2.949	999.9	19.511	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.027	0.6	0.000	0.0	0.070	19.0	0.061	8.2	0.070	4.6	1.135	38.5	1.363	6.7
Craig 1-3	0.002	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 1-2	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 1	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 2	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.021	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.021	0.1
Hayden 1	0.018	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.018	0.1
Hayden 2	0.003	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.0
Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.1	0.001	0.1	0.001	0.1	0.001	0.0	0.003	0.0
Other Yampa Valley	0.004	0.1	0.000	0.0	0.070	19.0	0.060	8.1	0.069	4.5	1.134	38.4	1.337	6.6
Non-Yampa Valley	4.774	99.4	0.000	0.0	0.279	75.4	0.569	77.0	0.712	46.8	1.814	61.5	8.148	40.0
Denver	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Colorado w/ Denver	0.061	1.3	0.000	0.0	0.045	12.1	0.074	10.0	0.104	6.9	0.304	10.3	0.589	2.9
Non-Colorado	4.713	98.2	0.000	0.0	0.234	63.3	0.495	67.0	0.607	39.9	1.510	51.2	7.559	37.1
Coal-fired PP	1.606	33.5	0.000	0.0	0.004	1.0	0.000	0.0	0.000	0.0	0.000	0.0	1.610	7.9
All other sources	3.195	66.5	0.000	100.0	0.366	99.0	0.738	100.0	1.521	100.0	2.949	100.0	18.770	92.1
Fires	0.000	0.0	0.000	0.0	0.021	5.6	0.109	14.7	0.740	48.6	0.000	0.0	0.869	4.3

Gilpin Creek
CONCENTRATION 1200-1800 95/ 9/21

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.770		-99.000		0.140		0.449		0.043		0.043		1.498	
Estimated w/ fires	0.775	0.6	0.543	-99.0	0.104	-25.5	0.048	-89.4	0.156	262.0	0.316	634.0	1.942	29.6
Estimated w/o fires	0.775	0.6	0.525	-99.0	0.100	-28.3	0.043	-90.5	0.095	120.6	0.316	634.0	1.854	23.8

Table B.2.3.9b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.054	7.0	0.103	19.0	0.023	22.0	0.006	11.7	0.010	6.4	0.118	37.3	0.313	16.1
Craig 1-3	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 1-2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.053	6.8	0.091	16.8	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.144	7.4
Hayden 1	0.050	6.5	0.090	16.5	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.140	7.2
Hayden 2	0.002	0.3	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.2
Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Other Yampa Valley	0.001	0.1	0.012	2.1	0.023	21.8	0.006	11.7	0.010	6.3	0.118	37.3	0.168	8.7
Non-Yampa Valley	0.721	93.0	0.422	77.7	0.077	74.3	0.037	78.1	0.085	54.6	0.198	62.7	1.540	79.3
Denver	0.000	0.0	0.000	0.1	0.000	0.1	0.000	0.1	0.000	0.1	0.000	0.0	0.001	0.0
Colorado w/ Denver	0.023	3.0	0.111	20.5	0.022	21.3	0.010	21.0	0.025	16.1	0.038	12.2	0.230	11.9
Non-Colorado	0.698	90.0	0.310	57.1	0.055	53.1	0.027	57.2	0.060	38.5	0.160	50.5	1.310	67.5
Coal-fired PP	0.286	36.9	0.154	28.4	0.001	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.441	22.7
All other sources	0.489	63.1	0.389	71.6	0.103	99.0	0.048	100.0	0.156	100.0	0.316	100.0	1.501	77.3
Fires	0.000	0.0	0.018	3.4	0.004	3.7	0.005	10.2	0.061	39.1	0.000	0.0	0.088	4.5

Gilpin Creek
EXTINCTION 1200-1800 95/ 9/21 6-hour average RH: 56%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.950		-99.000		0.233		4.086		0.151		0.151		-99.000	
Estimated w/ fires	1.962	0.6	1.473	-99.0	0.174	-25.5	0.433	-89.4	0.546	262.0	1.107	634.0	15.695	-99.0
Estimated w/o fires	1.962	0.6	1.423	-99.0	0.167	-28.3	0.389	-90.5	0.333	120.6	1.107	634.0	15.381	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.137	7.0	0.279	19.0	0.038	22.0	0.051	11.7	0.035	6.4	0.413	37.3	0.953	6.1
Craig 1-3	0.002	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 1-2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 1	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 2	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.133	6.8	0.247	16.8	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.381	2.4
Hayden 1	0.128	6.5	0.243	16.5	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.371	2.4
Hayden 2	0.005	0.3	0.004	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.1

Table B.2.3.9b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 09/17/95 to 09/21/95 Episode

Steamboat Springs	0.000	0.0	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Other Yampa Valley	0.002	0.1	0.031	2.1	0.038	21.8	0.050	11.7	0.035	6.3	0.413	37.3	0.569	3.6
Non-Yampa Valley	1.825	93.0	1.144	77.7	0.129	74.3	0.338	78.1	0.298	54.6	0.694	62.7	4.428	28.2
Denver	0.001	0.0	0.001	0.1	0.000	0.1	0.000	0.1	0.000	0.1	0.000	0.0	0.003	0.0
Colorado w/ Denver	0.059	3.0	0.302	20.5	0.037	21.3	0.091	21.0	0.088	16.1	0.135	12.2	0.712	4.5
Non-Colorado	1.766	90.0	0.841	57.1	0.092	53.1	0.248	57.2	0.210	38.5	0.559	50.5	3.717	23.7
Coal-fired PP	0.724	36.9	0.418	28.4	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	1.144	7.3
All other sources	1.238	63.1	1.055	71.6	0.172	99.0	0.433	100.0	0.546	100.0	1.107	100.0	14.551	92.7
Fires	0.000	0.0	0.050	3.4	0.006	3.7	0.044	10.2	0.213	39.1	0.000	0.0	0.314	2.0

Table B.2.3.9c

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

[This table also presents six-hour concentrations from filter measurements, as well as extinction estimated from the filter measurements using identical extinction efficiencies as applied to predicted concentrations. Source attributions are presented for all 12 source regions/types modeled with CALPUFF, and present results from each six-hour daylight period (0600-1200, and 1200-1800 LST).]

Mad Creek
CONCENTRATION 0600-1200 95/ 9/17

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.194	-99.0	0.438	-99.0	0.657	-99.0	0.274	-99.0	0.949	-99.0	1.039	-99.0	5.551	-99.0
Estimated w/o fires	2.194	-99.0	0.433	-99.0	0.645	-99.0	0.259	-99.0	0.757	-99.0	1.039	-99.0	5.326	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.702	32.0	0.086	19.7	0.060	9.1	0.017	6.2	0.048	5.0	0.232	22.3	1.145	20.6
Craig 1-3	0.185	8.4	0.037	8.5	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.223	4.0
Craig 1-2	0.143	6.5	0.025	5.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.169	3.0
Craig 1	0.065	2.9	0.012	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.077	1.4
Craig 2	0.078	3.6	0.012	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.091	1.6
Craig 3	0.042	1.9	0.012	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.054	1.0
Hayden 1-2	0.512	23.3	0.043	9.9	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.557	10.0
Hayden 1	0.233	10.6	0.025	5.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.258	4.7
Hayden 2	0.279	12.7	0.019	4.3	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.299	5.4
Steamboat Springs	0.001	0.0	0.001	0.3	0.004	0.7	0.003	1.0	0.007	0.7	0.010	0.9	0.026	0.5
Other Yampa Valley	0.004	0.2	0.005	1.0	0.053	8.1	0.014	5.2	0.041	4.3	0.222	21.4	0.340	6.1
Non-Yampa Valley	1.492	68.0	0.347	79.1	0.585	89.0	0.242	88.3	0.709	74.7	0.807	77.7	4.181	75.3
Denver	0.355	16.2	0.054	12.3	0.072	11.0	0.039	14.1	0.120	12.6	0.007	0.6	0.647	11.7
Colorado w/ Denver	0.855	39.0	0.281	64.1	0.514	78.3	0.206	75.2	0.642	67.6	0.583	56.1	3.081	55.5
Non-Colorado	0.637	29.0	0.066	14.9	0.070	10.7	0.036	13.1	0.067	7.1	0.225	21.6	1.100	19.8
Coal-fired PP	1.319	60.1	0.124	28.2	0.004	0.6	0.000	0.0	0.000	0.0	0.000	0.0	1.447	26.1
All other sources	0.874	39.9	0.315	71.8	0.653	99.4	0.274	100.0	0.949	100.0	1.039	100.0	4.105	73.9
Fires	0.000	0.0	0.005	1.2	0.012	1.9	0.015	5.6	0.192	20.3	0.000	0.0	0.225	4.1

Table B.2.3.9c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/ 9/17 6-hour average RH: 31%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	4.213	-99.0	0.921	-99.0	1.000	-99.0	2.495	-99.0	2.909	-99.0	3.186	-99.0	24.724	-99.0
Estimated w/o fires	4.213	-99.0	0.910	-99.0	0.981	-99.0	2.356	-99.0	2.320	-99.0	3.186	-99.0	23.966	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.348	32.0	0.182	19.7	0.091	9.1	0.154	6.2	0.147	5.0	0.712	22.3	2.633	10.6
Craig 1-3	0.356	8.4	0.078	8.5	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.435	1.8
Craig 1-2	0.275	6.5	0.052	5.7	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.328	1.3
Craig 1	0.124	2.9	0.026	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.151	0.6
Craig 2	0.151	3.6	0.026	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.177	0.7
Craig 3	0.081	1.9	0.026	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.107	0.4
Hayden 1-2	0.983	23.3	0.091	9.9	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	1.077	4.4
Hayden 1	0.448	10.6	0.052	5.6	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.501	2.0
Hayden 2	0.535	12.7	0.040	4.3	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.576	2.3
Steamboat Springs	0.002	0.0	0.003	0.3	0.007	0.7	0.024	1.0	0.021	0.7	0.029	0.9	0.085	0.3
Other Yampa Valley	0.007	0.2	0.010	1.0	0.081	8.1	0.130	5.2	0.126	4.3	0.682	21.4	1.036	4.2
Non-Yampa Valley	2.865	68.0	0.728	79.1	0.890	89.0	2.203	88.3	2.173	74.7	2.475	77.7	11.333	45.8
Denver	0.682	16.2	0.114	12.3	0.110	11.0	0.353	14.1	0.367	12.6	0.020	0.6	1.646	6.7
Colorado w/ Denver	1.642	39.0	0.591	64.1	0.783	78.3	1.876	75.2	1.967	67.6	1.786	56.1	8.644	35.0
Non-Colorado	1.222	29.0	0.138	14.9	0.107	10.7	0.327	13.1	0.206	7.1	0.688	21.6	2.689	10.9
Coal-fired PP	2.534	60.1	0.260	28.2	0.006	0.6	0.000	0.0	0.000	0.0	0.001	0.0	2.800	11.3
All other sources	1.679	39.9	0.661	71.8	0.994	99.4	2.495	100.0	2.909	100.0	3.185	100.0	21.924	88.7
Fires	0.000	0.0	0.011	1.2	0.019	1.9	0.139	5.6	0.589	20.3	0.000	0.0	0.758	3.1

Mad Creek
CONCENTRATION 1200-1800 95/ 9/17

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.527	-99.0	0.108	-99.0	0.460	-99.0	0.188	-99.0	0.856	-99.0	0.660	-99.0	4.799	-99.0
Estimated w/o fires	2.527	-99.0	0.106	-99.0	0.434	-99.0	0.156	-99.0	0.452	-99.0	0.660	-99.0	4.335	-99.0

Table B.2.3.9c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.317	52.1	0.078	72.8	0.126	27.5	0.029	15.4	0.088	10.2	0.195	29.5	1.833	38.2
Craig 1-3	0.373	14.8	0.029	27.1	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.404	8.4
Craig 1-2	0.313	12.4	0.021	19.3	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.335	7.0
Craig 1	0.155	6.1	0.012	10.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.167	3.5
Craig 2	0.158	6.2	0.009	8.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.168	3.5
Craig 3	0.061	2.4	0.008	7.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.069	1.4
Hayden 1-2	0.934	37.0	0.047	43.6	0.004	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.986	20.5
Hayden 1	0.534	21.1	0.034	31.4	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.570	11.9
Hayden 2	0.400	15.8	0.013	12.2	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.416	8.7
Steamboat Springs	0.001	0.0	0.001	0.7	0.005	1.0	0.003	1.4	0.007	0.8	0.010	1.5	0.026	0.5
Other Yampa Valley	0.009	0.3	0.001	1.4	0.116	25.1	0.026	14.1	0.081	9.4	0.185	28.0	0.417	8.7
Non-Yampa Valley	1.210	47.9	0.027	25.2	0.308	67.0	0.127	67.5	0.364	42.5	0.465	70.5	2.502	52.1
Denver	0.245	9.7	0.003	3.0	0.032	7.0	0.017	9.0	0.053	6.1	0.003	0.4	0.353	7.4
Colorado w/ Denver	0.619	24.5	0.020	18.5	0.263	57.3	0.104	55.6	0.322	37.6	0.329	49.8	1.658	34.5
Non-Colorado	0.592	23.4	0.007	6.7	0.045	9.7	0.022	11.9	0.042	4.9	0.136	20.7	0.844	17.6
Coal-fired PP	1.822	72.1	0.080	74.0	0.008	1.7	0.000	0.0	0.000	0.0	0.001	0.1	1.910	39.8
All other sources	0.706	27.9	0.028	26.0	0.452	98.3	0.188	100.0	0.856	100.0	0.660	99.9	2.889	60.2
Fires	0.000	0.0	0.002	2.0	0.026	5.6	0.032	17.1	0.404	47.2	0.000	0.0	0.464	9.7

Mad Creek
EXTINCTION 1200-1800 95/ 9/17 6-hour average RH: 32%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	4.893	-99.0	0.228	-99.0	0.702	-99.0	1.708	-99.0	2.634	-99.0	2.031	-99.0	22.196	-99.0
Estimated w/o fires	4.893	-99.0	0.223	-99.0	0.663	-99.0	1.416	-99.0	1.390	-99.0	2.031	-99.0	20.617	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	2.550	52.1	0.166	72.8	0.193	27.5	0.264	15.4	0.270	10.2	0.599	29.5	4.042	18.2
Craig 1-3	0.722	14.8	0.062	27.1	0.003	0.4	0.000	0.0	0.000	0.0	0.001	0.0	0.788	3.5
Craig 1-2	0.605	12.4	0.044	19.3	0.003	0.4	0.000	0.0	0.000	0.0	0.001	0.0	0.652	2.9
Craig 1	0.300	6.1	0.025	10.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.326	1.5
Craig 2	0.305	6.2	0.019	8.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.326	1.5
Craig 3	0.117	2.4	0.018	7.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.136	0.6
Hayden 1-2	1.809	37.0	0.099	43.6	0.007	1.0	0.000	0.0	0.000	0.0	0.001	0.0	1.915	8.6
Hayden 1	1.033	21.1	0.072	31.4	0.004	0.5	0.000	0.0	0.000	0.0	0.000	0.0	1.109	5.0
Hayden 2	0.775	15.8	0.028	12.2	0.003	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.806	3.6

Table B.2.3.9c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

Steamboat Springs	0.002	0.0	0.002	0.7	0.007	1.0	0.024	1.4	0.021	0.8	0.030	1.5	0.086	0.4
Other Yampa Valley	0.017	0.3	0.003	1.4	0.176	25.1	0.240	14.1	0.249	9.4	0.568	28.0	1.253	5.6
Non-Yampa Valley	2.343	47.9	0.058	25.2	0.470	67.0	1.152	67.5	1.121	42.5	1.432	70.5	6.575	29.6
Denver	0.474	9.7	0.007	3.0	0.049	7.0	0.154	9.0	0.162	6.1	0.009	0.4	0.855	3.8
Colorado w/ Denver	1.198	24.5	0.042	18.5	0.402	57.3	0.949	55.6	0.992	37.6	1.012	49.8	4.595	20.7
Non-Colorado	1.146	23.4	0.015	6.7	0.068	9.7	0.203	11.9	0.129	4.9	0.420	20.7	1.980	8.9
Coal-fired PP	3.527	72.1	0.169	74.0	0.012	1.7	0.000	0.0	0.000	0.0	0.002	0.1	3.709	16.7
All other sources	1.366	27.9	0.059	26.0	0.690	98.3	1.708	100.0	2.634	100.0	2.029	99.9	18.487	83.3
Fires	0.000	0.0	0.005	2.0	0.039	5.6	0.292	17.1	1.244	47.2	0.000	0.0	1.579	7.1

Mad Creek
CONCENTRATION 0600-1200 95/ 9/18

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.150	-99.0	0.930	-99.0	0.477	-99.0	0.222	-99.0	1.149	-99.0	0.910	-99.0	5.838	-99.0
Estimated w/o fires	2.150	-99.0	0.872	-99.0	0.434	-99.0	0.167	-99.0	0.457	-99.0	0.910	-99.0	4.990	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.979	45.6	0.652	70.1	0.099	20.7	0.028	12.4	0.071	6.2	0.320	35.2	2.149	36.8
Craig 1-3	0.227	10.6	0.207	22.3	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.436	7.5
Craig 1-2	0.203	9.4	0.147	15.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.351	6.0
Craig 1	0.101	4.7	0.072	7.7	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.173	3.0
Craig 2	0.102	4.7	0.075	8.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.178	3.0
Craig 3	0.024	1.1	0.060	6.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.084	1.4
Hayden 1-2	0.746	34.7	0.422	45.4	0.004	0.8	0.000	0.0	0.000	0.0	0.000	0.0	1.172	20.1
Hayden 1	0.411	19.1	0.294	31.7	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.707	12.1
Hayden 2	0.335	15.6	0.128	13.8	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.465	8.0
Steamboat Springs	0.002	0.1	0.007	0.8	0.012	2.6	0.006	2.7	0.015	1.3	0.043	4.7	0.085	1.5
Other Yampa Valley	0.005	0.2	0.016	1.7	0.081	17.0	0.021	9.6	0.056	4.9	0.277	30.5	0.457	7.8
Non-Yampa Valley	1.171	54.4	0.221	23.7	0.335	70.1	0.140	62.9	0.386	33.6	0.590	64.8	2.841	48.7
Denver	0.227	10.6	0.013	1.4	0.042	8.9	0.020	9.2	0.065	5.6	0.004	0.4	0.371	6.4
Colorado w/ Denver	0.600	27.9	0.116	12.5	0.280	58.7	0.112	50.4	0.332	28.9	0.416	45.7	1.856	31.8
Non-Colorado	0.571	26.6	0.105	11.2	0.055	11.4	0.028	12.5	0.054	4.7	0.173	19.1	0.985	16.9
Coal-fired PP	1.376	64.0	0.659	70.9	0.006	1.3	0.000	0.0	0.000	0.0	0.000	0.0	2.041	35.0
All other sources	0.774	36.0	0.271	29.1	0.471	98.7	0.222	100.0	1.149	100.0	0.909	100.0	3.797	65.0
Fires	0.000	0.0	0.057	6.2	0.044	9.2	0.055	24.7	0.692	60.2	0.000	0.0	0.848	14.5

Table B.2.3.9c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/ 9/18 6-hour average RH: 84%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	11.459	-99.0	5.123	-99.0	1.128	-99.0	2.022	-99.0	6.313	-99.0	4.998	-99.0	41.042	-99.0
Estimated w/o fires	11.459	-99.0	4.807	-99.0	1.024	-99.0	1.522	-99.0	2.511	-99.0	4.998	-99.0	36.321	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	5.220	45.6	3.591	70.1	0.233	20.7	0.250	12.4	0.392	6.2	1.759	35.2	11.446	27.9
Craig 1-3	1.210	10.6	1.140	22.3	0.003	0.3	0.000	0.0	0.000	0.0	0.001	0.0	2.355	5.7
Craig 1-2	1.082	9.4	0.810	15.8	0.003	0.3	0.000	0.0	0.000	0.0	0.001	0.0	1.895	4.6
Craig 1	0.537	4.7	0.396	7.7	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.936	2.3
Craig 2	0.544	4.7	0.413	8.1	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.960	2.3
Craig 3	0.128	1.1	0.330	6.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.459	1.1
Hayden 1-2	3.973	34.7	2.326	45.4	0.009	0.8	0.000	0.0	0.000	0.0	0.001	0.0	6.310	15.4
Hayden 1	2.188	19.1	1.622	31.7	0.005	0.4	0.000	0.0	0.000	0.0	0.000	0.0	3.815	9.3
Hayden 2	1.785	15.6	0.705	13.8	0.004	0.4	0.000	0.0	0.000	0.0	0.000	0.0	2.494	6.1
Steamboat Springs	0.009	0.1	0.039	0.8	0.029	2.6	0.055	2.7	0.085	1.3	0.234	4.7	0.451	1.1
Other Yampa Valley	0.027	0.2	0.086	1.7	0.192	17.0	0.195	9.6	0.307	4.9	1.524	30.5	2.330	5.7
Non-Yampa Valley	6.240	54.4	1.216	23.7	0.790	70.1	1.271	62.9	2.120	33.6	3.239	64.8	14.876	36.2
Denver	1.210	10.6	0.070	1.4	0.100	8.9	0.186	9.2	0.356	5.6	0.020	0.4	1.942	4.7
Colorado w/ Denver	3.197	27.9	0.640	12.5	0.661	58.7	1.019	50.4	1.823	28.9	2.287	45.7	9.626	23.5
Non-Colorado	3.043	26.6	0.576	11.2	0.129	11.4	0.253	12.5	0.297	4.7	0.952	19.1	5.249	12.8
Coal-fired PP	7.332	64.0	3.630	70.9	0.015	1.3	0.000	0.0	0.000	0.0	0.002	0.0	10.979	26.8
All other sources	4.127	36.0	1.493	29.1	1.113	98.7	2.022	100.0	6.313	100.0	4.996	100.0	30.063	73.2
Fires	0.000	0.0	0.316	6.2	0.104	9.2	0.500	24.7	3.801	60.2	0.000	0.0	4.721	11.5

Mad Creek
CONCENTRATION 1200-1800 95/ 9/18

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.895	-99.0	0.577	-99.0	0.152	-99.0	0.074	-99.0	0.387	-99.0	0.325	-99.0	3.410	-99.0
Estimated w/o fires	1.895	-99.0	0.556	-99.0	0.136	-99.0	0.054	-99.0	0.134	-99.0	0.325	-99.0	3.099	-99.0

Table B.2.3.9c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.097	57.9	0.468	81.1	0.034	22.6	0.009	12.1	0.021	5.4	0.099	30.6	1.729	50.7
Craig 1-3	0.359	18.9	0.222	38.5	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.582	17.1
Craig 1-2	0.329	17.4	0.153	26.6	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.484	14.2
Craig 1	0.166	8.8	0.074	12.8	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.240	7.0
Craig 2	0.163	8.6	0.079	13.7	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.243	7.1
Craig 3	0.030	1.6	0.069	11.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.099	2.9
Hayden 1-2	0.735	38.8	0.236	40.9	0.001	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.973	28.5
Hayden 1	0.352	18.6	0.152	26.3	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.505	14.8
Hayden 2	0.383	20.2	0.084	14.6	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.468	13.7
Steamboat Springs	0.000	0.0	0.001	0.2	0.001	0.5	0.000	0.6	0.001	0.3	0.002	0.5	0.005	0.2
Other Yampa Valley	0.002	0.1	0.009	1.6	0.031	20.5	0.009	11.6	0.020	5.1	0.097	30.0	0.168	4.9
Non-Yampa Valley	0.798	42.1	0.088	15.2	0.101	66.8	0.045	60.9	0.113	29.1	0.225	69.4	1.370	40.2
Denver	0.062	3.3	0.002	0.4	0.008	5.0	0.004	5.0	0.012	3.1	0.001	0.2	0.089	2.6
Colorado w/ Denver	0.207	10.9	0.026	4.5	0.065	43.1	0.027	36.5	0.077	20.0	0.114	35.2	0.518	15.2
Non-Colorado	0.590	31.2	0.062	10.7	0.036	23.7	0.018	24.3	0.035	9.1	0.111	34.2	0.852	25.0
Coal-fired PP	1.349	71.2	0.479	82.9	0.003	2.2	0.000	0.0	0.000	0.0	0.000	0.1	1.831	53.7
All other sources	0.546	28.8	0.099	17.1	0.149	97.8	0.074	100.0	0.387	100.0	0.324	99.9	1.578	46.3
Fires	0.000	0.0	0.021	3.7	0.016	10.6	0.020	27.0	0.253	65.5	0.000	0.0	0.310	9.1

Mad Creek
EXTINCTION 1200-1800 95/ 9/18 6-hour average RH: 81%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	9.039	-99.0	2.858	-99.0	0.338	-99.0	0.678	-99.0	1.970	-99.0	1.655	-99.0	26.538	-99.0
Estimated w/o fires	9.039	-99.0	2.753	-99.0	0.302	-99.0	0.495	-99.0	0.681	-99.0	1.655	-99.0	24.924	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	5.233	57.9	2.319	81.1	0.076	22.6	0.082	12.1	0.107	5.4	0.506	30.6	8.323	31.4
Craig 1-3	1.713	18.9	1.101	38.5	0.002	0.7	0.000	0.0	0.000	0.0	0.001	0.0	2.816	10.6
Craig 1-2	1.571	17.4	0.759	26.6	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	2.333	8.8
Craig 1	0.791	8.8	0.367	12.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	1.159	4.4
Craig 2	0.780	8.6	0.393	13.7	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	1.174	4.4
Craig 3	0.142	1.6	0.341	11.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.484	1.8
Hayden 1-2	3.508	38.8	1.169	40.9	0.003	1.0	0.000	0.0	0.000	0.0	0.000	0.0	4.681	17.6
Hayden 1	1.679	18.6	0.752	26.3	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	2.433	9.2
Hayden 2	1.829	20.2	0.417	14.6	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	2.248	8.5

Table B.2.3.9c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

Steamboat Springs	0.001	0.0	0.004	0.2	0.002	0.5	0.004	0.6	0.006	0.3	0.009	0.5	0.026	0.1
Other Yampa Valley	0.011	0.1	0.045	1.6	0.069	20.5	0.079	11.6	0.101	5.1	0.496	30.0	0.801	3.0
Non-Yampa Valley	3.806	42.1	0.434	15.2	0.226	66.8	0.412	60.9	0.574	29.1	1.149	69.4	6.601	24.9
Denver	0.298	3.3	0.012	0.4	0.017	5.0	0.034	5.0	0.061	3.1	0.003	0.2	0.425	1.6
Colorado w/ Denver	0.989	10.9	0.130	4.5	0.145	43.1	0.248	36.5	0.394	20.0	0.583	35.2	2.490	9.4
Non-Colorado	2.817	31.2	0.305	10.7	0.080	23.7	0.165	24.3	0.180	9.1	0.566	34.2	4.111	15.5
Coal-fired PP	6.437	71.2	2.369	82.9	0.007	2.2	0.000	0.0	0.000	0.0	0.001	0.1	8.815	33.2
All other sources	2.602	28.8	0.489	17.1	0.330	97.8	0.678	100.0	1.970	100.0	1.653	99.9	17.723	66.8
Fires	0.000	0.0	0.105	3.7	0.036	10.6	0.183	27.0	1.289	65.5	0.000	0.0	1.613	6.1

Mad Creek
CONCENTRATION 0600-1200 95/ 9/19

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.915	-99.0	0.163	-99.0	0.133	-99.0	0.057	-99.0	0.209	-99.0	0.453	-99.0	1.931	-99.0
Estimated w/o fires	0.915	-99.0	0.155	-99.0	0.128	-99.0	0.051	-99.0	0.125	-99.0	0.453	-99.0	1.827	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.337	36.8	0.065	40.0	0.035	26.3	0.011	18.5	0.026	12.5	0.167	36.8	0.640	33.2
Craig 1-3	0.082	9.0	0.018	11.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.101	5.2
Craig 1-2	0.074	8.1	0.013	7.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.087	4.5
Craig 1	0.038	4.2	0.007	4.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.045	2.3
Craig 2	0.036	3.9	0.006	3.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.042	2.2
Craig 3	0.008	0.9	0.005	3.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.014	0.7
Hayden 1-2	0.252	27.5	0.039	23.8	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.291	15.1
Hayden 1	0.138	15.1	0.028	17.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.166	8.6
Hayden 2	0.114	12.4	0.011	6.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.125	6.5
Steamboat Springs	0.001	0.1	0.003	1.6	0.005	3.8	0.003	5.0	0.007	3.5	0.012	2.7	0.031	1.6
Other Yampa Valley	0.002	0.2	0.006	3.4	0.030	22.3	0.008	13.5	0.019	9.0	0.154	34.0	0.218	11.3
Non-Yampa Valley	0.578	63.2	0.090	55.0	0.093	69.7	0.040	70.0	0.099	47.6	0.287	63.2	1.187	61.5
Denver	0.011	1.2	0.002	1.0	0.002	1.3	0.001	1.4	0.003	1.2	0.000	0.0	0.017	0.9
Colorado w/ Denver	0.063	6.9	0.040	24.6	0.054	40.6	0.021	36.1	0.057	27.4	0.172	37.9	0.407	21.1
Non-Colorado	0.515	56.3	0.050	30.4	0.039	29.1	0.019	33.8	0.042	20.1	0.115	25.4	0.780	40.4
Coal-fired PP	0.487	53.2	0.066	40.4	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.554	28.7
All other sources	0.428	46.8	0.097	59.6	0.132	99.3	0.057	100.0	0.209	100.0	0.453	100.0	1.377	71.3
Fires	0.000	0.0	0.008	5.0	0.005	4.0	0.007	11.5	0.084	40.0	0.000	0.0	0.104	5.4

Table B.2.3.9c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/ 9/19 6-hour average RH: 77%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	3.650	-99.0	0.681	-99.0	0.270	-99.0	0.523	-99.0	0.948	-99.0	2.057	-99.0	18.130	-99.0
Estimated w/o fires	3.650	-99.0	0.647	-99.0	0.259	-99.0	0.463	-99.0	0.569	-99.0	2.057	-99.0	17.645	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.343	36.8	0.272	40.0	0.071	26.3	0.097	18.5	0.118	12.5	0.756	36.8	2.658	14.7
Craig 1-3	0.328	9.0	0.077	11.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.405	2.2
Craig 1-2	0.295	8.1	0.054	7.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.349	1.9
Craig 1	0.153	4.2	0.027	4.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.180	1.0
Craig 2	0.142	3.9	0.026	3.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.169	0.9
Craig 3	0.033	0.9	0.023	3.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.056	0.3
Hayden 1-2	1.005	27.5	0.162	23.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	1.168	6.4
Hayden 1	0.552	15.1	0.115	17.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.668	3.7
Hayden 2	0.453	12.4	0.047	6.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.500	2.8
Steamboat Springs	0.002	0.1	0.011	1.6	0.010	3.8	0.026	5.0	0.033	3.5	0.056	2.7	0.138	0.8
Other Yampa Valley	0.008	0.2	0.023	3.4	0.060	22.3	0.071	13.5	0.085	9.0	0.700	34.0	0.947	5.2
Non-Yampa Valley	2.307	63.2	0.374	55.0	0.188	69.7	0.366	70.0	0.451	47.6	1.301	63.2	4.987	27.5
Denver	0.042	1.2	0.007	1.0	0.003	1.3	0.007	1.4	0.012	1.2	0.001	0.0	0.072	0.4
Colorado w/ Denver	0.252	6.9	0.167	24.6	0.110	40.6	0.189	36.1	0.260	27.4	0.779	37.9	1.757	9.7
Non-Colorado	2.055	56.3	0.207	30.4	0.079	29.1	0.177	33.8	0.191	20.1	0.522	25.4	3.230	17.8
Coal-fired PP	1.943	53.2	0.275	40.4	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	2.220	12.2
All other sources	1.707	46.8	0.406	59.6	0.268	99.3	0.523	100.0	0.948	100.0	2.057	100.0	15.910	87.8
Fires	0.000	0.0	0.034	5.0	0.011	4.0	0.060	11.5	0.379	40.0	0.000	0.0	0.484	2.7

Mad Creek
CONCENTRATION 1200-1800 95/ 9/19

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.418	-99.0	0.638	-99.0	0.170	-99.0	0.069	-99.0	0.401	-99.0	0.276	-99.0	2.972	-99.0
Estimated w/o fires	1.418	-99.0	0.607	-99.0	0.153	-99.0	0.047	-99.0	0.126	-99.0	0.276	-99.0	2.627	-99.0

Table B.2.3.9c (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.757	53.3	0.432	67.6	0.091	53.2	0.020	28.5	0.061	15.2	0.100	36.3	1.460	49.1
Craig 1-3	0.143	10.1	0.113	17.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.257	8.7
Craig 1-2	0.125	8.8	0.083	12.9	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.208	7.0
Craig 1	0.057	4.0	0.035	5.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.092	3.1
Craig 2	0.069	4.8	0.047	7.4	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.116	3.9
Craig 3	0.018	1.3	0.031	4.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.049	1.6
Hayden 1-2	0.607	42.8	0.300	47.0	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.909	30.6
Hayden 1	0.342	24.1	0.210	32.9	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.553	18.6
Hayden 2	0.265	18.7	0.090	14.1	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.356	12.0
Steamboat Springs	0.000	0.0	0.003	0.5	0.001	0.8	0.001	1.2	0.002	0.5	0.003	1.0	0.011	0.4
Other Yampa Valley	0.005	0.4	0.015	2.4	0.087	51.0	0.019	27.4	0.059	14.7	0.097	35.2	0.283	9.5
Non-Yampa Valley	0.662	46.7	0.176	27.5	0.062	36.6	0.027	39.7	0.065	16.2	0.176	63.7	1.167	39.3
Denver	0.005	0.4	0.002	0.4	0.001	0.3	0.000	0.4	0.001	0.2	0.000	0.0	0.009	0.3
Colorado w/ Denver	0.050	3.5	0.064	10.1	0.034	19.7	0.013	19.0	0.034	8.4	0.100	36.2	0.295	9.9
Non-Colorado	0.611	43.1	0.111	17.4	0.029	16.9	0.014	20.7	0.031	7.7	0.076	27.5	0.873	29.4
Coal-fired PP	0.976	68.9	0.439	68.8	0.003	1.9	0.000	0.0	0.000	0.0	0.000	0.1	1.419	47.7
All other sources	0.442	31.1	0.199	31.2	0.167	98.1	0.069	100.0	0.401	100.0	0.276	99.9	1.553	52.3
Fires	0.000	0.0	0.031	4.9	0.017	10.2	0.022	31.8	0.275	68.6	0.000	0.0	0.345	11.6

Mad Creek
EXTINCTION 1200-1800 95/ 9/19 6-hour average RH: 50%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	3.290	-99.0	1.596	-99.0	0.276	-99.0	0.624	-99.0	1.342	-99.0	0.925	-99.0	18.054	-99.0
Estimated w/o fires	3.290	-99.0	1.519	-99.0	0.248	-99.0	0.425	-99.0	0.421	-99.0	0.925	-99.0	16.828	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.755	53.3	1.079	67.6	0.147	53.2	0.178	28.5	0.205	15.2	0.336	36.3	3.700	20.5
Craig 1-3	0.332	10.1	0.284	17.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.617	3.4
Craig 1-2	0.291	8.8	0.207	12.9	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.498	2.8
Craig 1	0.131	4.0	0.088	5.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.220	1.2
Craig 2	0.159	4.8	0.118	7.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.278	1.5
Craig 3	0.042	1.3	0.077	4.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.119	0.7
Hayden 1-2	1.409	42.8	0.750	47.0	0.003	1.0	0.000	0.0	0.000	0.0	0.000	0.0	2.163	12.0
Hayden 1	0.794	24.1	0.525	32.9	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	1.321	7.3
Hayden 2	0.615	18.7	0.225	14.1	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.841	4.7

Table B.2.3.9c (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

Steamboat Springs	0.001	0.0	0.008	0.5	0.002	0.8	0.007	1.2	0.007	0.5	0.010	1.0	0.035	0.2
Other Yampa Valley	0.013	0.4	0.038	2.4	0.141	51.0	0.171	27.4	0.197	14.7	0.326	35.2	0.885	4.9
Non-Yampa Valley	1.535	46.7	0.439	27.5	0.101	36.6	0.247	39.7	0.217	16.2	0.589	63.7	3.128	17.3
Denver	0.013	0.4	0.006	0.4	0.001	0.3	0.002	0.4	0.003	0.2	0.000	0.0	0.025	0.1
Colorado w/ Denver	0.117	3.5	0.161	10.1	0.054	19.7	0.118	19.0	0.113	8.4	0.335	36.2	0.898	5.0
Non-Colorado	1.418	43.1	0.278	17.4	0.047	16.9	0.129	20.7	0.104	7.7	0.254	27.5	2.231	12.4
Coal-fired PP	2.265	68.9	1.098	68.8	0.005	1.9	0.000	0.0	0.000	0.0	0.001	0.1	3.370	18.7
All other sources	1.025	31.1	0.498	31.2	0.271	98.1	0.624	100.0	1.342	100.0	0.924	99.9	14.684	81.3
Fires	0.000	0.0	0.078	4.9	0.028	10.2	0.199	31.8	0.921	68.6	0.000	0.0	1.225	6.8

Mad Creek
CONCENTRATION 0600-1200 95/ 9/20

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.106	-99.0	0.439	-99.0	0.393	-99.0	0.254	-99.0	2.075	-99.0	0.942	-99.0	6.209	-99.0
Estimated w/o fires	2.106	-99.0	0.357	-99.0	0.278	-99.0	0.110	-99.0	0.262	-99.0	0.942	-99.0	4.056	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.454	21.6	0.209	47.6	0.079	20.2	0.022	8.5	0.052	2.5	0.303	32.1	1.119	18.0
Craig 1-3	0.115	5.5	0.075	17.1	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.192	3.1
Craig 1-2	0.105	5.0	0.058	13.1	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.164	2.6
Craig 1	0.048	2.3	0.030	6.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.078	1.3
Craig 2	0.057	2.7	0.028	6.4	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.086	1.4
Craig 3	0.010	0.5	0.017	4.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.028	0.4
Hayden 1-2	0.337	16.0	0.125	28.4	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.464	7.5
Hayden 1	0.164	7.8	0.072	16.4	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.237	3.8
Hayden 2	0.173	8.2	0.053	12.0	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.227	3.7
Steamboat Springs	0.000	0.0	0.001	0.2	0.002	0.5	0.001	0.5	0.003	0.2	0.004	0.5	0.012	0.2
Other Yampa Valley	0.002	0.1	0.009	2.0	0.074	18.8	0.020	8.0	0.049	2.3	0.298	31.6	0.451	7.3
Non-Yampa Valley	1.652	78.4	0.148	33.8	0.198	50.5	0.089	34.9	0.210	10.1	0.639	67.9	2.937	47.3
Denver	0.001	0.0	0.000	0.1	0.001	0.1	0.000	0.1	0.001	0.0	0.000	0.0	0.003	0.1
Colorado w/ Denver	0.073	3.4	0.033	7.5	0.084	21.3	0.031	12.3	0.081	3.9	0.294	31.2	0.595	9.6
Non-Colorado	1.579	75.0	0.116	26.3	0.115	29.2	0.057	22.6	0.129	6.2	0.345	36.6	2.342	37.7
Coal-fired PP	0.986	46.8	0.248	56.5	0.007	1.7	0.000	0.0	0.000	0.0	0.000	0.0	1.241	20.0
All other sources	1.121	53.2	0.191	43.5	0.386	98.3	0.254	100.0	2.075	100.0	0.942	100.0	4.969	80.0
Fires	0.000	0.0	0.082	18.6	0.115	29.3	0.144	56.6	1.813	87.4	0.000	0.0	2.154	34.7

Table B.2.3.9c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/ 9/20 6-hour average RH: 93%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	23.264	-99.0	4.927	-99.0	1.481	-99.0	2.314	-99.0	19.849	-99.0	9.012	-99.0	70.848	-99.0
Estimated w/o fires	23.264	-99.0	4.011	-99.0	1.048	-99.0	1.004	-99.0	2.505	-99.0	9.012	-99.0	50.844	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	5.016	21.6	2.347	47.6	0.299	20.2	0.197	8.5	0.496	2.5	2.896	32.1	11.252	15.9
Craig 1-3	1.274	5.5	0.842	17.1	0.004	0.3	0.000	0.0	0.000	0.0	0.002	0.0	2.121	3.0
Craig 1-2	1.161	5.0	0.646	13.1	0.004	0.3	0.000	0.0	0.000	0.0	0.001	0.0	1.811	2.6
Craig 1	0.531	2.3	0.331	6.7	0.002	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.864	1.2
Craig 2	0.630	2.7	0.314	6.4	0.002	0.1	0.000	0.0	0.000	0.0	0.001	0.0	0.947	1.3
Craig 3	0.113	0.5	0.196	4.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0	0.310	0.4
Hayden 1-2	3.719	16.0	1.398	28.4	0.009	0.6	0.000	0.0	0.000	0.0	0.001	0.0	5.127	7.2
Hayden 1	1.811	7.8	0.806	16.4	0.004	0.3	0.000	0.0	0.000	0.0	0.000	0.0	2.621	3.7
Hayden 2	1.907	8.2	0.593	12.0	0.005	0.4	0.000	0.0	0.000	0.0	0.001	0.0	2.506	3.5
Steamboat Springs	0.003	0.0	0.011	0.2	0.008	0.5	0.011	0.5	0.031	0.2	0.042	0.5	0.105	0.1
Other Yampa Valley	0.021	0.1	0.096	2.0	0.278	18.8	0.186	8.0	0.465	2.3	2.852	31.6	3.898	5.5
Non-Yampa Valley	18.248	78.4	1.664	33.8	0.749	50.5	0.807	34.9	2.009	10.1	6.115	67.9	29.593	41.8
Denver	0.012	0.0	0.003	0.1	0.002	0.1	0.003	0.1	0.009	0.0	0.001	0.0	0.029	0.0
Colorado w/ Denver	0.801	3.4	0.367	7.5	0.316	21.3	0.284	12.3	0.771	3.9	2.815	31.2	5.355	7.6
Non-Colorado	17.447	75.0	1.297	26.3	0.433	29.2	0.523	22.6	1.239	6.2	3.300	36.6	24.238	34.2
Coal-fired PP	10.887	46.8	2.782	56.5	0.025	1.7	0.000	0.0	0.000	0.0	0.004	0.0	13.699	19.3
All other sources	12.377	53.2	2.144	43.5	1.456	98.3	2.314	100.0	19.849	100.0	9.008	100.0	57.149	80.7
Fires	0.000	0.0	0.916	18.6	0.434	29.3	1.310	56.6	17.344	87.4	0.000	0.0	20.003	28.2

Mad Creek
CONCENTRATION 1200-1800 95/ 9/20

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.093	-99.0	0.167	-99.0	0.207	-99.0	0.128	-99.0	0.916	-99.0	0.462	-99.0	3.973	-99.0
Estimated w/o fires	2.093	-99.0	0.138	-99.0	0.159	-99.0	0.067	-99.0	0.156	-99.0	0.462	-99.0	3.075	-99.0

Table B.2.3.9c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.047	2.2	0.012	7.0	0.033	15.9	0.010	7.4	0.021	2.3	0.103	22.2	0.224	5.6
Craig 1-3	0.004	0.2	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.1
Craig 1-2	0.003	0.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.1
Craig 1	0.002	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 2	0.002	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.1
Craig 3	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.042	2.0	0.008	4.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.050	1.3
Hayden 1	0.030	1.4	0.007	4.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.037	0.9
Hayden 2	0.012	0.6	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.3
Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Other Yampa Valley	0.001	0.0	0.003	1.8	0.033	15.8	0.010	7.4	0.021	2.3	0.103	22.2	0.170	4.3
Non-Yampa Valley	2.046	97.8	0.126	75.6	0.126	60.9	0.058	45.3	0.135	14.7	0.359	77.8	2.850	71.7
Denver	0.001	0.0	0.000	0.1	0.000	0.2	0.000	0.2	0.001	0.1	0.000	0.0	0.002	0.0
Colorado w/ Denver	0.029	1.4	0.009	5.4	0.029	13.8	0.011	9.0	0.029	3.2	0.102	22.0	0.209	5.3
Non-Colorado	2.017	96.4	0.117	70.2	0.097	47.0	0.046	36.3	0.105	11.5	0.258	55.8	2.642	66.5
Coal-fired PP	0.906	43.3	0.074	44.4	0.006	2.9	0.000	0.0	0.000	0.0	0.000	0.1	0.987	24.8
All other sources	1.187	56.7	0.093	55.6	0.201	97.1	0.128	100.0	0.916	100.0	0.462	99.9	2.986	75.2
Fires	0.000	0.0	0.029	17.4	0.048	23.3	0.060	47.3	0.761	83.0	0.000	0.0	0.898	22.6

Mad Creek
EXTINCTION 1200-1800 95/ 9/20 6-hour average RH: 89%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	15.278	-99.0	1.249	-99.0	0.590	-99.0	1.163	-99.0	6.320	-99.0	3.188	-99.0	37.789	-99.0
Estimated w/o fires	15.278	-99.0	1.032	-99.0	0.453	-99.0	0.613	-99.0	1.073	-99.0	3.188	-99.0	31.637	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.341	2.2	0.087	7.0	0.094	15.9	0.087	7.4	0.142	2.3	0.709	22.2	1.459	3.9
Craig 1-3	0.027	0.2	0.003	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.031	0.1
Craig 1-2	0.025	0.2	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.027	0.1
Craig 1	0.011	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.012	0.0
Craig 2	0.013	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.015	0.0
Craig 3	0.002	0.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.0
Hayden 1-2	0.306	2.0	0.061	4.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.368	1.0
Hayden 1	0.220	1.4	0.052	4.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.273	0.7
Hayden 2	0.086	0.6	0.009	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.095	0.3

Table B.2.3.9c (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Other Yampa Valley	0.007	0.0	0.023	1.8	0.093	15.8	0.086	7.4	0.142	2.3	0.709	22.2	1.061	2.8
Non-Yampa Valley	14.938	97.8	0.944	75.6	0.359	60.9	0.527	45.3	0.931	14.7	2.480	77.8	20.178	53.4
Denver	0.004	0.0	0.001	0.1	0.001	0.2	0.002	0.2	0.004	0.1	0.000	0.0	0.012	0.0
Colorado w/ Denver	0.209	1.4	0.067	5.4	0.082	13.8	0.104	9.0	0.203	3.2	0.701	22.0	1.367	3.6
Non-Colorado	14.728	96.4	0.877	70.2	0.278	47.0	0.422	36.3	0.727	11.5	1.778	55.8	18.811	49.8
Coal-fired PP	6.615	43.3	0.554	44.4	0.017	2.9	0.000	0.0	0.000	0.0	0.002	0.1	7.189	19.0
All other sources	8.663	56.7	0.695	55.6	0.573	97.1	1.163	100.0	6.320	100.0	3.186	99.9	30.600	81.0
Fires	0.000	0.0	0.217	17.4	0.137	23.3	0.550	47.3	5.247	83.0	0.000	0.0	6.151	16.3

Mad Creek
CONCENTRATION 0600-1200 95/ 9/21

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.331	-99.0	0.000	-99.0	0.233	-99.0	0.102	-99.0	0.404	-99.0	0.724	-99.0	2.794	-99.0
Estimated w/o fires	1.331	-99.0	0.000	-99.0	0.220	-99.0	0.087	-99.0	0.211	-99.0	0.724	-99.0	2.573	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.050	3.7	0.000	0.0	0.074	31.7	0.017	17.0	0.047	11.6	0.304	42.0	0.491	17.6
Craig 1-3	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 1-2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.047	3.5	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.047	1.7
Hayden 1	0.042	3.2	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.042	1.5
Hayden 2	0.005	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.2
Steamboat Springs	0.000	0.0	0.000	0.0	0.001	0.6	0.001	0.8	0.002	0.5	0.003	0.4	0.008	0.3
Other Yampa Valley	0.002	0.1	0.000	0.0	0.072	31.0	0.017	16.2	0.045	11.1	0.301	41.5	0.436	15.6
Non-Yampa Valley	1.281	96.3	0.000	0.0	0.147	63.1	0.070	68.1	0.164	40.6	0.420	58.0	2.082	74.5
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.016	1.2	0.000	0.0	0.028	12.1	0.011	10.4	0.028	6.9	0.092	12.7	0.175	6.2
Non-Colorado	1.266	95.1	0.000	0.0	0.119	50.9	0.059	57.6	0.137	33.8	0.328	45.3	1.907	68.3
Coal-fired PP	0.508	38.2	0.000	0.0	0.003	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.511	18.3
All other sources	0.823	61.8	0.000	100.0	0.230	98.8	0.102	100.0	0.404	100.0	0.724	100.0	2.283	81.7
Fires	0.000	0.0	0.000	0.0	0.012	5.3	0.015	15.0	0.193	47.8	0.000	0.0	0.221	7.9

Table B.2.3.9c (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/ 9/21 6-hour average RH: 86%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	8.168	-99.0	0.000	-99.0	0.596	-99.0	0.932	-99.0	2.454	-99.0	4.392	-99.0	26.542	-99.0
Estimated w/o fires	8.168	-99.0	0.000	-99.0	0.565	-99.0	0.792	-99.0	1.282	-99.0	4.392	-99.0	25.199	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.305	3.7	0.000	0.0	0.189	31.7	0.158	17.0	0.284	11.6	1.844	42.0	2.780	10.5
Craig 1-3	0.005	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.0
Craig 1-2	0.005	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.0
Craig 1	0.002	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 2	0.003	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.288	3.5	0.000	0.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.289	1.1
Hayden 1	0.259	3.2	0.000	0.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.259	1.0
Hayden 2	0.029	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.029	0.1
Steamboat Springs	0.001	0.0	0.000	0.0	0.004	0.6	0.007	0.8	0.013	0.5	0.019	0.4	0.044	0.2
Other Yampa Valley	0.010	0.1	0.000	0.0	0.185	31.0	0.151	16.2	0.271	11.1	1.825	41.5	2.442	9.2
Non-Yampa Valley	7.863	96.3	0.000	0.0	0.376	63.1	0.634	68.1	0.998	40.6	2.548	58.0	12.419	46.8
Denver	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0	0.000	0.0	0.003	0.0
Colorado w/ Denver	0.096	1.2	0.000	0.0	0.072	12.1	0.097	10.4	0.169	6.9	0.559	12.7	0.994	3.7
Non-Colorado	7.767	95.1	0.000	0.0	0.304	50.9	0.537	57.6	0.829	33.8	1.989	45.3	11.425	43.0
Coal-fired PP	3.120	38.2	0.000	0.0	0.007	1.2	0.000	0.0	0.000	0.0	0.001	0.0	3.128	11.8
All other sources	5.048	61.8	0.000	100.0	0.589	98.8	0.932	100.0	2.454	100.0	4.391	100.0	23.415	88.2
Fires	0.000	0.0	0.000	0.0	0.031	5.3	0.140	15.0	1.172	47.8	0.000	0.0	1.343	5.1

Mad Creek
CONCENTRATION 1200-1800 95/ 9/21

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.044	-99.0	0.424	-99.0	0.133	-99.0	0.057	-99.0	0.196	-99.0	0.342	-99.0	2.195	-99.0
Estimated w/o fires	1.044	-99.0	0.413	-99.0	0.128	-99.0	0.051	-99.0	0.121	-99.0	0.342	-99.0	2.099	-99.0

Table B.2.3.9c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.213	20.4	0.171	40.4	0.048	35.9	0.013	22.9	0.032	16.5	0.130	38.1	0.607	27.7
Craig 1-3	0.003	0.2	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.2
Craig 1-2	0.002	0.2	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.2
Craig 1	0.001	0.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.1
Craig 2	0.002	0.1	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.1
Craig 3	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.208	20.0	0.153	36.0	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.362	16.5
Hayden 1	0.186	17.8	0.142	33.6	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.329	15.0
Hayden 2	0.023	2.2	0.010	2.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.033	1.5
Steamboat Springs	0.000	0.0	0.002	0.4	0.002	1.2	0.001	1.4	0.002	1.2	0.003	0.8	0.009	0.4
Other Yampa Valley	0.002	0.2	0.015	3.5	0.045	34.1	0.012	21.5	0.030	15.3	0.127	37.3	0.231	10.5
Non-Yampa Valley	0.831	79.6	0.242	56.9	0.080	60.6	0.038	66.7	0.089	45.5	0.212	61.9	1.491	67.9
Denver	0.001	0.1	0.000	0.1	0.000	0.1	0.000	0.1	0.000	0.1	0.000	0.0	0.001	0.1
Colorado w/ Denver	0.024	2.3	0.064	15.1	0.024	18.0	0.010	18.2	0.026	13.5	0.051	15.0	0.200	9.1
Non-Colorado	0.807	77.3	0.177	41.8	0.056	42.6	0.028	48.6	0.063	32.0	0.160	46.9	1.291	58.8
Coal-fired PP	0.501	48.0	0.199	46.9	0.002	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.703	32.0
All other sources	0.542	52.0	0.225	53.1	0.131	98.4	0.057	100.0	0.196	100.0	0.342	100.0	1.492	68.0
Fires	0.000	0.0	0.011	2.7	0.005	3.6	0.006	10.4	0.074	38.0	0.000	0.0	0.096	4.4

Mad Creek
EXTINCTION 1200-1800 95/ 9/21 6-hour average RH: 69%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	3.368	-99.0	1.446	-99.0	0.245	-99.0	0.518	-99.0	0.782	-99.0	1.366	-99.0	17.725	-99.0
Estimated w/o fires	3.368	-99.0	1.407	-99.0	0.236	-99.0	0.464	-99.0	0.485	-99.0	1.366	-99.0	17.326	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.687	20.4	0.584	40.4	0.088	35.9	0.118	22.9	0.129	16.5	0.520	38.1	2.126	12.0
Craig 1-3	0.008	0.2	0.008	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.1
Craig 1-2	0.008	0.2	0.007	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.015	0.1
Craig 1	0.003	0.1	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.0
Craig 2	0.005	0.1	0.005	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.1
Craig 3	0.001	0.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Hayden 1-2	0.672	20.0	0.521	36.0	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	1.195	6.7
Hayden 1	0.599	17.8	0.486	33.6	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	1.086	6.1
Hayden 2	0.073	2.2	0.035	2.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.109	0.6

Table B.2.3.9c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 09/17/95 to 09/21/95 Episode

Steamboat Springs	0.000	0.0	0.005	0.4	0.003	1.2	0.007	1.4	0.009	1.2	0.011	0.8	0.036	0.2
Other Yampa Valley	0.006	0.2	0.050	3.5	0.083	34.1	0.111	21.5	0.119	15.3	0.509	37.3	0.879	5.0
Non-Yampa Valley	2.682	79.6	0.823	56.9	0.148	60.6	0.345	66.7	0.356	45.5	0.846	61.9	5.200	29.3
Denver	0.002	0.1	0.001	0.1	0.000	0.1	0.000	0.1	0.001	0.1	0.000	0.0	0.004	0.0
Colorado w/ Denver	0.078	2.3	0.219	15.1	0.044	18.0	0.094	18.2	0.105	13.5	0.205	15.0	0.745	4.2
Non-Colorado	2.603	77.3	0.604	41.8	0.104	42.6	0.251	48.6	0.251	32.0	0.641	46.9	4.455	25.1
Coal-fired PP	1.618	48.0	0.678	46.9	0.004	1.6	0.000	0.0	0.000	0.0	0.000	0.0	2.301	13.0
All other sources	1.750	52.0	0.768	53.1	0.241	98.4	0.518	100.0	0.782	100.0	1.366	100.0	15.424	87.0
Fires	0.000	0.0	0.039	2.7	0.009	3.6	0.054	10.4	0.297	38.0	0.000	0.0	0.398	2.2

Table B.2.3.10a

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/07/95 to 08/09/95 Episode

[This table also presents six-hour concentrations from filter measurements, as well as extinction estimated from the filter measurements using identical extinction efficiencies as applied to predicted concentrations. Source attributions are presented for all 12 source regions/types modeled with CALPUFF, and present results from each six-hour daylight period (0600-1200, and 1200-1800 LST).]

Buffalo Pass
CONCENTRATION 0600-1200 95/ 8/ 7

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.522		-99.000		0.618		0.688		3.058		3.058		5.682	
Estimated w/ fires	0.796	-47.7	0.236	-99.0	0.397	-35.8	0.159	-77.0	0.533	-82.6	0.870	-71.6	2.989	-47.4
Estimated w/o fires	0.796	-47.7	0.230	-99.0	0.390	-36.8	0.151	-78.1	0.434	-85.8	0.870	-71.6	2.872	-49.5
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.108	13.6	0.017	7.2	0.040	10.2	0.012	7.6	0.029	5.4	0.194	22.3	0.400	13.4
Craig 1-3	0.016	2.0	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.018	0.6
Craig 1-2	0.013	1.6	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.015	0.5
Craig 1	0.004	0.5	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.2
Craig 2	0.009	1.1	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.3
Craig 3	0.003	0.3	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.1
Hayden 1-2	0.091	11.4	0.007	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.097	3.3
Hayden 1	0.052	6.5	0.004	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.056	1.9
Hayden 2	0.039	4.9	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.041	1.4
Steamboat Springs	0.001	0.1	0.003	1.4	0.006	1.6	0.004	2.5	0.010	1.9	0.012	1.4	0.036	1.2
Other Yampa Valley	0.001	0.2	0.005	2.1	0.034	8.5	0.008	5.1	0.019	3.5	0.181	20.9	0.248	8.3
Non-Yampa Valley	0.688	86.4	0.213	90.5	0.350	88.3	0.139	87.5	0.406	76.1	0.676	77.7	2.471	82.7
Denver	0.277	34.8	0.038	16.1	0.050	12.6	0.025	15.6	0.078	14.7	0.004	0.5	0.472	15.8
Colorado w/ Denver	0.594	74.6	0.195	82.8	0.330	83.2	0.129	81.4	0.385	72.2	0.596	68.5	2.229	74.5
Non-Colorado	0.094	11.8	0.018	7.8	0.020	5.1	0.010	6.1	0.021	3.9	0.080	9.2	0.243	8.1
Coal-fired PP	0.357	44.9	0.021	9.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.379	12.7
All other sources	0.438	55.1	0.214	91.0	0.396	99.9	0.159	100.0	0.533	100.0	0.870	100.0	2.610	87.3
Fires	0.000	0.0	0.005	2.2	0.006	1.6	0.008	4.9	0.099	18.5	0.000	0.0	0.118	3.9

Table B.2.3.10a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/07/95 to 08/09/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/ 8/ 7 6-hour average RH: 36%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	3.040		-99.000		0.952		6.263		9.542		9.542		-99.000	
Estimated w/ fires	1.590	-47.7	0.513	-99.0	0.611	-35.8	1.443	-77.0	1.662	-82.6	2.715	-71.6	18.534	-99.0
Estimated w/o fires	1.590	-47.7	0.501	-99.0	0.602	-36.8	1.372	-78.1	1.355	-85.8	2.715	-71.6	18.134	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.217	13.6	0.037	7.2	0.062	10.2	0.109	7.6	0.089	5.4	0.605	22.3	1.119	6.0
Craig 1-3	0.031	2.0	0.005	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.037	0.2
Craig 1-2	0.026	1.6	0.003	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.030	0.2
Craig 1	0.008	0.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.0
Craig 2	0.018	1.1	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.021	0.1
Craig 3	0.005	0.3	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.0
Hayden 1-2	0.181	11.4	0.014	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.195	1.1
Hayden 1	0.103	6.5	0.009	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.112	0.6
Hayden 2	0.078	4.9	0.005	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.083	0.4
Steamboat Springs	0.001	0.1	0.007	1.4	0.010	1.6	0.035	2.5	0.031	1.9	0.039	1.4	0.123	0.7
Other Yampa Valley	0.003	0.2	0.011	2.1	0.052	8.5	0.074	5.1	0.058	3.5	0.566	20.9	0.764	4.1
Non-Yampa Valley	1.373	86.4	0.464	90.5	0.540	88.3	1.263	87.5	1.266	76.1	2.110	77.7	7.015	37.9
Denver	0.554	34.8	0.083	16.1	0.077	12.6	0.226	15.6	0.244	14.7	0.013	0.5	1.196	6.5
Colorado w/ Denver	1.186	74.6	0.425	82.8	0.509	83.2	1.174	81.4	1.201	72.2	1.859	68.5	6.354	34.3
Non-Colorado	0.187	11.8	0.040	7.8	0.031	5.1	0.088	6.1	0.065	3.9	0.250	9.2	0.662	3.6
Coal-fired PP	0.714	44.9	0.046	9.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.761	4.1
All other sources	0.876	55.1	0.467	91.0	0.610	99.9	1.443	100.0	1.662	100.0	2.715	100.0	17.773	95.9
Fires	0.000	0.0	0.011	2.2	0.010	1.6	0.071	4.9	0.307	18.5	0.000	0.0	0.400	2.2

Buffalo Pass
CONCENTRATION 1200-1800 95/ 8/ 7

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.472		-99.000		0.573		0.604		1.567		1.567		4.164	
Estimated w/ fires	0.213	-85.5	0.009	-99.0	0.106	-81.5	0.045	-92.5	0.156	-90.0	0.228	-85.4	0.758	-81.8
Estimated w/o fires	0.213	-85.5	0.009	-99.0	0.103	-82.0	0.042	-93.0	0.116	-92.6	0.228	-85.4	0.712	-82.9

Table B.2.3.10a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/07/95 to 08/09/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.014	6.4	0.001	5.8	0.013	12.1	0.005	10.0	0.011	7.0	0.037	16.4	0.080	10.5
Craig 1-3	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.2
Craig 1-2	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.012	5.7	0.000	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.012	1.6
Hayden 1	0.007	3.3	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.9
Hayden 2	0.005	2.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.7
Steamboat Springs	0.000	0.0	0.000	1.8	0.002	2.0	0.001	2.8	0.003	2.2	0.004	1.7	0.011	1.4
Other Yampa Valley	0.000	0.1	0.000	3.4	0.011	10.1	0.003	7.2	0.008	4.8	0.034	14.7	0.056	7.3
Non-Yampa Valley	0.199	93.6	0.008	92.6	0.091	85.5	0.038	83.0	0.105	67.4	0.191	83.6	0.632	83.4
Denver	0.069	32.6	0.001	8.6	0.013	12.3	0.006	13.9	0.020	12.8	0.001	0.5	0.111	14.6
Colorado w/ Denver	0.197	92.5	0.008	92.2	0.087	82.4	0.036	79.8	0.102	65.3	0.169	74.2	0.600	79.2
Non-Colorado	0.002	1.0	0.000	0.4	0.003	3.1	0.001	3.3	0.003	2.1	0.021	9.4	0.032	4.2
Coal-fired PP	0.072	34.0	0.002	26.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.075	9.9
All other sources	0.140	66.0	0.007	73.9	0.106	99.9	0.045	100.0	0.156	100.0	0.228	100.0	0.683	90.1
Fires	0.000	0.0	0.000	1.6	0.003	2.4	0.003	7.0	0.040	25.6	0.000	0.0	0.046	6.1

Buffalo Pass
EXTINCTION 1200-1800 95/ 8/ 7 6-hour average RH: 35%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.916		-99.000		0.881		5.496		4.870		4.870		-99.000	
Estimated w/ fires	0.421	-85.5	0.020	-99.0	0.163	-81.5	0.413	-92.5	0.486	-90.0	0.709	-85.4	12.212	-99.0
Estimated w/o fires	0.421	-85.5	0.019	-99.0	0.159	-82.0	0.384	-93.0	0.362	-92.6	0.709	-85.4	12.054	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.027	6.4	0.001	5.8	0.020	12.1	0.041	10.0	0.034	7.0	0.116	16.4	0.239	2.0
Craig 1-3	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.0
Craig 1-2	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 2	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.024	5.7	0.000	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.024	0.2
Hayden 1	0.014	3.3	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.014	0.1
Hayden 2	0.010	2.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.1

Table B.2.3.10a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/07/95 to 08/09/95 Episode

Steamboat Springs	0.000	0.0	0.000	1.8	0.003	2.0	0.012	2.8	0.010	2.2	0.012	1.7	0.038	0.3
Other Yampa Valley	0.000	0.1	0.001	3.4	0.016	10.1	0.030	7.2	0.024	4.8	0.104	14.7	0.175	1.4
Non-Yampa Valley	0.394	93.6	0.018	92.6	0.139	85.5	0.343	83.0	0.328	67.4	0.593	83.6	1.815	14.9
Denver	0.137	32.6	0.002	8.6	0.020	12.3	0.058	13.9	0.062	12.8	0.003	0.5	0.282	2.3
Colorado w/ Denver	0.390	92.5	0.018	92.2	0.134	82.4	0.329	79.8	0.318	65.3	0.526	74.2	1.715	14.0
Non-Colorado	0.004	1.0	0.000	0.4	0.005	3.1	0.013	3.3	0.010	2.1	0.067	9.4	0.100	0.8
Coal-fired PP	0.143	34.0	0.005	26.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.149	1.2
All other sources	0.278	66.0	0.014	73.9	0.163	99.9	0.413	100.0	0.486	100.0	0.709	100.0	12.063	98.8
Fires	0.000	0.0	0.000	1.6	0.004	2.4	0.029	7.0	0.124	25.6	0.000	0.0	0.157	1.3

Buffalo Pass
CONCENTRATION 0600-1200 95/ 8/ 8

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.946		-99.000		0.824		0.002		2.728		2.728		5.187	
Estimated w/ fires	0.034	-98.3	0.031	-99.0	0.077	-90.7	0.031	999.9	0.078	-97.1	0.292	-89.3	0.542	-89.6
Estimated w/o fires	0.034	-98.3	0.031	-99.0	0.076	-90.7	0.031	999.9	0.075	-97.3	0.292	-89.3	0.538	-89.6
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.017	50.3	0.008	24.0	0.026	33.9	0.009	30.1	0.022	28.8	0.086	29.6	0.169	31.1
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.017	49.6	0.003	11.0	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.020	3.8
Hayden 1	0.007	19.9	0.002	5.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.009	1.6
Hayden 2	0.010	29.8	0.002	5.1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.012	2.2
Steamboat Springs	0.000	0.4	0.003	8.6	0.008	9.9	0.004	14.1	0.010	13.3	0.021	7.3	0.046	8.6
Other Yampa Valley	0.000	0.3	0.001	4.4	0.018	23.6	0.005	16.0	0.012	15.5	0.065	22.3	0.102	18.8
Non-Yampa Valley	0.017	49.7	0.024	76.0	0.050	65.9	0.021	69.1	0.052	67.4	0.205	70.4	0.370	68.3
Denver	0.001	1.9	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Colorado w/ Denver	0.014	41.3	0.022	70.3	0.047	61.5	0.020	63.8	0.049	62.6	0.186	63.7	0.337	62.2
Non-Colorado	0.003	8.3	0.002	5.6	0.003	4.4	0.002	5.3	0.004	4.8	0.019	6.6	0.033	6.0
Coal-fired PP	0.017	50.6	0.003	11.0	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.021	3.8
All other sources	0.017	49.4	0.028	89.0	0.076	99.7	0.031	100.0	0.078	100.0	0.292	100.0	0.521	96.2
Fires	0.000	0.0	0.000	0.0	0.000	0.2	0.000	0.8	0.003	3.8	0.000	0.0	0.003	0.6

Table B.2.3.10a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/07/95 to 08/09/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/ 8/ 8 6-hour average RH: 48%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	4.414		-99.000		1.325		0.015		9.039		9.039		-99.000	
Estimated w/ fires	0.077	-98.3	0.077	-99.0	0.123	-90.7	0.280	999.9	0.258	-97.1	0.966	-89.3	11.780	-99.0
Estimated w/o fires	0.077	-98.3	0.077	-99.0	0.123	-90.7	0.278	999.9	0.248	-97.3	0.966	-89.3	11.768	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.039	50.3	0.018	24.0	0.042	33.9	0.084	30.1	0.074	28.8	0.286	29.6	0.543	4.6
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.038	49.6	0.008	11.0	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.047	0.4
Hayden 1	0.015	19.9	0.005	5.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.020	0.2
Hayden 2	0.023	29.8	0.004	5.1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.027	0.2
Steamboat Springs	0.000	0.4	0.007	8.6	0.012	9.9	0.039	14.1	0.034	13.3	0.071	7.3	0.163	1.4
Other Yampa Valley	0.000	0.3	0.003	4.4	0.029	23.6	0.045	16.0	0.040	15.5	0.216	22.3	0.333	2.8
Non-Yampa Valley	0.038	49.7	0.058	76.0	0.081	65.9	0.193	69.1	0.174	67.4	0.680	70.4	1.224	10.4
Denver	0.001	1.9	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Colorado w/ Denver	0.032	41.3	0.054	70.3	0.076	61.5	0.179	63.8	0.161	62.6	0.616	63.7	1.117	9.5
Non-Colorado	0.006	8.3	0.004	5.6	0.005	4.4	0.015	5.3	0.012	4.8	0.064	6.6	0.107	0.9
Coal-fired PP	0.039	50.6	0.008	11.0	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.048	0.4
All other sources	0.038	49.4	0.068	89.0	0.123	99.7	0.280	100.0	0.258	100.0	0.966	100.0	11.732	99.6
Fires	0.000	0.0	0.000	0.0	0.000	0.2	0.002	0.8	0.010	3.8	0.000	0.0	0.012	0.1

Buffalo Pass
CONCENTRATION 1200-1800 95/ 8/ 8

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.019		-99.000		1.004		0.733		1.722		1.722		5.694	
Estimated w/ fires	0.147	-92.7	0.027	-99.0	0.068	-93.2	0.029	-96.0	0.166	-90.4	0.150	-91.3	0.587	-89.7
Estimated w/o fires	0.147	-92.7	0.025	-99.0	0.061	-93.9	0.020	-97.3	0.051	-97.0	0.150	-91.3	0.455	-92.0

Table B.2.3.10a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/07/95 to 08/09/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.065	44.4	0.019	69.9	0.037	54.4	0.009	31.9	0.024	14.5	0.074	49.5	0.229	39.0
Craig 1-3	0.017	11.5	0.006	23.3	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.023	4.0
Craig 1-2	0.014	9.2	0.004	13.2	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.017	2.9
Craig 1	0.005	3.3	0.001	3.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.006	1.0
Craig 2	0.009	5.9	0.003	9.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.011	1.9
Craig 3	0.003	2.3	0.003	10.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	1.0
Hayden 1-2	0.048	32.3	0.012	43.0	0.001	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.060	10.2
Hayden 1	0.026	17.6	0.008	29.7	0.000	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.034	5.8
Hayden 2	0.022	14.7	0.004	13.3	0.000	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.026	4.3
Steamboat Springs	0.000	0.0	0.000	0.2	0.001	1.1	0.000	1.4	0.001	0.7	0.001	0.9	0.004	0.7
Other Yampa Valley	0.001	0.7	0.001	3.4	0.035	51.9	0.009	30.4	0.023	13.8	0.073	48.6	0.142	24.2
Non-Yampa Valley	0.082	55.6	0.007	25.0	0.024	34.9	0.011	36.8	0.027	16.3	0.076	50.5	0.226	38.5
Denver	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.016	11.0	0.002	8.4	0.014	19.9	0.005	18.8	0.014	8.5	0.052	34.5	0.103	17.6
Non-Colorado	0.066	44.6	0.004	16.6	0.010	15.0	0.005	17.9	0.013	7.8	0.024	16.0	0.123	20.9
Coal-fired PP	0.082	56.0	0.022	80.3	0.001	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.105	17.9
All other sources	0.065	44.0	0.005	19.7	0.067	98.3	0.029	100.0	0.166	100.0	0.150	100.0	0.482	82.1
Fires	0.000	0.0	0.001	5.1	0.007	10.7	0.009	31.4	0.115	69.2	0.000	0.0	0.132	22.5

Buffalo Pass
EXTINCTION 1200-1800 95/ 8/ 8 6-hour average RH: 46%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	4.448		-99.000		1.597		6.674		5.627		5.627		-99.000	
Estimated w/ fires	0.325	-92.7	0.064	-99.0	0.108	-93.2	0.264	-96.0	0.541	-90.4	0.491	-91.3	11.793	-99.0
Estimated w/o fires	0.325	-92.7	0.061	-99.0	0.097	-93.9	0.181	-97.3	0.167	-97.0	0.491	-91.3	11.321	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.144	44.4	0.045	69.9	0.059	54.4	0.084	31.9	0.079	14.5	0.243	49.5	0.654	5.5
Craig 1-3	0.037	11.5	0.015	23.3	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.052	0.4
Craig 1-2	0.030	9.2	0.008	13.2	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.039	0.3
Craig 1	0.011	3.3	0.002	3.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.1
Craig 2	0.019	5.9	0.006	9.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.026	0.2
Craig 3	0.007	2.3	0.006	10.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.014	0.1
Hayden 1-2	0.105	32.3	0.027	43.0	0.001	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.133	1.1
Hayden 1	0.057	17.6	0.019	29.7	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.077	0.6
Hayden 2	0.048	14.7	0.008	13.3	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.057	0.5

Table B.2.3.10a (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/07/95 to 08/09/95 Episode

Steamboat Springs	0.000	0.0	0.000	0.2	0.001	1.1	0.004	1.4	0.004	0.7	0.004	0.9	0.014	0.1
Other Yampa Valley	0.002	0.7	0.002	3.4	0.056	51.9	0.080	30.4	0.075	13.8	0.238	48.6	0.454	3.9
Non-Yampa Valley	0.181	55.6	0.016	25.0	0.038	34.9	0.097	36.8	0.088	16.3	0.248	50.5	0.667	5.7
Denver	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.036	11.0	0.005	8.4	0.022	19.9	0.050	18.8	0.046	8.5	0.169	34.5	0.328	2.8
Non-Colorado	0.145	44.6	0.011	16.6	0.016	15.0	0.047	17.9	0.042	7.8	0.079	16.0	0.340	2.9
Coal-fired PP	0.182	56.0	0.051	80.3	0.002	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.235	2.0
All other sources	0.143	44.0	0.013	19.7	0.106	98.3	0.264	100.0	0.541	100.0	0.491	100.0	11.558	98.0
Fires	0.000	0.0	0.003	5.1	0.012	10.7	0.083	31.4	0.375	69.2	0.000	0.0	0.472	4.0

Buffalo Pass
CONCENTRATION 0600-1200 95/ 8/ 9

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.585		-99.000		1.769		0.007		2.377		2.377		4.606	
Estimated w/ fires	0.313	-46.5	0.218	-99.0	0.177	-90.0	0.074	999.9	0.212	-91.1	0.660	-72.2	1.653	-64.1
Estimated w/o fires	0.313	-46.5	0.214	-99.0	0.174	-90.2	0.070	967.0	0.167	-93.0	0.660	-72.2	1.598	-65.3
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.012	3.9	0.032	14.8	0.050	28.5	0.014	18.7	0.033	15.6	0.274	41.5	0.416	25.2
Craig 1-3	0.003	0.9	0.003	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.4
Craig 1-2	0.002	0.6	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.2
Craig 1	0.001	0.3	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.1
Craig 2	0.001	0.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 3	0.001	0.4	0.002	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.2
Hayden 1-2	0.008	2.6	0.003	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.011	0.7
Hayden 1	0.006	2.0	0.002	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.5
Hayden 2	0.002	0.6	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.1
Steamboat Springs	0.000	0.1	0.010	4.6	0.008	4.5	0.004	5.5	0.010	4.8	0.026	4.0	0.059	3.6
Other Yampa Valley	0.001	0.3	0.016	7.3	0.042	24.0	0.010	13.3	0.023	10.8	0.248	37.5	0.340	20.5
Non-Yampa Valley	0.300	96.1	0.182	83.5	0.123	69.9	0.057	76.5	0.134	63.5	0.386	58.5	1.182	71.5
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.011	3.7	0.037	16.9	0.044	24.7	0.015	20.1	0.039	18.6	0.166	25.2	0.312	18.9
Non-Colorado	0.289	92.4	0.145	66.6	0.080	45.2	0.042	56.4	0.095	44.9	0.220	33.3	0.870	52.7
Coal-fired PP	0.056	17.8	0.026	12.1	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.082	5.0
All other sources	0.257	82.2	0.191	87.9	0.176	99.7	0.074	100.0	0.212	100.0	0.660	100.0	1.570	95.0
Fires	0.000	0.0	0.004	1.7	0.003	1.6	0.004	4.8	0.044	20.9	0.000	0.0	0.054	3.3

Table B.2.3.10a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/07/95 to 08/09/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/ 8/ 9 6-hour average RH: 31%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.124		-99.000		2.691		0.060		7.286		7.286		-99.000	
Estimated w/ fires	0.601	-46.5	0.457	-99.0	0.269	-90.0	0.673	999.9	0.649	-91.1	2.023	-72.2	14.671	-99.0
Estimated w/o fires	0.601	-46.5	0.449	-99.0	0.264	-90.2	0.641	967.0	0.513	-93.0	2.023	-72.2	14.491	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.024	3.9	0.068	14.8	0.077	28.5	0.126	18.7	0.101	15.6	0.840	41.5	1.236	8.4
Craig 1-3	0.006	0.9	0.007	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.1
Craig 1-2	0.003	0.6	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.0
Craig 1	0.002	0.3	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.0
Craig 2	0.001	0.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 3	0.002	0.4	0.004	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.0
Hayden 1-2	0.016	2.6	0.006	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.022	0.1
Hayden 1	0.012	2.0	0.005	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.017	0.1
Hayden 2	0.004	0.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.0
Steamboat Springs	0.001	0.1	0.021	4.6	0.012	4.5	0.037	5.5	0.031	4.8	0.081	4.0	0.183	1.2
Other Yampa Valley	0.002	0.3	0.033	7.3	0.064	24.0	0.089	13.3	0.070	10.8	0.759	37.5	1.018	6.9
Non-Yampa Valley	0.577	96.1	0.382	83.5	0.188	69.9	0.515	76.5	0.412	63.5	1.183	58.5	3.256	22.2
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.022	3.7	0.077	16.9	0.066	24.7	0.135	20.1	0.121	18.6	0.509	25.2	0.931	6.3
Non-Colorado	0.555	92.4	0.304	66.6	0.121	45.2	0.380	56.4	0.291	44.9	0.674	33.3	2.325	15.8
Coal-fired PP	0.107	17.8	0.055	12.1	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.163	1.1
All other sources	0.494	82.2	0.402	87.9	0.268	99.7	0.673	100.0	0.649	100.0	2.023	100.0	14.508	98.9
Fires	0.000	0.0	0.008	1.7	0.004	1.6	0.032	4.8	0.136	20.9	0.000	0.0	0.180	1.2

Buffalo Pass
CONCENTRATION 1200-1800 95/ 8/ 9

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.161		-99.000		1.432		0.148		3.093		3.093		5.424	
Estimated w/ fires	0.831	-28.4	0.108	-99.0	0.118	-91.7	0.049	-66.8	0.155	-95.0	0.302	-90.2	1.564	-71.2
Estimated w/o fires	0.831	-28.4	0.107	-99.0	0.116	-91.9	0.046	-68.9	0.115	-96.3	0.302	-90.2	1.517	-72.0

Table B.2.3.10a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/07/95 to 08/09/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.555	66.8	0.094	87.1	0.045	38.1	0.013	26.7	0.034	21.8	0.115	38.0	0.856	54.7
Craig 1-3	0.138	16.5	0.026	24.1	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.164	10.5
Craig 1-2	0.110	13.2	0.018	16.9	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.129	8.2
Craig 1	0.046	5.5	0.009	8.7	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.055	3.5
Craig 2	0.064	7.7	0.009	8.2	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.073	4.7
Craig 3	0.028	3.3	0.008	7.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.035	2.3
Hayden 1-2	0.415	49.9	0.065	60.7	0.002	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.483	30.9
Hayden 1	0.259	31.2	0.048	44.8	0.001	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.309	19.8
Hayden 2	0.156	18.7	0.017	15.8	0.001	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.174	11.1
Steamboat Springs	0.001	0.1	0.001	1.2	0.007	5.7	0.004	7.6	0.010	6.7	0.013	4.3	0.036	2.3
Other Yampa Valley	0.002	0.2	0.001	1.2	0.035	29.9	0.009	19.0	0.023	15.1	0.102	33.6	0.173	11.1
Non-Yampa Valley	0.276	33.2	0.013	12.5	0.071	59.8	0.033	66.8	0.081	52.1	0.187	62.0	0.661	42.3
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.014	1.6	0.006	5.6	0.034	28.5	0.014	27.6	0.035	22.7	0.099	32.9	0.202	12.9
Non-Colorado	0.262	31.6	0.007	6.9	0.037	31.2	0.019	39.2	0.046	29.5	0.088	29.1	0.460	29.4
Coal-fired PP	0.612	73.6	0.094	87.0	0.003	2.8	0.000	0.0	0.000	0.0	0.000	0.1	0.709	45.3
All other sources	0.220	26.4	0.014	13.0	0.115	97.2	0.049	100.0	0.155	100.0	0.302	99.9	0.855	54.7
Fires	0.000	0.0	0.000	0.3	0.003	2.2	0.003	6.5	0.040	26.0	0.000	0.0	0.046	3.0

Buffalo Pass
EXTINCTION 1200-1800 95/ 8/ 9 6-hour average RH: 28%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.175		-99.000		2.163		1.346		9.379		9.379		-99.000	
Estimated w/ fires	1.558	-28.4	0.221	-99.0	0.179	-91.7	0.447	-66.8	0.470	-95.0	0.916	-90.2	13.791	-99.0
Estimated w/o fires	1.558	-28.4	0.220	-99.0	0.175	-91.9	0.418	-68.9	0.348	-96.3	0.916	-90.2	13.635	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.041	66.8	0.193	87.1	0.068	38.1	0.119	26.7	0.103	21.8	0.348	38.0	1.871	13.6
Craig 1-3	0.258	16.5	0.053	24.1	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.312	2.3
Craig 1-2	0.206	13.2	0.037	16.9	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.244	1.8
Craig 1	0.086	5.5	0.019	8.7	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.105	0.8
Craig 2	0.120	7.7	0.018	8.2	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.139	1.0
Craig 3	0.052	3.3	0.016	7.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.068	0.5
Hayden 1-2	0.778	49.9	0.134	60.7	0.003	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.916	6.6
Hayden 1	0.486	31.2	0.099	44.8	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.587	4.3
Hayden 2	0.292	18.7	0.035	15.8	0.001	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.328	2.4

Table B.2.3.10a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/07/95 to 08/09/95 Episode

Steamboat Springs	0.002	0.1	0.003	1.2	0.010	5.7	0.034	7.6	0.032	6.7	0.039	4.3	0.119	0.9
Other Yampa Valley	0.004	0.2	0.003	1.2	0.053	29.9	0.085	19.0	0.071	15.1	0.308	33.6	0.524	3.8
Non-Yampa Valley	0.517	33.2	0.028	12.5	0.107	59.8	0.299	66.8	0.245	52.1	0.569	62.0	1.764	12.8
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.025	1.6	0.012	5.6	0.051	28.5	0.123	27.6	0.106	22.7	0.302	32.9	0.620	4.5
Non-Colorado	0.492	31.6	0.015	6.9	0.056	31.2	0.175	39.2	0.138	29.5	0.267	29.1	1.143	8.3
Coal-fired PP	1.146	73.6	0.192	87.0	0.005	2.8	0.000	0.0	0.000	0.0	0.001	0.1	1.344	9.7
All other sources	0.412	26.4	0.029	13.0	0.174	97.2	0.447	100.0	0.470	100.0	0.916	99.9	12.447	90.3
Fires	0.000	0.0	0.001	0.3	0.004	2.2	0.029	6.5	0.122	26.0	0.000	0.0	0.156	1.1

Table B.2.3.10b

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/07/95 to 08/09/95 Episode

[This table also presents six-hour concentrations from filter measurements, as well as extinction estimated from the filter measurements using identical extinction efficiencies as applied to predicted concentrations. Source attributions are presented for all 12 source regions/types modeled with CALPUFF, and present results from each six-hour daylight period (0600-1200, and 1200-1800 LST).]

Gilpin Creek
CONCENTRATION 0600-1200 95/ 8/ 7

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.758		-99.000		0.392		1.749		4.569		4.569		8.199	
Estimated w/ fires	0.857	-51.3	0.239	-99.0	0.381	-2.8	0.153	-91.2	0.554	-87.9	0.808	-82.3	2.993	-63.5
Estimated w/o fires	0.857	-51.3	0.230	-99.0	0.371	-5.2	0.142	-91.9	0.408	-91.1	0.808	-82.3	2.817	-65.6
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.150	17.5	0.023	9.6	0.034	8.9	0.009	5.7	0.021	3.7	0.148	18.3	0.384	12.8
Craig 1-3	0.021	2.5	0.003	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.024	0.8
Craig 1-2	0.018	2.1	0.002	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.020	0.7
Craig 1	0.005	0.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.2
Craig 2	0.012	1.4	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.014	0.5
Craig 3	0.004	0.4	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.2
Hayden 1-2	0.126	14.8	0.013	5.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.140	4.7
Hayden 1	0.072	8.4	0.009	3.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.081	2.7
Hayden 2	0.055	6.4	0.004	1.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.059	2.0
Steamboat Springs	0.001	0.1	0.002	0.9	0.002	0.6	0.001	0.9	0.004	0.7	0.004	0.5	0.014	0.5
Other Yampa Valley	0.002	0.2	0.005	1.9	0.031	8.1	0.007	4.8	0.017	3.1	0.144	17.8	0.205	6.9
Non-Yampa Valley	0.707	82.5	0.207	86.8	0.338	88.7	0.133	86.7	0.387	69.9	0.660	81.7	2.432	81.3
Denver	0.263	30.7	0.033	13.8	0.045	11.8	0.023	14.7	0.071	12.8	0.004	0.5	0.438	14.6
Colorado w/ Denver	0.567	66.1	0.178	74.7	0.310	81.5	0.120	78.0	0.360	64.8	0.552	68.3	2.086	69.7
Non-Colorado	0.140	16.3	0.029	12.2	0.027	7.2	0.013	8.7	0.028	5.0	0.109	13.4	0.346	11.6
Coal-fired PP	0.412	48.1	0.030	12.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.443	14.8
All other sources	0.445	51.9	0.209	87.5	0.380	99.8	0.153	100.0	0.554	100.0	0.808	100.0	2.550	85.2
Fires	0.000	0.0	0.009	3.6	0.009	2.4	0.012	7.6	0.146	26.4	0.000	0.0	0.176	5.9

Table B.2.3.10b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/07/95 to 08/09/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/ 8/ 7 6-hour average RH: 33%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	3.428		-99.000		0.599		15.916		14.101		14.101		-99.000	
Estimated w/ fires	1.671	-51.3	0.509	-99.0	0.582	-2.8	1.396	-91.2	1.711	-87.9	2.494	-82.3	18.363	-99.0
Estimated w/o fires	1.671	-51.3	0.491	-99.0	0.568	-5.2	1.290	-91.9	1.259	-91.1	2.494	-82.3	17.772	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.293	17.5	0.049	9.6	0.052	8.9	0.080	5.7	0.064	3.7	0.456	18.3	0.993	5.4
Craig 1-3	0.042	2.5	0.007	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.048	0.3
Craig 1-2	0.034	2.1	0.004	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.039	0.2
Craig 1	0.011	0.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.012	0.1
Craig 2	0.024	1.4	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.027	0.1
Craig 3	0.007	0.4	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.1
Hayden 1-2	0.247	14.8	0.028	5.5	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.275	1.5
Hayden 1	0.140	8.4	0.019	3.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.159	0.9
Hayden 2	0.107	6.4	0.009	1.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.116	0.6
Steamboat Springs	0.001	0.1	0.004	0.9	0.004	0.6	0.013	0.9	0.011	0.7	0.013	0.5	0.046	0.3
Other Yampa Valley	0.004	0.2	0.010	1.9	0.047	8.1	0.067	4.8	0.052	3.1	0.443	17.8	0.624	3.4
Non-Yampa Valley	1.378	82.5	0.442	86.8	0.516	88.7	1.210	86.7	1.195	69.9	2.038	81.7	6.779	36.9
Denver	0.513	30.7	0.070	13.8	0.069	11.8	0.205	14.7	0.219	12.8	0.012	0.5	1.088	5.9
Colorado w/ Denver	1.105	66.1	0.380	74.7	0.474	81.5	1.088	78.0	1.110	64.8	1.703	68.3	5.860	31.9
Non-Colorado	0.273	16.3	0.062	12.2	0.042	7.2	0.122	8.7	0.086	5.0	0.335	13.4	0.919	5.0
Coal-fired PP	0.803	48.1	0.063	12.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.868	4.7
All other sources	0.868	51.9	0.445	87.5	0.580	99.8	1.396	100.0	1.711	100.0	2.494	100.0	17.494	95.3
Fires	0.000	0.0	0.018	3.6	0.014	2.4	0.106	7.6	0.452	26.4	0.000	0.0	0.590	3.2

Gilpin Creek
CONCENTRATION 1200-1800 95/ 8/ 7

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.758		-99.000		0.392		1.749		4.569		4.569		8.199	
Estimated w/ fires	0.326	-81.5	0.041	-99.0	0.115	-70.6	0.048	-97.3	0.177	-96.1	0.240	-94.7	0.947	-88.5
Estimated w/o fires	0.326	-81.5	0.041	-99.0	0.111	-71.6	0.043	-97.5	0.119	-97.4	0.240	-94.7	0.880	-89.3

Table B.2.3.10b (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/07/95 to 08/09/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.114	35.0	0.033	79.7	0.019	16.8	0.005	10.4	0.012	6.8	0.047	19.6	0.230	24.3
Craig 1-3	0.008	2.6	0.003	7.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.012	1.2
Craig 1-2	0.007	2.0	0.002	4.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.9
Craig 1	0.002	0.7	0.001	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.3
Craig 2	0.004	1.3	0.001	2.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.6
Craig 3	0.002	0.6	0.001	2.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.3
Hayden 1-2	0.105	32.2	0.029	70.5	0.002	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.136	14.3
Hayden 1	0.065	20.0	0.021	51.1	0.001	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.087	9.2
Hayden 2	0.040	12.2	0.008	19.4	0.001	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.049	5.1
Steamboat Springs	0.000	0.0	0.000	0.2	0.000	0.4	0.000	0.6	0.001	0.4	0.001	0.5	0.003	0.3
Other Yampa Valley	0.000	0.1	0.001	1.6	0.017	14.6	0.005	9.9	0.011	6.4	0.046	19.0	0.080	8.4
Non-Yampa Valley	0.212	65.0	0.008	19.8	0.092	80.0	0.038	79.9	0.107	60.4	0.193	80.4	0.650	68.7
Denver	0.075	23.1	0.001	2.1	0.014	12.0	0.007	14.1	0.021	12.0	0.001	0.5	0.119	12.6
Colorado w/ Denver	0.209	64.1	0.008	19.6	0.087	76.0	0.036	75.5	0.103	57.9	0.166	69.3	0.609	64.3
Non-Colorado	0.003	0.9	0.000	0.2	0.005	3.9	0.002	4.3	0.004	2.5	0.027	11.1	0.041	4.3
Coal-fired PP	0.174	53.4	0.034	82.6	0.002	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.210	22.2
All other sources	0.152	46.6	0.007	17.4	0.113	98.2	0.048	100.0	0.177	100.0	0.240	100.0	0.737	77.8
Fires	0.000	0.0	0.000	0.5	0.004	3.2	0.005	9.7	0.058	32.8	0.000	0.0	0.067	7.0

Gilpin Creek
EXTINCTION 1200-1800 95/ 8/ 7 6-hour average RH: 26%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	3.251		-99.000		0.589		15.916		13.773		13.773		-99.000	
Estimated w/ fires	0.602	-81.5	0.083	-99.0	0.173	-70.6	0.434	-97.3	0.535	-96.1	0.724	-94.7	12.550	-99.0
Estimated w/o fires	0.602	-81.5	0.083	-99.0	0.167	-71.6	0.392	-97.5	0.359	-97.4	0.724	-94.7	12.327	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.211	35.0	0.066	79.7	0.029	16.8	0.045	10.4	0.036	6.8	0.142	19.6	0.530	4.2
Craig 1-3	0.016	2.6	0.006	7.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.022	0.2
Craig 1-2	0.012	2.0	0.004	4.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.1
Craig 1	0.004	0.7	0.001	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.0
Craig 2	0.008	1.3	0.002	2.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.1
Craig 3	0.003	0.6	0.002	2.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.0
Hayden 1-2	0.194	32.2	0.059	70.5	0.003	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.256	2.0
Hayden 1	0.121	20.0	0.042	51.1	0.002	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.165	1.3
Hayden 2	0.073	12.2	0.016	19.4	0.001	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.091	0.7

Table B.2.3.10b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/07/95 to 08/09/95 Episode

Steamboat Springs	0.000	0.0	0.000	0.2	0.001	0.4	0.002	0.6	0.002	0.4	0.004	0.5	0.009	0.1
Other Yampa Valley	0.001	0.1	0.001	1.6	0.025	14.6	0.043	9.9	0.034	6.4	0.138	19.0	0.242	1.9
Non-Yampa Valley	0.391	65.0	0.016	19.8	0.138	80.0	0.346	79.9	0.323	60.4	0.582	80.4	1.797	14.3
Denver	0.139	23.1	0.002	2.1	0.021	12.0	0.061	14.1	0.064	12.0	0.003	0.5	0.290	2.3
Colorado w/ Denver	0.386	64.1	0.016	19.6	0.132	76.0	0.327	75.5	0.309	57.9	0.502	69.3	1.672	13.3
Non-Colorado	0.006	0.9	0.000	0.2	0.007	3.9	0.019	4.3	0.013	2.5	0.080	11.1	0.125	1.0
Coal-fired PP	0.321	53.4	0.069	82.6	0.003	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.393	3.1
All other sources	0.281	46.6	0.014	17.4	0.170	98.2	0.434	100.0	0.535	100.0	0.724	100.0	12.157	96.9
Fires	0.000	0.0	0.000	0.5	0.006	3.2	0.042	9.7	0.175	32.8	0.000	0.0	0.223	1.8

Gilpin Creek
CONCENTRATION 0600-1200 95/ 8/ 8

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		0.514	
Estimated w/ fires	0.063	-99.0	0.059	-99.0	0.066	-99.0	0.025	-99.0	0.065	-99.0	0.268	-99.0	0.547	6.4
Estimated w/o fires	0.063	-99.0	0.059	-99.0	0.066	-99.0	0.025	-99.0	0.060	-99.0	0.268	-99.0	0.542	5.5
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.043	68.8	0.039	65.0	0.020	30.2	0.005	19.6	0.012	18.1	0.089	33.1	0.207	38.0
Craig 1-3	0.019	29.9	0.019	32.2	0.000	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.038	7.0
Craig 1-2	0.012	19.5	0.009	15.8	0.000	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.022	4.1
Craig 1	0.000	0.3	0.000	0.2	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 2	0.012	19.2	0.009	15.5	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.022	3.9
Craig 3	0.007	10.4	0.010	16.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.016	3.0
Hayden 1-2	0.024	38.6	0.016	27.8	0.001	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.041	7.6
Hayden 1	0.013	20.0	0.011	18.3	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.024	4.3
Hayden 2	0.012	18.6	0.006	9.5	0.000	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.018	3.2
Steamboat Springs	0.000	0.2	0.002	2.6	0.002	3.1	0.001	3.7	0.002	3.6	0.009	3.5	0.016	3.0
Other Yampa Valley	0.000	0.2	0.001	2.5	0.017	25.5	0.004	15.8	0.009	14.5	0.080	29.6	0.111	20.4
Non-Yampa Valley	0.020	31.2	0.021	34.9	0.046	69.4	0.020	79.1	0.049	75.5	0.179	66.9	0.334	61.2
Denver	0.001	1.5	0.000	0.0	0.000	0.1	0.000	0.1	0.000	0.1	0.000	0.0	0.001	0.2
Colorado w/ Denver	0.016	25.1	0.018	30.0	0.041	61.5	0.017	69.0	0.043	66.9	0.152	56.5	0.286	52.4
Non-Colorado	0.004	6.1	0.003	4.9	0.005	7.9	0.003	10.1	0.006	8.5	0.028	10.4	0.048	8.8
Coal-fired PP	0.044	69.3	0.036	60.0	0.001	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.081	14.7
All other sources	0.019	30.7	0.024	40.0	0.065	98.4	0.025	100.0	0.065	100.0	0.268	100.0	0.466	85.3
Fires	0.000	0.0	0.000	0.0	0.000	0.4	0.000	1.3	0.004	6.5	0.000	0.0	0.005	0.9

Table B.2.3.10b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/07/95 to 08/09/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/ 8/ 8 6-hour average RH: 38%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.129	-99.0	0.131	-99.0	0.102	-99.0	0.228	-99.0	0.203	-99.0	0.844	-99.0	11.638	-99.0
Estimated w/o fires	0.129	-99.0	0.131	-99.0	0.102	-99.0	0.225	-99.0	0.190	-99.0	0.844	-99.0	11.621	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.088	68.8	0.085	65.0	0.031	30.2	0.045	19.6	0.037	18.1	0.280	33.1	0.566	4.9
Craig 1-3	0.038	29.9	0.042	32.2	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.082	0.7
Craig 1-2	0.025	19.5	0.021	15.8	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.047	0.4
Craig 1	0.000	0.3	0.000	0.2	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 2	0.025	19.2	0.020	15.5	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.045	0.4
Craig 3	0.013	10.4	0.022	16.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.035	0.3
Hayden 1-2	0.050	38.6	0.036	27.8	0.001	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.087	0.7
Hayden 1	0.026	20.0	0.024	18.3	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.050	0.4
Hayden 2	0.024	18.6	0.012	9.5	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.037	0.3
Steamboat Springs	0.000	0.2	0.003	2.6	0.003	3.1	0.009	3.7	0.007	3.6	0.029	3.5	0.052	0.4
Other Yampa Valley	0.000	0.2	0.003	2.5	0.026	25.5	0.036	15.8	0.029	14.5	0.250	29.6	0.345	3.0
Non-Yampa Valley	0.040	31.2	0.046	34.9	0.071	69.4	0.180	79.1	0.153	75.5	0.565	66.9	1.055	9.1
Denver	0.002	1.5	0.000	0.0	0.000	0.1	0.000	0.1	0.000	0.1	0.000	0.0	0.002	0.0
Colorado w/ Denver	0.032	25.1	0.039	30.0	0.063	61.5	0.157	69.0	0.136	66.9	0.477	56.5	0.905	7.8
Non-Colorado	0.008	6.1	0.006	4.9	0.008	7.9	0.023	10.1	0.017	8.5	0.088	10.4	0.150	1.3
Coal-fired PP	0.089	69.3	0.079	60.0	0.002	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.170	1.5
All other sources	0.039	30.7	0.052	40.0	0.101	98.4	0.228	100.0	0.203	100.0	0.844	100.0	11.468	98.5
Fires	0.000	0.0	0.000	0.0	0.000	0.4	0.003	1.3	0.013	6.5	0.000	0.0	0.017	0.1

Gilpin Creek
CONCENTRATION 1200-1800 95/ 8/ 8

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		0.514	
Estimated w/ fires	0.086	-99.0	0.012	-99.0	0.052	-99.0	0.023	-99.0	0.121	-99.0	0.151	-99.0	0.444	-13.5
Estimated w/o fires	0.086	-99.0	0.011	-99.0	0.046	-99.0	0.016	-99.0	0.037	-99.0	0.151	-99.0	0.347	-32.4

Table B.2.3.10b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/07/95 to 08/09/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.006	6.9	0.004	34.1	0.025	48.9	0.006	26.8	0.013	10.4	0.082	54.1	0.136	30.6
Craig 1-3	0.005	6.1	0.003	27.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.009	2.0
Craig 1-2	0.004	4.7	0.002	15.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.006	1.4
Craig 1	0.001	0.9	0.000	1.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.2
Craig 2	0.003	3.7	0.002	14.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.005	1.1
Craig 3	0.001	1.4	0.001	11.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.6
Hayden 1-2	0.000	0.3	0.000	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1
Hayden 1	0.000	0.3	0.000	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1
Hayden 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Steamboat Springs	0.000	0.0	0.000	0.1	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.2	0.000	0.1
Other Yampa Valley	0.000	0.5	0.001	5.9	0.025	48.7	0.006	26.7	0.013	10.4	0.082	53.9	0.126	28.4
Non-Yampa Valley	0.080	93.1	0.007	54.6	0.021	40.8	0.010	43.8	0.024	19.9	0.069	45.9	0.211	47.5
Denver	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.012	13.8	0.002	15.2	0.009	17.0	0.004	16.3	0.009	7.7	0.038	25.0	0.073	16.5
Non-Colorado	0.068	79.3	0.005	39.5	0.012	23.8	0.006	27.5	0.015	12.2	0.032	20.8	0.138	31.0
Coal-fired PP	0.020	23.8	0.008	67.9	0.000	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.029	6.6
All other sources	0.066	76.2	0.004	32.1	0.051	99.2	0.023	100.0	0.121	100.0	0.151	100.0	0.415	93.4
Fires	0.000	0.0	0.001	11.3	0.005	10.3	0.007	29.4	0.084	69.6	0.000	0.0	0.097	21.9

Gilpin Creek
EXTINCTION 1200-1800 95/ 8/ 8 6-hour average RH: 34%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.168	-99.0	0.026	-99.0	0.079	-99.0	0.206	-99.0	0.373	-99.0	0.468	-99.0	11.321	-99.0
Estimated w/o fires	0.168	-99.0	0.023	-99.0	0.071	-99.0	0.146	-99.0	0.113	-99.0	0.468	-99.0	10.989	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.012	6.9	0.009	34.1	0.039	48.9	0.055	26.8	0.039	10.4	0.253	54.1	0.406	3.6
Craig 1-3	0.010	6.1	0.007	27.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.018	0.2
Craig 1-2	0.008	4.7	0.004	15.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.012	0.1
Craig 1	0.002	0.9	0.000	1.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 2	0.006	3.7	0.004	14.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.1
Craig 3	0.002	1.4	0.003	11.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.0
Hayden 1-2	0.001	0.3	0.000	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1	0.001	0.3	0.000	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.10b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/07/95 to 08/09/95 Episode

Steamboat Springs	0.000	0.0	0.000	0.1	0.000	0.1	0.000	0.1	0.000	0.0	0.001	0.2	0.001	0.0
Other Yampa Valley	0.001	0.5	0.002	5.9	0.039	48.7	0.055	26.7	0.039	10.4	0.252	53.9	0.387	3.4
Non-Yampa Valley	0.157	93.1	0.014	54.6	0.032	40.8	0.090	43.8	0.074	19.9	0.215	45.9	0.582	5.1
Denver	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.023	13.8	0.004	15.2	0.013	17.0	0.034	16.3	0.029	7.7	0.117	25.0	0.220	1.9
Non-Colorado	0.134	79.3	0.010	39.5	0.019	23.8	0.057	27.5	0.046	12.2	0.097	20.8	0.362	3.2
Coal-fired PP	0.040	23.8	0.018	67.9	0.001	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.058	0.5
All other sources	0.128	76.2	0.008	32.1	0.079	99.2	0.206	100.0	0.373	100.0	0.467	100.0	11.262	99.5
Fires	0.000	0.0	0.003	11.3	0.008	10.3	0.061	29.4	0.260	69.6	0.000	0.0	0.332	2.9

Gilpin Creek
CONCENTRATION 0600-1200 95/ 8/ 9

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		0.394	
Estimated w/ fires	0.290	-99.0	0.220	-99.0	0.141	-99.0	0.063	-99.0	0.179	-99.0	0.546	-99.0	1.439	264.8
Estimated w/o fires	0.290	-99.0	0.216	-99.0	0.138	-99.0	0.059	-99.0	0.135	-99.0	0.546	-99.0	1.384	251.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.002	0.6	0.012	5.6	0.025	17.8	0.006	8.8	0.012	6.5	0.185	33.9	0.242	16.8
Craig 1-3	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 1-2	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 1	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.001	0.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Hayden 1	0.001	0.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Hayden 2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Steamboat Springs	0.000	0.0	0.002	0.9	0.001	0.6	0.000	0.7	0.001	0.6	0.003	0.6	0.008	0.5
Other Yampa Valley	0.000	0.2	0.010	4.5	0.024	17.2	0.005	8.1	0.011	5.9	0.182	33.3	0.232	16.1
Non-Yampa Valley	0.288	99.4	0.203	92.3	0.113	80.2	0.054	85.7	0.123	68.9	0.361	66.1	1.143	79.4
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.011	3.7	0.030	13.5	0.030	21.5	0.010	16.7	0.028	15.5	0.115	21.0	0.224	15.6
Non-Colorado	0.278	95.7	0.174	78.8	0.083	58.8	0.043	69.0	0.095	53.4	0.246	45.1	0.919	63.9
Coal-fired PP	0.042	14.5	0.021	9.6	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.064	4.4
All other sources	0.248	85.5	0.199	90.4	0.140	99.7	0.063	100.0	0.179	100.0	0.546	100.0	1.375	95.6
Fires	0.000	0.0	0.005	2.1	0.003	2.0	0.003	5.5	0.044	24.5	0.000	0.0	0.055	3.8

Table B.2.3.10b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/07/95 to 08/09/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/ 8/ 9 6-hour average RH: 35%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.576	-99.0	0.477	-99.0	0.216	-99.0	0.570	-99.0	0.556	-99.0	1.700	-99.0	14.096	-99.0
Estimated w/o fires	0.576	-99.0	0.467	-99.0	0.212	-99.0	0.539	-99.0	0.420	-99.0	1.700	-99.0	13.914	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.004	0.6	0.027	5.6	0.039	17.8	0.050	8.8	0.036	6.5	0.576	33.9	0.731	5.2
Craig 1-3	0.001	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 1-2	0.001	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 1	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.001	0.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Hayden 1	0.001	0.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Hayden 2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Steamboat Springs	0.000	0.0	0.004	0.9	0.001	0.6	0.004	0.7	0.004	0.6	0.010	0.6	0.023	0.2
Other Yampa Valley	0.001	0.2	0.021	4.5	0.037	17.2	0.046	8.1	0.033	5.9	0.566	33.3	0.705	5.0
Non-Yampa Valley	0.573	99.4	0.440	92.3	0.173	80.2	0.488	85.7	0.383	68.9	1.124	66.1	3.183	22.6
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.021	3.7	0.064	13.5	0.046	21.5	0.095	16.7	0.086	15.5	0.358	21.0	0.671	4.8
Non-Colorado	0.551	95.7	0.376	78.8	0.127	58.8	0.394	69.0	0.297	53.4	0.766	45.1	2.511	17.8
Coal-fired PP	0.084	14.5	0.046	9.6	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.131	0.9
All other sources	0.493	85.5	0.431	90.4	0.216	99.7	0.570	100.0	0.556	100.0	1.700	100.0	13.966	99.1
Fires	0.000	0.0	0.010	2.1	0.004	2.0	0.032	5.5	0.136	24.5	0.000	0.0	0.182	1.3

Gilpin Creek
CONCENTRATION 1200-1800 95/ 8/ 9

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		0.394	
Estimated w/ fires	0.498	-99.0	0.029	-99.0	0.087	-99.0	0.037	-99.0	0.113	-99.0	0.264	-99.0	1.028	160.6
Estimated w/o fires	0.498	-99.0	0.029	-99.0	0.085	-99.0	0.035	-99.0	0.081	-99.0	0.264	-99.0	0.991	151.4

Table B.2.3.10b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/07/95 to 08/09/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.212	42.7	0.017	57.1	0.024	27.2	0.006	15.5	0.012	10.6	0.099	37.6	0.370	36.0
Craig 1-3	0.062	12.4	0.006	19.4	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.068	6.6
Craig 1-2	0.045	9.1	0.004	13.9	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.050	4.8
Craig 1	0.019	3.7	0.002	7.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.021	2.0
Craig 2	0.027	5.3	0.002	6.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.029	2.8
Craig 3	0.016	3.3	0.002	5.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.018	1.8
Hayden 1-2	0.150	30.1	0.010	34.9	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.160	15.6
Hayden 1	0.077	15.4	0.007	22.4	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.083	8.1
Hayden 2	0.073	14.7	0.004	12.5	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.077	7.5
Steamboat Springs	0.000	0.0	0.000	0.5	0.001	0.9	0.000	1.2	0.001	1.0	0.002	0.9	0.005	0.5
Other Yampa Valley	0.001	0.2	0.001	2.3	0.022	25.2	0.005	14.3	0.011	9.6	0.097	36.7	0.136	13.3
Non-Yampa Valley	0.285	57.3	0.012	42.1	0.061	70.5	0.029	77.7	0.069	61.3	0.165	62.4	0.622	60.5
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.011	2.2	0.004	14.3	0.023	26.6	0.009	25.1	0.024	21.4	0.068	25.7	0.139	13.6
Non-Colorado	0.275	55.2	0.008	27.8	0.038	43.9	0.020	52.7	0.045	39.9	0.097	36.7	0.482	46.9
Coal-fired PP	0.281	56.5	0.018	62.0	0.001	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.301	29.3
All other sources	0.217	43.5	0.011	38.0	0.085	98.3	0.037	100.0	0.113	100.0	0.264	100.0	0.727	70.7
Fires	0.000	0.0	0.000	0.8	0.002	2.3	0.003	6.7	0.032	28.0	0.000	0.0	0.036	3.5

Gilpin Creek
EXTINCTION 1200-1800 95/ 8/ 9 6-hour average RH: 23%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.899	-99.0	0.058	-99.0	0.129	-99.0	0.339	-99.0	0.337	-99.0	0.787	-99.0	12.550	-99.0
Estimated w/o fires	0.899	-99.0	0.057	-99.0	0.126	-99.0	0.316	-99.0	0.243	-99.0	0.787	-99.0	12.429	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.384	42.7	0.033	57.1	0.035	27.2	0.053	15.5	0.036	10.6	0.296	37.6	0.837	6.7
Craig 1-3	0.111	12.4	0.011	19.4	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.123	1.0
Craig 1-2	0.082	9.1	0.008	13.9	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.090	0.7
Craig 1	0.034	3.7	0.004	7.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.038	0.3
Craig 2	0.048	5.3	0.004	6.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.052	0.4
Craig 3	0.030	3.3	0.003	5.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.033	0.3
Hayden 1-2	0.270	30.1	0.020	34.9	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.291	2.3
Hayden 1	0.138	15.4	0.013	22.4	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.152	1.2
Hayden 2	0.132	14.7	0.007	12.5	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.140	1.1

Table B.2.3.10b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/07/95 to 08/09/95 Episode

Steamboat Springs	0.000	0.0	0.000	0.5	0.001	0.9	0.004	1.2	0.003	1.0	0.007	0.9	0.016	0.1
Other Yampa Valley	0.002	0.2	0.001	2.3	0.033	25.2	0.049	14.3	0.032	9.6	0.289	36.7	0.406	3.2
Non-Yampa Valley	0.515	57.3	0.024	42.1	0.091	70.5	0.264	77.7	0.207	61.3	0.491	62.4	1.593	12.7
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.020	2.2	0.008	14.3	0.034	26.6	0.085	25.1	0.072	21.4	0.202	25.7	0.422	3.4
Non-Colorado	0.496	55.2	0.016	27.8	0.057	43.9	0.179	52.7	0.135	39.9	0.289	36.7	1.171	9.3
Coal-fired PP	0.508	56.5	0.036	62.0	0.002	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.546	4.4
All other sources	0.391	43.5	0.022	38.0	0.127	98.3	0.339	100.0	0.337	100.0	0.787	100.0	12.004	95.6
Fires	0.000	0.0	0.000	0.8	0.003	2.3	0.023	6.7	0.094	28.0	0.000	0.0	0.121	1.0

Table B.2.3.10c

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/07/95 to 08/09/95 Episode

[This table also presents six-hour concentrations from filter measurements, as well as extinction estimated from the filter measurements using identical extinction efficiencies as applied to predicted concentrations. Source attributions are presented for all 12 source regions/types modeled with CALPUFF, and present results from each six-hour daylight period (0600-1200, and 1200-1800 LST).]

Mad Creek
CONCENTRATION 0600-1200 95/ 8/ 7

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.745	-99.0	0.225	-99.0	0.373	-99.0	0.147	-99.0	0.507	-99.0	0.909	-99.0	2.906	-99.0
Estimated w/o fires	0.745	-99.0	0.219	-99.0	0.366	-99.0	0.138	-99.0	0.394	-99.0	0.909	-99.0	2.771	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.140	18.8	0.025	11.0	0.051	13.6	0.014	9.5	0.034	6.6	0.257	28.2	0.519	17.9
Craig 1-3	0.014	1.8	0.002	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.5
Craig 1-2	0.011	1.5	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.4
Craig 1	0.004	0.5	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.1
Craig 2	0.008	1.1	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.3
Craig 3	0.002	0.3	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.1
Hayden 1-2	0.124	16.6	0.012	5.3	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.137	4.7
Hayden 1	0.071	9.5	0.008	3.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.079	2.7
Hayden 2	0.053	7.1	0.004	1.7	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.057	2.0
Steamboat Springs	0.001	0.1	0.005	2.1	0.008	2.1	0.004	3.0	0.011	2.1	0.019	2.1	0.048	1.6
Other Yampa Valley	0.002	0.2	0.006	2.7	0.042	11.2	0.010	6.5	0.023	4.5	0.237	26.1	0.319	11.0
Non-Yampa Valley	0.605	81.2	0.194	86.3	0.315	84.5	0.124	84.4	0.361	71.1	0.652	71.8	2.252	77.5
Denver	0.220	29.5	0.029	13.1	0.040	10.7	0.020	13.4	0.063	12.3	0.003	0.4	0.375	12.9
Colorado w/ Denver	0.501	67.3	0.173	77.2	0.293	78.7	0.114	77.3	0.338	66.7	0.562	61.8	1.982	68.2
Non-Colorado	0.104	13.9	0.020	9.1	0.022	5.8	0.011	7.1	0.023	4.5	0.090	9.9	0.269	9.3
Coal-fired PP	0.339	45.5	0.024	10.6	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.364	12.5
All other sources	0.406	54.5	0.201	89.4	0.372	99.6	0.147	100.0	0.507	100.0	0.909	100.0	2.541	87.5
Fires	0.000	0.0	0.006	2.7	0.007	1.9	0.009	6.1	0.113	22.2	0.000	0.0	0.135	4.6

Table B.2.3.10c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/07/95 to 08/09/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/ 8/ 7 6-hour average RH: 30%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.419	-99.0	0.469	-99.0	0.566	-99.0	1.341	-99.0	1.549	-99.0	2.776	-99.0	18.120	-99.0
Estimated w/o fires	1.419	-99.0	0.456	-99.0	0.555	-99.0	1.259	-99.0	1.204	-99.0	2.776	-99.0	17.670	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.266	18.8	0.052	11.0	0.077	13.6	0.128	9.5	0.103	6.6	0.784	28.2	1.409	7.8
Craig 1-3	0.026	1.8	0.004	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.030	0.2
Craig 1-2	0.022	1.5	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.024	0.1
Craig 1	0.007	0.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.0
Craig 2	0.015	1.1	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.017	0.1
Craig 3	0.004	0.3	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.0
Hayden 1-2	0.236	16.6	0.025	5.3	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.263	1.4
Hayden 1	0.135	9.5	0.017	3.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.153	0.8
Hayden 2	0.101	7.1	0.008	1.7	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.110	0.6
Steamboat Springs	0.001	0.1	0.010	2.1	0.012	2.1	0.040	3.0	0.033	2.1	0.059	2.1	0.155	0.9
Other Yampa Valley	0.003	0.2	0.013	2.7	0.063	11.2	0.088	6.5	0.070	4.5	0.724	26.1	0.961	5.3
Non-Yampa Valley	1.153	81.2	0.405	86.3	0.479	84.5	1.131	84.4	1.102	71.1	1.992	71.8	6.261	34.6
Denver	0.418	29.5	0.061	13.1	0.060	10.7	0.180	13.4	0.191	12.3	0.010	0.4	0.922	5.1
Colorado w/ Denver	0.955	67.3	0.362	77.2	0.445	78.7	1.036	77.3	1.032	66.7	1.717	61.8	5.548	30.6
Non-Colorado	0.198	13.9	0.043	9.1	0.033	5.8	0.096	7.1	0.069	4.5	0.275	9.9	0.714	3.9
Coal-fired PP	0.646	45.5	0.050	10.6	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.698	3.9
All other sources	0.773	54.5	0.419	89.4	0.564	99.6	1.341	100.0	1.549	100.0	2.776	100.0	17.422	96.1
Fires	0.000	0.0	0.013	2.7	0.011	1.9	0.081	6.1	0.344	22.2	0.000	0.0	0.449	2.5

Mad Creek
CONCENTRATION 1200-1800 95/ 8/ 7

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.349	-99.0	0.031	-99.0	0.105	-99.0	0.042	-99.0	0.151	-99.0	0.239	-99.0	0.917	-99.0
Estimated w/o fires	0.349	-99.0	0.030	-99.0	0.102	-99.0	0.039	-99.0	0.106	-99.0	0.239	-99.0	0.865	-99.0

Table B.2.3.10c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/07/95 to 08/09/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.175	50.1	0.023	76.1	0.020	18.9	0.005	12.2	0.012	7.7	0.051	21.5	0.286	31.2
Craig 1-3	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 1-2	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.173	49.7	0.023	74.6	0.004	3.6	0.000	0.0	0.000	0.0	0.000	0.1	0.200	21.8
Hayden 1	0.097	27.8	0.015	49.5	0.002	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.114	12.5
Hayden 2	0.076	21.9	0.008	25.1	0.002	1.9	0.000	0.0	0.000	0.0	0.000	0.0	0.086	9.4
Steamboat Springs	0.000	0.0	0.000	0.1	0.000	0.3	0.000	0.4	0.000	0.3	0.001	0.4	0.002	0.2
Other Yampa Valley	0.000	0.1	0.000	1.3	0.016	15.0	0.005	11.8	0.011	7.5	0.050	21.0	0.083	9.0
Non-Yampa Valley	0.174	49.9	0.007	23.4	0.082	78.4	0.034	79.4	0.094	62.4	0.188	78.5	0.579	63.1
Denver	0.056	16.1	0.001	2.1	0.011	10.2	0.005	12.3	0.017	11.0	0.001	0.4	0.090	9.9
Colorado w/ Denver	0.172	49.2	0.007	23.3	0.079	74.9	0.032	75.6	0.090	60.0	0.163	68.2	0.543	59.2
Non-Colorado	0.002	0.7	0.000	0.1	0.004	3.4	0.002	3.8	0.004	2.4	0.025	10.4	0.036	3.9
Coal-fired PP	0.220	62.9	0.024	79.9	0.004	3.7	0.000	0.0	0.000	0.0	0.000	0.1	0.248	27.1
All other sources	0.129	37.1	0.006	20.1	0.101	96.3	0.042	100.0	0.151	100.0	0.239	99.9	0.669	72.9
Fires	0.000	0.0	0.000	0.5	0.003	2.7	0.004	8.5	0.045	29.9	0.000	0.0	0.052	5.6

Mad Creek
EXTINCTION 1200-1800 95/ 8/ 7 6-hour average RH: 23%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.633	-99.0	0.061	-99.0	0.157	-99.0	0.386	-99.0	0.451	-99.0	0.714	-99.0	12.402	-99.0
Estimated w/o fires	0.633	-99.0	0.061	-99.0	0.153	-99.0	0.353	-99.0	0.316	-99.0	0.714	-99.0	12.230	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.317	50.1	0.046	76.1	0.030	18.9	0.047	12.2	0.035	7.7	0.153	21.5	0.628	5.1
Craig 1-3	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 1-2	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.315	49.7	0.046	74.6	0.006	3.6	0.000	0.0	0.000	0.0	0.000	0.1	0.366	3.0
Hayden 1	0.176	27.8	0.030	49.5	0.003	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.210	1.7
Hayden 2	0.139	21.9	0.015	25.1	0.003	1.9	0.000	0.0	0.000	0.0	0.000	0.0	0.157	1.3

Table B.2.3.10c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/07/95 to 08/09/95 Episode

Steamboat Springs	0.000	0.0	0.000	0.1	0.000	0.3	0.002	0.4	0.001	0.3	0.003	0.4	0.006	0.0
Other Yampa Valley	0.000	0.1	0.001	1.3	0.024	15.0	0.045	11.8	0.034	7.5	0.150	21.0	0.254	2.0
Non-Yampa Valley	0.316	49.9	0.014	23.4	0.123	78.4	0.306	79.4	0.281	62.4	0.561	78.5	1.601	12.9
Denver	0.102	16.1	0.001	2.1	0.016	10.2	0.048	12.3	0.050	11.0	0.003	0.4	0.219	1.8
Colorado w/ Denver	0.312	49.2	0.014	23.3	0.118	74.9	0.292	75.6	0.270	60.0	0.487	68.2	1.493	12.0
Non-Colorado	0.004	0.7	0.000	0.1	0.005	3.4	0.015	3.8	0.011	2.4	0.074	10.4	0.109	0.9
Coal-fired PP	0.398	62.9	0.049	79.9	0.006	3.7	0.000	0.0	0.000	0.0	0.000	0.1	0.453	3.7
All other sources	0.235	37.1	0.012	20.1	0.152	96.3	0.386	100.0	0.451	100.0	0.713	99.9	11.949	96.3
Fires	0.000	0.0	0.000	0.5	0.004	2.7	0.033	8.5	0.135	29.9	0.000	0.0	0.172	1.4

Mad Creek
CONCENTRATION 0600-1200 95/ 8/ 8

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.136	-99.0	0.060	-99.0	0.092	-99.0	0.033	-99.0	0.084	-99.0	0.347	-99.0	0.752	-99.0
Estimated w/o fires	0.136	-99.0	0.060	-99.0	0.091	-99.0	0.033	-99.0	0.081	-99.0	0.347	-99.0	0.748	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.119	87.5	0.038	63.6	0.045	49.5	0.014	41.7	0.034	40.1	0.148	42.5	0.398	52.9
Craig 1-3	0.013	9.4	0.005	8.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.018	2.4
Craig 1-2	0.010	7.5	0.003	4.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.013	1.8
Craig 1	0.004	3.2	0.001	1.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.7
Craig 2	0.006	4.3	0.002	3.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.008	1.1
Craig 3	0.003	1.8	0.002	3.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.6
Hayden 1-2	0.106	77.9	0.026	42.8	0.002	2.5	0.000	0.0	0.000	0.0	0.000	0.0	0.134	17.8
Hayden 1	0.057	41.7	0.017	29.1	0.001	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.075	10.0
Hayden 2	0.049	36.2	0.008	13.7	0.001	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.059	7.8
Steamboat Springs	0.000	0.1	0.005	8.1	0.010	10.8	0.005	13.8	0.010	12.3	0.039	11.2	0.069	9.2
Other Yampa Valley	0.000	0.2	0.003	4.6	0.033	36.0	0.009	27.8	0.023	27.7	0.108	31.2	0.177	23.5
Non-Yampa Valley	0.017	12.5	0.022	36.4	0.046	50.3	0.019	57.5	0.047	56.0	0.200	57.5	0.351	46.6
Denver	0.001	0.4	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Colorado w/ Denver	0.013	9.6	0.019	32.3	0.042	45.9	0.017	51.6	0.042	50.4	0.177	51.0	0.311	41.3
Non-Colorado	0.004	2.9	0.002	4.0	0.004	4.4	0.002	6.0	0.005	5.6	0.023	6.6	0.040	5.3
Coal-fired PP	0.119	87.4	0.031	51.0	0.003	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.152	20.3
All other sources	0.017	12.6	0.029	49.0	0.089	97.2	0.033	100.0	0.084	100.0	0.347	100.0	0.600	79.7
Fires	0.000	0.0	0.000	0.0	0.000	0.2	0.000	0.8	0.003	4.0	0.000	0.0	0.004	0.5

Table B.2.3.10c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/07/95 to 08/09/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/ 8/ 8 6-hour average RH: 37%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.274	-99.0	0.132	-99.0	0.142	-99.0	0.298	-99.0	0.263	-99.0	1.089	-99.0	12.198	-99.0
Estimated w/o fires	0.274	-99.0	0.132	-99.0	0.141	-99.0	0.296	-99.0	0.253	-99.0	1.089	-99.0	12.185	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.240	87.5	0.084	63.6	0.070	49.5	0.124	41.7	0.106	40.1	0.463	42.5	1.087	8.9
Craig 1-3	0.026	9.4	0.011	8.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.037	0.3
Craig 1-2	0.021	7.5	0.006	4.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.027	0.2
Craig 1	0.009	3.2	0.002	1.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.011	0.1
Craig 2	0.012	4.3	0.004	3.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.017	0.1
Craig 3	0.005	1.8	0.005	3.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.1
Hayden 1-2	0.214	77.9	0.056	42.8	0.004	2.5	0.000	0.0	0.000	0.0	0.000	0.0	0.274	2.2
Hayden 1	0.114	41.7	0.038	29.1	0.002	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.155	1.3
Hayden 2	0.099	36.2	0.018	13.7	0.002	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.119	1.0
Steamboat Springs	0.000	0.1	0.011	8.1	0.015	10.8	0.041	13.8	0.033	12.3	0.122	11.2	0.222	1.8
Other Yampa Valley	0.000	0.2	0.006	4.6	0.051	36.0	0.083	27.8	0.073	27.7	0.340	31.2	0.553	4.5
Non-Yampa Valley	0.034	12.5	0.048	36.4	0.071	50.3	0.172	57.5	0.147	56.0	0.626	57.5	1.098	9.0
Denver	0.001	0.4	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Colorado w/ Denver	0.026	9.6	0.043	32.3	0.065	45.9	0.154	51.6	0.133	50.4	0.555	51.0	0.975	8.0
Non-Colorado	0.008	2.9	0.005	4.0	0.006	4.4	0.018	6.0	0.015	5.6	0.071	6.6	0.123	1.0
Coal-fired PP	0.240	87.4	0.067	51.0	0.004	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.312	2.6
All other sources	0.034	12.6	0.065	49.0	0.138	97.2	0.298	100.0	0.263	100.0	1.088	100.0	11.887	97.4
Fires	0.000	0.0	0.000	0.0	0.000	0.2	0.002	0.8	0.010	4.0	0.000	0.0	0.013	0.1

Mad Creek
CONCENTRATION 1200-1800 95/ 8/ 8

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.119	-99.0	0.015	-99.0	0.067	-99.0	0.029	-99.0	0.176	-99.0	0.136	-99.0	0.542	-99.0
Estimated w/o fires	0.119	-99.0	0.014	-99.0	0.059	-99.0	0.019	-99.0	0.049	-99.0	0.136	-99.0	0.396	-99.0

Table B.2.3.10c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/07/95 to 08/09/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.018	14.7	0.007	43.1	0.037	54.8	0.009	29.9	0.024	13.4	0.063	46.2	0.156	28.7
Craig 1-3	0.016	13.8	0.006	37.9	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.023	4.2
Craig 1-2	0.013	11.0	0.003	22.0	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.017	3.1
Craig 1	0.004	3.6	0.001	4.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.9
Craig 2	0.009	7.5	0.003	17.1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.012	2.2
Craig 3	0.003	2.7	0.002	15.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	1.1
Hayden 1-2	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.1	0.000	0.0
Other Yampa Valley	0.001	0.8	0.001	5.1	0.036	54.4	0.009	29.8	0.023	13.4	0.063	46.1	0.133	24.5
Non-Yampa Valley	0.102	85.3	0.007	47.5	0.022	33.2	0.010	35.2	0.026	14.5	0.073	53.8	0.240	44.3
Denver	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.015	12.3	0.002	14.1	0.010	14.8	0.004	13.4	0.010	5.6	0.044	32.4	0.084	15.6
Non-Colorado	0.087	73.0	0.005	33.4	0.012	18.4	0.006	21.8	0.016	9.0	0.029	21.5	0.156	28.8
Coal-fired PP	0.038	31.6	0.010	67.0	0.001	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.049	9.0
All other sources	0.082	68.4	0.005	33.0	0.066	99.1	0.029	100.0	0.176	100.0	0.136	100.0	0.494	91.0
Fires	0.000	0.0	0.001	9.3	0.008	12.0	0.010	35.0	0.127	72.1	0.000	0.0	0.146	26.9

Mad Creek
EXTINCTION 1200-1800 95/ 8/ 8 6-hour average RH: 30%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.227	-99.0	0.032	-99.0	0.101	-99.0	0.262	-99.0	0.536	-99.0	0.416	-99.0	11.574	-99.0
Estimated w/o fires	0.227	-99.0	0.029	-99.0	0.089	-99.0	0.170	-99.0	0.150	-99.0	0.416	-99.0	11.081	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.033	14.7	0.014	43.1	0.056	54.8	0.078	29.9	0.072	13.4	0.192	46.2	0.444	3.8
Craig 1-3	0.031	13.8	0.012	37.9	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.044	0.4
Craig 1-2	0.025	11.0	0.007	22.0	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.032	0.3
Craig 1	0.008	3.6	0.002	4.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.1
Craig 2	0.017	7.5	0.005	17.1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.023	0.2
Craig 3	0.006	2.7	0.005	15.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.011	0.1
Hayden 1-2	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.10c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/07/95 to 08/09/95 Episode

Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.1	0.001	0.0
Other Yampa Valley	0.002	0.8	0.002	5.1	0.055	54.4	0.078	29.8	0.072	13.4	0.191	46.1	0.400	3.5
Non-Yampa Valley	0.194	85.3	0.015	47.5	0.034	33.2	0.092	35.2	0.078	14.5	0.224	53.8	0.637	5.5
Denver	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.028	12.3	0.004	14.1	0.015	14.8	0.035	13.4	0.030	5.6	0.135	32.4	0.247	2.1
Non-Colorado	0.166	73.0	0.011	33.4	0.019	18.4	0.057	21.8	0.048	9.0	0.089	21.5	0.390	3.4
Coal-fired PP	0.072	31.6	0.021	67.0	0.001	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.094	0.8
All other sources	0.156	68.4	0.010	33.0	0.101	99.1	0.262	100.0	0.536	100.0	0.415	100.0	11.480	99.2
Fires	0.000	0.0	0.003	9.3	0.012	12.0	0.091	35.0	0.386	72.1	0.000	0.0	0.493	4.3

Mad Creek
CONCENTRATION 0600-1200 95/ 8/ 9

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.330	-99.0	0.229	-99.0	0.173	-99.0	0.074	-99.0	0.212	-99.0	0.658	-99.0	1.675	-99.0
Estimated w/o fires	0.330	-99.0	0.225	-99.0	0.170	-99.0	0.070	-99.0	0.166	-99.0	0.658	-99.0	1.619	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.011	3.2	0.037	16.2	0.054	30.9	0.015	20.0	0.036	16.9	0.296	44.9	0.447	26.7
Craig 1-3	0.001	0.3	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.2
Craig 1-2	0.001	0.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 1	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.1	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Hayden 1-2	0.008	2.4	0.004	2.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.8
Hayden 1	0.005	1.4	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.4
Hayden 2	0.003	1.1	0.003	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.4
Steamboat Springs	0.001	0.2	0.014	6.0	0.009	5.2	0.004	5.8	0.011	5.1	0.033	5.1	0.072	4.3
Other Yampa Valley	0.001	0.3	0.017	7.6	0.045	25.7	0.010	14.2	0.025	11.8	0.262	39.9	0.360	21.5
Non-Yampa Valley	0.320	96.8	0.188	82.1	0.117	67.4	0.055	75.1	0.130	61.6	0.362	55.1	1.172	70.0
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.009	2.9	0.029	12.7	0.031	17.9	0.011	14.6	0.028	13.3	0.126	19.1	0.234	14.0
Non-Colorado	0.310	93.9	0.159	69.4	0.086	49.4	0.045	60.5	0.102	48.2	0.236	36.0	0.938	56.0
Coal-fired PP	0.063	19.0	0.029	12.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.093	5.5
All other sources	0.268	81.0	0.199	87.2	0.173	99.7	0.074	100.0	0.212	100.0	0.658	100.0	1.583	94.5
Fires	0.000	0.0	0.004	1.7	0.003	1.7	0.004	4.9	0.046	21.6	0.000	0.0	0.056	3.3

Table B.2.3.10c (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/07/95 to 08/09/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/ 8/ 9 6-hour average RH: 29%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.624	-99.0	0.473	-99.0	0.262	-99.0	0.672	-99.0	0.644	-99.0	2.002	-99.0	14.678	-99.0
Estimated w/o fires	0.624	-99.0	0.465	-99.0	0.258	-99.0	0.639	-99.0	0.505	-99.0	2.002	-99.0	14.494	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.020	3.2	0.077	16.2	0.081	30.9	0.135	20.0	0.109	16.9	0.900	44.9	1.321	9.0
Craig 1-3	0.002	0.3	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.0
Craig 1-2	0.001	0.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 1	0.001	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 3	0.001	0.1	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.0
Hayden 1-2	0.015	2.4	0.009	2.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.025	0.2
Hayden 1	0.009	1.4	0.003	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.011	0.1
Hayden 2	0.007	1.1	0.007	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.1
Steamboat Springs	0.001	0.2	0.028	6.0	0.014	5.2	0.039	5.8	0.033	5.1	0.101	5.1	0.217	1.5
Other Yampa Valley	0.002	0.3	0.036	7.6	0.067	25.7	0.095	14.2	0.076	11.8	0.798	39.9	1.075	7.3
Non-Yampa Valley	0.604	96.8	0.389	82.1	0.177	67.4	0.505	75.1	0.396	61.6	1.102	55.1	3.173	21.6
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.018	2.9	0.060	12.7	0.047	17.9	0.098	14.6	0.086	13.3	0.382	19.1	0.692	4.7
Non-Colorado	0.586	93.9	0.328	69.4	0.130	49.4	0.407	60.5	0.310	48.2	0.720	36.0	2.481	16.9
Coal-fired PP	0.118	19.0	0.061	12.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.180	1.2
All other sources	0.506	81.0	0.413	87.2	0.261	99.7	0.672	100.0	0.644	100.0	2.002	100.0	14.498	98.8
Fires	0.000	0.0	0.008	1.7	0.004	1.7	0.033	4.9	0.139	21.6	0.000	0.0	0.184	1.3

Mad Creek
CONCENTRATION 1200-1800 95/ 8/ 9

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.793	-99.0	0.055	-99.0	0.118	-99.0	0.046	-99.0	0.151	-99.0	0.278	-99.0	1.441	-99.0
Estimated w/o fires	0.793	-99.0	0.054	-99.0	0.116	-99.0	0.043	-99.0	0.109	-99.0	0.278	-99.0	1.393	-99.0

Table B.2.3.10c (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/07/95 to 08/09/95 Episode

SOURCE CONTRIBUTIONS	(%)	is	contribution	to	Estimated	w/	fires							
Total Yampa Valley	0.502	63.3	0.042	77.4	0.052	43.8	0.013	28.0	0.036	23.7	0.105	38.0	0.750	52.0
Craig 1-3	0.146	18.4	0.015	28.3	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.162	11.3
Craig 1-2	0.110	13.9	0.011	20.2	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.122	8.5
Craig 1	0.047	5.9	0.006	10.6	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.053	3.7
Craig 2	0.064	8.1	0.005	9.6	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.070	4.8
Craig 3	0.036	4.5	0.004	8.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.040	2.8
Hayden 1-2	0.352	44.4	0.025	46.5	0.002	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.379	26.3
Hayden 1	0.202	25.5	0.018	33.2	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.221	15.3
Hayden 2	0.150	18.9	0.007	13.4	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.158	11.0
Steamboat Springs	0.001	0.1	0.000	0.9	0.003	2.7	0.002	3.8	0.005	3.1	0.007	2.5	0.018	1.2
Other Yampa Valley	0.003	0.3	0.001	1.8	0.046	39.2	0.011	24.2	0.031	20.6	0.098	35.4	0.191	13.2
Non-Yampa Valley	0.291	36.7	0.012	22.0	0.064	53.9	0.030	64.8	0.073	48.5	0.172	62.0	0.643	44.6
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.010	1.3	0.004	8.2	0.025	21.0	0.010	21.1	0.025	16.7	0.080	28.8	0.155	10.7
Non-Colorado	0.281	35.4	0.007	13.7	0.039	32.9	0.020	43.7	0.048	31.8	0.092	33.3	0.488	33.9
Coal-fired PP	0.564	71.1	0.043	79.0	0.003	2.3	0.000	0.0	0.000	0.0	0.000	0.1	0.610	42.3
All other sources	0.229	28.9	0.011	21.0	0.116	97.7	0.046	100.0	0.151	100.0	0.277	99.9	0.831	57.7
Fires	0.000	0.0	0.000	0.6	0.003	2.2	0.003	7.2	0.042	27.8	0.000	0.0	0.048	3.4

Mad Creek
EXTINCTION 1200-1800 95/ 8/ 9 6-hour average RH: 17%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%)	is	difference	from	Observed									
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.381	-99.0	0.105	-99.0	0.175	-99.0	0.422	-99.0	0.444	-99.0	0.816	-99.0	13.343	-99.0
Estimated w/o fires	1.381	-99.0	0.104	-99.0	0.171	-99.0	0.391	-99.0	0.321	-99.0	0.816	-99.0	13.184	-99.0
SOURCE CONTRIBUTIONS	(%)	is	contribution	to	Estimated	w/	fires							
Total Yampa Valley	0.874	63.3	0.081	77.4	0.077	43.8	0.118	28.0	0.105	23.7	0.310	38.0	1.565	11.7
Craig 1-3	0.254	18.4	0.030	28.3	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.285	2.1
Craig 1-2	0.192	13.9	0.021	20.2	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.215	1.6
Craig 1	0.081	5.9	0.011	10.6	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.093	0.7
Craig 2	0.111	8.1	0.010	9.6	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.122	0.9
Craig 3	0.062	4.5	0.008	8.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.070	0.5
Hayden 1-2	0.614	44.4	0.049	46.5	0.002	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.665	5.0
Hayden 1	0.352	25.5	0.035	33.2	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.388	2.9
Hayden 2	0.261	18.9	0.014	13.4	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.277	2.1

Table B.2.3.10c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/07/95 to 08/09/95 Episode

Steamboat Springs	0.001	0.1	0.001	0.9	0.005	2.7	0.016	3.8	0.014	3.1	0.020	2.5	0.057	0.4
Other Yampa Valley	0.005	0.3	0.002	1.8	0.069	39.2	0.102	24.2	0.091	20.6	0.289	35.4	0.557	4.2
Non-Yampa Valley	0.507	36.7	0.023	22.0	0.094	53.9	0.273	64.8	0.216	48.5	0.506	62.0	1.620	12.1
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.018	1.3	0.009	8.2	0.037	21.0	0.089	21.1	0.074	16.7	0.235	28.8	0.461	3.5
Non-Colorado	0.489	35.4	0.014	13.7	0.058	32.9	0.184	43.7	0.142	31.8	0.271	33.3	1.158	8.7
Coal-fired PP	0.983	71.1	0.083	79.0	0.004	2.3	0.000	0.0	0.000	0.0	0.001	0.1	1.070	8.0
All other sources	0.398	28.9	0.022	21.0	0.171	97.7	0.422	100.0	0.444	100.0	0.815	99.9	12.273	92.0
Fires	0.000	0.0	0.001	0.6	0.004	2.2	0.030	7.2	0.123	27.8	0.000	0.0	0.158	1.2

Table B.2.3.11a

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

[This table also presents six-hour concentrations from filter measurements, as well as extinction estimated from the filter measurements using identical extinction efficiencies as applied to predicted concentrations. Source attributions are presented for all 12 source regions/types modeled with CALPUFF, and present results from each six-hour daylight period (0600-1200, and 1200-1800 LST).]

Buffalo Pass
CONCENTRATION 0600-1200 95/10/ 7

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.703		0.089		0.986		0.573		0.967		0.967		3.088	
Estimated w/ fires	0.379	-46.1	0.057	-36.6	0.299	-69.7	0.117	-79.5	0.332	-65.7	0.623	-35.6	1.806	-41.5
Estimated w/o fires	0.379	-46.1	0.057	-36.6	0.299	-69.7	0.117	-79.5	0.332	-65.7	0.623	-35.6	1.806	-41.5
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.061	16.1	0.003	5.6	0.026	8.7	0.008	6.5	0.017	5.3	0.152	24.4	0.267	14.8
Craig 1-3	0.025	6.7	0.001	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.026	1.5
Craig 1-2	0.025	6.7	0.001	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.026	1.5
Craig 1	0.011	3.0	0.000	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.012	0.7
Craig 2	0.014	3.7	0.000	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.015	0.8
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.034	8.9	0.001	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.035	1.9
Hayden 1	0.018	4.9	0.001	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.019	1.1
Hayden 2	0.015	4.1	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.9
Steamboat Springs	0.000	0.1	0.000	0.7	0.003	0.9	0.002	1.4	0.004	1.3	0.005	0.7	0.014	0.8
Other Yampa Valley	0.001	0.3	0.001	1.9	0.023	7.8	0.006	5.1	0.013	4.0	0.147	23.6	0.192	10.6
Non-Yampa Valley	0.318	83.9	0.054	94.4	0.273	91.3	0.110	93.5	0.314	94.7	0.471	75.6	1.539	85.2
Denver	0.064	16.8	0.007	12.3	0.030	10.1	0.013	11.3	0.042	12.8	0.003	0.4	0.159	8.8
Colorado w/ Denver	0.182	48.2	0.045	79.7	0.254	84.9	0.100	85.1	0.297	89.5	0.415	66.7	1.293	71.6
Non-Colorado	0.135	35.8	0.008	14.8	0.019	6.4	0.010	8.5	0.017	5.2	0.056	9.0	0.246	13.6
Coal-fired PP	0.152	40.1	0.005	8.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.157	8.7
All other sources	0.227	59.9	0.052	91.4	0.298	99.9	0.117	100.0	0.332	100.0	0.622	100.0	1.649	91.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/10/ 7 6-hour average RH: 42%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.492		0.206		1.549		5.216		3.103		3.103		21.566	
Estimated w/ fires	0.804	-46.1	0.131	-36.6	0.469	-69.7	1.068	-79.5	1.065	-65.7	1.998	-35.6	15.535	-28.0
Estimated w/o fires	0.804	-46.1	0.131	-36.6	0.469	-69.7	1.068	-79.5	1.065	-65.7	1.998	-35.6	15.535	-28.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.129	16.1	0.007	5.6	0.041	8.7	0.069	6.5	0.056	5.3	0.487	24.4	0.789	5.1
Craig 1-3	0.054	6.7	0.002	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.056	0.4
Craig 1-2	0.054	6.7	0.002	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.056	0.4
Craig 1	0.024	3.0	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.025	0.2
Craig 2	0.030	3.7	0.001	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.031	0.2
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.072	8.9	0.002	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.074	0.5
Hayden 1	0.039	4.9	0.001	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.041	0.3
Hayden 2	0.033	4.1	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.033	0.2
Steamboat Springs	0.001	0.1	0.001	0.7	0.004	0.9	0.015	1.4	0.014	1.3	0.015	0.7	0.049	0.3
Other Yampa Valley	0.003	0.3	0.003	1.9	0.037	7.8	0.055	5.1	0.043	4.0	0.472	23.6	0.611	3.9
Non-Yampa Valley	0.675	83.9	0.123	94.4	0.429	91.3	0.999	93.5	1.009	94.7	1.511	75.6	4.745	30.5
Denver	0.135	16.8	0.016	12.3	0.048	10.1	0.121	11.3	0.136	12.8	0.008	0.4	0.464	3.0
Colorado w/ Denver	0.387	48.2	0.104	79.7	0.399	84.9	0.908	85.1	0.953	89.5	1.332	66.7	4.083	26.3
Non-Colorado	0.287	35.8	0.019	14.8	0.030	6.4	0.090	8.5	0.056	5.2	0.179	9.0	0.662	4.3
Coal-fired PP	0.322	40.1	0.011	8.6	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.334	2.2
All other sources	0.481	59.9	0.119	91.4	0.469	99.9	1.068	100.0	1.065	100.0	1.998	100.0	15.200	97.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
CONCENTRATION 1200-1800 95/10/ 7

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.753		0.112		-99.000		0.016		-99.000		-99.000		1.144	
Estimated w/ fires	0.459	-39.0	0.384	243.9	0.225	-99.0	0.081	411.8	0.234	-99.0	0.378	-99.0	1.761	53.9
Estimated w/o fires	0.459	-39.0	0.384	243.9	0.225	-99.0	0.081	411.8	0.234	-99.0	0.378	-99.0	1.761	53.9

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.175	38.0	0.246	64.0	0.074	33.1	0.019	23.6	0.056	24.1	0.116	30.6	0.686	39.0
Craig 1-3	0.054	11.8	0.099	25.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.154	8.7
Craig 1-2	0.054	11.8	0.099	25.8	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.154	8.7
Craig 1	0.026	5.6	0.049	12.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.075	4.2
Craig 2	0.028	6.2	0.050	13.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.079	4.5
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.117	25.5	0.117	30.5	0.003	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.237	13.5
Hayden 1	0.016	3.4	0.001	0.3	0.002	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.019	1.1
Hayden 2	0.101	22.1	0.116	30.2	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.219	12.4
Steamboat Springs	0.001	0.2	0.016	4.1	0.008	3.5	0.004	5.3	0.012	5.2	0.014	3.7	0.055	3.1
Other Yampa Valley	0.003	0.6	0.014	3.7	0.063	28.0	0.015	18.3	0.044	18.9	0.101	26.8	0.240	13.7
Non-Yampa Valley	0.285	62.0	0.138	36.0	0.150	66.9	0.062	76.4	0.178	75.9	0.262	69.4	1.075	61.0
Denver	0.065	14.2	0.011	2.8	0.019	8.5	0.009	11.4	0.029	12.5	0.002	0.5	0.136	7.7
Colorado w/ Denver	0.189	41.2	0.102	26.7	0.137	60.9	0.055	68.0	0.164	70.3	0.220	58.3	0.868	49.3
Non-Colorado	0.096	20.8	0.036	9.3	0.014	6.1	0.007	8.4	0.013	5.6	0.042	11.1	0.207	11.7
Coal-fired PP	0.261	56.7	0.227	59.2	0.004	1.7	0.000	0.0	0.000	0.0	0.000	0.1	0.492	27.9
All other sources	0.199	43.3	0.157	40.8	0.221	98.3	0.081	100.0	0.234	100.0	0.377	99.9	1.269	72.1
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
EXTINCTION 1200-1800 95/10/ 7 6-hour average RH: 43%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.610		0.259		-99.000		0.145		-99.000		-99.000		-99.000	
Estimated w/ fires	0.982	-39.0	0.889	243.9	0.354	-99.0	0.740	411.8	0.754	-99.0	1.215	-99.0	14.934	-99.0
Estimated w/o fires	0.982	-39.0	0.889	243.9	0.354	-99.0	0.740	411.8	0.754	-99.0	1.215	-99.0	14.934	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.374	38.0	0.569	64.0	0.117	33.1	0.175	23.6	0.182	24.1	0.372	30.6	1.789	12.0
Craig 1-3	0.116	11.8	0.229	25.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.346	2.3
Craig 1-2	0.116	11.8	0.229	25.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.346	2.3
Craig 1	0.055	5.6	0.113	12.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.169	1.1
Craig 2	0.061	6.2	0.116	13.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.177	1.2
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.250	25.5	0.271	30.5	0.005	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.526	3.5
Hayden 1	0.033	3.4	0.002	0.3	0.003	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.039	0.3
Hayden 2	0.217	22.1	0.268	30.2	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.487	3.3

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.002	0.2	0.036	4.1	0.012	3.5	0.040	5.3	0.039	5.2	0.045	3.7	0.174	1.2
Other Yampa Valley	0.006	0.6	0.033	3.7	0.099	28.0	0.135	18.3	0.143	18.9	0.326	26.8	0.742	5.0
Non-Yampa Valley	0.608	62.0	0.320	36.0	0.237	66.9	0.566	76.4	0.572	75.9	0.843	69.4	3.146	21.1
Denver	0.140	14.2	0.025	2.8	0.030	8.5	0.085	11.4	0.094	12.5	0.006	0.5	0.379	2.5
Colorado w/ Denver	0.404	41.2	0.237	26.7	0.215	60.9	0.503	68.0	0.530	70.3	0.709	58.3	2.598	17.4
Non-Colorado	0.204	20.8	0.082	9.3	0.021	6.1	0.062	8.4	0.042	5.6	0.135	11.1	0.547	3.7
Coal-fired PP	0.557	56.7	0.526	59.2	0.006	1.7	0.000	0.0	0.000	0.0	0.001	0.1	1.090	7.3
All other sources	0.425	43.3	0.363	40.8	0.348	98.3	0.740	100.0	0.754	100.0	1.215	99.9	13.844	92.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
CONCENTRATION 0600-1200 95/10/ 8

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.932		0.383		0.269		0.163		1.467		1.467		2.618	
Estimated w/ fires	1.148	23.2	1.362	255.6	0.358	33.0	0.143	-11.9	0.373	-74.6	0.880	-40.0	4.264	62.9
Estimated w/o fires	1.148	23.2	1.362	255.6	0.358	33.0	0.143	-11.9	0.373	-74.6	0.880	-40.0	4.264	62.9
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.043	3.8	0.083	6.1	0.048	13.4	0.014	9.7	0.033	8.7	0.233	26.5	0.454	10.6
Craig 1-3	0.006	0.5	0.004	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.2
Craig 1-2	0.006	0.5	0.004	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.2
Craig 1	0.003	0.3	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.1
Craig 2	0.003	0.3	0.002	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.1
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.036	3.1	0.036	2.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.073	1.7
Hayden 1	0.010	0.8	0.002	0.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.3
Hayden 2	0.026	2.3	0.033	2.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.060	1.4
Steamboat Springs	0.000	0.0	0.012	0.9	0.006	1.6	0.003	2.4	0.008	2.2	0.015	1.7	0.045	1.1
Other Yampa Valley	0.001	0.1	0.030	2.2	0.041	11.6	0.011	7.3	0.024	6.5	0.218	24.8	0.326	7.6
Non-Yampa Valley	1.105	96.2	1.279	93.9	0.310	86.6	0.129	90.3	0.341	91.3	0.647	73.5	3.810	89.4
Denver	0.110	9.6	0.072	5.3	0.038	10.6	0.018	12.7	0.057	15.3	0.003	0.4	0.299	7.0
Colorado w/ Denver	0.237	20.6	0.340	24.9	0.203	56.7	0.079	55.2	0.232	62.0	0.376	42.7	1.465	34.4
Non-Colorado	0.869	75.6	0.939	69.0	0.107	29.8	0.050	35.1	0.109	29.2	0.271	30.8	2.345	55.0
Coal-fired PP	0.274	23.9	0.262	19.3	0.003	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.539	12.6
All other sources	0.874	76.1	1.100	80.7	0.355	99.2	0.143	100.0	0.373	100.0	0.880	100.0	3.725	87.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/10/ 8 6-hour average RH: 88%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	6.321		2.664		0.732		1.481		9.571		9.571		30.768	
Estimated w/ fires	7.785	23.2	9.476	255.6	0.973	33.0	1.304	-11.9	2.436	-74.6	5.742	-40.0	37.716	22.6
Estimated w/o fires	7.785	23.2	9.476	255.6	0.973	33.0	1.304	-11.9	2.436	-74.6	5.742	-40.0	37.716	22.6
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.293	3.8	0.578	6.1	0.131	13.4	0.127	9.7	0.212	8.7	1.521	26.5	2.862	7.6
Craig 1-3	0.041	0.5	0.031	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.072	0.2
Craig 1-2	0.041	0.5	0.031	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.072	0.2
Craig 1	0.020	0.3	0.017	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.037	0.1
Craig 2	0.021	0.3	0.014	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.034	0.1
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.244	3.1	0.249	2.6	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.495	1.3
Hayden 1	0.065	0.8	0.017	0.2	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.084	0.2
Hayden 2	0.179	2.3	0.232	2.4	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.411	1.1
Steamboat Springs	0.002	0.0	0.086	0.9	0.016	1.6	0.031	2.4	0.053	2.2	0.098	1.7	0.287	0.8
Other Yampa Valley	0.006	0.1	0.212	2.2	0.112	11.6	0.096	7.3	0.159	6.5	1.422	24.8	2.008	5.3
Non-Yampa Valley	7.492	96.2	8.897	93.9	0.843	86.6	1.177	90.3	2.223	91.3	4.221	73.5	24.854	65.9
Denver	0.747	9.6	0.504	5.3	0.103	10.6	0.165	12.7	0.374	15.3	0.022	0.4	1.914	5.1
Colorado w/ Denver	1.604	20.6	2.363	24.9	0.552	56.7	0.720	55.2	1.511	62.0	2.452	42.7	9.201	24.4
Non-Colorado	5.888	75.6	6.534	69.0	0.290	29.8	0.457	35.1	0.712	29.2	1.769	30.8	15.652	41.5
Coal-fired PP	1.858	23.9	1.824	19.3	0.008	0.8	0.000	0.0	0.000	0.0	0.001	0.0	3.691	9.8
All other sources	5.927	76.1	7.652	80.7	0.966	99.2	1.304	100.0	2.436	100.0	5.741	100.0	34.025	90.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
CONCENTRATION 1200-1800 95/10/ 8

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.810		0.155		0.268		0.012		0.255		0.255		1.332	
Estimated w/ fires	1.432	76.8	0.622	301.0	0.239	-10.6	0.096	722.1	0.262	2.6	0.458	79.5	3.109	133.4
Estimated w/o fires	1.432	76.8	0.622	301.0	0.239	-10.6	0.096	722.1	0.262	2.6	0.458	79.5	3.109	133.4

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.439	30.7	0.348	55.9	0.049	20.3	0.015	16.0	0.039	14.8	0.136	29.6	1.025	33.0
Craig 1-3	0.089	6.2	0.079	12.7	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.169	5.4
Craig 1-2	0.089	6.2	0.079	12.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.169	5.4
Craig 1	0.052	3.6	0.044	7.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.097	3.1
Craig 2	0.037	2.6	0.035	5.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.072	2.3
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.347	24.3	0.231	37.1	0.004	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.583	18.7
Hayden 1	0.008	0.6	0.000	0.1	0.002	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.011	0.3
Hayden 2	0.339	23.7	0.230	37.0	0.002	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.572	18.4
Steamboat Springs	0.001	0.1	0.024	3.9	0.011	4.5	0.006	6.2	0.017	6.4	0.019	4.2	0.078	2.5
Other Yampa Valley	0.001	0.1	0.014	2.2	0.033	13.9	0.009	9.8	0.022	8.4	0.116	25.4	0.196	6.3
Non-Yampa Valley	0.993	69.3	0.275	44.1	0.191	79.7	0.081	84.0	0.223	85.2	0.322	70.4	2.084	67.0
Denver	0.142	9.9	0.014	2.2	0.031	12.7	0.015	15.5	0.047	17.9	0.003	0.6	0.251	8.1
Colorado w/ Denver	0.271	18.9	0.066	10.6	0.135	56.3	0.055	57.2	0.164	62.7	0.198	43.2	0.888	28.6
Non-Colorado	0.722	50.4	0.208	33.5	0.056	23.4	0.026	26.8	0.059	22.6	0.125	27.2	1.196	38.5
Coal-fired PP	0.703	49.1	0.363	58.3	0.006	2.5	0.000	0.0	0.000	0.0	0.000	0.1	1.072	34.5
All other sources	0.729	50.9	0.260	41.7	0.233	97.5	0.096	100.0	0.262	100.0	0.457	99.9	2.037	65.5
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
EXTINCTION 1200-1800 95/10/ 8 6-hour average RH: 39%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.665		0.347		0.416		0.106		0.806		0.806		13.342	
Estimated w/ fires	2.945	76.8	1.392	301.0	0.372	-10.6	0.875	722.1	0.827	2.6	1.448	79.5	17.859	33.9
Estimated w/o fires	2.945	76.8	1.392	301.0	0.372	-10.6	0.875	722.1	0.827	2.6	1.448	79.5	17.859	33.9
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.903	30.7	0.778	55.9	0.076	20.3	0.140	16.0	0.122	14.8	0.429	29.6	2.448	13.7
Craig 1-3	0.184	6.2	0.177	12.7	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.362	2.0
Craig 1-2	0.184	6.2	0.177	12.7	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.362	2.0
Craig 1	0.107	3.6	0.099	7.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.207	1.2
Craig 2	0.077	2.6	0.078	5.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.155	0.9
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.715	24.3	0.516	37.1	0.006	1.7	0.000	0.0	0.000	0.0	0.001	0.0	1.238	6.9
Hayden 1	0.017	0.6	0.001	0.1	0.003	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.021	0.1
Hayden 2	0.698	23.7	0.515	37.0	0.003	0.9	0.000	0.0	0.000	0.0	0.000	0.0	1.217	6.8

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.002	0.1	0.054	3.9	0.017	4.5	0.054	6.2	0.053	6.4	0.060	4.2	0.240	1.3
Other Yampa Valley	0.002	0.1	0.030	2.2	0.052	13.9	0.086	9.8	0.070	8.4	0.368	25.4	0.607	3.4
Non-Yampa Valley	2.041	69.3	0.614	44.1	0.296	79.7	0.735	84.0	0.705	85.2	1.019	70.4	5.411	30.3
Denver	0.292	9.9	0.031	2.2	0.047	12.7	0.136	15.5	0.148	17.9	0.009	0.6	0.663	3.7
Colorado w/ Denver	0.557	18.9	0.148	10.6	0.209	56.3	0.501	57.2	0.518	62.7	0.625	43.2	2.558	14.3
Non-Colorado	1.484	50.4	0.466	33.5	0.087	23.4	0.235	26.8	0.187	22.6	0.394	27.2	2.853	16.0
Coal-fired PP	1.445	49.1	0.811	58.3	0.009	2.5	0.000	0.0	0.000	0.0	0.001	0.1	2.267	12.7
All other sources	1.500	50.9	0.581	41.7	0.363	97.5	0.875	100.0	0.827	100.0	1.447	99.9	15.592	87.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
CONCENTRATION 0600-1200 95/10/ 9

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.560		0.236		0.279		0.171		0.814		0.814		1.725	
Estimated w/ fires	1.680	199.7	0.525	122.5	0.738	164.6	0.308	80.3	0.901	10.7	1.170	43.7	5.322	208.5
Estimated w/o fires	1.680	199.7	0.525	122.5	0.738	164.6	0.308	80.3	0.901	10.7	1.170	43.7	5.322	208.5
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.156	9.3	0.070	13.4	0.061	8.3	0.017	5.6	0.041	4.5	0.260	22.2	0.606	11.4
Craig 1-3	0.087	5.2	0.043	8.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.130	2.4
Craig 1-2	0.087	5.2	0.043	8.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.130	2.4
Craig 1	0.048	2.8	0.026	5.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.074	1.4
Craig 2	0.039	2.3	0.017	3.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.056	1.1
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.067	4.0	0.015	2.9	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.083	1.6
Hayden 1	0.007	0.4	0.001	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.2
Hayden 2	0.059	3.5	0.014	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.074	1.4
Steamboat Springs	0.001	0.0	0.003	0.6	0.006	0.8	0.003	1.0	0.008	0.9	0.013	1.1	0.034	0.6
Other Yampa Valley	0.002	0.1	0.009	1.7	0.054	7.3	0.014	4.6	0.033	3.6	0.247	21.1	0.359	6.7
Non-Yampa Valley	1.523	90.7	0.455	86.6	0.677	91.7	0.291	94.4	0.860	95.5	0.910	77.8	4.716	88.6
Denver	0.387	23.0	0.116	22.0	0.155	21.0	0.082	26.6	0.254	28.2	0.014	1.2	1.008	18.9
Colorado w/ Denver	0.715	42.6	0.346	66.0	0.570	77.2	0.238	77.3	0.732	81.3	0.664	56.7	3.265	61.3
Non-Colorado	0.808	48.1	0.108	20.7	0.107	14.5	0.053	17.1	0.128	14.2	0.246	21.0	1.451	27.3
Coal-fired PP	0.581	34.6	0.112	21.3	0.003	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.696	13.1
All other sources	1.099	65.4	0.413	78.7	0.735	99.6	0.308	100.0	0.901	100.0	1.170	100.0	4.626	86.9
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/10/ 9 6-hour average RH: 50%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.306		0.592		0.453		1.554		2.733		2.733		16.638	
Estimated w/ fires	3.914	199.7	1.318	122.5	1.198	164.6	2.802	80.3	3.025	10.7	3.928	43.7	26.184	57.4
Estimated w/o fires	3.914	199.7	1.318	122.5	1.198	164.6	2.802	80.3	3.025	10.7	3.928	43.7	26.184	57.4
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.365	9.3	0.176	13.4	0.099	8.3	0.157	5.6	0.137	4.5	0.873	22.2	1.808	6.9
Craig 1-3	0.202	5.2	0.108	8.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.311	1.2
Craig 1-2	0.202	5.2	0.108	8.2	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.311	1.2
Craig 1	0.111	2.8	0.065	5.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.177	0.7
Craig 2	0.091	2.3	0.043	3.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.134	0.5
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.155	4.0	0.038	2.9	0.002	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.195	0.7
Hayden 1	0.017	0.4	0.001	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.020	0.1
Hayden 2	0.138	3.5	0.036	2.8	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.175	0.7
Steamboat Springs	0.002	0.0	0.008	0.6	0.009	0.8	0.028	1.0	0.027	0.9	0.044	1.1	0.119	0.5
Other Yampa Valley	0.006	0.1	0.022	1.7	0.088	7.3	0.129	4.6	0.110	3.6	0.829	21.1	1.183	4.5
Non-Yampa Valley	3.549	90.7	1.142	86.6	1.099	91.7	2.645	94.4	2.888	95.5	3.054	77.8	14.376	54.9
Denver	0.901	23.0	0.290	22.0	0.252	21.0	0.745	26.6	0.853	28.2	0.048	1.2	3.090	11.8
Colorado w/ Denver	1.666	42.6	0.869	66.0	0.925	77.2	2.165	77.3	2.458	81.3	2.227	56.7	10.311	39.4
Non-Colorado	1.883	48.1	0.272	20.7	0.174	14.5	0.480	17.1	0.430	14.2	0.827	21.0	4.065	15.5
Coal-fired PP	1.354	34.6	0.281	21.3	0.005	0.4	0.000	0.0	0.000	0.0	0.001	0.0	1.641	6.3
All other sources	2.559	65.4	1.037	78.7	1.193	99.6	2.802	100.0	3.025	100.0	3.927	100.0	24.543	93.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
CONCENTRATION 1200-1800 95/10/ 9

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.548		0.284		0.392		0.303		0.732		0.732		1.908	
Estimated w/ fires	1.549	182.4	0.487	71.2	0.370	-5.6	0.145	-52.1	0.411	-43.8	0.609	-16.8	3.571	87.1
Estimated w/o fires	1.549	182.4	0.487	71.2	0.370	-5.6	0.145	-52.1	0.411	-43.8	0.609	-16.8	3.571	87.1

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.400	25.8	0.320	65.8	0.097	26.2	0.026	17.7	0.069	16.7	0.200	32.8	1.111	31.1
Craig 1-3	0.180	11.6	0.184	37.9	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.366	10.2
Craig 1-2	0.180	11.6	0.184	37.9	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.365	10.2
Craig 1	0.098	6.4	0.105	21.7	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.204	5.7
Craig 2	0.081	5.2	0.079	16.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.161	4.5
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.215	13.9	0.108	22.2	0.004	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.327	9.2
Hayden 1	0.004	0.2	0.000	0.0	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.2
Hayden 2	0.212	13.7	0.108	22.2	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.322	9.0
Steamboat Springs	0.001	0.1	0.010	2.1	0.007	2.0	0.004	2.8	0.011	2.7	0.014	2.3	0.047	1.3
Other Yampa Valley	0.004	0.2	0.018	3.6	0.084	22.7	0.022	14.9	0.057	14.0	0.186	30.5	0.370	10.4
Non-Yampa Valley	1.149	74.2	0.167	34.2	0.273	73.8	0.120	82.3	0.342	83.3	0.409	67.2	2.460	68.9
Denver	0.210	13.5	0.026	5.3	0.051	13.9	0.026	18.1	0.082	20.0	0.005	0.8	0.400	11.2
Colorado w/ Denver	0.395	25.5	0.093	19.0	0.206	55.6	0.086	59.1	0.258	62.7	0.273	44.8	1.310	36.7
Non-Colorado	0.754	48.7	0.074	15.2	0.067	18.2	0.034	23.2	0.085	20.6	0.137	22.4	1.150	32.2
Coal-fired PP	0.701	45.3	0.322	66.2	0.007	1.8	0.000	0.0	0.000	0.0	0.001	0.1	1.030	28.9
All other sources	0.848	54.7	0.164	33.8	0.363	98.2	0.145	100.0	0.411	100.0	0.609	99.9	2.541	71.1
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
EXTINCTION 1200-1800 95/10/ 9 6-hour average RH: 41%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.152		0.648		0.614		2.760		2.338		2.338		17.513	
Estimated w/ fires	3.254	182.4	1.110	71.2	0.579	-5.6	1.323	-52.1	1.313	-43.8	1.946	-16.8	19.525	11.5
Estimated w/o fires	3.254	182.4	1.110	71.2	0.579	-5.6	1.323	-52.1	1.313	-43.8	1.946	-16.8	19.525	11.5
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.839	25.8	0.730	65.8	0.152	26.2	0.235	17.7	0.219	16.7	0.638	32.8	2.813	14.4
Craig 1-3	0.378	11.6	0.420	37.9	0.002	0.4	0.000	0.0	0.000	0.0	0.001	0.0	0.801	4.1
Craig 1-2	0.378	11.6	0.420	37.9	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.800	4.1
Craig 1	0.207	6.4	0.240	21.7	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.448	2.3
Craig 2	0.171	5.2	0.180	16.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.352	1.8
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.001	0.0	0.001	0.0
Hayden 1-2	0.452	13.9	0.246	22.2	0.006	1.1	0.000	0.0	0.000	0.0	0.001	0.0	0.705	3.6
Hayden 1	0.007	0.2	0.000	0.0	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.011	0.1
Hayden 2	0.445	13.7	0.246	22.2	0.003	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.694	3.6

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.002	0.1	0.023	2.1	0.011	2.0	0.037	2.8	0.036	2.7	0.044	2.3	0.154	0.8
Other Yampa Valley	0.008	0.2	0.040	3.6	0.132	22.7	0.197	14.9	0.183	14.0	0.593	30.5	1.153	5.9
Non-Yampa Valley	2.414	74.2	0.380	34.2	0.428	73.8	1.088	82.3	1.094	83.3	1.307	67.2	6.712	34.4
Denver	0.441	13.5	0.059	5.3	0.080	13.9	0.240	18.1	0.263	20.0	0.015	0.8	1.098	5.6
Colorado w/ Denver	0.830	25.5	0.211	19.0	0.322	55.6	0.782	59.1	0.824	62.7	0.871	44.8	3.840	19.7
Non-Colorado	1.584	48.7	0.169	15.2	0.106	18.2	0.307	23.2	0.270	20.6	0.437	22.4	2.872	14.7
Coal-fired PP	1.473	45.3	0.735	66.2	0.010	1.8	0.000	0.0	0.000	0.0	0.002	0.1	2.220	11.4
All other sources	1.781	54.7	0.375	33.8	0.569	98.2	1.323	100.0	1.313	100.0	1.944	99.9	17.305	88.6
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
CONCENTRATION 0600-1200 95/10/10

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.641		0.377		0.337		0.154		0.227		0.227		1.387	
Estimated w/ fires	1.359	112.1	0.646	71.4	0.365	8.2	0.153	-0.8	0.405	78.4	0.880	287.8	3.807	174.5
Estimated w/o fires	1.359	112.1	0.646	71.4	0.365	8.2	0.153	-0.8	0.405	78.4	0.880	287.8	3.807	174.5
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.105	7.7	0.278	43.0	0.058	16.0	0.017	10.8	0.038	9.5	0.225	25.6	0.721	18.9
Craig 1-3	0.042	3.1	0.121	18.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.164	4.3
Craig 1-2	0.042	3.1	0.121	18.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.164	4.3
Craig 1	0.036	2.6	0.115	17.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.151	4.0
Craig 2	0.007	0.5	0.006	1.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.3
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.060	4.4	0.135	20.8	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.197	5.2
Hayden 1	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 2	0.060	4.4	0.135	20.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.196	5.2
Steamboat Springs	0.000	0.0	0.005	0.7	0.006	1.5	0.003	2.0	0.008	2.0	0.015	1.7	0.037	1.0
Other Yampa Valley	0.002	0.1	0.017	2.6	0.050	13.7	0.013	8.8	0.030	7.5	0.210	23.9	0.323	8.5
Non-Yampa Valley	1.254	92.3	0.369	57.0	0.306	84.0	0.137	89.2	0.366	90.5	0.654	74.4	3.086	81.1
Denver	0.086	6.3	0.024	3.7	0.031	8.4	0.016	10.6	0.050	12.4	0.003	0.3	0.210	5.5
Colorado w/ Denver	0.165	12.2	0.125	19.3	0.168	46.0	0.067	43.8	0.196	48.3	0.359	40.8	1.080	28.4
Non-Colorado	1.089	80.1	0.244	37.7	0.139	38.0	0.069	45.3	0.171	42.2	0.295	33.6	2.006	52.7
Coal-fired PP	0.311	22.9	0.324	50.1	0.004	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.639	16.8
All other sources	1.048	77.1	0.323	49.9	0.361	98.9	0.153	100.0	0.405	100.0	0.879	100.0	3.168	83.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/10/10 6-hour average RH: 50%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.486		0.942		0.546		1.406		0.760		0.760		15.140	
Estimated w/ fires	3.152	112.1	1.615	71.4	0.591	8.2	1.395	-0.8	1.356	78.4	2.947	287.8	21.055	39.1
Estimated w/o fires	3.152	112.1	1.615	71.4	0.591	8.2	1.395	-0.8	1.356	78.4	2.947	287.8	21.055	39.1
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.243	7.7	0.694	43.0	0.094	16.0	0.151	10.8	0.129	9.5	0.755	25.6	2.065	9.8
Craig 1-3	0.098	3.1	0.303	18.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.403	1.9
Craig 1-2	0.098	3.1	0.303	18.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.403	1.9
Craig 1	0.083	2.6	0.288	17.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.371	1.8
Craig 2	0.016	0.5	0.016	1.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.032	0.2
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.140	4.4	0.337	20.8	0.003	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.480	2.3
Hayden 1	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 2	0.140	4.4	0.337	20.8	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.479	2.3
Steamboat Springs	0.001	0.0	0.011	0.7	0.009	1.5	0.028	2.0	0.027	2.0	0.051	1.7	0.127	0.6
Other Yampa Valley	0.004	0.1	0.043	2.6	0.081	13.7	0.123	8.8	0.102	7.5	0.703	23.9	1.055	5.0
Non-Yampa Valley	2.909	92.3	0.921	57.0	0.496	84.0	1.244	89.2	1.227	90.5	2.192	74.4	8.989	42.7
Denver	0.200	6.3	0.060	3.7	0.050	8.4	0.148	10.6	0.169	12.4	0.009	0.3	0.636	3.0
Colorado w/ Denver	0.384	12.2	0.312	19.3	0.272	46.0	0.611	43.8	0.655	48.3	1.203	40.8	3.436	16.3
Non-Colorado	2.525	80.1	0.610	37.7	0.224	38.0	0.632	45.3	0.572	42.2	0.989	33.6	5.553	26.4
Coal-fired PP	0.721	22.9	0.809	50.1	0.006	1.1	0.000	0.0	0.000	0.0	0.001	0.0	1.537	7.3
All other sources	2.431	77.1	0.806	49.9	0.584	98.9	1.395	100.0	1.356	100.0	2.946	100.0	19.517	92.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
CONCENTRATION 1200-1800 95/10/10

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.710		0.182		0.277		0.283		0.474		0.474		1.729	
Estimated w/ fires	1.429	101.2	0.521	186.5	0.279	0.9	0.115	-59.2	0.306	-35.3	0.647	36.7	3.299	90.8
Estimated w/o fires	1.429	101.2	0.521	186.5	0.279	0.9	0.115	-59.2	0.306	-35.3	0.647	36.7	3.299	90.8

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.398	27.8	0.454	87.1	0.067	24.1	0.020	17.3	0.048	15.6	0.197	30.4	1.184	35.9
Craig 1-3	0.206	14.4	0.237	45.5	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.445	13.5
Craig 1-2	0.206	14.4	0.237	45.5	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.445	13.5
Craig 1	0.188	13.1	0.230	44.1	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.419	12.7
Craig 2	0.019	1.3	0.007	1.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.027	0.8
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.188	13.2	0.194	37.3	0.003	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.385	11.7
Hayden 1	0.000	0.0	0.000	0.0	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 2	0.188	13.2	0.194	37.3	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.384	11.6
Steamboat Springs	0.001	0.1	0.012	2.3	0.009	3.0	0.005	4.1	0.013	4.3	0.016	2.5	0.056	1.7
Other Yampa Valley	0.002	0.1	0.011	2.1	0.055	19.6	0.015	13.1	0.035	11.3	0.180	27.9	0.298	9.0
Non-Yampa Valley	1.032	72.2	0.067	12.9	0.212	75.9	0.095	82.7	0.258	84.4	0.450	69.6	2.115	64.1
Denver	0.038	2.6	0.001	0.3	0.018	6.4	0.010	8.6	0.031	10.0	0.002	0.3	0.099	3.0
Colorado w/ Denver	0.097	6.8	0.016	3.0	0.120	42.9	0.049	42.7	0.142	46.4	0.259	40.0	0.682	20.7
Non-Colorado	0.935	65.4	0.051	9.9	0.092	33.0	0.046	40.0	0.116	38.0	0.192	29.6	1.433	43.4
Coal-fired PP	0.584	40.9	0.444	85.2	0.005	1.9	0.000	0.0	0.000	0.0	0.000	0.1	1.034	31.4
All other sources	0.845	59.1	0.077	14.8	0.274	98.1	0.115	100.0	0.306	100.0	0.647	99.9	2.265	68.6
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
EXTINCTION 1200-1800 95/10/10 6-hour average RH: 40%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.483		0.412		0.433		2.575		1.508		1.508		16.411	
Estimated w/ fires	2.983	101.2	1.181	186.5	0.437	0.9	1.050	-59.2	0.975	-35.3	2.061	36.7	18.687	13.9
Estimated w/o fires	2.983	101.2	1.181	186.5	0.437	0.9	1.050	-59.2	0.975	-35.3	2.061	36.7	18.687	13.9
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.830	27.8	1.029	87.1	0.105	24.1	0.181	17.3	0.152	15.6	0.627	30.4	2.925	15.7
Craig 1-3	0.431	14.4	0.538	45.5	0.002	0.6	0.000	0.0	0.000	0.0	0.001	0.0	0.972	5.2
Craig 1-2	0.431	14.4	0.538	45.5	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.971	5.2
Craig 1	0.392	13.1	0.521	44.1	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.915	4.9
Craig 2	0.039	1.3	0.017	1.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.057	0.3
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.392	13.2	0.440	37.3	0.004	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.837	4.5
Hayden 1	0.000	0.0	0.000	0.0	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Hayden 2	0.392	13.2	0.440	37.3	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.836	4.5

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.002	0.1	0.027	2.3	0.013	3.0	0.043	4.1	0.042	4.3	0.052	2.5	0.179	1.0
Other Yampa Valley	0.004	0.1	0.025	2.1	0.085	19.6	0.138	13.1	0.110	11.3	0.574	27.9	0.937	5.0
Non-Yampa Valley	2.153	72.2	0.152	12.9	0.331	75.9	0.869	82.7	0.823	84.4	1.434	69.6	5.762	30.8
Denver	0.079	2.6	0.003	0.3	0.028	6.4	0.091	8.6	0.097	10.0	0.005	0.3	0.303	1.6
Colorado w/ Denver	0.202	6.8	0.035	3.0	0.187	42.9	0.448	42.7	0.452	46.4	0.823	40.0	2.149	11.5
Non-Colorado	1.951	65.4	0.117	9.9	0.144	33.0	0.420	40.0	0.371	38.0	0.611	29.6	3.613	19.3
Coal-fired PP	1.220	40.9	1.007	85.2	0.008	1.9	0.000	0.0	0.000	0.0	0.001	0.1	2.236	12.0
All other sources	1.763	59.1	0.175	14.8	0.428	98.1	1.050	100.0	0.975	100.0	2.060	99.9	16.451	88.0
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
CONCENTRATION 0600-1200 95/10/11

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.331		0.111		0.225		0.286		0.986		0.986		1.687	
Estimated w/ fires	1.173	254.7	0.422	279.4	0.352	56.3	0.148	-48.1	0.400	-59.4	0.843	-14.5	3.339	97.9
Estimated w/o fires	1.173	254.7	0.422	279.4	0.352	56.3	0.148	-48.1	0.400	-59.4	0.843	-14.5	3.339	97.9
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.094	8.0	0.051	12.1	0.037	10.5	0.010	7.0	0.024	6.0	0.160	19.0	0.377	11.3
Craig 1-3	0.035	3.0	0.020	4.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.055	1.7
Craig 1-2	0.035	3.0	0.020	4.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.055	1.7
Craig 1	0.023	2.0	0.012	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.035	1.0
Craig 2	0.012	1.0	0.008	2.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.020	0.6
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.058	4.9	0.018	4.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.076	2.3
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.058	4.9	0.018	4.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.076	2.3
Steamboat Springs	0.000	0.0	0.004	1.0	0.004	1.1	0.002	1.5	0.006	1.5	0.007	0.9	0.024	0.7
Other Yampa Valley	0.001	0.1	0.009	2.1	0.032	9.1	0.008	5.5	0.018	4.5	0.153	18.1	0.221	6.6
Non-Yampa Valley	1.078	92.0	0.371	87.9	0.315	89.5	0.138	93.0	0.376	94.0	0.683	81.0	2.962	88.7
Denver	0.055	4.7	0.021	4.9	0.014	3.9	0.008	5.4	0.025	6.2	0.001	0.2	0.124	3.7
Colorado w/ Denver	0.188	16.1	0.210	49.6	0.217	61.6	0.089	60.1	0.251	62.7	0.474	56.2	1.429	42.8
Non-Colorado	0.890	75.9	0.162	38.3	0.098	27.9	0.049	32.9	0.125	31.3	0.209	24.8	1.533	45.9
Coal-fired PP	0.471	40.1	0.132	31.4	0.003	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.606	18.2
All other sources	0.702	59.9	0.290	68.6	0.349	99.1	0.148	100.0	0.400	100.0	0.843	100.0	2.732	81.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/10/11 6-hour average RH: 35%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.655		0.240		0.346		2.604		3.065		3.065		16.910	
Estimated w/ fires	2.322	254.7	0.912	279.4	0.541	56.3	1.350	-48.1	1.243	-59.4	2.620	-14.5	18.989	12.3
Estimated w/o fires	2.322	254.7	0.912	279.4	0.541	56.3	1.350	-48.1	1.243	-59.4	2.620	-14.5	18.989	12.3
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.187	8.0	0.110	12.1	0.057	10.5	0.095	7.0	0.075	6.0	0.497	19.0	1.020	5.4
Craig 1-3	0.069	3.0	0.044	4.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.113	0.6
Craig 1-2	0.069	3.0	0.044	4.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.113	0.6
Craig 1	0.045	2.0	0.026	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.071	0.4
Craig 2	0.023	1.0	0.018	2.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.042	0.2
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.114	4.9	0.038	4.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.154	0.8
Hayden 1	0.000	0.0	0.000	0.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 2	0.114	4.9	0.038	4.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.153	0.8
Steamboat Springs	0.001	0.0	0.009	1.0	0.006	1.1	0.020	1.5	0.019	1.5	0.022	0.9	0.077	0.4
Other Yampa Valley	0.003	0.1	0.019	2.1	0.049	9.1	0.075	5.5	0.056	4.5	0.474	18.1	0.676	3.6
Non-Yampa Valley	2.135	92.0	0.802	87.9	0.484	89.5	1.256	93.0	1.169	94.0	2.123	81.0	7.969	42.0
Denver	0.109	4.7	0.045	4.9	0.021	3.9	0.074	5.4	0.077	6.2	0.004	0.2	0.330	1.7
Colorado w/ Denver	0.373	16.1	0.453	49.6	0.334	61.6	0.812	60.1	0.779	62.7	1.472	56.2	4.223	22.2
Non-Colorado	1.762	75.9	0.349	38.3	0.151	27.9	0.444	32.9	0.389	31.3	0.651	24.8	3.746	19.7
Coal-fired PP	0.932	40.1	0.286	31.4	0.005	0.9	0.000	0.0	0.000	0.0	0.001	0.0	1.224	6.4
All other sources	1.390	59.9	0.626	68.6	0.536	99.1	1.350	100.0	1.243	100.0	2.619	100.0	17.766	93.6
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
CONCENTRATION 1200-1800 95/10/11

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.517		0.123		1.001		0.411		1.654		1.654		3.342	
Estimated w/ fires	0.727	40.8	0.039	-68.0	0.179	-82.1	0.075	-81.7	0.200	-87.9	0.440	-73.4	1.661	-50.3
Estimated w/o fires	0.727	40.8	0.039	-68.0	0.179	-82.1	0.075	-81.7	0.200	-87.9	0.440	-73.4	1.661	-50.3

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.020	2.7	0.006	15.6	0.029	16.3	0.011	14.1	0.027	13.3	0.084	19.2	0.177	10.6
Craig 1-3	0.007	1.0	0.000	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.5
Craig 1-2	0.007	1.0	0.000	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.5
Craig 1	0.005	0.7	0.000	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.3
Craig 2	0.002	0.3	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.1
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.011	1.6	0.000	1.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.012	0.7
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.011	1.6	0.000	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.012	0.7
Steamboat Springs	0.001	0.1	0.003	8.1	0.008	4.5	0.004	5.8	0.012	6.2	0.013	3.0	0.042	2.5
Other Yampa Valley	0.001	0.1	0.002	5.4	0.021	11.7	0.006	8.3	0.014	7.1	0.071	16.2	0.115	6.9
Non-Yampa Valley	0.707	97.3	0.033	84.4	0.150	83.7	0.065	85.9	0.173	86.7	0.355	80.8	1.484	89.4
Denver	0.021	2.9	0.001	2.1	0.005	2.8	0.003	3.9	0.009	4.5	0.000	0.1	0.039	2.4
Colorado w/ Denver	0.134	18.4	0.018	45.1	0.106	59.6	0.044	58.3	0.120	59.8	0.254	57.8	0.676	40.7
Non-Colorado	0.574	78.9	0.015	39.3	0.043	24.2	0.021	27.6	0.054	26.9	0.101	22.9	0.808	48.7
Coal-fired PP	0.306	42.1	0.013	33.1	0.002	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.322	19.4
All other sources	0.421	57.9	0.026	66.9	0.177	98.9	0.075	100.0	0.200	100.0	0.440	100.0	1.339	80.6
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
EXTINCTION 1200-1800 95/10/11 6-hour average RH: 30%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.983		0.256		1.518		3.744		5.050		5.050		21.551	
Estimated w/ fires	1.384	40.8	0.082	-68.0	0.271	-82.1	0.685	-81.7	0.611	-87.9	1.343	-73.4	14.376	-33.3
Estimated w/o fires	1.384	40.8	0.082	-68.0	0.271	-82.1	0.685	-81.7	0.611	-87.9	1.343	-73.4	14.376	-33.3
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.038	2.7	0.013	15.6	0.044	16.3	0.097	14.1	0.082	13.3	0.258	19.2	0.531	3.7
Craig 1-3	0.013	1.0	0.001	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.014	0.1
Craig 1-2	0.013	1.0	0.001	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.014	0.1
Craig 1	0.009	0.7	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.1
Craig 2	0.004	0.3	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.022	1.6	0.001	1.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.023	0.2
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.022	1.6	0.001	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.023	0.2

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.1	0.007	8.1	0.012	4.5	0.040	5.8	0.038	6.2	0.041	3.0	0.139	1.0
Other Yampa Valley	0.001	0.1	0.004	5.4	0.032	11.7	0.057	8.3	0.043	7.1	0.217	16.2	0.355	2.5
Non-Yampa Valley	1.346	97.3	0.069	84.4	0.227	83.7	0.589	85.9	0.530	86.7	1.085	80.8	3.845	26.7
Denver	0.040	2.9	0.002	2.1	0.008	2.8	0.027	3.9	0.027	4.5	0.001	0.1	0.105	0.7
Colorado w/ Denver	0.254	18.4	0.037	45.1	0.162	59.6	0.400	58.3	0.365	59.8	0.777	57.8	1.994	13.9
Non-Colorado	1.092	78.9	0.032	39.3	0.065	24.2	0.189	27.6	0.164	26.9	0.308	22.9	1.851	12.9
Coal-fired PP	0.583	42.1	0.027	33.1	0.003	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.614	4.3
All other sources	0.801	57.9	0.055	66.9	0.268	98.9	0.685	100.0	0.611	100.0	1.342	100.0	13.762	95.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
CONCENTRATION 0600-1200 95/10/12

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.318		0.216		1.480		1.017		3.623		3.623		7.969	
Estimated w/ fires	0.248	-89.3	0.172	-20.6	0.189	-87.3	0.082	-92.0	0.210	-94.2	0.572	-84.2	1.472	-81.5
Estimated w/o fires	0.248	-89.3	0.172	-20.6	0.189	-87.3	0.082	-92.0	0.210	-94.2	0.572	-84.2	1.472	-81.5
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.012	4.7	0.052	30.1	0.030	15.9	0.011	13.7	0.027	12.7	0.091	16.0	0.223	15.1
Craig 1-3	0.000	0.0	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 1-2	0.000	0.0	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 1	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.011	4.6	0.032	18.7	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.044	3.0
Hayden 1	0.004	1.8	0.023	13.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.027	1.9
Hayden 2	0.007	2.8	0.009	5.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.017	1.1
Steamboat Springs	0.000	0.0	0.011	6.6	0.008	4.1	0.005	6.2	0.012	5.5	0.019	3.3	0.055	3.7
Other Yampa Valley	0.000	0.0	0.008	4.4	0.022	11.5	0.006	7.5	0.015	7.2	0.072	12.7	0.123	8.4
Non-Yampa Valley	0.236	95.3	0.120	69.9	0.159	84.1	0.071	86.3	0.184	87.3	0.481	84.0	1.250	84.9
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.057	23.2	0.106	61.7	0.127	67.4	0.055	67.7	0.145	68.7	0.385	67.4	0.876	59.5
Non-Colorado	0.179	72.1	0.014	8.3	0.032	16.8	0.015	18.5	0.039	18.5	0.095	16.6	0.374	25.4
Coal-fired PP	0.055	22.3	0.035	20.5	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.091	6.2
All other sources	0.192	77.7	0.136	79.5	0.188	99.7	0.082	100.0	0.210	100.0	0.572	100.0	1.381	93.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/10/12 6-hour average RH: 55%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	5.753		0.576		2.457		9.257		12.555		12.555		40.597	
Estimated w/ fires	0.615	-89.3	0.457	-20.6	0.313	-87.3	0.745	-92.0	0.729	-94.2	1.982	-84.2	14.841	-63.4
Estimated w/o fires	0.615	-89.3	0.457	-20.6	0.313	-87.3	0.745	-92.0	0.728	-94.2	1.982	-84.2	14.841	-63.4
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.029	4.7	0.137	30.1	0.050	15.9	0.102	13.7	0.092	12.7	0.317	16.0	0.727	4.9
Craig 1-3	0.000	0.0	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 1-2	0.000	0.0	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 1	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 2	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.028	4.6	0.086	18.7	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.115	0.8
Hayden 1	0.011	1.8	0.061	13.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.072	0.5
Hayden 2	0.017	2.8	0.025	5.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.043	0.3
Steamboat Springs	0.000	0.0	0.030	6.6	0.013	4.1	0.046	6.2	0.040	5.5	0.065	3.3	0.195	1.3
Other Yampa Valley	0.000	0.0	0.020	4.4	0.036	11.5	0.056	7.5	0.052	7.2	0.251	12.7	0.416	2.8
Non-Yampa Valley	0.586	95.3	0.320	69.9	0.263	84.1	0.643	86.3	0.636	87.3	1.666	84.0	4.113	27.7
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.143	23.2	0.282	61.7	0.211	67.4	0.504	67.7	0.501	68.7	1.336	67.4	2.977	20.1
Non-Colorado	0.443	72.1	0.038	8.3	0.052	16.8	0.138	18.5	0.135	18.5	0.330	16.6	1.136	7.7
Coal-fired PP	0.137	22.3	0.094	20.5	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.232	1.6
All other sources	0.478	77.7	0.363	79.5	0.312	99.7	0.745	100.0	0.729	100.0	1.982	100.0	14.609	98.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Buffalo Pass
CONCENTRATION 1200-1800 95/10/12

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.578		0.986		0.160		0.951		1.946		1.946		4.366	
Estimated w/ fires	0.182	-88.5	0.527	-46.6	0.090	-43.8	0.033	-96.6	0.084	-95.7	0.267	-86.3	1.183	-72.9
Estimated w/o fires	0.182	-88.5	0.527	-46.6	0.090	-43.8	0.033	-96.6	0.083	-95.7	0.267	-86.3	1.182	-72.9

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.066	36.3	0.235	44.6	0.032	35.3	0.008	24.2	0.022	26.0	0.053	19.7	0.416	35.1
Craig 1-3	0.019	10.6	0.089	16.9	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.109	9.2
Craig 1-2	0.019	10.6	0.089	16.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.109	9.2
Craig 1	0.010	5.3	0.045	8.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.055	4.7
Craig 2	0.009	5.2	0.044	8.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.054	4.5
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.046	25.3	0.133	25.2	0.001	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.180	15.2
Hayden 1	0.018	9.8	0.091	17.3	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.110	9.3
Hayden 2	0.028	15.4	0.042	7.9	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.070	5.9
Steamboat Springs	0.000	0.0	0.001	0.2	0.001	1.5	0.001	2.6	0.002	2.6	0.002	0.8	0.008	0.7
Other Yampa Valley	0.001	0.5	0.012	2.2	0.030	32.7	0.007	21.6	0.020	23.4	0.050	18.9	0.119	10.1
Non-Yampa Valley	0.116	63.7	0.292	55.3	0.058	64.6	0.025	75.6	0.061	73.3	0.214	80.3	0.766	64.8
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.039	21.3	0.070	13.2	0.038	42.6	0.016	48.3	0.041	48.9	0.131	49.1	0.335	28.3
Non-Colorado	0.077	42.3	0.222	42.1	0.020	22.0	0.009	27.4	0.020	24.4	0.083	31.2	0.432	36.5
Coal-fired PP	0.097	53.5	0.416	78.9	0.002	2.4	0.000	0.0	0.000	0.0	0.000	0.1	0.515	43.6
All other sources	0.084	46.5	0.111	21.1	0.088	97.6	0.033	100.0	0.084	100.0	0.267	99.9	0.667	56.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.001	0.7	0.000	0.0	0.001	0.1

Buffalo Pass
EXTINCTION 1200-1800 95/10/12 6-hour average RH: 92%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	16.062		10.219		0.571		8.651		17.417		17.417		62.920	
Estimated w/ fires	1.850	-88.5	5.460	-46.6	0.321	-43.8	0.298	-96.6	0.750	-95.7	2.389	-86.3	21.068	-66.5
Estimated w/o fires	1.850	-88.5	5.459	-46.6	0.321	-43.8	0.298	-96.6	0.745	-95.7	2.389	-86.3	21.061	-66.5
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.672	36.3	2.437	44.6	0.113	35.3	0.072	24.2	0.195	26.0	0.471	19.7	3.961	18.8
Craig 1-3	0.195	10.6	0.924	16.9	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	1.121	5.3
Craig 1-2	0.195	10.6	0.924	16.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	1.121	5.3
Craig 1	0.099	5.3	0.469	8.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.568	2.7
Craig 2	0.097	5.2	0.456	8.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.553	2.6
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.467	25.3	1.378	25.2	0.003	0.8	0.000	0.0	0.000	0.0	0.000	0.0	1.848	8.8
Hayden 1	0.182	9.8	0.946	17.3	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	1.130	5.4
Hayden 2	0.285	15.4	0.431	7.9	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.718	3.4

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.000	0.0	0.013	0.2	0.005	1.5	0.008	2.6	0.020	2.6	0.019	0.8	0.065	0.3
Other Yampa Valley	0.009	0.5	0.122	2.2	0.105	32.7	0.065	21.6	0.175	23.4	0.452	18.9	0.927	4.4
Non-Yampa Valley	1.178	63.7	3.022	55.3	0.207	64.6	0.226	75.6	0.550	73.3	1.918	80.3	7.100	33.7
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.394	21.3	0.721	13.2	0.137	42.6	0.144	48.3	0.367	48.9	1.173	49.1	2.936	13.9
Non-Colorado	0.784	42.3	2.301	42.1	0.071	22.0	0.082	27.4	0.183	24.4	0.745	31.2	4.164	19.8
Coal-fired PP	0.990	53.5	4.307	78.9	0.008	2.4	0.000	0.0	0.000	0.0	0.001	0.1	5.307	25.2
All other sources	0.860	46.5	1.152	21.1	0.313	97.6	0.298	100.0	0.750	100.0	2.387	99.9	15.762	74.8
Fires	0.000	0.0	0.001	0.0	0.000	0.0	0.000	0.1	0.005	0.7	0.000	0.0	0.007	0.0

Buffalo Pass
CONCENTRATION 0600-1200 95/10/13

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.368		0.178		0.239		0.365		0.961		0.961		1.868	
Estimated w/ fires	0.807	119.1	1.059	494.4	0.216	-9.5	0.080	-78.2	0.182	-81.0	0.669	-30.4	3.012	61.3
Estimated w/o fires	0.807	119.1	1.059	494.4	0.216	-9.5	0.080	-78.2	0.182	-81.0	0.669	-30.4	3.012	61.3
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.341	42.3	0.627	59.2	0.071	32.7	0.019	23.6	0.050	27.3	0.224	33.5	1.332	44.2
Craig 1-3	0.078	9.7	0.135	12.7	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.214	7.1
Craig 1-2	0.078	9.7	0.135	12.7	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.214	7.1
Craig 1	0.046	5.7	0.073	6.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.120	4.0
Craig 2	0.033	4.0	0.061	5.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.094	3.1
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.262	32.5	0.472	44.6	0.004	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.738	24.5
Hayden 1	0.114	14.1	0.354	33.4	0.002	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.470	15.6
Hayden 2	0.148	18.3	0.118	11.2	0.002	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.268	8.9
Steamboat Springs	0.000	0.0	0.007	0.7	0.010	4.6	0.006	7.2	0.014	7.6	0.027	4.0	0.063	2.1
Other Yampa Valley	0.000	0.0	0.014	1.3	0.056	25.8	0.013	16.4	0.036	19.7	0.197	29.5	0.316	10.5
Non-Yampa Valley	0.465	57.7	0.432	40.8	0.145	67.3	0.061	76.3	0.132	72.6	0.445	66.5	1.680	55.8
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.004	0.5	0.037	3.5	0.035	16.4	0.012	15.1	0.029	15.8	0.126	18.8	0.243	8.1
Non-Colorado	0.462	57.2	0.394	37.2	0.110	50.8	0.049	61.3	0.104	56.8	0.319	47.7	1.437	47.7
Coal-fired PP	0.536	66.5	0.786	74.2	0.009	4.0	0.000	0.0	0.000	0.0	0.000	0.1	1.331	44.2
All other sources	0.270	33.5	0.273	25.8	0.207	96.0	0.080	100.0	0.182	100.0	0.668	99.9	1.681	55.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/10/13 6-hour average RH: 78%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.511		0.763		0.491		3.325		4.440		4.440		20.530	
Estimated w/ fires	3.311	119.1	4.537	494.4	0.445	-9.5	0.724	-78.2	0.843	-81.0	3.090	-30.4	22.949	11.8
Estimated w/o fires	3.311	119.1	4.537	494.4	0.445	-9.5	0.724	-78.2	0.842	-81.0	3.090	-30.4	22.948	11.8
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.400	42.3	2.687	59.2	0.145	32.7	0.171	23.6	0.230	27.3	1.036	33.5	5.670	24.7
Craig 1-3	0.322	9.7	0.577	12.7	0.003	0.6	0.000	0.0	0.000	0.0	0.001	0.0	0.902	3.9
Craig 1-2	0.322	9.7	0.577	12.7	0.002	0.5	0.000	0.0	0.000	0.0	0.001	0.0	0.901	3.9
Craig 1	0.188	5.7	0.314	6.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.504	2.2
Craig 2	0.133	4.0	0.262	5.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.397	1.7
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	1.076	32.5	2.023	44.6	0.007	1.7	0.000	0.0	0.000	0.0	0.001	0.0	3.107	13.5
Hayden 1	0.468	14.1	1.515	33.4	0.004	0.8	0.000	0.0	0.000	0.0	0.000	0.0	1.988	8.7
Hayden 2	0.607	18.3	0.507	11.2	0.004	0.9	0.000	0.0	0.000	0.0	0.000	0.0	1.119	4.9
Steamboat Springs	0.001	0.0	0.030	0.7	0.021	4.6	0.052	7.2	0.064	7.6	0.123	4.0	0.291	1.3
Other Yampa Valley	0.001	0.0	0.058	1.3	0.115	25.8	0.119	16.4	0.166	19.7	0.911	29.5	1.370	6.0
Non-Yampa Valley	1.910	57.7	1.849	40.8	0.299	67.3	0.553	76.3	0.612	72.6	2.054	66.5	7.279	31.7
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.016	0.5	0.160	3.5	0.073	16.4	0.109	15.1	0.133	15.8	0.580	18.8	1.072	4.7
Non-Colorado	1.894	57.2	1.690	37.2	0.226	50.8	0.444	61.3	0.479	56.8	1.474	47.7	6.207	27.0
Coal-fired PP	2.201	66.5	3.366	74.2	0.018	4.0	0.000	0.0	0.000	0.0	0.002	0.1	5.587	24.3
All other sources	1.110	33.5	1.171	25.8	0.427	96.0	0.724	100.0	0.843	100.0	3.088	99.9	17.363	75.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1	0.000	0.0	0.001	0.0

Buffalo Pass
CONCENTRATION 1200-1800 95/10/13

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.317		0.153		0.176		0.157		1.015		1.015		1.532	
Estimated w/ fires	1.335	321.0	1.121	634.4	0.162	-7.6	0.051	-67.8	0.132	-87.0	0.303	-70.2	3.103	102.5
Estimated w/o fires	1.335	321.0	1.121	634.4	0.162	-7.6	0.051	-67.8	0.131	-87.1	0.303	-70.2	3.103	102.5

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.795	59.6	0.915	81.6	0.089	55.1	0.021	42.1	0.064	48.6	0.110	36.4	1.995	64.3
Craig 1-3	0.312	23.4	0.408	36.4	0.003	2.0	0.000	0.0	0.000	0.0	0.001	0.2	0.724	23.3
Craig 1-2	0.312	23.4	0.408	36.4	0.003	1.7	0.000	0.0	0.000	0.0	0.000	0.1	0.724	23.3
Craig 1	0.173	13.0	0.217	19.4	0.001	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.392	12.6
Craig 2	0.139	10.4	0.191	17.0	0.001	0.9	0.000	0.0	0.000	0.0	0.000	0.1	0.332	10.7
Craig 3	0.000	0.0	0.000	0.0	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.1	0.001	0.0
Hayden 1-2	0.479	35.9	0.490	43.7	0.004	2.3	0.000	0.0	0.000	0.0	0.000	0.1	0.972	31.3
Hayden 1	0.197	14.7	0.357	31.9	0.002	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.556	17.9
Hayden 2	0.282	21.1	0.132	11.8	0.002	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.416	13.4
Steamboat Springs	0.000	0.0	0.007	0.6	0.007	4.6	0.004	8.0	0.011	8.7	0.013	4.3	0.043	1.4
Other Yampa Valley	0.003	0.3	0.011	1.0	0.075	46.2	0.017	34.1	0.052	39.9	0.097	31.9	0.256	8.2
Non-Yampa Valley	0.539	40.4	0.206	18.4	0.073	44.9	0.029	57.9	0.067	51.3	0.192	63.6	1.107	35.7
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.004	0.3	0.012	1.1	0.020	12.2	0.008	15.4	0.018	14.0	0.068	22.3	0.129	4.2
Non-Colorado	0.535	40.1	0.194	17.3	0.053	32.7	0.021	42.5	0.049	37.3	0.125	41.2	0.978	31.5
Coal-fired PP	1.008	75.5	1.008	90.0	0.010	6.1	0.000	0.0	0.000	0.0	0.001	0.3	2.027	65.3
All other sources	0.327	24.5	0.112	10.0	0.153	93.9	0.051	100.0	0.132	100.0	0.302	99.7	1.076	34.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0

Buffalo Pass
EXTINCTION 1200-1800 95/10/13 6-hour average RH: 48%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.715		0.372		0.282		1.429		3.352		3.352		16.149	
Estimated w/ fires	3.010	321.0	2.729	634.4	0.260	-7.6	0.460	-67.8	0.434	-87.0	1.001	-70.2	17.894	10.8
Estimated w/o fires	3.010	321.0	2.729	634.4	0.260	-7.6	0.460	-67.8	0.434	-87.1	1.001	-70.2	17.894	10.8
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.793	59.6	2.228	81.6	0.144	55.1	0.194	42.1	0.211	48.6	0.365	36.4	4.934	27.6
Craig 1-3	0.705	23.4	0.994	36.4	0.005	2.0	0.000	0.0	0.000	0.0	0.002	0.2	1.705	9.5
Craig 1-2	0.705	23.4	0.994	36.4	0.004	1.7	0.000	0.0	0.000	0.0	0.001	0.1	1.704	9.5
Craig 1	0.391	13.0	0.529	19.4	0.002	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.922	5.2
Craig 2	0.314	10.4	0.465	17.0	0.002	0.9	0.000	0.0	0.000	0.0	0.001	0.1	0.782	4.4
Craig 3	0.000	0.0	0.000	0.0	0.001	0.3	0.000	0.0	0.000	0.0	0.001	0.1	0.001	0.0
Hayden 1-2	1.080	35.9	1.192	43.7	0.006	2.3	0.000	0.0	0.000	0.0	0.001	0.1	2.279	12.7
Hayden 1	0.444	14.7	0.870	31.9	0.003	1.1	0.000	0.0	0.000	0.0	0.000	0.0	1.317	7.4
Hayden 2	0.636	21.1	0.322	11.8	0.003	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.962	5.4

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.0	0.016	0.6	0.012	4.6	0.037	8.0	0.038	8.7	0.043	4.3	0.147	0.8
Other Yampa Valley	0.008	0.3	0.026	1.0	0.120	46.2	0.157	34.1	0.173	39.9	0.319	31.9	0.804	4.5
Non-Yampa Valley	1.217	40.4	0.501	18.4	0.117	44.9	0.266	57.9	0.223	51.3	0.636	63.6	2.959	16.5
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.009	0.3	0.029	1.1	0.032	12.2	0.071	15.4	0.061	14.0	0.223	22.3	0.425	2.4
Non-Colorado	1.207	40.1	0.472	17.3	0.085	32.7	0.196	42.5	0.162	37.3	0.413	41.2	2.535	14.2
Coal-fired PP	2.273	75.5	2.455	90.0	0.016	6.1	0.000	0.0	0.000	0.0	0.003	0.3	4.747	26.5
All other sources	0.737	24.5	0.273	10.0	0.245	93.9	0.460	100.0	0.434	100.0	0.998	99.7	13.147	73.5
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.001	0.0

Buffalo Pass
CONCENTRATION 0600-1200 95/10/14

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.299		0.224		0.493		0.292		0.635		0.635		1.656	
Estimated w/ fires	0.612	104.8	0.186	-17.1	0.249	-49.4	0.096	-67.2	0.233	-63.3	0.787	24.0	2.164	30.7
Estimated w/o fires	0.612	104.8	0.186	-17.1	0.249	-49.4	0.096	-67.2	0.233	-63.4	0.787	24.0	2.163	30.7
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.023	3.7	0.016	8.4	0.057	22.8	0.016	16.3	0.038	16.3	0.252	31.9	0.400	18.5
Craig 1-3	0.006	0.9	0.002	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.4
Craig 1-2	0.006	0.9	0.002	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.4
Craig 1	0.003	0.5	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.2
Craig 2	0.002	0.4	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.2
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.015	2.4	0.003	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.018	0.8
Hayden 1	0.006	1.0	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.4
Hayden 2	0.009	1.4	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.5
Steamboat Springs	0.000	0.0	0.003	1.5	0.005	2.1	0.003	3.1	0.008	3.4	0.013	1.6	0.032	1.5
Other Yampa Valley	0.002	0.3	0.008	4.2	0.051	20.6	0.013	13.2	0.030	13.0	0.239	30.3	0.343	15.8
Non-Yampa Valley	0.590	96.3	0.170	91.6	0.193	77.2	0.080	83.7	0.195	83.6	0.536	68.1	1.763	81.5
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.016	2.6	0.040	21.5	0.089	35.6	0.034	35.5	0.086	36.8	0.280	35.6	0.545	25.2
Non-Colorado	0.574	93.7	0.130	70.1	0.104	41.6	0.046	48.2	0.109	46.8	0.256	32.5	1.219	56.3
Coal-fired PP	0.133	21.7	0.038	20.6	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.173	8.0
All other sources	0.479	78.3	0.148	79.4	0.248	99.5	0.096	100.0	0.233	100.0	0.787	100.0	1.991	92.0
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/10/14 6-hour average RH: 38%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.606		0.495		0.763		2.662		1.995		1.995		16.521	
Estimated w/ fires	1.241	104.8	0.411	-17.1	0.386	-49.4	0.874	-67.2	0.732	-63.3	2.474	24.0	16.117	-2.4
Estimated w/o fires	1.241	104.8	0.411	-17.1	0.386	-49.4	0.874	-67.2	0.731	-63.4	2.474	24.0	16.117	-2.4
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.046	3.7	0.034	8.4	0.088	22.8	0.142	16.3	0.119	16.3	0.790	31.9	1.220	7.6
Craig 1-3	0.011	0.9	0.005	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.1
Craig 1-2	0.011	0.9	0.005	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.1
Craig 1	0.007	0.5	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.1
Craig 2	0.005	0.4	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.030	2.4	0.007	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.037	0.2
Hayden 1	0.012	1.0	0.004	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.017	0.1
Hayden 2	0.018	1.4	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.020	0.1
Steamboat Springs	0.001	0.0	0.006	1.5	0.008	2.1	0.027	3.1	0.025	3.4	0.040	1.6	0.107	0.7
Other Yampa Valley	0.004	0.3	0.017	4.2	0.079	20.6	0.115	13.2	0.095	13.0	0.750	30.3	1.061	6.6
Non-Yampa Valley	1.196	96.3	0.376	91.6	0.298	77.2	0.732	83.7	0.612	83.6	1.683	68.1	4.896	30.4
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.032	2.6	0.088	21.5	0.138	35.6	0.310	35.5	0.269	36.8	0.880	35.6	1.718	10.7
Non-Colorado	1.164	93.7	0.288	70.1	0.161	41.6	0.421	48.2	0.343	46.8	0.803	32.5	3.179	19.7
Coal-fired PP	0.269	21.7	0.085	20.6	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.356	2.2
All other sources	0.972	78.3	0.326	79.4	0.384	99.5	0.874	100.0	0.732	100.0	2.473	100.0	15.761	97.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1	0.000	0.0	0.001	0.0

Buffalo Pass
CONCENTRATION 1200-1800 95/10/14

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.327		0.059		0.302		0.258		0.936		0.936		1.700	
Estimated w/ fires	0.844	157.9	0.458	678.0	0.181	-40.1	0.071	-72.3	0.176	-81.2	0.501	-46.5	2.232	31.3
Estimated w/o fires	0.844	157.9	0.458	678.0	0.181	-40.1	0.071	-72.3	0.176	-81.2	0.501	-46.5	2.231	31.3

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires												
Total Yampa Valley	0.396	46.9	0.316	69.1	0.057	31.4	0.018	25.5	0.045	25.7	0.178	35.5	1.010	45.3
Craig 1-3	0.085	10.0	0.042	9.2	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.127	5.7
Craig 1-2	0.078	9.2	0.041	9.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.119	5.4
Craig 1	0.042	5.0	0.022	4.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.064	2.9
Craig 2	0.036	4.2	0.020	4.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.056	2.5
Craig 3	0.007	0.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.4
Hayden 1-2	0.309	36.6	0.251	54.8	0.002	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.561	25.2
Hayden 1	0.141	16.7	0.177	38.7	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.319	14.3
Hayden 2	0.168	19.9	0.074	16.1	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.243	10.9
Steamboat Springs	0.001	0.1	0.010	2.1	0.011	6.3	0.006	8.9	0.018	10.1	0.020	4.0	0.067	3.0
Other Yampa Valley	0.002	0.2	0.013	2.8	0.043	23.9	0.012	16.6	0.027	15.6	0.157	31.4	0.255	11.4
Non-Yampa Valley	0.448	53.1	0.142	30.9	0.124	68.5	0.053	74.5	0.131	74.2	0.323	64.5	1.221	54.7
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.020	2.3	0.036	7.9	0.060	33.3	0.025	34.7	0.064	36.2	0.170	33.9	0.375	16.8
Non-Colorado	0.428	50.7	0.105	23.0	0.064	35.2	0.028	39.7	0.067	38.1	0.153	30.6	0.846	37.9
Coal-fired PP	0.489	57.9	0.328	71.6	0.003	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.820	36.8
All other sources	0.355	42.1	0.130	28.4	0.178	98.2	0.071	100.0	0.176	100.0	0.501	100.0	1.411	63.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0

Buffalo Pass
EXTINCTION 1200-1800 95/10/14 6-hour average RH: 42%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.691		0.135		0.474		2.345		2.996		2.996		16.641	
Estimated w/ fires	1.782	157.9	1.049	678.0	0.284	-40.1	0.651	-72.3	0.565	-81.2	1.604	-46.5	15.934	-4.2
Estimated w/o fires	1.782	157.9	1.049	678.0	0.284	-40.1	0.651	-72.3	0.564	-81.2	1.604	-46.5	15.933	-4.3
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.836	46.9	0.724	69.1	0.089	31.4	0.166	25.5	0.145	25.7	0.569	35.5	2.530	15.9
Craig 1-3	0.179	10.0	0.097	9.2	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.276	1.7
Craig 1-2	0.164	9.2	0.094	9.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.259	1.6
Craig 1	0.089	5.0	0.049	4.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.139	0.9
Craig 2	0.075	4.2	0.045	4.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.121	0.8
Craig 3	0.014	0.8	0.003	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.017	0.1
Hayden 1-2	0.651	36.6	0.575	54.8	0.003	0.9	0.000	0.0	0.000	0.0	0.000	0.0	1.229	7.7
Hayden 1	0.297	16.7	0.406	38.7	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.704	4.4
Hayden 2	0.355	19.9	0.169	16.1	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.525	3.3

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.003	0.1	0.022	2.1	0.018	6.3	0.058	8.9	0.057	10.1	0.065	4.0	0.223	1.4
Other Yampa Valley	0.004	0.2	0.030	2.8	0.068	23.9	0.108	16.6	0.088	15.6	0.503	31.4	0.801	5.0
Non-Yampa Valley	0.946	53.1	0.324	30.9	0.195	68.5	0.484	74.5	0.419	74.2	1.035	64.5	3.404	21.4
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.042	2.3	0.083	7.9	0.095	33.3	0.226	34.7	0.204	36.2	0.544	33.9	1.194	7.5
Non-Colorado	0.904	50.7	0.241	23.0	0.100	35.2	0.259	39.7	0.215	38.1	0.491	30.6	2.210	13.9
Coal-fired PP	1.032	57.9	0.751	71.6	0.005	1.8	0.000	0.0	0.000	0.0	0.001	0.0	1.789	11.2
All other sources	0.750	42.1	0.298	28.4	0.279	98.2	0.651	100.0	0.565	100.0	1.603	100.0	14.145	88.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.001	0.0

Buffalo Pass
CONCENTRATION 0600-1200 95/10/15

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.257		0.190		-99.000		0.290		-99.000		-99.000		1.103	
Estimated w/ fires	0.881	242.4	0.606	219.5	0.312	-99.0	0.125	-56.9	0.321	-99.0	0.893	-99.0	3.138	184.5
Estimated w/o fires	0.881	242.4	0.606	219.5	0.312	-99.0	0.125	-56.9	0.320	-99.0	0.893	-99.0	3.137	184.4
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.203	23.0	0.196	32.3	0.054	17.3	0.016	12.7	0.037	11.6	0.233	26.1	0.739	23.6
Craig 1-3	0.037	4.2	0.026	4.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.063	2.0
Craig 1-2	0.033	3.7	0.023	3.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.056	1.8
Craig 1	0.017	1.9	0.011	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.028	0.9
Craig 2	0.016	1.8	0.013	2.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.028	0.9
Craig 3	0.004	0.5	0.003	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.2
Hayden 1-2	0.163	18.5	0.144	23.7	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.308	9.8
Hayden 1	0.086	9.8	0.112	18.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.198	6.3
Hayden 2	0.077	8.8	0.032	5.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.109	3.5
Steamboat Springs	0.001	0.1	0.008	1.3	0.006	1.8	0.003	2.6	0.009	2.7	0.011	1.2	0.037	1.2
Other Yampa Valley	0.002	0.2	0.018	3.0	0.048	15.2	0.013	10.1	0.029	8.9	0.222	24.8	0.331	10.5
Non-Yampa Valley	0.678	77.0	0.410	67.6	0.258	82.7	0.109	87.3	0.283	88.1	0.660	73.9	2.398	76.4
Denver	0.025	2.8	0.012	2.0	0.001	0.3	0.001	0.4	0.002	0.5	0.000	0.0	0.040	1.3
Colorado w/ Denver	0.098	11.1	0.213	35.1	0.166	53.2	0.067	53.3	0.180	56.2	0.434	48.6	1.158	36.9
Non-Colorado	0.580	65.8	0.197	32.5	0.092	29.5	0.042	33.9	0.102	31.9	0.226	25.3	1.240	39.5
Coal-fired PP	0.358	40.7	0.230	38.0	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.591	18.8
All other sources	0.522	59.3	0.376	62.0	0.310	99.4	0.125	100.0	0.321	100.0	0.893	100.0	2.547	81.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.001	0.3	0.000	0.0	0.001	0.0

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/10/15 6-hour average RH: 38%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.525		0.421		-99.000		2.643		-99.000		-99.000		-99.000	
Estimated w/ fires	1.798	242.4	1.346	219.5	0.484	-99.0	1.138	-56.9	1.011	-99.0	2.814	-99.0	18.591	-99.0
Estimated w/o fires	1.798	242.4	1.346	219.5	0.484	-99.0	1.138	-56.9	1.008	-99.0	2.814	-99.0	18.587	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.414	23.0	0.436	32.3	0.084	17.3	0.145	12.7	0.117	11.6	0.734	26.1	1.929	10.4
Craig 1-3	0.075	4.2	0.059	4.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.134	0.7
Craig 1-2	0.067	3.7	0.052	3.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.119	0.6
Craig 1	0.035	1.9	0.023	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.058	0.3
Craig 2	0.032	1.8	0.028	2.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.060	0.3
Craig 3	0.008	0.5	0.007	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.015	0.1
Hayden 1-2	0.333	18.5	0.319	23.7	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.653	3.5
Hayden 1	0.175	9.8	0.248	18.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.424	2.3
Hayden 2	0.158	8.8	0.071	5.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.229	1.2
Steamboat Springs	0.001	0.1	0.017	1.3	0.009	1.8	0.030	2.6	0.028	2.7	0.035	1.2	0.119	0.6
Other Yampa Valley	0.004	0.2	0.041	3.0	0.074	15.2	0.115	10.1	0.090	8.9	0.699	24.8	1.022	5.5
Non-Yampa Valley	1.383	77.0	0.911	67.6	0.400	82.7	0.993	87.3	0.891	88.1	2.080	73.9	6.658	35.8
Denver	0.050	2.8	0.027	2.0	0.002	0.3	0.005	0.4	0.005	0.5	0.000	0.0	0.090	0.5
Colorado w/ Denver	0.200	11.1	0.473	35.1	0.257	53.2	0.607	53.3	0.568	56.2	1.368	48.6	3.473	18.7
Non-Colorado	1.183	65.8	0.438	32.5	0.142	29.5	0.386	33.9	0.323	31.9	0.712	25.3	3.185	17.1
Coal-fired PP	0.731	40.7	0.512	38.0	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	1.246	6.7
All other sources	1.066	59.3	0.835	62.0	0.481	99.4	1.138	100.0	1.011	100.0	2.814	100.0	17.344	93.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1	0.003	0.3	0.000	0.0	0.003	0.0

Buffalo Pass
CONCENTRATION 1200-1800 95/10/15

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.242		0.107		0.486		0.163		1.606		1.606		2.300	
Estimated w/ fires	1.042	330.0	0.372	246.1	0.248	-48.9	0.101	-38.4	0.262	-83.7	0.660	-58.9	2.685	16.7
Estimated w/o fires	1.042	330.0	0.372	246.1	0.248	-49.0	0.100	-38.5	0.260	-83.8	0.660	-58.9	2.682	16.6

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.413	39.7	0.309	83.1	0.056	22.7	0.018	17.7	0.043	16.3	0.197	29.8	1.036	38.6
Craig 1-3	0.062	6.0	0.034	9.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.097	3.6
Craig 1-2	0.051	4.9	0.031	8.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.082	3.0
Craig 1	0.026	2.5	0.016	4.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.042	1.6
Craig 2	0.024	2.3	0.015	4.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.040	1.5
Craig 3	0.012	1.1	0.003	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.015	0.6
Hayden 1-2	0.347	33.3	0.255	68.5	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.604	22.5
Hayden 1	0.138	13.3	0.156	41.9	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.295	11.0
Hayden 2	0.209	20.1	0.099	26.6	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.309	11.5
Steamboat Springs	0.001	0.1	0.011	3.0	0.010	4.0	0.005	5.4	0.016	5.9	0.017	2.6	0.061	2.3
Other Yampa Valley	0.002	0.2	0.009	2.5	0.044	17.8	0.012	12.2	0.027	10.4	0.179	27.2	0.274	10.2
Non-Yampa Valley	0.629	60.3	0.063	16.9	0.192	77.3	0.083	82.2	0.217	82.8	0.463	70.2	1.646	61.3
Denver	0.040	3.9	0.001	0.3	0.003	1.1	0.001	1.3	0.004	1.6	0.000	0.0	0.050	1.9
Colorado w/ Denver	0.123	11.8	0.032	8.6	0.125	50.4	0.051	51.0	0.140	53.5	0.311	47.1	0.782	29.1
Non-Colorado	0.506	48.6	0.031	8.3	0.067	26.9	0.031	31.2	0.077	29.3	0.153	23.1	0.864	32.2
Coal-fired PP	0.585	56.1	0.297	79.9	0.003	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.885	33.0
All other sources	0.457	43.9	0.075	20.1	0.245	98.8	0.101	100.0	0.262	100.0	0.660	100.0	1.800	67.0
Fires	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.2	0.002	0.9	0.000	0.0	0.003	0.1

Buffalo Pass
EXTINCTION 1200-1800 95/10/15 6-hour average RH: 32%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.469		0.227		0.741		1.485		4.940		4.940		17.863	
Estimated w/ fires	2.017	330.0	0.787	246.1	0.379	-48.9	0.915	-38.4	0.807	-83.7	2.030	-58.9	16.935	-5.2
Estimated w/o fires	2.017	330.0	0.787	246.1	0.378	-49.0	0.913	-38.5	0.800	-83.8	2.030	-58.9	16.926	-5.2
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.800	39.7	0.654	83.1	0.086	22.7	0.162	17.7	0.131	16.3	0.605	29.8	2.438	14.4
Craig 1-3	0.121	6.0	0.072	9.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.194	1.1
Craig 1-2	0.098	4.9	0.065	8.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.164	1.0
Craig 1	0.051	2.5	0.033	4.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.084	0.5
Craig 2	0.047	2.3	0.032	4.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.080	0.5
Craig 3	0.023	1.1	0.007	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.030	0.2
Hayden 1-2	0.673	33.3	0.539	68.5	0.003	0.7	0.000	0.0	0.000	0.0	0.000	0.0	1.215	7.2
Hayden 1	0.268	13.3	0.330	41.9	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.599	3.5
Hayden 2	0.405	20.1	0.209	26.6	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.616	3.6

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.002	0.1	0.024	3.0	0.015	4.0	0.050	5.4	0.048	5.9	0.053	2.6	0.192	1.1
Other Yampa Valley	0.004	0.2	0.019	2.5	0.067	17.8	0.112	12.2	0.084	10.4	0.552	27.2	0.838	4.9
Non-Yampa Valley	1.217	60.3	0.133	16.9	0.293	77.3	0.752	82.2	0.668	82.8	1.425	70.2	4.487	26.5
Denver	0.078	3.9	0.003	0.3	0.004	1.1	0.012	1.3	0.013	1.6	0.001	0.0	0.110	0.6
Colorado w/ Denver	0.237	11.8	0.067	8.6	0.191	50.4	0.466	51.0	0.432	53.5	0.955	47.1	2.349	13.9
Non-Colorado	0.980	48.6	0.065	8.3	0.102	26.9	0.285	31.2	0.236	29.3	0.469	23.1	2.138	12.6
Coal-fired PP	1.132	56.1	0.629	79.9	0.005	1.2	0.000	0.0	0.000	0.0	0.001	0.0	1.766	10.4
All other sources	0.885	43.9	0.158	20.1	0.374	98.8	0.915	100.0	0.807	100.0	2.029	100.0	15.169	89.6
Fires	0.000	0.0	0.000	0.0	0.000	0.1	0.002	0.2	0.007	0.9	0.000	0.0	0.009	0.1

Buffalo Pass
CONCENTRATION 0600-1200 95/10/16

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.842		-99.000		0.528		0.206		0.431		0.431		1.973	
Estimated w/ fires	1.063	26.3	0.383	-99.0	0.371	-29.6	0.154	-25.5	0.413	-4.2	0.944	119.1	3.328	68.7
Estimated w/o fires	1.063	26.3	0.383	-99.0	0.371	-29.7	0.153	-25.7	0.409	-5.1	0.944	119.1	3.323	68.4
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.068	6.4	0.046	12.0	0.043	11.6	0.013	8.5	0.031	7.5	0.190	20.1	0.391	11.8
Craig 1-3	0.011	1.0	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.4
Craig 1-2	0.010	1.0	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.4
Craig 1	0.006	0.6	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.2
Craig 2	0.004	0.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.2
Craig 3	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.055	5.1	0.031	8.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.086	2.6
Hayden 1	0.038	3.6	0.030	7.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.068	2.0
Hayden 2	0.017	1.6	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.018	0.6
Steamboat Springs	0.001	0.1	0.004	1.0	0.005	1.4	0.003	2.0	0.008	2.0	0.010	1.1	0.031	0.9
Other Yampa Valley	0.002	0.2	0.008	2.2	0.038	10.2	0.010	6.5	0.023	5.5	0.180	19.0	0.260	7.8
Non-Yampa Valley	0.995	93.6	0.337	88.0	0.328	88.3	0.140	91.3	0.378	91.6	0.754	79.9	2.932	88.1
Denver	0.122	11.4	0.030	7.9	0.013	3.4	0.006	4.2	0.020	4.9	0.001	0.1	0.192	5.8
Colorado w/ Denver	0.329	31.0	0.208	54.3	0.240	64.7	0.098	63.7	0.274	66.4	0.525	55.7	1.675	50.3
Non-Colorado	0.666	62.6	0.129	33.7	0.088	23.6	0.042	27.6	0.104	25.2	0.229	24.2	1.257	37.8
Coal-fired PP	0.464	43.6	0.106	27.7	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.572	17.2
All other sources	0.599	56.4	0.277	72.3	0.369	99.5	0.154	100.0	0.413	100.0	0.944	100.0	2.755	82.8
Fires	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.2	0.004	0.9	0.000	0.0	0.005	0.1

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/10/16 6-hour average RH: 30%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.604		-99.000		0.801		1.876		1.316		1.316		-99.000	
Estimated w/ fires	2.025	26.3	0.799	-99.0	0.563	-29.6	1.397	-25.5	1.260	-4.2	2.883	119.1	18.929	-99.0
Estimated w/o fires	2.025	26.3	0.799	-99.0	0.563	-29.7	1.394	-25.7	1.248	-5.1	2.883	119.1	18.914	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.130	6.4	0.096	12.0	0.066	11.6	0.118	8.5	0.094	7.5	0.580	20.1	1.084	5.7
Craig 1-3	0.021	1.0	0.005	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.026	0.1
Craig 1-2	0.020	1.0	0.005	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.025	0.1
Craig 1	0.012	0.6	0.003	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.014	0.1
Craig 2	0.008	0.4	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.1
Craig 3	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.104	5.1	0.066	8.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.170	0.9
Hayden 1	0.072	3.6	0.062	7.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.135	0.7
Hayden 2	0.032	1.6	0.003	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.035	0.2
Steamboat Springs	0.001	0.1	0.008	1.0	0.008	1.4	0.027	2.0	0.025	2.0	0.031	1.1	0.102	0.5
Other Yampa Valley	0.004	0.2	0.017	2.2	0.057	10.2	0.091	6.5	0.069	5.5	0.549	19.0	0.787	4.2
Non-Yampa Valley	1.895	93.6	0.703	88.0	0.497	88.3	1.276	91.3	1.154	91.6	2.303	79.9	7.830	41.4
Denver	0.232	11.4	0.063	7.9	0.019	3.4	0.059	4.2	0.062	4.9	0.004	0.1	0.438	2.3
Colorado w/ Denver	0.627	31.0	0.434	54.3	0.365	64.7	0.890	63.7	0.836	66.4	1.605	55.7	4.758	25.1
Non-Colorado	1.268	62.6	0.269	33.7	0.133	23.6	0.386	27.6	0.318	25.2	0.698	24.2	3.072	16.2
Coal-fired PP	0.884	43.6	0.221	27.7	0.003	0.5	0.000	0.0	0.000	0.0	0.000	0.0	1.108	5.9
All other sources	1.142	56.4	0.578	72.3	0.561	99.5	1.397	100.0	1.260	100.0	2.883	100.0	17.820	94.1
Fires	0.000	0.0	0.000	0.0	0.000	0.1	0.003	0.2	0.012	0.9	0.000	0.0	0.015	0.1

Buffalo Pass
CONCENTRATION 1200-1800 95/10/16

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.842		-99.000		0.528		0.206		0.431		0.431		1.973	
Estimated w/ fires	1.139	35.3	0.381	-99.0	0.271	-48.7	0.099	-51.9	0.305	-29.2	0.556	29.1	2.751	39.5
Estimated w/o fires	1.139	35.3	0.379	-99.0	0.268	-49.2	0.096	-53.6	0.262	-39.3	0.556	29.1	2.700	36.8

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.307	27.0	0.318	83.5	0.110	40.8	0.028	28.6	0.081	26.7	0.170	30.6	1.015	36.9
Craig 1-3	0.060	5.3	0.071	18.7	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.132	4.8
Craig 1-2	0.054	4.7	0.055	14.3	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.109	4.0
Craig 1	0.029	2.5	0.025	6.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.054	2.0
Craig 2	0.025	2.2	0.030	7.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.055	2.0
Craig 3	0.006	0.5	0.017	4.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.023	0.8
Hayden 1-2	0.242	21.3	0.226	59.4	0.003	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.471	17.1
Hayden 1	0.143	12.6	0.166	43.6	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.311	11.3
Hayden 2	0.099	8.7	0.060	15.8	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.160	5.8
Steamboat Springs	0.001	0.1	0.008	2.0	0.009	3.3	0.005	5.2	0.014	4.6	0.017	3.0	0.054	1.9
Other Yampa Valley	0.004	0.3	0.013	3.4	0.098	36.2	0.023	23.4	0.067	22.0	0.153	27.5	0.358	13.0
Non-Yampa Valley	0.832	73.0	0.061	15.9	0.158	58.2	0.067	67.9	0.180	59.2	0.386	69.4	1.685	61.2
Denver	0.057	5.0	0.001	0.2	0.003	1.1	0.002	1.5	0.005	1.6	0.000	0.0	0.068	2.5
Colorado w/ Denver	0.183	16.1	0.022	5.8	0.102	37.6	0.040	40.2	0.111	36.4	0.262	47.0	0.719	26.1
Non-Colorado	0.649	57.0	0.039	10.2	0.056	20.6	0.027	27.7	0.069	22.8	0.125	22.4	0.965	35.1
Coal-fired PP	0.696	61.1	0.322	84.4	0.006	2.1	0.000	0.0	0.000	0.0	0.000	0.1	1.024	37.2
All other sources	0.443	38.9	0.059	15.6	0.265	97.9	0.099	100.0	0.305	100.0	0.556	99.9	1.728	62.8
Fires	0.000	0.0	0.002	0.6	0.003	1.0	0.003	3.5	0.043	14.2	0.000	0.0	0.052	1.9

Buffalo Pass
EXTINCTION 1200-1800 95/10/16 6-hour average RH: 33%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.646		-99.000		0.807		1.876		1.331		1.331		-99.000	
Estimated w/ fires	2.227	35.3	0.814	-99.0	0.414	-48.7	0.902	-51.9	0.942	-29.2	1.719	29.1	17.018	-99.0
Estimated w/o fires	2.227	35.3	0.809	-99.0	0.410	-49.2	0.871	-53.6	0.809	-39.3	1.719	29.1	16.844	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.600	27.0	0.679	83.5	0.169	40.8	0.258	28.6	0.251	26.7	0.525	30.6	2.483	14.6
Craig 1-3	0.118	5.3	0.152	18.7	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.271	1.6
Craig 1-2	0.105	4.7	0.116	14.3	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.223	1.3
Craig 1	0.056	2.5	0.053	6.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.109	0.6
Craig 2	0.049	2.2	0.064	7.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.114	0.7
Craig 3	0.012	0.5	0.036	4.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.048	0.3
Hayden 1-2	0.474	21.3	0.483	59.4	0.004	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.961	5.6
Hayden 1	0.280	12.6	0.355	43.6	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.638	3.7
Hayden 2	0.194	8.7	0.128	15.8	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.324	1.9

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.1	0.017	2.0	0.014	3.3	0.047	5.2	0.043	4.6	0.052	3.0	0.174	1.0
Other Yampa Valley	0.007	0.3	0.027	3.4	0.150	36.2	0.211	23.4	0.208	22.0	0.473	27.5	1.076	6.3
Non-Yampa Valley	1.627	73.0	0.129	15.9	0.241	58.2	0.613	67.9	0.557	59.2	1.194	69.4	4.361	25.6
Denver	0.112	5.0	0.001	0.2	0.004	1.1	0.014	1.5	0.015	1.6	0.001	0.0	0.148	0.9
Colorado w/ Denver	0.359	16.1	0.047	5.8	0.156	37.6	0.363	40.2	0.343	36.4	0.808	47.0	2.075	12.2
Non-Colorado	1.269	57.0	0.083	10.2	0.086	20.6	0.250	27.7	0.215	22.8	0.385	22.4	2.286	13.4
Coal-fired PP	1.361	61.1	0.686	84.4	0.009	2.1	0.000	0.0	0.000	0.0	0.001	0.1	2.057	12.1
All other sources	0.866	38.9	0.127	15.6	0.406	97.9	0.902	100.0	0.942	100.0	1.718	99.9	14.961	87.9
Fires	0.000	0.0	0.005	0.6	0.004	1.0	0.031	3.5	0.134	14.2	0.000	0.0	0.174	1.0

Buffalo Pass
CONCENTRATION 0600-1200 95/10/17

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.826		-99.000		0.404		0.096		0.634		0.634		1.899	
Estimated w/ fires	1.873	126.7	0.493	-99.0	0.516	27.7	0.223	132.9	0.691	8.9	1.222	92.7	5.018	164.2
Estimated w/o fires	1.873	126.7	0.489	-99.0	0.508	25.8	0.213	122.5	0.565	-10.9	1.222	92.7	4.869	156.4
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.222	11.9	0.259	52.6	0.075	14.6	0.020	8.9	0.047	6.8	0.308	25.2	0.932	18.6
Craig 1-3	0.055	3.0	0.085	17.3	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.142	2.8
Craig 1-2	0.051	2.7	0.064	13.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.115	2.3
Craig 1	0.027	1.4	0.031	6.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.058	1.2
Craig 2	0.024	1.3	0.033	6.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.058	1.1
Craig 3	0.005	0.3	0.022	4.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.027	0.5
Hayden 1-2	0.165	8.8	0.163	33.0	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.330	6.6
Hayden 1	0.062	3.3	0.088	17.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.151	3.0
Hayden 2	0.103	5.5	0.074	15.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.179	3.6
Steamboat Springs	0.000	0.0	0.002	0.5	0.006	1.1	0.003	1.5	0.009	1.3	0.012	0.9	0.032	0.6
Other Yampa Valley	0.002	0.1	0.009	1.8	0.066	12.9	0.016	7.4	0.038	5.6	0.296	24.2	0.428	8.5
Non-Yampa Valley	1.650	88.1	0.229	46.5	0.433	83.9	0.193	86.6	0.518	75.0	0.914	74.8	3.937	78.5
Denver	0.100	5.4	0.008	1.6	0.021	4.1	0.011	5.0	0.035	5.1	0.002	0.2	0.178	3.5
Colorado w/ Denver	0.403	21.5	0.082	16.6	0.267	51.8	0.108	48.5	0.311	45.1	0.550	45.0	1.721	34.3
Non-Colorado	1.247	66.6	0.147	29.9	0.166	32.1	0.085	38.1	0.206	29.9	0.364	29.8	2.216	44.2
Coal-fired PP	0.879	46.9	0.320	65.0	0.007	1.3	0.000	0.0	0.000	0.0	0.000	0.0	1.207	24.1
All other sources	0.993	53.1	0.173	35.0	0.509	98.7	0.223	100.0	0.691	100.0	1.222	100.0	3.811	75.9
Fires	0.000	0.0	0.005	0.9	0.008	1.5	0.010	4.5	0.126	18.2	0.000	0.0	0.148	3.0

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/10/17 6-hour average RH: 51%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.950		-99.000		0.658		0.872		2.142		2.142		-99.000	
Estimated w/ fires	4.419	126.7	1.253	-99.0	0.841	27.7	2.031	132.9	2.334	8.9	4.129	92.7	25.006	-99.0
Estimated w/o fires	4.419	126.7	1.241	-99.0	0.828	25.8	1.940	122.5	1.909	-10.9	4.129	92.7	24.466	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.525	11.9	0.659	52.6	0.122	14.6	0.181	8.9	0.159	6.8	1.040	25.2	2.687	10.7
Craig 1-3	0.131	3.0	0.217	17.3	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.350	1.4
Craig 1-2	0.119	2.7	0.162	13.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.283	1.1
Craig 1	0.063	1.4	0.078	6.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.142	0.6
Craig 2	0.057	1.3	0.084	6.7	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.142	0.6
Craig 3	0.011	0.3	0.055	4.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.066	0.3
Hayden 1-2	0.389	8.8	0.414	33.0	0.003	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.807	3.2
Hayden 1	0.146	3.3	0.225	17.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.372	1.5
Hayden 2	0.243	5.5	0.189	15.1	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.435	1.7
Steamboat Springs	0.001	0.0	0.006	0.5	0.009	1.1	0.031	1.5	0.030	1.3	0.039	0.9	0.115	0.5
Other Yampa Valley	0.004	0.1	0.022	1.8	0.108	12.9	0.150	7.4	0.130	5.6	1.001	24.2	1.415	5.7
Non-Yampa Valley	3.894	88.1	0.582	46.5	0.705	83.9	1.759	86.6	1.750	75.0	3.089	74.8	11.779	47.1
Denver	0.237	5.4	0.020	1.6	0.035	4.1	0.102	5.0	0.118	5.1	0.007	0.2	0.518	2.1
Colorado w/ Denver	0.950	21.5	0.208	16.6	0.435	51.8	0.985	48.5	1.052	45.1	1.858	45.0	5.488	21.9
Non-Colorado	2.944	66.6	0.375	29.9	0.270	32.1	0.774	38.1	0.697	29.9	1.231	29.8	6.291	25.2
Coal-fired PP	2.075	46.9	0.814	65.0	0.011	1.3	0.000	0.0	0.000	0.0	0.002	0.0	2.901	11.6
All other sources	2.344	53.1	0.439	35.0	0.830	98.7	2.031	100.0	2.334	100.0	4.127	100.0	22.105	88.4
Fires	0.000	0.0	0.012	0.9	0.013	1.5	0.091	4.5	0.425	18.2	0.000	0.0	0.540	2.2

Buffalo Pass
CONCENTRATION 1200-1800 95/10/17

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.826		-99.000		0.404		0.096		0.634		0.634		1.899	
Estimated w/ fires	2.275	175.4	0.488	-99.0	0.500	23.8	0.227	136.6	0.846	33.5	0.864	36.2	5.200	173.9
Estimated w/o fires	2.275	175.4	0.482	-99.0	0.482	19.3	0.204	113.1	0.563	-11.2	0.864	36.2	4.870	156.5

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.696	30.6	0.390	79.9	0.084	16.8	0.024	10.8	0.062	7.3	0.207	24.0	1.464	28.1
Craig 1-3	0.344	15.1	0.192	39.4	0.003	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.540	10.4
Craig 1-2	0.309	13.6	0.139	28.5	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.451	8.7
Craig 1	0.157	6.9	0.066	13.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.224	4.3
Craig 2	0.152	6.7	0.073	15.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.227	4.4
Craig 3	0.035	1.5	0.053	10.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.089	1.7
Hayden 1-2	0.349	15.3	0.186	38.1	0.004	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.539	10.4
Hayden 1	0.268	11.8	0.163	33.4	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.433	8.3
Hayden 2	0.081	3.6	0.023	4.7	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.106	2.0
Steamboat Springs	0.001	0.0	0.006	1.2	0.011	2.2	0.006	2.6	0.017	2.0	0.019	2.2	0.060	1.1
Other Yampa Valley	0.002	0.1	0.006	1.2	0.066	13.3	0.018	8.1	0.045	5.3	0.187	21.7	0.325	6.3
Non-Yampa Valley	1.579	69.4	0.092	18.8	0.398	79.6	0.180	79.3	0.501	59.2	0.657	76.0	3.406	65.5
Denver	0.126	5.5	0.007	1.4	0.042	8.4	0.022	9.6	0.068	8.1	0.004	0.4	0.269	5.2
Colorado w/ Denver	0.460	20.2	0.039	8.0	0.274	54.8	0.117	51.7	0.345	40.8	0.387	44.7	1.622	31.2
Non-Colorado	1.120	49.2	0.052	10.7	0.124	24.8	0.063	27.6	0.156	18.4	0.270	31.3	1.784	34.3
Coal-fired PP	1.266	55.7	0.402	82.4	0.009	1.9	0.000	0.0	0.000	0.0	0.001	0.1	1.679	32.3
All other sources	1.009	44.3	0.086	17.6	0.490	98.1	0.227	100.0	0.846	100.0	0.863	99.9	3.522	67.7
Fires	0.000	0.0	0.007	1.4	0.018	3.6	0.022	9.9	0.283	33.5	0.000	0.0	0.330	6.4

Buffalo Pass
EXTINCTION 1200-1800 95/10/17 6-hour average RH: 41%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.724		-99.000		0.631		0.872		2.019		2.019		-99.000	
Estimated w/ fires	4.748	175.4	1.107	-99.0	0.781	23.8	2.063	136.6	2.695	33.5	2.750	36.2	24.144	-99.0
Estimated w/o fires	4.748	175.4	1.092	-99.0	0.753	19.3	1.858	113.1	1.793	-11.2	2.750	36.2	22.994	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.452	30.6	0.885	79.9	0.131	16.8	0.222	10.8	0.197	7.3	0.660	24.0	3.547	14.7
Craig 1-3	0.719	15.1	0.436	39.4	0.004	0.5	0.000	0.0	0.000	0.0	0.001	0.0	1.160	4.8
Craig 1-2	0.645	13.6	0.315	28.5	0.004	0.5	0.000	0.0	0.000	0.0	0.001	0.0	0.965	4.0
Craig 1	0.328	6.9	0.149	13.5	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.479	2.0
Craig 2	0.318	6.7	0.166	15.0	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.486	2.0
Craig 3	0.073	1.5	0.120	10.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.194	0.8
Hayden 1-2	0.728	15.3	0.422	38.1	0.007	0.9	0.000	0.0	0.000	0.0	0.001	0.0	1.157	4.8
Hayden 1	0.559	11.8	0.370	33.4	0.003	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.932	3.9
Hayden 2	0.169	3.6	0.052	4.7	0.004	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.225	0.9

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.002	0.0	0.014	1.2	0.017	2.2	0.054	2.6	0.053	2.0	0.062	2.2	0.201	0.8
Other Yampa Valley	0.004	0.1	0.013	1.2	0.104	13.3	0.168	8.1	0.144	5.3	0.596	21.7	1.029	4.3
Non-Yampa Valley	3.296	69.4	0.208	18.8	0.622	79.6	1.636	79.3	1.596	59.2	2.091	76.0	9.447	39.1
Denver	0.262	5.5	0.016	1.4	0.065	8.4	0.198	9.6	0.218	8.1	0.012	0.4	0.772	3.2
Colorado w/ Denver	0.959	20.2	0.089	8.0	0.428	54.8	1.066	51.7	1.100	40.8	1.231	44.7	4.873	20.2
Non-Colorado	2.336	49.2	0.119	10.7	0.193	24.8	0.570	27.6	0.496	18.4	0.860	31.3	4.574	18.9
Coal-fired PP	2.642	55.7	0.912	82.4	0.015	1.9	0.000	0.0	0.000	0.0	0.002	0.1	3.571	14.8
All other sources	2.106	44.3	0.195	17.6	0.766	98.1	2.063	100.0	2.695	100.0	2.748	99.9	20.573	85.2
Fires	0.000	0.0	0.015	1.4	0.028	3.6	0.205	9.9	0.902	33.5	0.000	0.0	1.150	4.8

Buffalo Pass
CONCENTRATION 0600-1200 95/10/18

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.826		-99.000		0.270		0.184		0.480		0.480		1.717	
Estimated w/ fires	1.562	89.1	0.440	-99.0	0.588	117.9	0.256	39.1	0.769	60.1	1.175	144.5	4.789	179.0
Estimated w/o fires	1.562	89.1	0.435	-99.0	0.583	116.1	0.250	35.7	0.690	43.7	1.175	144.5	4.694	173.5
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.050	3.2	0.049	11.2	0.063	10.8	0.020	7.8	0.048	6.2	0.212	18.1	0.443	9.2
Craig 1-3	0.008	0.5	0.004	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.012	0.2
Craig 1-2	0.007	0.5	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.2
Craig 1	0.004	0.2	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.1
Craig 2	0.004	0.2	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.1
Craig 3	0.001	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Hayden 1-2	0.040	2.5	0.027	6.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.068	1.4
Hayden 1	0.036	2.3	0.027	6.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.063	1.3
Hayden 2	0.003	0.2	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.1
Steamboat Springs	0.001	0.0	0.007	1.7	0.007	1.2	0.004	1.7	0.011	1.5	0.015	1.2	0.045	0.9
Other Yampa Valley	0.002	0.1	0.011	2.5	0.056	9.5	0.016	6.1	0.037	4.8	0.198	16.8	0.318	6.6
Non-Yampa Valley	1.512	96.8	0.385	87.7	0.519	88.4	0.230	89.8	0.642	83.5	0.962	81.9	4.251	88.8
Denver	0.169	10.8	0.046	10.5	0.062	10.5	0.030	11.7	0.096	12.4	0.005	0.5	0.408	8.5
Colorado w/ Denver	0.537	34.4	0.256	58.2	0.390	66.4	0.164	63.9	0.475	61.7	0.683	58.2	2.505	52.3
Non-Colorado	0.975	62.4	0.129	29.4	0.129	21.9	0.066	25.8	0.167	21.8	0.279	23.8	1.746	36.5
Coal-fired PP	0.593	38.0	0.102	23.2	0.003	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.698	14.6
All other sources	0.969	62.0	0.338	76.8	0.585	99.5	0.256	100.0	0.769	100.0	1.174	100.0	4.091	85.4
Fires	0.000	0.0	0.005	1.1	0.005	0.9	0.006	2.5	0.079	10.3	0.000	0.0	0.095	2.0

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/10/18 6-hour average RH: 42%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.756		-99.000		0.424		1.676		1.543		1.543		-99.000	
Estimated w/ fires	3.321	89.1	1.014	-99.0	0.924	117.9	2.331	39.1	2.471	60.1	3.772	144.5	23.833	-99.0
Estimated w/o fires	3.321	89.1	1.002	-99.0	0.916	116.1	2.274	35.7	2.217	43.7	3.772	144.5	23.503	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.106	3.2	0.114	11.2	0.100	10.8	0.182	7.8	0.154	6.2	0.682	18.1	1.337	5.6
Craig 1-3	0.017	0.5	0.008	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.025	0.1
Craig 1-2	0.015	0.5	0.006	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.022	0.1
Craig 1	0.007	0.2	0.003	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.0
Craig 2	0.008	0.2	0.003	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.011	0.0
Craig 3	0.001	0.0	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.0
Hayden 1-2	0.085	2.5	0.063	6.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.148	0.6
Hayden 1	0.077	2.3	0.062	6.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.140	0.6
Hayden 2	0.007	0.2	0.001	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.0
Steamboat Springs	0.001	0.0	0.017	1.7	0.011	1.2	0.040	1.7	0.036	1.5	0.047	1.2	0.153	0.6
Other Yampa Valley	0.003	0.1	0.025	2.5	0.088	9.5	0.141	6.1	0.118	4.8	0.635	16.8	1.010	4.2
Non-Yampa Valley	3.215	96.8	0.889	87.7	0.816	88.4	2.093	89.8	2.063	83.5	3.091	81.9	12.166	51.0
Denver	0.359	10.8	0.107	10.5	0.097	10.5	0.274	11.7	0.307	12.4	0.017	0.5	1.161	4.9
Colorado w/ Denver	1.142	34.4	0.590	58.2	0.614	66.4	1.490	63.9	1.525	61.7	2.194	58.2	7.555	31.7
Non-Colorado	2.072	62.4	0.298	29.4	0.203	21.9	0.603	25.8	0.538	21.8	0.897	23.8	4.611	19.3
Coal-fired PP	1.261	38.0	0.235	23.2	0.004	0.5	0.000	0.0	0.000	0.0	0.001	0.0	1.501	6.3
All other sources	2.060	62.0	0.779	76.8	0.920	99.5	2.331	100.0	2.471	100.0	3.772	100.0	22.332	93.7
Fires	0.000	0.0	0.011	1.1	0.008	0.9	0.057	2.5	0.254	10.3	0.000	0.0	0.330	1.4

Buffalo Pass
CONCENTRATION 1200-1800 95/10/18

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.826		-99.000		0.270		0.184		0.480		0.480		1.717	
Estimated w/ fires	1.299	57.2	0.331	-99.0	0.270	0.0	0.123	-33.2	0.480	0.0	0.583	21.4	3.086	79.8
Estimated w/o fires	1.299	57.2	0.318	-99.0	0.257	-4.7	0.107	-41.8	0.282	-41.4	0.583	21.4	2.846	65.8

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.069	5.3	0.142	43.0	0.065	24.0	0.019	15.1	0.047	9.7	0.152	26.1	0.494	16.0
Craig 1-3	0.023	1.7	0.046	14.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.069	2.2
Craig 1-2	0.021	1.6	0.035	10.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.056	1.8
Craig 1	0.009	0.7	0.017	5.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.026	0.8
Craig 2	0.012	0.9	0.018	5.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.030	1.0
Craig 3	0.002	0.1	0.012	3.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.4
Hayden 1-2	0.045	3.5	0.079	23.9	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.125	4.1
Hayden 1	0.045	3.5	0.079	23.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.124	4.0
Hayden 2	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Steamboat Springs	0.000	0.0	0.006	1.8	0.005	2.0	0.003	2.5	0.008	1.7	0.010	1.7	0.033	1.1
Other Yampa Valley	0.001	0.1	0.011	3.3	0.058	21.7	0.015	12.6	0.038	8.0	0.142	24.4	0.267	8.6
Non-Yampa Valley	1.229	94.7	0.176	53.2	0.192	71.3	0.089	72.1	0.235	48.9	0.431	73.9	2.352	76.2
Denver	0.037	2.8	0.001	0.4	0.011	3.9	0.005	4.2	0.016	3.4	0.001	0.2	0.071	2.3
Colorado w/ Denver	0.169	13.0	0.024	7.3	0.097	36.1	0.041	33.3	0.114	23.8	0.239	41.0	0.685	22.2
Non-Colorado	1.060	81.6	0.152	46.0	0.095	35.2	0.048	38.7	0.121	25.1	0.192	32.9	1.667	54.0
Coal-fired PP	0.563	43.4	0.217	65.6	0.004	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.785	25.4
All other sources	0.736	56.6	0.114	34.4	0.265	98.4	0.123	100.0	0.480	100.0	0.583	100.0	2.301	74.6
Fires	0.000	0.0	0.013	3.8	0.013	4.7	0.016	12.8	0.199	41.4	0.000	0.0	0.240	7.8

Buffalo Pass
EXTINCTION 1200-1800 95/10/18 6-hour average RH: 40%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.707		-99.000		0.420		1.676		1.523		1.523		-99.000	
Estimated w/ fires	2.684	57.2	0.743	-99.0	0.420	0.0	1.120	-33.2	1.523	0.0	1.849	21.4	18.338	-99.0
Estimated w/o fires	2.684	57.2	0.715	-99.0	0.400	-4.7	0.976	-41.8	0.893	-41.4	1.849	21.4	17.516	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.143	5.3	0.319	43.0	0.101	24.0	0.169	15.1	0.148	9.7	0.482	26.1	1.362	7.4
Craig 1-3	0.047	1.7	0.104	14.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.151	0.8
Craig 1-2	0.043	1.6	0.078	10.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.121	0.7
Craig 1	0.018	0.7	0.037	5.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.056	0.3
Craig 2	0.024	0.9	0.041	5.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.065	0.4
Craig 3	0.004	0.1	0.026	3.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.030	0.2
Hayden 1-2	0.094	3.5	0.178	23.9	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.273	1.5
Hayden 1	0.093	3.5	0.177	23.9	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.271	1.5
Hayden 2	0.001	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.0	0.013	1.8	0.008	2.0	0.028	2.5	0.026	1.7	0.031	1.7	0.107	0.6
Other Yampa Valley	0.002	0.1	0.025	3.3	0.091	21.7	0.141	12.6	0.122	8.0	0.450	24.4	0.831	4.5
Non-Yampa Valley	2.541	94.7	0.395	53.2	0.299	71.3	0.807	72.1	0.745	48.9	1.367	73.9	6.154	33.6
Denver	0.076	2.8	0.003	0.4	0.016	3.9	0.047	4.2	0.052	3.4	0.003	0.2	0.197	1.1
Colorado w/ Denver	0.350	13.0	0.054	7.3	0.152	36.1	0.373	33.3	0.362	23.8	0.758	41.0	2.049	11.2
Non-Colorado	2.191	81.6	0.341	46.0	0.148	35.2	0.434	38.7	0.383	25.1	0.609	32.9	4.105	22.4
Coal-fired PP	1.164	43.4	0.488	65.6	0.007	1.6	0.000	0.0	0.000	0.0	0.001	0.0	1.659	9.0
All other sources	1.520	56.6	0.255	34.4	0.413	98.4	1.120	100.0	1.523	100.0	1.848	100.0	16.679	91.0
Fires	0.000	0.0	0.028	3.8	0.020	4.7	0.144	12.8	0.630	41.4	0.000	0.0	0.822	4.5

Buffalo Pass
CONCENTRATION 0600-1200 95/10/19

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.300		-99.000		0.194		0.097		0.193		0.193		0.798	
Estimated w/ fires	1.388	362.1	1.001	-99.0	0.352	81.0	0.170	75.1	0.709	267.7	0.862	346.8	4.483	462.1
Estimated w/o fires	1.388	362.1	0.942	-99.0	0.329	69.4	0.142	46.1	0.353	83.0	0.862	346.8	4.016	403.6
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.001	0.0	0.024	2.4	0.060	16.9	0.015	8.9	0.039	5.5	0.261	30.3	0.399	8.9
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Steamboat Springs	0.000	0.0	0.003	0.3	0.004	1.2	0.003	1.5	0.006	0.9	0.011	1.2	0.027	0.6
Other Yampa Valley	0.000	0.0	0.020	2.0	0.055	15.5	0.013	7.4	0.033	4.7	0.250	29.1	0.371	8.3
Non-Yampa Valley	1.388	100.0	0.918	91.7	0.270	76.6	0.127	74.5	0.314	44.2	0.601	69.7	3.617	80.7
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.021	1.5	0.089	8.9	0.058	16.6	0.022	13.1	0.059	8.3	0.185	21.5	0.435	9.7
Non-Colorado	1.366	98.4	0.829	82.8	0.211	60.1	0.105	61.4	0.255	35.9	0.416	48.2	3.182	71.0
Coal-fired PP	0.176	12.7	0.285	28.5	0.005	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.466	10.4
All other sources	1.212	87.3	0.716	71.5	0.347	98.7	0.170	100.0	0.709	100.0	0.861	100.0	4.017	89.6
Fires	0.000	0.0	0.060	6.0	0.023	6.4	0.028	16.6	0.356	50.2	0.000	0.0	0.467	10.4

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/10/19 6-hour average RH: 56%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.757		-99.000		0.325		0.885		0.673		0.673		-99.000	
Estimated w/ fires	3.497	362.1	2.703	-99.0	0.588	81.0	1.551	75.1	2.476	267.7	3.009	346.8	23.823	-99.0
Estimated w/o fires	3.497	362.1	2.542	-99.0	0.550	69.4	1.293	46.1	1.232	83.0	3.009	346.8	22.123	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.002	0.0	0.064	2.4	0.100	16.9	0.138	8.9	0.137	5.5	0.911	30.3	1.351	5.7
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Steamboat Springs	0.000	0.0	0.009	0.3	0.007	1.2	0.023	1.5	0.021	0.9	0.037	1.2	0.098	0.4
Other Yampa Valley	0.001	0.0	0.055	2.0	0.091	15.5	0.115	7.4	0.116	4.7	0.875	29.1	1.252	5.3
Non-Yampa Valley	3.496	100.0	2.478	91.7	0.450	76.6	1.156	74.5	1.095	44.2	2.097	69.7	10.772	45.2
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.053	1.5	0.240	8.9	0.097	16.6	0.203	13.1	0.207	8.3	0.646	21.5	1.447	6.1
Non-Colorado	3.442	98.4	2.238	82.8	0.353	60.1	0.953	61.4	0.889	35.9	1.451	48.2	9.325	39.1
Coal-fired PP	0.444	12.7	0.770	28.5	0.008	1.3	0.000	0.0	0.000	0.0	0.001	0.0	1.222	5.1
All other sources	3.053	87.3	1.933	71.5	0.580	98.7	1.551	100.0	2.476	100.0	3.008	100.0	22.601	94.9
Fires	0.000	0.0	0.161	6.0	0.038	6.4	0.257	16.6	1.243	50.2	0.000	0.0	1.700	7.1

Buffalo Pass
CONCENTRATION 1200-1800 95/10/19

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.300		-99.000		0.194		0.097		0.193		0.193		0.798	
Estimated w/ fires	0.981	226.4	0.652	-99.0	0.211	8.4	0.103	5.5	0.405	109.9	0.461	139.1	2.812	252.6
Estimated w/o fires	0.981	226.4	0.604	-99.0	0.199	2.3	0.088	-9.8	0.217	12.7	0.461	139.1	2.550	219.8

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.008	0.8	0.094	14.4	0.049	23.3	0.015	14.4	0.035	8.7	0.161	34.9	0.361	12.8
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.007	0.7	0.045	7.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.052	1.9
Hayden 1	0.007	0.7	0.045	7.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.052	1.9
Hayden 2	0.000	0.0	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Steamboat Springs	0.000	0.0	0.016	2.5	0.005	2.5	0.003	2.8	0.008	2.0	0.009	1.9	0.042	1.5
Other Yampa Valley	0.001	0.1	0.032	4.9	0.043	20.6	0.012	11.6	0.027	6.7	0.152	33.0	0.267	9.5
Non-Yampa Valley	0.973	99.2	0.511	78.3	0.150	71.1	0.073	71.1	0.182	45.0	0.300	65.1	2.189	77.8
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.017	1.7	0.071	10.8	0.036	17.0	0.016	15.4	0.042	10.3	0.088	19.0	0.269	9.6
Non-Colorado	0.956	97.5	0.440	67.5	0.114	54.1	0.057	55.7	0.140	34.7	0.213	46.1	1.920	68.3
Coal-fired PP	0.117	11.9	0.153	23.5	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.271	9.7
All other sources	0.864	88.1	0.499	76.5	0.209	99.3	0.103	100.0	0.405	100.0	0.461	100.0	2.541	90.3
Fires	0.000	0.0	0.048	7.3	0.012	5.6	0.015	14.5	0.187	46.3	0.000	0.0	0.262	9.3

Buffalo Pass
EXTINCTION 1200-1800 95/10/19 6-hour average RH: 31%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.575		-99.000		0.296		0.885		0.590		0.590		-99.000	
Estimated w/ fires	1.876	226.4	1.365	-99.0	0.320	8.4	0.934	5.5	1.238	109.9	1.411	139.1	17.144	-99.0
Estimated w/o fires	1.876	226.4	1.265	-99.0	0.302	2.3	0.798	-9.8	0.665	12.7	1.411	139.1	16.317	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.015	0.8	0.196	14.4	0.075	23.3	0.134	14.4	0.108	8.7	0.492	34.9	1.019	5.9
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.013	0.7	0.095	7.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.108	0.6
Hayden 1	0.013	0.7	0.095	7.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.108	0.6
Hayden 2	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0

Table B.2.3.11a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.0	0.034	2.5	0.008	2.5	0.026	2.8	0.025	2.0	0.027	1.9	0.121	0.7
Other Yampa Valley	0.002	0.1	0.067	4.9	0.066	20.6	0.108	11.6	0.083	6.7	0.465	33.0	0.790	4.6
Non-Yampa Valley	1.861	99.2	1.069	78.3	0.228	71.1	0.664	71.1	0.557	45.0	0.919	65.1	5.298	30.9
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.032	1.7	0.148	10.8	0.054	17.0	0.144	15.4	0.128	10.3	0.268	19.0	0.775	4.5
Non-Colorado	1.828	97.5	0.922	67.5	0.173	54.1	0.520	55.7	0.429	34.7	0.651	46.1	4.524	26.4
Coal-fired PP	0.223	11.9	0.321	23.5	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.546	3.2
All other sources	1.653	88.1	1.044	76.5	0.318	99.3	0.934	100.0	1.238	100.0	1.411	100.0	16.598	96.8
Fires	0.000	0.0	0.100	7.3	0.018	5.6	0.135	14.5	0.573	46.3	0.000	0.0	0.827	4.8

Table B.2.3.11b

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

[This table also presents six-hour concentrations from filter measurements, as well as extinction estimated from the filter measurements using identical extinction efficiencies as applied to predicted concentrations. Source attributions are presented for all 12 source regions/types modeled with CALPUFF, and present results from each six-hour daylight period (0600-1200, and 1200-1800 LST).]

Gilpin Creek
CONCENTRATION 0600-1200 95/10/ 7

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.371	-99.0	0.057	-99.0	0.281	-99.0	0.108	-99.0	0.297	-99.0	0.646	-99.0	1.760	-99.0
Estimated w/o fires	0.371	-99.0	0.057	-99.0	0.281	-99.0	0.108	-99.0	0.297	-99.0	0.646	-99.0	1.760	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.054	14.5	0.003	5.3	0.027	9.4	0.006	5.8	0.014	4.6	0.162	25.1	0.265	15.1
Craig 1-3	0.023	6.2	0.001	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.024	1.3
Craig 1-2	0.023	6.2	0.001	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.024	1.3
Craig 1	0.010	2.7	0.000	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.6
Craig 2	0.013	3.5	0.000	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.8
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.029	7.8	0.001	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.030	1.7
Hayden 1	0.016	4.3	0.001	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.017	1.0
Hayden 2	0.013	3.5	0.000	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.8
Steamboat Springs	0.000	0.1	0.000	0.3	0.001	0.3	0.000	0.4	0.001	0.4	0.001	0.2	0.004	0.2
Other Yampa Valley	0.002	0.4	0.001	1.9	0.026	9.1	0.006	5.3	0.012	4.2	0.161	24.9	0.207	11.8
Non-Yampa Valley	0.317	85.5	0.054	94.7	0.255	90.6	0.102	94.2	0.284	95.4	0.484	74.9	1.495	84.9
Denver	0.050	13.5	0.005	9.1	0.023	8.3	0.010	8.9	0.031	10.3	0.002	0.3	0.121	6.9
Colorado w/ Denver	0.150	40.5	0.041	72.9	0.228	80.9	0.087	81.0	0.259	87.1	0.393	60.9	1.159	65.8
Non-Colorado	0.167	45.0	0.012	21.7	0.027	9.6	0.014	13.2	0.025	8.4	0.091	14.0	0.336	19.1
Coal-fired PP	0.145	39.2	0.005	9.5	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.151	8.6
All other sources	0.226	60.8	0.051	90.5	0.281	99.8	0.108	100.0	0.297	100.0	0.646	100.0	1.609	91.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/10/ 7 6-hour average RH: 42%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.787	-99.0	0.131	-99.0	0.442	-99.0	0.980	-99.0	0.955	-99.0	2.073	-99.0	15.368	-99.0
Estimated w/o fires	0.787	-99.0	0.131	-99.0	0.442	-99.0	0.980	-99.0	0.955	-99.0	2.073	-99.0	15.368	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.114	14.5	0.007	5.3	0.042	9.4	0.056	5.8	0.044	4.6	0.521	25.1	0.783	5.1
Craig 1-3	0.048	6.2	0.002	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.050	0.3
Craig 1-2	0.048	6.2	0.002	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.050	0.3
Craig 1	0.021	2.7	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.022	0.1
Craig 2	0.027	3.5	0.001	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.029	0.2
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.062	7.8	0.002	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.064	0.4
Hayden 1	0.034	4.3	0.002	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.036	0.2
Hayden 2	0.028	3.5	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.028	0.2
Steamboat Springs	0.001	0.1	0.000	0.3	0.001	0.3	0.004	0.4	0.004	0.4	0.005	0.2	0.015	0.1
Other Yampa Valley	0.003	0.4	0.002	1.9	0.040	9.1	0.052	5.3	0.040	4.2	0.516	24.9	0.654	4.3
Non-Yampa Valley	0.673	85.5	0.124	94.7	0.400	90.6	0.924	94.2	0.911	95.4	1.552	74.9	4.584	29.8
Denver	0.106	13.5	0.012	9.1	0.037	8.3	0.087	8.9	0.099	10.3	0.006	0.3	0.347	2.3
Colorado w/ Denver	0.319	40.5	0.095	72.9	0.358	80.9	0.794	81.0	0.831	87.1	1.262	60.9	3.659	23.8
Non-Colorado	0.354	45.0	0.028	21.7	0.043	9.6	0.130	13.2	0.080	8.4	0.291	14.0	0.925	6.0
Coal-fired PP	0.309	39.2	0.012	9.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.322	2.1
All other sources	0.479	60.8	0.118	90.5	0.441	99.8	0.980	100.0	0.955	100.0	2.073	100.0	15.046	97.9
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
CONCENTRATION 1200-1800 95/10/ 7

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.454	-99.0	0.388	-99.0	0.179	-99.0	0.067	-99.0	0.183	-99.0	0.371	-99.0	1.640	-99.0
Estimated w/o fires	0.454	-99.0	0.388	-99.0	0.179	-99.0	0.067	-99.0	0.183	-99.0	0.371	-99.0	1.640	-99.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.166	36.5	0.227	58.5	0.041	22.9	0.010	14.9	0.024	13.2	0.118	31.8	0.586	35.7
Craig 1-3	0.057	12.6	0.119	30.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.177	10.8
Craig 1-2	0.057	12.6	0.119	30.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.177	10.8
Craig 1	0.027	6.1	0.059	15.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.087	5.3
Craig 2	0.030	6.6	0.060	15.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.090	5.5
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.106	23.4	0.095	24.4	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.202	12.3
Hayden 1	0.014	3.1	0.001	0.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.015	0.9
Hayden 2	0.092	20.3	0.094	24.2	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.187	11.4
Steamboat Springs	0.000	0.1	0.002	0.5	0.001	0.5	0.001	0.8	0.001	0.7	0.003	0.7	0.008	0.5
Other Yampa Valley	0.002	0.4	0.011	2.8	0.039	21.7	0.009	14.1	0.023	12.5	0.115	31.1	0.199	12.1
Non-Yampa Valley	0.288	63.5	0.161	41.5	0.138	77.1	0.057	85.1	0.158	86.8	0.253	68.2	1.055	64.3
Denver	0.055	12.1	0.009	2.4	0.016	8.7	0.007	11.0	0.023	12.8	0.001	0.4	0.112	6.8
Colorado w/ Denver	0.168	37.1	0.102	26.4	0.120	67.0	0.048	71.3	0.141	77.2	0.198	53.3	0.776	47.3
Non-Colorado	0.120	26.4	0.058	15.1	0.018	10.1	0.009	13.8	0.017	9.5	0.055	14.9	0.278	17.0
Coal-fired PP	0.253	55.9	0.231	59.5	0.002	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.486	29.6
All other sources	0.200	44.1	0.157	40.5	0.177	99.1	0.067	100.0	0.183	100.0	0.371	100.0	1.154	70.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
EXTINCTION 1200-1800 95/10/ 7 6-hour average RH: 43%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.969	-99.0	0.899	-99.0	0.281	-99.0	0.607	-99.0	0.588	-99.0	1.194	-99.0	14.538	-99.0
Estimated w/o fires	0.969	-99.0	0.899	-99.0	0.281	-99.0	0.607	-99.0	0.588	-99.0	1.194	-99.0	14.538	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.354	36.5	0.526	58.5	0.065	22.9	0.090	14.9	0.078	13.2	0.380	31.8	1.492	10.3
Craig 1-3	0.122	12.6	0.276	30.7	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.399	2.7
Craig 1-2	0.122	12.6	0.276	30.7	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.399	2.7
Craig 1	0.059	6.1	0.138	15.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.197	1.4
Craig 2	0.064	6.6	0.138	15.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.202	1.4
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.227	23.4	0.220	24.4	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.448	3.1
Hayden 1	0.030	3.1	0.002	0.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.032	0.2
Hayden 2	0.197	20.3	0.217	24.2	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.416	2.9

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.1	0.005	0.5	0.001	0.5	0.005	0.8	0.004	0.7	0.008	0.7	0.024	0.2
Other Yampa Valley	0.004	0.4	0.026	2.8	0.061	21.7	0.085	14.1	0.073	12.5	0.372	31.1	0.621	4.3
Non-Yampa Valley	0.616	63.5	0.373	41.5	0.217	77.1	0.516	85.1	0.510	86.8	0.814	68.2	3.046	20.9
Denver	0.117	12.1	0.021	2.4	0.024	8.7	0.067	11.0	0.075	12.8	0.004	0.4	0.310	2.1
Colorado w/ Denver	0.359	37.1	0.237	26.4	0.188	67.0	0.433	71.3	0.454	77.2	0.636	53.3	2.308	15.9
Non-Colorado	0.256	26.4	0.135	15.1	0.028	10.1	0.084	13.8	0.056	9.5	0.178	14.9	0.737	5.1
Coal-fired PP	0.541	55.9	0.534	59.5	0.003	0.9	0.000	0.0	0.000	0.0	0.000	0.0	1.079	7.4
All other sources	0.428	44.1	0.364	40.5	0.279	99.1	0.607	100.0	0.588	100.0	1.193	100.0	13.459	92.6
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
CONCENTRATION 0600-1200 95/10/ 8

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.067		-99.000		0.477		0.579		1.433		1.433		3.559	
Estimated w/ fires	1.060	-0.6	1.280	-99.0	0.294	-38.4	0.119	-79.4	0.306	-78.7	0.767	-46.5	3.826	7.5
Estimated w/o fires	1.060	-0.6	1.280	-99.0	0.294	-38.4	0.119	-79.4	0.306	-78.7	0.767	-46.5	3.826	7.5
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.018	1.7	0.023	1.8	0.023	7.9	0.005	4.3	0.010	3.3	0.190	24.8	0.270	7.1
Craig 1-3	0.004	0.4	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.1
Craig 1-2	0.004	0.4	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.1
Craig 1	0.002	0.2	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.1
Craig 2	0.002	0.2	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.1
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.013	1.2	0.003	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.4
Hayden 1	0.008	0.8	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.011	0.3
Hayden 2	0.005	0.4	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.1
Steamboat Springs	0.000	0.0	0.001	0.1	0.000	0.1	0.000	0.2	0.000	0.2	0.001	0.1	0.003	0.1
Other Yampa Valley	0.001	0.1	0.018	1.4	0.023	7.8	0.005	4.2	0.010	3.2	0.189	24.7	0.245	6.4
Non-Yampa Valley	1.042	98.3	1.257	98.2	0.271	92.1	0.114	95.7	0.296	96.7	0.577	75.2	3.556	92.9
Denver	0.086	8.1	0.050	3.9	0.031	10.4	0.015	12.3	0.046	15.1	0.003	0.4	0.230	6.0
Colorado w/ Denver	0.188	17.7	0.243	19.0	0.162	55.1	0.063	52.7	0.185	60.5	0.288	37.6	1.129	29.5
Non-Colorado	0.855	80.6	1.014	79.2	0.109	37.0	0.051	43.0	0.111	36.2	0.288	37.6	2.427	63.4
Coal-fired PP	0.252	23.8	0.364	28.4	0.004	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.620	16.2
All other sources	0.808	76.2	0.916	71.6	0.290	98.7	0.119	100.0	0.306	100.0	0.766	100.0	3.206	83.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/10/ 8 6-hour average RH: 88%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	7.233		-99.000		1.298		5.268		9.350		9.350		-99.000	
Estimated w/ fires	7.189	-0.6	8.906	-99.0	0.799	-38.4	1.087	-79.4	1.995	-78.7	5.003	-46.5	34.978	-99.0
Estimated w/o fires	7.189	-0.6	8.906	-99.0	0.799	-38.4	1.087	-79.4	1.995	-78.7	5.003	-46.5	34.978	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.124	1.7	0.159	1.8	0.063	7.9	0.047	4.3	0.066	3.3	1.240	24.8	1.699	4.9
Craig 1-3	0.030	0.4	0.008	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.038	0.1
Craig 1-2	0.030	0.4	0.008	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.038	0.1
Craig 1	0.014	0.2	0.004	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.018	0.1
Craig 2	0.015	0.2	0.004	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.019	0.1
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.089	1.2	0.021	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.110	0.3
Hayden 1	0.057	0.8	0.016	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.073	0.2
Hayden 2	0.032	0.4	0.005	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.037	0.1
Steamboat Springs	0.001	0.0	0.008	0.1	0.001	0.1	0.002	0.2	0.003	0.2	0.006	0.1	0.020	0.1
Other Yampa Valley	0.004	0.1	0.122	1.4	0.062	7.8	0.045	4.2	0.063	3.2	1.234	24.7	1.531	4.4
Non-Yampa Valley	7.064	98.3	8.747	98.2	0.736	92.1	1.040	95.7	1.929	96.7	3.763	75.2	23.279	66.6
Denver	0.580	8.1	0.351	3.9	0.083	10.4	0.133	12.3	0.301	15.1	0.018	0.4	1.467	4.2
Colorado w/ Denver	1.271	17.7	1.691	19.0	0.440	55.1	0.573	52.7	1.207	60.5	1.881	37.6	7.064	20.2
Non-Colorado	5.793	80.6	7.056	79.2	0.296	37.0	0.467	43.0	0.722	36.2	1.882	37.6	16.215	46.4
Coal-fired PP	1.709	23.8	2.532	28.4	0.010	1.3	0.000	0.0	0.000	0.0	0.001	0.0	4.252	12.2
All other sources	5.479	76.2	6.374	71.6	0.789	98.7	1.087	100.0	1.995	100.0	5.001	100.0	30.726	87.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
CONCENTRATION 1200-1800 95/10/ 8

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.067		-99.000		0.477		0.579		1.433		1.433		3.559	
Estimated w/ fires	1.141	6.9	0.311	-99.0	0.191	-60.0	0.077	-86.6	0.204	-85.8	0.399	-72.1	2.323	-34.7
Estimated w/o fires	1.141	6.9	0.311	-99.0	0.191	-60.0	0.077	-86.6	0.204	-85.8	0.399	-72.1	2.323	-34.7

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.205	18.0	0.105	33.7	0.027	14.1	0.007	9.0	0.014	7.0	0.115	28.7	0.473	20.4
Craig 1-3	0.042	3.7	0.033	10.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.075	3.2
Craig 1-2	0.042	3.7	0.033	10.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.075	3.2
Craig 1	0.025	2.2	0.018	5.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.043	1.9
Craig 2	0.018	1.5	0.014	4.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.032	1.4
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.162	14.2	0.062	19.9	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.225	9.7
Hayden 1	0.007	0.6	0.000	0.1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.3
Hayden 2	0.155	13.6	0.061	19.8	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.217	9.3
Steamboat Springs	0.000	0.0	0.003	1.0	0.001	0.7	0.001	1.0	0.002	0.9	0.003	0.7	0.010	0.4
Other Yampa Valley	0.001	0.1	0.007	2.3	0.024	12.6	0.006	8.0	0.012	6.0	0.112	28.0	0.163	7.0
Non-Yampa Valley	0.935	82.0	0.206	66.3	0.164	85.9	0.070	91.0	0.190	93.0	0.285	71.3	1.850	79.6
Denver	0.107	9.4	0.007	2.3	0.024	12.8	0.012	15.3	0.037	18.3	0.002	0.5	0.190	8.2
Colorado w/ Denver	0.209	18.3	0.034	11.1	0.105	55.0	0.043	55.4	0.128	62.7	0.148	37.1	0.667	28.7
Non-Colorado	0.727	63.7	0.171	55.2	0.059	30.9	0.028	35.6	0.062	30.3	0.136	34.2	1.183	50.9
Coal-fired PP	0.434	38.1	0.148	47.6	0.003	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.586	25.2
All other sources	0.706	61.9	0.163	52.4	0.188	98.4	0.077	100.0	0.204	100.0	0.399	100.0	1.737	74.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
EXTINCTION 1200-1800 95/10/ 8 6-hour average RH: 39%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.195		-99.000		0.742		5.268		4.531		4.531		-99.000	
Estimated w/ fires	2.346	6.9	0.695	-99.0	0.297	-60.0	0.704	-86.6	0.646	-85.8	1.263	-72.1	15.950	-99.0
Estimated w/o fires	2.346	6.9	0.695	-99.0	0.297	-60.0	0.704	-86.6	0.646	-85.8	1.263	-72.1	15.950	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.423	18.0	0.234	33.7	0.042	14.1	0.064	9.0	0.045	7.0	0.363	28.7	1.170	7.3
Craig 1-3	0.087	3.7	0.073	10.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.160	1.0
Craig 1-2	0.087	3.7	0.073	10.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.160	1.0
Craig 1	0.051	2.2	0.041	5.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.092	0.6
Craig 2	0.036	1.5	0.032	4.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.068	0.4
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.333	14.2	0.138	19.9	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.474	3.0
Hayden 1	0.015	0.6	0.001	0.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.017	0.1
Hayden 2	0.318	13.6	0.137	19.8	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.457	2.9

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.0	0.007	1.0	0.002	0.7	0.007	1.0	0.006	0.9	0.009	0.7	0.031	0.2
Other Yampa Valley	0.002	0.1	0.016	2.3	0.037	12.6	0.056	8.0	0.039	6.0	0.354	28.0	0.504	3.2
Non-Yampa Valley	1.924	82.0	0.460	66.3	0.255	85.9	0.640	91.0	0.601	93.0	0.900	71.3	4.780	30.0
Denver	0.220	9.4	0.016	2.3	0.038	12.8	0.108	15.3	0.118	18.3	0.007	0.5	0.507	3.2
Colorado w/ Denver	0.429	18.3	0.077	11.1	0.163	55.0	0.390	55.4	0.405	62.7	0.469	37.1	1.932	12.1
Non-Colorado	1.495	63.7	0.383	55.2	0.092	30.9	0.250	35.6	0.196	30.3	0.431	34.2	2.847	17.9
Coal-fired PP	0.893	38.1	0.331	47.6	0.005	1.6	0.000	0.0	0.000	0.0	0.001	0.0	1.230	7.7
All other sources	1.453	61.9	0.364	52.4	0.292	98.4	0.704	100.0	0.646	100.0	1.262	100.0	14.720	92.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
CONCENTRATION 0600-1200 95/10/ 9

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.806		-99.000		-99.000		0.235		-99.000		-99.000		1.558	
Estimated w/ fires	1.596	98.1	0.228	-99.0	0.617	-99.0	0.253	7.4	0.724	-99.0	1.117	-99.0	4.535	191.0
Estimated w/o fires	1.596	98.1	0.228	-99.0	0.617	-99.0	0.253	7.4	0.724	-99.0	1.117	-99.0	4.535	191.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.163	10.2	0.045	19.6	0.059	9.6	0.015	5.8	0.033	4.6	0.296	26.5	0.610	13.5
Craig 1-3	0.093	5.8	0.034	14.9	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.128	2.8
Craig 1-2	0.093	5.8	0.034	14.9	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.128	2.8
Craig 1	0.051	3.2	0.020	8.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.071	1.6
Craig 2	0.042	2.6	0.014	6.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.056	1.2
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.067	4.2	0.006	2.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.073	1.6
Hayden 1	0.007	0.4	0.000	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.2
Hayden 2	0.060	3.7	0.005	2.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.065	1.4
Steamboat Springs	0.001	0.0	0.001	0.4	0.002	0.3	0.001	0.4	0.003	0.4	0.004	0.4	0.012	0.3
Other Yampa Valley	0.002	0.1	0.004	1.9	0.055	9.0	0.013	5.3	0.030	4.1	0.291	26.0	0.397	8.7
Non-Yampa Valley	1.434	89.8	0.183	80.4	0.557	90.4	0.238	94.2	0.691	95.4	0.822	73.5	3.925	86.5
Denver	0.321	20.1	0.036	15.9	0.108	17.5	0.055	21.9	0.172	23.8	0.010	0.9	0.702	15.5
Colorado w/ Denver	0.597	37.4	0.124	54.4	0.443	71.9	0.181	71.9	0.557	76.9	0.550	49.2	2.452	54.1
Non-Colorado	0.837	52.4	0.059	26.0	0.114	18.5	0.056	22.4	0.135	18.6	0.272	24.4	1.473	32.5
Coal-fired PP	0.522	32.7	0.064	28.2	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.589	13.0
All other sources	1.075	67.3	0.163	71.8	0.613	99.4	0.253	100.0	0.724	100.0	1.117	100.0	3.945	87.0
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/10/ 9 6-hour average RH: 50%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.878		-99.000		-99.000		2.140		-99.000		-99.000		-99.000	
Estimated w/ fires	3.719	98.1	0.571	-99.0	1.000	-99.0	2.298	7.4	2.431	-99.0	3.751	-99.0	23.771	-99.0
Estimated w/o fires	3.719	98.1	0.571	-99.0	1.000	-99.0	2.298	7.4	2.431	-99.0	3.751	-99.0	23.771	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.379	10.2	0.112	19.6	0.096	9.6	0.133	5.8	0.111	4.6	0.993	26.5	1.824	7.7
Craig 1-3	0.217	5.8	0.085	14.9	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.303	1.3
Craig 1-2	0.217	5.8	0.085	14.9	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.303	1.3
Craig 1	0.119	3.2	0.050	8.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.169	0.7
Craig 2	0.098	2.6	0.035	6.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.134	0.6
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.156	4.2	0.014	2.5	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.171	0.7
Hayden 1	0.016	0.4	0.001	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.018	0.1
Hayden 2	0.139	3.7	0.013	2.4	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.153	0.6
Steamboat Springs	0.001	0.0	0.002	0.4	0.003	0.3	0.010	0.4	0.010	0.4	0.015	0.4	0.043	0.2
Other Yampa Valley	0.006	0.1	0.011	1.9	0.090	9.0	0.123	5.3	0.101	4.1	0.977	26.0	1.307	5.5
Non-Yampa Valley	3.340	89.8	0.459	80.4	0.904	90.4	2.165	94.2	2.320	95.4	2.759	73.5	11.947	50.3
Denver	0.748	20.1	0.091	15.9	0.175	17.5	0.502	21.9	0.578	23.8	0.033	0.9	2.127	8.9
Colorado w/ Denver	1.391	37.4	0.311	54.4	0.719	71.9	1.651	71.9	1.868	76.9	1.845	49.2	7.786	32.8
Non-Colorado	1.949	52.4	0.149	26.0	0.185	18.5	0.514	22.4	0.452	18.6	0.913	24.4	4.161	17.5
Coal-fired PP	1.215	32.7	0.161	28.2	0.006	0.6	0.000	0.0	0.000	0.0	0.001	0.0	1.383	5.8
All other sources	2.504	67.3	0.410	71.8	0.995	99.4	2.298	100.0	2.431	100.0	3.751	100.0	22.388	94.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
CONCENTRATION 1200-1800 95/10/ 9

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.806		-99.000		-99.000		0.235		-99.000		-99.000		1.558	
Estimated w/ fires	1.466	81.9	0.175	-99.0	0.299	-99.0	0.120	-49.0	0.330	-99.0	0.563	-99.0	2.953	89.5
Estimated w/o fires	1.466	81.9	0.175	-99.0	0.299	-99.0	0.120	-49.0	0.330	-99.0	0.563	-99.0	2.953	89.5

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.362	24.7	0.117	67.0	0.058	19.6	0.014	11.8	0.032	9.7	0.192	34.0	0.775	26.2
Craig 1-3	0.210	14.3	0.089	51.2	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.1	0.302	10.2
Craig 1-2	0.210	14.3	0.089	51.2	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.301	10.2
Craig 1	0.111	7.6	0.049	28.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.161	5.5
Craig 2	0.099	6.7	0.040	23.2	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.140	4.7
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.149	10.2	0.022	12.5	0.002	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.173	5.9
Hayden 1	0.003	0.2	0.000	0.0	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.2
Hayden 2	0.146	9.9	0.022	12.5	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.169	5.7
Steamboat Springs	0.000	0.0	0.001	0.5	0.002	0.5	0.001	0.8	0.002	0.7	0.003	0.6	0.010	0.3
Other Yampa Valley	0.003	0.2	0.005	2.8	0.053	17.6	0.013	11.0	0.030	8.9	0.188	33.4	0.291	9.8
Non-Yampa Valley	1.104	75.3	0.058	33.0	0.240	80.4	0.106	88.2	0.298	90.3	0.372	66.0	2.178	73.8
Denver	0.184	12.5	0.007	3.9	0.041	13.7	0.021	17.2	0.065	19.6	0.004	0.6	0.321	10.9
Colorado w/ Denver	0.342	23.3	0.026	14.9	0.169	56.5	0.070	58.2	0.210	63.5	0.222	39.4	1.038	35.2
Non-Colorado	0.763	52.0	0.032	18.1	0.072	23.9	0.036	30.0	0.089	26.8	0.150	26.6	1.140	38.6
Coal-fired PP	0.620	42.3	0.123	70.5	0.005	1.8	0.000	0.0	0.000	0.0	0.000	0.1	0.748	25.3
All other sources	0.847	57.7	0.052	29.5	0.293	98.2	0.120	100.0	0.330	100.0	0.563	99.9	2.205	74.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
EXTINCTION 1200-1800 95/10/ 9 6-hour average RH: 41%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.693		-99.000		-99.000		2.140		-99.000		-99.000		-99.000	
Estimated w/ fires	3.080	81.9	0.398	-99.0	0.468	-99.0	1.092	-49.0	1.055	-99.0	1.800	-99.0	17.893	-99.0
Estimated w/o fires	3.080	81.9	0.398	-99.0	0.468	-99.0	1.092	-49.0	1.055	-99.0	1.800	-99.0	17.893	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.760	24.7	0.267	67.0	0.091	19.6	0.128	11.8	0.102	9.7	0.612	34.0	1.962	11.0
Craig 1-3	0.441	14.3	0.204	51.2	0.003	0.6	0.000	0.0	0.000	0.0	0.001	0.1	0.649	3.6
Craig 1-2	0.441	14.3	0.204	51.2	0.002	0.5	0.000	0.0	0.000	0.0	0.001	0.0	0.648	3.6
Craig 1	0.234	7.6	0.112	28.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.347	1.9
Craig 2	0.207	6.7	0.092	23.2	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.301	1.7
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.313	10.2	0.050	12.5	0.004	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.367	2.0
Hayden 1	0.007	0.2	0.000	0.0	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.1
Hayden 2	0.306	9.9	0.050	12.5	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.358	2.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.0	0.002	0.5	0.002	0.5	0.008	0.8	0.008	0.7	0.011	0.6	0.032	0.2
Other Yampa Valley	0.005	0.2	0.011	2.8	0.082	17.6	0.120	11.0	0.094	8.9	0.600	33.4	0.914	5.1
Non-Yampa Valley	2.320	75.3	0.131	33.0	0.376	80.4	0.963	88.2	0.953	90.3	1.187	66.0	5.931	33.1
Denver	0.386	12.5	0.016	3.9	0.064	13.7	0.188	17.2	0.207	19.6	0.012	0.6	0.873	4.9
Colorado w/ Denver	0.718	23.3	0.060	14.9	0.264	56.5	0.636	58.2	0.670	63.5	0.709	39.4	3.056	17.1
Non-Colorado	1.602	52.0	0.072	18.1	0.112	23.9	0.327	30.0	0.283	26.8	0.478	26.6	2.875	16.1
Coal-fired PP	1.301	42.3	0.281	70.5	0.008	1.8	0.000	0.0	0.000	0.0	0.002	0.1	1.592	8.9
All other sources	1.779	57.7	0.118	29.5	0.460	98.2	1.092	100.0	1.055	100.0	1.798	99.9	16.300	91.1
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
CONCENTRATION 0600-1200 95/10/10

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.689		-99.000		0.479		1.401		3.147		3.147		5.395	
Estimated w/ fires	1.343	94.9	0.571	-99.0	0.332	-30.6	0.141	-89.9	0.366	-88.4	0.844	-73.2	3.599	-33.3
Estimated w/o fires	1.343	94.9	0.571	-99.0	0.332	-30.6	0.141	-89.9	0.366	-88.4	0.844	-73.2	3.599	-33.3
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.067	5.0	0.168	29.3	0.044	13.3	0.011	7.5	0.023	6.3	0.237	28.0	0.549	15.3
Craig 1-3	0.016	1.2	0.020	3.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.036	1.0
Craig 1-2	0.016	1.2	0.020	3.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.036	1.0
Craig 1	0.011	0.8	0.017	3.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.028	0.8
Craig 2	0.005	0.4	0.003	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.2
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.050	3.7	0.130	22.8	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.182	5.0
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.050	3.7	0.130	22.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.181	5.0
Steamboat Springs	0.000	0.0	0.001	0.2	0.001	0.3	0.001	0.4	0.001	0.4	0.002	0.3	0.007	0.2
Other Yampa Valley	0.001	0.1	0.016	2.7	0.042	12.6	0.010	7.2	0.022	5.9	0.234	27.7	0.324	9.0
Non-Yampa Valley	1.276	95.0	0.404	70.7	0.288	86.7	0.131	92.5	0.343	93.7	0.608	72.0	3.049	84.7
Denver	0.083	6.2	0.025	4.3	0.029	8.7	0.015	10.8	0.047	12.9	0.003	0.3	0.202	5.6
Colorado w/ Denver	0.154	11.4	0.112	19.5	0.141	42.5	0.057	40.4	0.167	45.7	0.279	33.1	0.910	25.3
Non-Colorado	1.122	83.5	0.292	51.1	0.147	44.2	0.074	52.1	0.176	48.1	0.329	38.9	2.139	59.4
Coal-fired PP	0.234	17.4	0.198	34.6	0.003	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.435	12.1
All other sources	1.109	82.6	0.373	65.4	0.330	99.2	0.141	100.0	0.366	100.0	0.844	100.0	3.164	87.9
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/10/10 6-hour average RH: 50%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.599		-99.000		0.776		12.748		10.541		10.541		-99.000	
Estimated w/ fires	3.116	94.9	1.428	-99.0	0.538	-30.6	1.286	-89.9	1.227	-88.4	2.829	-73.2	20.424	-99.0
Estimated w/o fires	3.116	94.9	1.428	-99.0	0.538	-30.6	1.286	-89.9	1.227	-88.4	2.829	-73.2	20.424	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.156	5.0	0.419	29.3	0.072	13.3	0.097	7.5	0.077	6.3	0.792	28.0	1.613	7.9
Craig 1-3	0.036	1.2	0.051	3.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.088	0.4
Craig 1-2	0.036	1.2	0.051	3.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.088	0.4
Craig 1	0.024	0.8	0.044	3.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.068	0.3
Craig 2	0.012	0.4	0.008	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.020	0.1
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.116	3.7	0.325	22.8	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.444	2.2
Hayden 1	0.000	0.0	0.000	0.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 2	0.116	3.7	0.325	22.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.443	2.2
Steamboat Springs	0.001	0.0	0.003	0.2	0.002	0.3	0.005	0.4	0.005	0.4	0.008	0.3	0.023	0.1
Other Yampa Valley	0.003	0.1	0.039	2.7	0.068	12.6	0.092	7.2	0.072	5.9	0.784	27.7	1.058	5.2
Non-Yampa Valley	2.959	95.0	1.009	70.7	0.467	86.7	1.189	92.5	1.151	93.7	2.037	72.0	8.811	43.1
Denver	0.193	6.2	0.062	4.3	0.047	8.7	0.139	10.8	0.158	12.9	0.009	0.3	0.608	3.0
Colorado w/ Denver	0.357	11.4	0.279	19.5	0.229	42.5	0.519	40.4	0.561	45.7	0.936	33.1	2.880	14.1
Non-Colorado	2.603	83.5	0.730	51.1	0.238	44.2	0.669	52.1	0.590	48.1	1.101	38.9	5.931	29.0
Coal-fired PP	0.544	17.4	0.495	34.6	0.004	0.8	0.000	0.0	0.000	0.0	0.000	0.0	1.043	5.1
All other sources	2.572	82.6	0.933	65.4	0.534	99.2	1.286	100.0	1.227	100.0	2.828	100.0	19.381	94.9
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
CONCENTRATION 1200-1800 95/10/10

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.689		-99.000		0.479		1.401		3.147		3.147		5.395	
Estimated w/ fires	1.223	77.4	0.233	-99.0	0.240	-49.8	0.100	-92.9	0.260	-91.7	0.595	-81.1	2.651	-50.9
Estimated w/o fires	1.223	77.4	0.233	-99.0	0.240	-49.8	0.100	-92.9	0.260	-91.7	0.595	-81.1	2.651	-50.9

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.184	15.1	0.159	68.3	0.045	18.8	0.011	11.0	0.022	8.4	0.189	31.8	0.611	23.0
Craig 1-3	0.092	7.6	0.075	32.1	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.169	6.4
Craig 1-2	0.092	7.6	0.075	32.1	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.168	6.4
Craig 1	0.082	6.7	0.072	30.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.154	5.8
Craig 2	0.011	0.9	0.003	1.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.014	0.5
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.090	7.4	0.076	32.5	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.167	6.3
Hayden 1	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 2	0.090	7.4	0.076	32.5	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.167	6.3
Steamboat Springs	0.000	0.0	0.001	0.4	0.001	0.4	0.001	0.5	0.001	0.5	0.002	0.4	0.006	0.2
Other Yampa Valley	0.002	0.1	0.008	3.3	0.042	17.5	0.010	10.5	0.021	7.9	0.187	31.4	0.269	10.1
Non-Yampa Valley	1.038	84.9	0.074	31.7	0.195	81.2	0.089	89.0	0.238	91.6	0.406	68.2	2.040	77.0
Denver	0.037	3.0	0.002	0.7	0.017	7.0	0.009	9.4	0.029	11.1	0.002	0.3	0.095	3.6
Colorado w/ Denver	0.088	7.2	0.013	5.8	0.100	41.6	0.041	41.3	0.120	46.2	0.204	34.3	0.567	21.4
Non-Colorado	0.950	77.7	0.060	25.9	0.095	39.6	0.048	47.7	0.118	45.4	0.202	33.9	1.473	55.6
Coal-fired PP	0.334	27.3	0.160	68.6	0.003	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.498	18.8
All other sources	0.888	72.7	0.073	31.4	0.237	98.7	0.100	100.0	0.260	100.0	0.594	100.0	2.153	81.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
EXTINCTION 1200-1800 95/10/10 6-hour average RH: 40%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.438		-99.000		0.748		12.748		10.018		10.018		-99.000	
Estimated w/ fires	2.551	77.4	0.529	-99.0	0.375	-49.8	0.910	-92.9	0.828	-91.7	1.893	-81.1	17.087	-99.0
Estimated w/o fires	2.551	77.4	0.529	-99.0	0.375	-49.8	0.910	-92.9	0.828	-91.7	1.893	-81.1	17.087	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.384	15.1	0.362	68.3	0.071	18.8	0.100	11.0	0.070	8.4	0.602	31.8	1.588	9.3
Craig 1-3	0.193	7.6	0.170	32.1	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.365	2.1
Craig 1-2	0.193	7.6	0.170	32.1	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.365	2.1
Craig 1	0.170	6.7	0.163	30.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.334	2.0
Craig 2	0.023	0.9	0.006	1.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.030	0.2
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.188	7.4	0.172	32.5	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.362	2.1
Hayden 1	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 2	0.188	7.4	0.172	32.5	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.361	2.1

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.0	0.002	0.4	0.001	0.4	0.005	0.5	0.004	0.5	0.007	0.4	0.020	0.1
Other Yampa Valley	0.003	0.1	0.018	3.3	0.066	17.5	0.095	10.5	0.065	7.9	0.594	31.4	0.841	4.9
Non-Yampa Valley	2.167	84.9	0.168	31.7	0.305	81.2	0.810	89.0	0.758	91.6	1.291	68.2	5.499	32.2
Denver	0.077	3.0	0.004	0.7	0.026	7.0	0.086	9.4	0.092	11.1	0.005	0.3	0.290	1.7
Colorado w/ Denver	0.183	7.2	0.031	5.8	0.156	41.6	0.376	41.3	0.383	46.2	0.649	34.3	1.778	10.4
Non-Colorado	1.983	77.7	0.137	25.9	0.149	39.6	0.434	47.7	0.376	45.4	0.642	33.9	3.721	21.8
Coal-fired PP	0.697	27.3	0.363	68.6	0.005	1.3	0.000	0.0	0.000	0.0	0.001	0.0	1.066	6.2
All other sources	1.854	72.7	0.166	31.4	0.371	98.7	0.910	100.0	0.828	100.0	1.892	100.0	16.021	93.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
CONCENTRATION 0600-1200 95/10/11

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.492		-99.000		0.212		1.099		0.581		0.581		2.381	
Estimated w/ fires	1.247	153.7	0.339	-99.0	0.363	71.5	0.150	-86.4	0.405	-30.3	0.882	51.7	3.387	42.2
Estimated w/o fires	1.247	153.7	0.339	-99.0	0.363	71.5	0.150	-86.4	0.405	-30.3	0.882	51.7	3.387	42.2
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.151	12.1	0.061	17.9	0.042	11.5	0.011	7.2	0.025	6.1	0.184	20.8	0.472	13.9
Craig 1-3	0.057	4.5	0.029	8.6	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.086	2.6
Craig 1-2	0.057	4.5	0.029	8.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.086	2.6
Craig 1	0.036	2.9	0.015	4.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.051	1.5
Craig 2	0.021	1.6	0.014	4.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.035	1.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.092	7.3	0.021	6.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.113	3.3
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.092	7.3	0.021	6.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.113	3.3
Steamboat Springs	0.001	0.1	0.003	0.9	0.003	0.8	0.002	1.0	0.004	1.1	0.005	0.6	0.018	0.5
Other Yampa Valley	0.002	0.1	0.008	2.3	0.037	10.3	0.009	6.2	0.020	5.0	0.178	20.2	0.255	7.5
Non-Yampa Valley	1.097	87.9	0.278	82.1	0.321	88.5	0.139	92.8	0.381	93.9	0.698	79.2	2.915	86.1
Denver	0.066	5.3	0.019	5.5	0.015	4.2	0.009	5.9	0.027	6.7	0.001	0.2	0.137	4.1
Colorado w/ Denver	0.192	15.4	0.153	45.1	0.216	59.5	0.087	57.7	0.248	61.1	0.462	52.4	1.357	40.1
Non-Colorado	0.905	72.5	0.126	37.0	0.105	29.0	0.053	35.1	0.133	32.8	0.236	26.8	1.557	46.0
Coal-fired PP	0.524	42.0	0.116	34.3	0.003	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.644	19.0
All other sources	0.724	58.0	0.223	65.7	0.360	99.1	0.150	100.0	0.405	100.0	0.882	100.0	2.743	81.0
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/10/11 6-hour average RH: 35%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.974		-99.000		0.325		10.000		1.806		1.806		-99.000	
Estimated w/ fires	2.470	153.7	0.732	-99.0	0.558	71.5	1.365	-86.4	1.260	-30.3	2.741	51.7	19.125	-99.0
Estimated w/o fires	2.470	153.7	0.732	-99.0	0.558	71.5	1.365	-86.4	1.260	-30.3	2.741	51.7	19.125	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.298	12.1	0.131	17.9	0.064	11.5	0.098	7.2	0.077	6.1	0.570	20.8	1.239	6.5
Craig 1-3	0.112	4.5	0.063	8.6	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.176	0.9
Craig 1-2	0.112	4.5	0.063	8.6	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.176	0.9
Craig 1	0.072	2.9	0.032	4.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.104	0.5
Craig 2	0.041	1.6	0.031	4.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.072	0.4
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.181	7.3	0.045	6.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.227	1.2
Hayden 1	0.000	0.0	0.000	0.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 2	0.181	7.3	0.045	6.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.227	1.2
Steamboat Springs	0.001	0.1	0.007	0.9	0.004	0.8	0.014	1.0	0.013	1.1	0.017	0.6	0.057	0.3
Other Yampa Valley	0.003	0.1	0.017	2.3	0.058	10.3	0.084	6.2	0.063	5.0	0.553	20.2	0.778	4.1
Non-Yampa Valley	2.172	87.9	0.601	82.1	0.494	88.5	1.267	92.8	1.183	93.9	2.170	79.2	7.887	41.2
Denver	0.130	5.3	0.040	5.5	0.023	4.2	0.081	5.9	0.085	6.7	0.005	0.2	0.365	1.9
Colorado w/ Denver	0.380	15.4	0.330	45.1	0.332	59.5	0.787	57.7	0.770	61.1	1.437	52.4	4.036	21.1
Non-Colorado	1.792	72.5	0.271	37.0	0.162	29.0	0.479	35.1	0.413	32.8	0.734	26.8	3.851	20.1
Coal-fired PP	1.037	42.0	0.251	34.3	0.005	0.9	0.000	0.0	0.000	0.0	0.001	0.0	1.295	6.8
All other sources	1.433	58.0	0.481	65.7	0.553	99.1	1.365	100.0	1.260	100.0	2.740	100.0	17.831	93.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
CONCENTRATION 1200-1800 95/10/11

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.492		-99.000		0.212		1.099		0.581		0.581		2.381	
Estimated w/ fires	0.877	78.3	0.114	-99.0	0.189	-10.8	0.073	-93.4	0.196	-66.2	0.435	-25.2	1.883	-20.9
Estimated w/o fires	0.877	78.3	0.114	-99.0	0.189	-10.8	0.073	-93.4	0.196	-66.2	0.435	-25.2	1.883	-20.9

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.132	15.1	0.080	70.0	0.042	22.3	0.010	13.4	0.026	13.3	0.094	21.7	0.384	20.4
Craig 1-3	0.036	4.1	0.036	32.0	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.073	3.9
Craig 1-2	0.036	4.1	0.036	32.0	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.073	3.9
Craig 1	0.020	2.3	0.019	17.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.039	2.1
Craig 2	0.016	1.8	0.017	15.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.033	1.8
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.094	10.8	0.040	34.9	0.002	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.136	7.2
Hayden 1	0.000	0.0	0.000	0.0	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Hayden 2	0.094	10.8	0.040	34.9	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.135	7.2
Steamboat Springs	0.000	0.0	0.001	1.1	0.002	1.1	0.001	1.6	0.003	1.6	0.004	0.9	0.012	0.6
Other Yampa Valley	0.001	0.2	0.002	2.0	0.037	19.8	0.009	11.8	0.023	11.7	0.090	20.8	0.163	8.7
Non-Yampa Valley	0.744	84.9	0.034	30.0	0.147	77.7	0.063	86.6	0.170	86.7	0.340	78.3	1.499	79.6
Denver	0.029	3.3	0.001	1.0	0.006	3.2	0.004	4.9	0.011	5.5	0.001	0.1	0.051	2.7
Colorado w/ Denver	0.140	15.9	0.017	15.0	0.101	53.6	0.041	56.5	0.114	58.0	0.233	53.7	0.646	34.3
Non-Colorado	0.605	69.0	0.017	15.0	0.046	24.2	0.022	30.1	0.056	28.7	0.107	24.6	0.852	45.3
Coal-fired PP	0.446	50.9	0.090	78.8	0.005	2.5	0.000	0.0	0.000	0.0	0.000	0.1	0.541	28.7
All other sources	0.430	49.1	0.024	21.2	0.184	97.5	0.073	100.0	0.196	100.0	0.434	99.9	1.342	71.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
EXTINCTION 1200-1800 95/10/11 6-hour average RH: 30%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.936		-99.000		0.321		10.000		1.774		1.774		-99.000	
Estimated w/ fires	1.668	78.3	0.237	-99.0	0.287	-10.8	0.663	-93.4	0.600	-66.2	1.327	-25.2	14.781	-99.0
Estimated w/o fires	1.668	78.3	0.237	-99.0	0.287	-10.8	0.663	-93.4	0.600	-66.2	1.327	-25.2	14.781	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.251	15.1	0.166	70.0	0.064	22.3	0.089	13.4	0.080	13.3	0.288	21.7	0.939	6.3
Craig 1-3	0.068	4.1	0.076	32.0	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.145	1.0
Craig 1-2	0.068	4.1	0.076	32.0	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.145	1.0
Craig 1	0.038	2.3	0.040	17.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.078	0.5
Craig 2	0.030	1.8	0.036	15.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.067	0.5
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.180	10.8	0.083	34.9	0.003	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.266	1.8
Hayden 1	0.000	0.0	0.000	0.0	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Hayden 2	0.180	10.8	0.083	34.9	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.264	1.8

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.0	0.002	1.1	0.003	1.1	0.011	1.6	0.010	1.6	0.012	0.9	0.038	0.3
Other Yampa Valley	0.003	0.2	0.005	2.0	0.057	19.8	0.078	11.8	0.070	11.7	0.276	20.8	0.489	3.3
Non-Yampa Valley	1.417	84.9	0.071	30.0	0.223	77.7	0.574	86.6	0.520	86.7	1.039	78.3	3.843	26.0
Denver	0.054	3.3	0.002	1.0	0.009	3.2	0.032	4.9	0.033	5.5	0.002	0.1	0.133	0.9
Colorado w/ Denver	0.266	15.9	0.035	15.0	0.153	53.6	0.374	56.5	0.348	58.0	0.713	53.7	1.890	12.8
Non-Colorado	1.151	69.0	0.036	15.0	0.069	24.2	0.200	30.1	0.172	28.7	0.326	24.6	1.953	13.2
Coal-fired PP	0.849	50.9	0.187	78.8	0.007	2.5	0.000	0.0	0.000	0.0	0.001	0.1	1.044	7.1
All other sources	0.819	49.1	0.050	21.2	0.279	97.5	0.663	100.0	0.600	100.0	1.326	99.9	13.737	92.9
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
CONCENTRATION 0600-1200 95/10/12

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.243		-99.000		-99.000		0.392		-99.000		-99.000		1.071	
Estimated w/ fires	0.286	17.7	0.209	-99.0	0.196	-99.0	0.079	-79.9	0.208	-99.0	0.558	-99.0	1.535	43.3
Estimated w/o fires	0.286	17.7	0.209	-99.0	0.196	-99.0	0.079	-79.9	0.208	-99.0	0.558	-99.0	1.534	43.3
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.022	7.8	0.085	40.5	0.032	16.2	0.007	9.0	0.019	9.1	0.093	16.8	0.258	16.8
Craig 1-3	0.004	1.6	0.027	12.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.032	2.1
Craig 1-2	0.004	1.6	0.027	12.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.032	2.1
Craig 1	0.002	0.8	0.014	6.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.017	1.1
Craig 2	0.002	0.8	0.013	6.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.015	1.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.017	6.1	0.047	22.4	0.001	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.066	4.3
Hayden 1	0.000	0.2	0.004	2.1	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.4
Hayden 2	0.017	5.9	0.042	20.4	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.060	3.9
Steamboat Springs	0.000	0.0	0.003	1.4	0.002	0.8	0.001	0.8	0.002	0.8	0.007	1.2	0.014	0.9
Other Yampa Valley	0.000	0.1	0.008	3.7	0.028	14.5	0.006	8.2	0.017	8.3	0.086	15.5	0.146	9.5
Non-Yampa Valley	0.263	92.2	0.124	59.5	0.164	83.8	0.072	91.0	0.189	90.9	0.464	83.2	1.276	83.2
Denver	0.000	0.1	0.001	0.4	0.001	0.4	0.000	0.6	0.001	0.7	0.000	0.0	0.004	0.3
Colorado w/ Denver	0.067	23.4	0.107	51.4	0.129	65.6	0.055	69.3	0.145	70.0	0.356	63.9	0.859	56.0
Non-Colorado	0.197	68.8	0.017	8.0	0.036	18.1	0.017	21.7	0.043	20.9	0.108	19.4	0.417	27.2
Coal-fired PP	0.072	25.0	0.077	36.8	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.150	9.8
All other sources	0.214	75.0	0.132	63.2	0.194	99.0	0.079	100.0	0.208	100.0	0.558	100.0	1.384	90.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/10/12 6-hour average RH: 55%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.602		-99.000		-99.000		3.570		-99.000		-99.000		-99.000	
Estimated w/ fires	0.709	17.7	0.556	-99.0	0.325	-99.0	0.717	-79.9	0.720	-99.0	1.933	-99.0	14.960	-99.0
Estimated w/o fires	0.709	17.7	0.556	-99.0	0.325	-99.0	0.717	-79.9	0.720	-99.0	1.933	-99.0	14.960	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.055	7.8	0.225	40.5	0.053	16.2	0.065	9.0	0.065	9.1	0.324	16.8	0.787	5.3
Craig 1-3	0.011	1.6	0.072	12.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.084	0.6
Craig 1-2	0.011	1.6	0.072	12.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.083	0.6
Craig 1	0.006	0.8	0.038	6.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.044	0.3
Craig 2	0.006	0.8	0.034	6.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.040	0.3
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.043	6.1	0.125	22.4	0.002	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.171	1.1
Hayden 1	0.001	0.2	0.012	2.1	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.015	0.1
Hayden 2	0.042	5.9	0.113	20.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.156	1.0
Steamboat Springs	0.000	0.0	0.008	1.4	0.003	0.8	0.006	0.8	0.006	0.8	0.024	1.2	0.046	0.3
Other Yampa Valley	0.001	0.1	0.021	3.7	0.047	14.5	0.059	8.2	0.060	8.3	0.299	15.5	0.486	3.2
Non-Yampa Valley	0.654	92.2	0.331	59.5	0.272	83.8	0.652	91.0	0.655	90.9	1.609	83.2	4.173	27.9
Denver	0.001	0.1	0.002	0.4	0.001	0.4	0.004	0.6	0.005	0.7	0.000	0.0	0.015	0.1
Colorado w/ Denver	0.166	23.4	0.286	51.4	0.213	65.6	0.497	69.3	0.504	70.0	1.234	63.9	2.901	19.4
Non-Colorado	0.488	68.8	0.045	8.0	0.059	18.1	0.155	21.7	0.150	20.9	0.375	19.4	1.272	8.5
Coal-fired PP	0.177	25.0	0.204	36.8	0.003	1.0	0.000	0.0	0.000	0.0	0.001	0.0	0.386	2.6
All other sources	0.531	75.0	0.351	63.2	0.322	99.0	0.717	100.0	0.720	100.0	1.932	100.0	14.574	97.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
CONCENTRATION 1200-1800 95/10/12

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.243		-99.000		-99.000		0.392		-99.000		-99.000		1.071	
Estimated w/ fires	0.141	-42.1	0.497	-99.0	0.086	-99.0	0.031	-92.0	0.078	-99.0	0.265	-99.0	1.097	2.5
Estimated w/o fires	0.141	-42.1	0.497	-99.0	0.086	-99.0	0.031	-92.0	0.077	-99.0	0.265	-99.0	1.097	2.4

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.028	19.9	0.156	31.4	0.030	35.2	0.007	20.9	0.018	22.9	0.054	20.4	0.293	26.7
Craig 1-3	0.027	19.4	0.147	29.5	0.000	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.174	15.9
Craig 1-2	0.027	19.4	0.147	29.5	0.000	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.174	15.9
Craig 1	0.014	9.9	0.077	15.5	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.091	8.3
Craig 2	0.013	9.5	0.070	14.0	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.083	7.6
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Other Yampa Valley	0.001	0.5	0.010	1.9	0.030	34.7	0.007	20.9	0.018	22.9	0.054	20.4	0.118	10.8
Non-Yampa Valley	0.113	80.1	0.341	68.6	0.056	64.7	0.025	79.0	0.060	76.7	0.211	79.6	0.804	73.3
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.020	14.6	0.048	9.6	0.031	36.4	0.014	43.6	0.035	45.2	0.113	42.8	0.261	23.8
Non-Colorado	0.092	65.6	0.293	59.0	0.024	28.3	0.011	35.3	0.024	31.4	0.097	36.8	0.543	49.4
Coal-fired PP	0.069	48.7	0.403	81.1	0.002	2.6	0.000	0.0	0.000	0.0	0.000	0.1	0.474	43.2
All other sources	0.072	51.3	0.094	18.9	0.084	97.4	0.031	100.0	0.078	100.0	0.264	99.9	0.624	56.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.5	0.000	0.0	0.000	0.0

Gilpin Creek
EXTINCTION 1200-1800 95/10/12 6-hour average RH: 92%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.470		-99.000		-99.000		3.570		-99.000		-99.000		-99.000	
Estimated w/ fires	1.431	-42.1	5.148	-99.0	0.307	-99.0	0.285	-92.0	0.695	-99.0	2.368	-99.0	20.234	-99.0
Estimated w/o fires	1.431	-42.1	5.147	-99.0	0.307	-99.0	0.284	-92.0	0.692	-99.0	2.368	-99.0	20.230	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.285	19.9	1.618	31.4	0.108	35.2	0.060	20.9	0.159	22.9	0.483	20.4	2.713	13.4
Craig 1-3	0.278	19.4	1.519	29.5	0.002	0.5	0.000	0.0	0.000	0.0	0.001	0.0	1.799	8.9
Craig 1-2	0.278	19.4	1.519	29.5	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	1.799	8.9
Craig 1	0.142	9.9	0.797	15.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.941	4.6
Craig 2	0.135	9.5	0.722	14.0	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.858	4.2
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Other Yampa Valley	0.007	0.5	0.099	1.9	0.107	34.7	0.060	20.9	0.159	22.9	0.483	20.4	0.914	4.5
Non-Yampa Valley	1.147	80.1	3.529	68.6	0.199	64.7	0.225	79.0	0.533	76.7	1.885	79.6	7.517	37.2
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.208	14.6	0.493	9.6	0.112	36.4	0.124	43.6	0.314	45.2	1.013	42.8	2.264	11.2
Non-Colorado	0.938	65.6	3.037	59.0	0.087	28.3	0.101	35.3	0.219	31.4	0.871	36.8	5.253	26.0
Coal-fired PP	0.698	48.7	4.173	81.1	0.008	2.6	0.000	0.0	0.000	0.0	0.001	0.1	4.879	24.1
All other sources	0.734	51.3	0.975	18.9	0.299	97.4	0.285	100.0	0.695	100.0	2.367	99.9	15.355	75.9
Fires	0.000	0.0	0.001	0.0	0.000	0.0	0.000	0.1	0.003	0.5	0.000	0.0	0.004	0.0

Gilpin Creek
CONCENTRATION 0600-1200 95/10/13

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.338		-99.000		-99.000		0.019		-99.000		-99.000		0.940	
Estimated w/ fires	0.559	65.3	1.095	-99.0	0.163	-99.0	0.063	240.3	0.139	-99.0	0.584	-99.0	2.603	177.0
Estimated w/o fires	0.559	65.3	1.095	-99.0	0.163	-99.0	0.063	240.3	0.139	-99.0	0.584	-99.0	2.603	177.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.166	29.8	0.344	31.4	0.035	21.4	0.008	12.0	0.018	13.2	0.200	34.2	0.771	29.6
Craig 1-3	0.006	1.1	0.013	1.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.019	0.7
Craig 1-2	0.006	1.1	0.013	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.019	0.7
Craig 1	0.003	0.6	0.006	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.4
Craig 2	0.003	0.5	0.006	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.4
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.160	28.6	0.311	28.4	0.001	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.472	18.1
Hayden 1	0.069	12.3	0.232	21.2	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.301	11.6
Hayden 2	0.091	16.3	0.079	7.2	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.171	6.6
Steamboat Springs	0.000	0.0	0.002	0.2	0.001	0.7	0.001	1.0	0.001	1.0	0.003	0.6	0.009	0.3
Other Yampa Valley	0.000	0.0	0.018	1.7	0.032	19.8	0.007	10.9	0.017	12.1	0.196	33.6	0.271	10.4
Non-Yampa Valley	0.393	70.2	0.751	68.6	0.128	78.6	0.056	88.0	0.120	86.8	0.384	65.8	1.833	70.4
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.003	0.5	0.053	4.9	0.022	13.3	0.007	11.5	0.018	12.7	0.070	11.9	0.172	6.6
Non-Colorado	0.390	69.8	0.698	63.7	0.107	65.3	0.048	76.6	0.103	74.1	0.315	53.9	1.660	63.8
Coal-fired PP	0.330	59.0	0.559	51.0	0.004	2.5	0.000	0.0	0.000	0.0	0.000	0.0	0.893	34.3
All other sources	0.229	41.0	0.537	49.0	0.159	97.5	0.063	100.0	0.139	100.0	0.584	100.0	1.711	65.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/10/13 6-hour average RH: 78%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.388		-99.000		-99.000		0.169		-99.000		-99.000		-99.000	
Estimated w/ fires	2.294	65.3	4.692	-99.0	0.337	-99.0	0.576	240.3	0.641	-99.0	2.698	-99.0	21.238	-99.0
Estimated w/o fires	2.294	65.3	4.692	-99.0	0.337	-99.0	0.576	240.3	0.641	-99.0	2.698	-99.0	21.238	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.683	29.8	1.474	31.4	0.072	21.4	0.069	12.0	0.085	13.2	0.922	34.2	3.304	15.6
Craig 1-3	0.026	1.1	0.055	1.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.081	0.4
Craig 1-2	0.026	1.1	0.055	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.081	0.4
Craig 1	0.014	0.6	0.028	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.042	0.2
Craig 2	0.012	0.5	0.028	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.039	0.2
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.656	28.6	1.331	28.4	0.003	0.9	0.000	0.0	0.000	0.0	0.000	0.0	1.990	9.4
Hayden 1	0.282	12.3	0.992	21.2	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	1.276	6.0
Hayden 2	0.374	16.3	0.339	7.2	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.715	3.4
Steamboat Springs	0.000	0.0	0.008	0.2	0.002	0.7	0.006	1.0	0.007	1.0	0.016	0.6	0.039	0.2
Other Yampa Valley	0.001	0.0	0.079	1.7	0.067	19.8	0.063	10.9	0.078	12.1	0.906	33.6	1.194	5.6
Non-Yampa Valley	1.611	70.2	3.219	68.6	0.264	78.6	0.507	88.0	0.557	86.8	1.776	65.8	7.934	37.4
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.011	0.5	0.229	4.9	0.045	13.3	0.066	11.5	0.082	12.7	0.322	11.9	0.754	3.6
Non-Colorado	1.600	69.8	2.990	63.7	0.220	65.3	0.441	76.6	0.475	74.1	1.454	53.9	7.180	33.8
Coal-fired PP	1.354	59.0	2.393	51.0	0.008	2.5	0.000	0.0	0.000	0.0	0.001	0.0	3.757	17.7
All other sources	0.940	41.0	2.299	49.0	0.328	97.5	0.576	100.0	0.641	100.0	2.697	100.0	17.481	82.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
CONCENTRATION 1200-1800 95/10/13

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.338		-99.000		-99.000		0.019		-99.000		-99.000		0.940	
Estimated w/ fires	1.204	256.0	1.077	-99.0	0.106	-99.0	0.037	96.8	0.084	-99.0	0.277	-99.0	2.783	196.2
Estimated w/o fires	1.204	256.0	1.077	-99.0	0.106	-99.0	0.037	96.8	0.084	-99.0	0.277	-99.0	2.783	196.2

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.618	51.4	0.626	58.1	0.038	36.4	0.009	24.9	0.022	26.0	0.104	37.5	1.418	50.9
Craig 1-3	0.059	4.9	0.103	9.5	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.162	5.8
Craig 1-2	0.059	4.9	0.103	9.5	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.162	5.8
Craig 1	0.033	2.7	0.055	5.1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.088	3.2
Craig 2	0.026	2.2	0.048	4.4	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.074	2.7
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.559	46.4	0.507	47.1	0.003	2.8	0.000	0.0	0.000	0.0	0.000	0.0	1.069	38.4
Hayden 1	0.228	18.9	0.384	35.7	0.001	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.613	22.0
Hayden 2	0.331	27.5	0.123	11.4	0.002	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.455	16.4
Steamboat Springs	0.000	0.0	0.001	0.1	0.001	0.7	0.000	1.2	0.001	1.2	0.002	0.8	0.005	0.2
Other Yampa Valley	0.001	0.1	0.016	1.5	0.034	32.3	0.009	23.7	0.021	24.7	0.101	36.6	0.181	6.5
Non-Yampa Valley	0.585	48.6	0.451	41.9	0.067	63.6	0.027	75.1	0.062	74.0	0.173	62.5	1.366	49.1
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.003	0.2	0.014	1.3	0.011	10.3	0.004	11.9	0.010	12.0	0.040	14.3	0.081	2.9
Non-Colorado	0.583	48.4	0.437	40.6	0.056	53.3	0.023	63.2	0.052	62.0	0.134	48.2	1.285	46.2
Coal-fired PP	0.884	73.5	0.872	81.0	0.007	6.7	0.000	0.0	0.000	0.0	0.000	0.1	1.763	63.4
All other sources	0.319	26.5	0.205	19.0	0.099	93.3	0.037	100.0	0.084	100.0	0.277	99.9	1.020	36.6
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
EXTINCTION 1200-1800 95/10/13 6-hour average RH: 48%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.762		-99.000		-99.000		0.169		-99.000		-99.000		-99.000	
Estimated w/ fires	2.714	256.0	2.622	-99.0	0.170	-99.0	0.333	96.8	0.277	-99.0	0.915	-99.0	17.030	-99.0
Estimated w/o fires	2.714	256.0	2.622	-99.0	0.170	-99.0	0.333	96.8	0.276	-99.0	0.915	-99.0	17.030	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.394	51.4	1.524	58.1	0.062	36.4	0.083	24.9	0.072	26.0	0.343	37.5	3.478	20.4
Craig 1-3	0.133	4.9	0.250	9.5	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.384	2.3
Craig 1-2	0.133	4.9	0.250	9.5	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.384	2.3
Craig 1	0.074	2.7	0.134	5.1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.209	1.2
Craig 2	0.059	2.2	0.116	4.4	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.175	1.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	1.260	46.4	1.234	47.1	0.005	2.8	0.000	0.0	0.000	0.0	0.000	0.0	2.499	14.7
Hayden 1	0.514	18.9	0.935	35.7	0.002	1.4	0.000	0.0	0.000	0.0	0.000	0.0	1.451	8.5
Hayden 2	0.746	27.5	0.299	11.4	0.002	1.5	0.000	0.0	0.000	0.0	0.000	0.0	1.047	6.2

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.000	0.0	0.002	0.1	0.001	0.7	0.004	1.2	0.003	1.2	0.007	0.8	0.018	0.1
Other Yampa Valley	0.002	0.1	0.038	1.5	0.055	32.3	0.079	23.7	0.068	24.7	0.335	36.6	0.577	3.4
Non-Yampa Valley	1.320	48.6	1.097	41.9	0.108	63.6	0.250	75.1	0.205	74.0	0.572	62.5	3.552	20.9
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.006	0.2	0.034	1.3	0.017	10.3	0.040	11.9	0.033	12.0	0.131	14.3	0.260	1.5
Non-Colorado	1.314	48.4	1.064	40.6	0.090	53.3	0.211	63.2	0.171	62.0	0.441	48.2	3.291	19.3
Coal-fired PP	1.994	73.5	2.122	81.0	0.011	6.7	0.000	0.0	0.000	0.0	0.001	0.1	4.129	24.2
All other sources	0.720	26.5	0.499	19.0	0.158	93.3	0.333	100.0	0.277	100.0	0.914	99.9	12.901	75.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
CONCENTRATION 0600-1200 95/10/14

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.663		-99.000		-99.000		-99.000		-99.000		-99.000		1.121	
Estimated w/ fires	0.698	5.2	0.000	-99.0	0.237	-99.0	0.092	-99.0	0.215	-99.0	0.790	-99.0	2.031	81.1
Estimated w/o fires	0.698	5.2	0.000	-99.0	0.237	-99.0	0.092	-99.0	0.215	-99.0	0.790	-99.0	2.031	81.1
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.016	2.3	0.000	0.0	0.050	21.3	0.012	13.2	0.027	12.8	0.260	32.9	0.366	18.0
Craig 1-3	0.003	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.2
Craig 1-2	0.003	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.2
Craig 1	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.1
Craig 2	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.1
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.011	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.011	0.5
Hayden 1	0.005	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.2
Hayden 2	0.006	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.3
Steamboat Springs	0.000	0.0	0.000	0.0	0.001	0.5	0.001	0.7	0.002	0.9	0.002	0.3	0.006	0.3
Other Yampa Valley	0.002	0.2	0.000	0.0	0.049	20.7	0.011	12.5	0.026	11.9	0.258	32.6	0.346	17.0
Non-Yampa Valley	0.681	97.7	0.000	0.0	0.186	78.7	0.079	86.8	0.187	87.2	0.530	67.1	1.664	82.0
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.011	1.5	0.000	0.0	0.066	28.1	0.025	27.5	0.063	29.3	0.213	27.0	0.378	18.6
Non-Colorado	0.671	96.1	0.000	0.0	0.120	50.7	0.054	59.2	0.124	57.9	0.317	40.1	1.286	63.3
Coal-fired PP	0.143	20.5	0.000	0.0	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.144	7.1
All other sources	0.555	79.5	0.000	100.0	0.235	99.4	0.092	100.0	0.215	100.0	0.790	100.0	1.887	92.9
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/10/14 6-hour average RH: 38%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.345		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.415	5.2	0.000	-99.0	0.366	-99.0	0.833	-99.0	0.675	-99.0	2.483	-99.0	15.772	-99.0
Estimated w/o fires	1.415	5.2	0.000	-99.0	0.366	-99.0	0.833	-99.0	0.674	-99.0	2.483	-99.0	15.772	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.033	2.3	0.000	0.0	0.078	21.3	0.110	13.2	0.086	12.8	0.818	32.9	1.125	7.1
Craig 1-3	0.007	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.0
Craig 1-2	0.007	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.0
Craig 1	0.004	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.0
Craig 2	0.003	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.022	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.022	0.1
Hayden 1	0.009	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.1
Hayden 2	0.013	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.1
Steamboat Springs	0.000	0.0	0.000	0.0	0.002	0.5	0.006	0.7	0.006	0.9	0.008	0.3	0.022	0.1
Other Yampa Valley	0.004	0.2	0.000	0.0	0.076	20.7	0.104	12.5	0.080	11.9	0.810	32.6	1.074	6.8
Non-Yampa Valley	1.382	97.7	0.000	0.0	0.288	78.7	0.723	86.8	0.588	87.2	1.665	67.1	4.647	29.5
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.022	1.5	0.000	0.0	0.103	28.1	0.229	27.5	0.197	29.3	0.670	27.0	1.221	7.7
Non-Colorado	1.360	96.1	0.000	0.0	0.186	50.7	0.494	59.2	0.391	57.9	0.996	40.1	3.426	21.7
Coal-fired PP	0.289	20.5	0.000	0.0	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.292	1.9
All other sources	1.125	79.5	0.000	100.0	0.364	99.4	0.833	100.0	0.675	100.0	2.483	100.0	15.480	98.1
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Gilpin Creek
CONCENTRATION 1200-1800 95/10/14

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.663		-99.000		-99.000		-99.000		-99.000		-99.000		1.121	
Estimated w/ fires	0.707	6.6	0.248	-99.0	0.160	-99.0	0.062	-99.0	0.144	-99.0	0.493	-99.0	1.814	61.8
Estimated w/o fires	0.707	6.6	0.248	-99.0	0.160	-99.0	0.062	-99.0	0.144	-99.0	0.493	-99.0	1.814	61.8

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.185	26.2	0.094	37.8	0.041	25.8	0.011	17.0	0.022	15.3	0.173	35.1	0.526	29.0
Craig 1-3	0.049	6.9	0.025	10.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.074	4.1
Craig 1-2	0.047	6.7	0.025	9.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.072	4.0
Craig 1	0.025	3.6	0.013	5.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.039	2.1
Craig 2	0.022	3.1	0.012	4.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.033	1.8
Craig 3	0.002	0.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.1
Hayden 1-2	0.134	19.0	0.055	22.3	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.190	10.5
Hayden 1	0.041	5.8	0.030	12.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.071	3.9
Hayden 2	0.093	13.2	0.025	10.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.119	6.5
Steamboat Springs	0.000	0.0	0.002	0.9	0.002	0.9	0.001	1.4	0.002	1.6	0.003	0.6	0.010	0.6
Other Yampa Valley	0.002	0.2	0.011	4.5	0.039	24.3	0.010	15.6	0.020	13.7	0.170	34.5	0.251	13.8
Non-Yampa Valley	0.522	73.8	0.154	62.2	0.118	74.2	0.052	83.0	0.122	84.6	0.320	64.9	1.288	71.0
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.014	1.9	0.027	10.9	0.043	26.9	0.017	28.0	0.044	30.3	0.127	25.6	0.271	15.0
Non-Colorado	0.509	71.9	0.127	51.3	0.075	47.2	0.034	55.0	0.078	54.3	0.194	39.2	1.017	56.1
Coal-fired PP	0.295	41.7	0.118	47.4	0.002	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.415	22.9
All other sources	0.412	58.3	0.131	52.6	0.158	98.7	0.062	100.0	0.144	100.0	0.493	100.0	1.400	77.1
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0

Gilpin Creek
EXTINCTION 1200-1800 95/10/14 6-hour average RH: 42%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.401		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.493	6.6	0.569	-99.0	0.250	-99.0	0.565	-99.0	0.462	-99.0	1.579	-99.0	14.918	-99.0
Estimated w/o fires	1.493	6.6	0.569	-99.0	0.250	-99.0	0.565	-99.0	0.461	-99.0	1.579	-99.0	14.918	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.391	26.2	0.215	37.8	0.065	25.8	0.096	17.0	0.071	15.3	0.555	35.1	1.392	9.3
Craig 1-3	0.103	6.9	0.057	10.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.161	1.1
Craig 1-2	0.100	6.7	0.056	9.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.156	1.0
Craig 1	0.054	3.6	0.030	5.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.084	0.6
Craig 2	0.046	3.1	0.026	4.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.073	0.5
Craig 3	0.004	0.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.0
Hayden 1-2	0.283	19.0	0.127	22.3	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.411	2.8
Hayden 1	0.087	5.8	0.069	12.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.156	1.0
Hayden 2	0.196	13.2	0.058	10.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.255	1.7

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.0	0.005	0.9	0.002	0.9	0.008	1.4	0.007	1.6	0.010	0.6	0.034	0.2
Other Yampa Valley	0.004	0.2	0.026	4.5	0.061	24.3	0.088	15.6	0.063	13.7	0.544	34.5	0.786	5.3
Non-Yampa Valley	1.102	73.8	0.354	62.2	0.186	74.2	0.469	83.0	0.390	84.6	1.025	64.9	3.526	23.6
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.029	1.9	0.062	10.9	0.067	26.9	0.158	28.0	0.140	30.3	0.405	25.6	0.861	5.8
Non-Colorado	1.074	71.9	0.292	51.3	0.118	47.2	0.311	55.0	0.250	54.3	0.620	39.2	2.664	17.9
Coal-fired PP	0.623	41.7	0.269	47.4	0.003	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.896	6.0
All other sources	0.870	58.3	0.299	52.6	0.247	98.7	0.565	100.0	0.462	100.0	1.579	100.0	14.022	94.0
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0

Gilpin Creek
CONCENTRATION 0600-1200 95/10/15

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		7.181	
Estimated w/ fires	1.042	-99.0	0.635	-99.0	0.316	-99.0	0.125	-99.0	0.314	-99.0	0.951	-99.0	3.383	-52.9
Estimated w/o fires	1.042	-99.0	0.635	-99.0	0.316	-99.0	0.125	-99.0	0.313	-99.0	0.951	-99.0	3.382	-52.9
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.293	28.1	0.254	39.9	0.061	19.4	0.016	12.7	0.036	11.5	0.276	29.0	0.936	27.7
Craig 1-3	0.056	5.3	0.041	6.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.097	2.9
Craig 1-2	0.048	4.6	0.037	5.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.085	2.5
Craig 1	0.025	2.4	0.017	2.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.042	1.2
Craig 2	0.023	2.2	0.020	3.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.043	1.3
Craig 3	0.007	0.7	0.004	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.012	0.3
Hayden 1-2	0.234	22.5	0.187	29.4	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.422	12.5
Hayden 1	0.123	11.8	0.142	22.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.266	7.9
Hayden 2	0.111	10.7	0.045	7.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.156	4.6
Steamboat Springs	0.001	0.1	0.006	1.0	0.003	0.8	0.001	1.2	0.004	1.3	0.005	0.5	0.020	0.6
Other Yampa Valley	0.003	0.2	0.020	3.1	0.058	18.2	0.014	11.5	0.032	10.3	0.271	28.5	0.397	11.7
Non-Yampa Valley	0.749	71.9	0.382	60.1	0.255	80.6	0.109	87.2	0.277	88.3	0.675	71.0	2.446	72.3
Denver	0.017	1.6	0.007	1.1	0.001	0.2	0.000	0.2	0.001	0.3	0.000	0.0	0.026	0.8
Colorado w/ Denver	0.078	7.5	0.170	26.8	0.147	46.5	0.058	46.9	0.159	50.7	0.389	40.9	1.002	29.6
Non-Colorado	0.671	64.4	0.211	33.3	0.108	34.1	0.050	40.3	0.118	37.6	0.286	30.0	1.444	42.7
Coal-fired PP	0.445	42.6	0.280	44.0	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.726	21.5
All other sources	0.598	57.4	0.356	56.0	0.314	99.3	0.125	100.0	0.314	100.0	0.951	100.0	2.656	78.5
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.001	0.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/10/15 6-hour average RH: 38%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.127	-99.0	1.411	-99.0	0.490	-99.0	1.134	-99.0	0.988	-99.0	2.996	-99.0	19.147	-99.0
Estimated w/o fires	2.127	-99.0	1.410	-99.0	0.490	-99.0	1.134	-99.0	0.986	-99.0	2.996	-99.0	19.144	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.598	28.1	0.563	39.9	0.095	19.4	0.145	12.7	0.114	11.5	0.870	29.0	2.385	12.5
Craig 1-3	0.113	5.3	0.091	6.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.205	1.1
Craig 1-2	0.098	4.6	0.082	5.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.181	0.9
Craig 1	0.051	2.4	0.037	2.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.089	0.5
Craig 2	0.047	2.2	0.044	3.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.092	0.5
Craig 3	0.015	0.7	0.009	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.025	0.1
Hayden 1-2	0.478	22.5	0.415	29.4	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.895	4.7
Hayden 1	0.251	11.8	0.316	22.4	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.568	3.0
Hayden 2	0.227	10.7	0.099	7.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.327	1.7
Steamboat Springs	0.001	0.1	0.013	1.0	0.004	0.8	0.014	1.2	0.013	1.3	0.016	0.5	0.061	0.3
Other Yampa Valley	0.005	0.2	0.044	3.1	0.089	18.2	0.131	11.5	0.101	10.3	0.854	28.5	1.224	6.4
Non-Yampa Valley	1.529	71.9	0.847	60.1	0.395	80.6	0.989	87.2	0.872	88.3	2.126	71.0	6.759	35.3
Denver	0.035	1.6	0.016	1.1	0.001	0.2	0.003	0.2	0.003	0.3	0.000	0.0	0.057	0.3
Colorado w/ Denver	0.159	7.5	0.378	26.8	0.228	46.5	0.532	46.9	0.501	50.7	1.226	40.9	3.024	15.8
Non-Colorado	1.370	64.4	0.469	33.3	0.167	34.1	0.458	40.3	0.371	37.6	0.900	30.0	3.735	19.5
Coal-fired PP	0.907	42.6	0.621	44.0	0.003	0.7	0.000	0.0	0.000	0.0	0.000	0.0	1.532	8.0
All other sources	1.220	57.4	0.790	56.0	0.487	99.3	1.134	100.0	0.988	100.0	2.996	100.0	17.615	92.0
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.2	0.000	0.0	0.003	0.0

Gilpin Creek
CONCENTRATION 1200-1800 95/10/15

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		7.181	
Estimated w/ fires	0.916	-99.0	0.138	-99.0	0.234	-99.0	0.093	-99.0	0.236	-99.0	0.656	-99.0	2.273	-68.3
Estimated w/o fires	0.916	-99.0	0.138	-99.0	0.234	-99.0	0.093	-99.0	0.234	-99.0	0.656	-99.0	2.271	-68.4

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.249	27.1	0.073	52.9	0.049	20.8	0.012	13.4	0.027	11.4	0.201	30.6	0.611	26.9
Craig 1-3	0.058	6.4	0.021	15.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.079	3.5
Craig 1-2	0.046	5.0	0.019	13.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.065	2.8
Craig 1	0.024	2.6	0.008	6.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.032	1.4
Craig 2	0.022	2.4	0.010	7.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.032	1.4
Craig 3	0.013	1.4	0.002	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.015	0.7
Hayden 1-2	0.187	20.5	0.043	30.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.231	10.1
Hayden 1	0.087	9.5	0.021	15.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.108	4.8
Hayden 2	0.101	11.0	0.022	15.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.123	5.4
Steamboat Springs	0.001	0.1	0.002	1.7	0.002	0.8	0.001	1.2	0.003	1.2	0.004	0.6	0.013	0.6
Other Yampa Valley	0.002	0.3	0.007	5.3	0.046	19.7	0.011	12.3	0.024	10.2	0.197	30.0	0.288	12.7
Non-Yampa Valley	0.667	72.9	0.065	47.1	0.185	79.1	0.080	86.4	0.207	87.5	0.455	69.4	1.660	73.0
Denver	0.033	3.6	0.001	0.7	0.002	0.8	0.001	1.0	0.003	1.3	0.000	0.0	0.040	1.8
Colorado w/ Denver	0.103	11.3	0.028	20.4	0.108	46.0	0.044	46.9	0.119	50.6	0.268	40.8	0.670	29.5
Non-Colorado	0.564	61.6	0.037	26.7	0.077	33.1	0.037	39.4	0.087	36.9	0.188	28.6	0.990	43.5
Coal-fired PP	0.406	44.3	0.072	52.0	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.480	21.1
All other sources	0.510	55.7	0.066	48.0	0.232	99.3	0.093	100.0	0.236	100.0	0.656	100.0	1.794	78.9
Fires	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.2	0.002	1.0	0.000	0.0	0.003	0.1

Gilpin Creek
EXTINCTION 1200-1800 95/10/15 6-hour average RH: 32%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.773	-99.0	0.293	-99.0	0.357	-99.0	0.845	-99.0	0.726	-99.0	2.019	-99.0	16.013	-99.0
Estimated w/o fires	1.773	-99.0	0.292	-99.0	0.357	-99.0	0.844	-99.0	0.719	-99.0	2.019	-99.0	16.004	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.481	27.1	0.155	52.9	0.074	20.8	0.114	13.4	0.083	11.4	0.617	30.6	1.525	9.5
Craig 1-3	0.113	6.4	0.044	15.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.157	1.0
Craig 1-2	0.088	5.0	0.040	13.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.128	0.8
Craig 1	0.046	2.6	0.018	6.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.064	0.4
Craig 2	0.042	2.4	0.022	7.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.064	0.4
Craig 3	0.024	1.4	0.004	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.029	0.2
Hayden 1-2	0.363	20.5	0.090	30.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.454	2.8
Hayden 1	0.168	9.5	0.045	15.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.213	1.3
Hayden 2	0.195	11.0	0.046	15.6	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.241	1.5

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.1	0.005	1.7	0.003	0.8	0.010	1.2	0.009	1.2	0.012	0.6	0.039	0.2
Other Yampa Valley	0.004	0.3	0.015	5.3	0.070	19.7	0.104	12.3	0.074	10.2	0.606	30.0	0.874	5.5
Non-Yampa Valley	1.292	72.9	0.138	47.1	0.282	79.1	0.730	86.4	0.636	87.5	1.401	69.4	4.479	28.0
Denver	0.064	3.6	0.002	0.7	0.003	0.8	0.009	1.0	0.009	1.3	0.001	0.0	0.087	0.5
Colorado w/ Denver	0.200	11.3	0.060	20.4	0.164	46.0	0.397	46.9	0.368	50.6	0.824	40.8	2.012	12.6
Non-Colorado	1.092	61.6	0.078	26.7	0.118	33.1	0.333	39.4	0.268	36.9	0.578	28.6	2.467	15.4
Coal-fired PP	0.786	44.3	0.152	52.0	0.003	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.941	5.9
All other sources	0.987	55.7	0.140	48.0	0.354	99.3	0.845	100.0	0.726	100.0	2.018	100.0	15.073	94.1
Fires	0.000	0.0	0.000	0.0	0.000	0.1	0.002	0.2	0.007	1.0	0.000	0.0	0.009	0.1

Gilpin Creek
CONCENTRATION 0600-1200 95/10/16

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		7.181	
Estimated w/ fires	1.203	-99.0	0.410	-99.0	0.398	-99.0	0.160	-99.0	0.430	-99.0	1.064	-99.0	3.667	-48.9
Estimated w/o fires	1.203	-99.0	0.410	-99.0	0.398	-99.0	0.160	-99.0	0.424	-99.0	1.064	-99.0	3.659	-49.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.125	10.4	0.091	22.3	0.057	14.3	0.015	9.2	0.035	8.2	0.272	25.5	0.595	16.2
Craig 1-3	0.018	1.5	0.009	2.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.027	0.7
Craig 1-2	0.017	1.4	0.009	2.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.026	0.7
Craig 1	0.010	0.9	0.006	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.017	0.5
Craig 2	0.007	0.6	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.2
Craig 3	0.001	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Hayden 1-2	0.103	8.6	0.069	16.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.173	4.7
Hayden 1	0.067	5.6	0.052	12.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.120	3.3
Hayden 2	0.036	3.0	0.017	4.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.053	1.4
Steamboat Springs	0.001	0.1	0.004	1.0	0.004	1.0	0.002	1.3	0.006	1.4	0.007	0.7	0.024	0.6
Other Yampa Valley	0.003	0.2	0.009	2.3	0.053	13.2	0.013	7.9	0.029	6.8	0.265	24.9	0.371	10.1
Non-Yampa Valley	1.078	89.6	0.319	77.7	0.341	85.6	0.145	90.5	0.389	90.4	0.792	74.5	3.064	83.6
Denver	0.122	10.2	0.028	6.9	0.014	3.5	0.007	4.5	0.022	5.2	0.001	0.1	0.195	5.3
Colorado w/ Denver	0.321	26.6	0.183	44.6	0.239	60.0	0.095	59.3	0.269	62.6	0.512	48.1	1.618	44.1
Non-Colorado	0.758	63.0	0.136	33.1	0.102	25.6	0.050	31.2	0.120	27.8	0.281	26.4	1.446	39.4
Coal-fired PP	0.522	43.4	0.143	34.8	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.667	18.2
All other sources	0.681	56.6	0.267	65.2	0.396	99.4	0.160	100.0	0.430	100.0	1.064	100.0	2.999	81.8
Fires	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.3	0.006	1.4	0.000	0.0	0.007	0.2

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/10/16 6-hour average RH: 30%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.293	-99.0	0.855	-99.0	0.604	-99.0	1.458	-99.0	1.314	-99.0	3.251	-99.0	19.776	-99.0
Estimated w/o fires	2.293	-99.0	0.855	-99.0	0.604	-99.0	1.454	-99.0	1.296	-99.0	3.251	-99.0	19.752	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.238	10.4	0.190	22.3	0.087	14.3	0.134	9.2	0.107	8.2	0.831	25.5	1.587	8.0
Craig 1-3	0.035	1.5	0.019	2.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.054	0.3
Craig 1-2	0.032	1.4	0.018	2.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.051	0.3
Craig 1	0.020	0.9	0.013	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.033	0.2
Craig 2	0.013	0.6	0.005	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.018	0.1
Craig 3	0.002	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.0
Hayden 1-2	0.196	8.6	0.144	16.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.341	1.7
Hayden 1	0.128	5.6	0.108	12.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.237	1.2
Hayden 2	0.068	3.0	0.036	4.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.104	0.5
Steamboat Springs	0.002	0.1	0.008	1.0	0.006	1.0	0.019	1.3	0.018	1.4	0.022	0.7	0.075	0.4
Other Yampa Valley	0.005	0.2	0.019	2.3	0.080	13.2	0.115	7.9	0.090	6.8	0.809	24.9	1.118	5.7
Non-Yampa Valley	2.055	89.6	0.664	77.7	0.517	85.6	1.320	90.5	1.188	90.4	2.421	74.5	8.165	41.3
Denver	0.233	10.2	0.059	6.9	0.021	3.5	0.065	4.5	0.069	5.2	0.004	0.1	0.450	2.3
Colorado w/ Denver	0.611	26.6	0.381	44.6	0.362	60.0	0.865	59.3	0.822	62.6	1.563	48.1	4.604	23.3
Non-Colorado	1.444	63.0	0.283	33.1	0.155	25.6	0.455	31.2	0.366	27.8	0.858	26.4	3.560	18.0
Coal-fired PP	0.995	43.4	0.298	34.8	0.004	0.6	0.000	0.0	0.000	0.0	0.001	0.0	1.297	6.6
All other sources	1.298	56.6	0.558	65.2	0.601	99.4	1.458	100.0	1.314	100.0	3.251	100.0	18.480	93.4
Fires	0.000	0.0	0.000	0.0	0.001	0.1	0.004	0.3	0.019	1.4	0.000	0.0	0.024	0.1

Gilpin Creek
CONCENTRATION 1200-1800 95/10/16

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		7.181	
Estimated w/ fires	1.056	-99.0	0.266	-99.0	0.230	-99.0	0.099	-99.0	0.427	-99.0	0.547	-99.0	2.625	-63.4
Estimated w/o fires	1.056	-99.0	0.249	-99.0	0.216	-99.0	0.083	-99.0	0.216	-99.0	0.547	-99.0	2.367	-67.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.136	12.9	0.162	60.8	0.056	24.6	0.014	13.8	0.033	7.7	0.166	30.3	0.567	21.6
Craig 1-3	0.028	2.6	0.058	21.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.086	3.3
Craig 1-2	0.024	2.2	0.040	15.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.064	2.4
Craig 1	0.011	1.0	0.016	6.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.027	1.0
Craig 2	0.013	1.2	0.024	9.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.037	1.4
Craig 3	0.004	0.4	0.017	6.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.022	0.8
Hayden 1-2	0.105	9.9	0.095	35.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.201	7.7
Hayden 1	0.053	5.1	0.071	26.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.124	4.7
Hayden 2	0.052	4.9	0.025	9.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.077	2.9
Steamboat Springs	0.000	0.0	0.002	0.6	0.002	0.7	0.001	1.0	0.003	0.6	0.004	0.8	0.012	0.4
Other Yampa Valley	0.002	0.2	0.007	2.7	0.054	23.5	0.013	12.9	0.031	7.1	0.162	29.5	0.268	10.2
Non-Yampa Valley	0.920	87.1	0.087	32.8	0.160	69.6	0.069	69.3	0.183	42.9	0.381	69.7	1.800	68.6
Denver	0.058	5.5	0.001	0.4	0.003	1.5	0.002	1.8	0.006	1.3	0.000	0.1	0.070	2.7
Colorado w/ Denver	0.172	16.3	0.025	9.6	0.095	41.5	0.037	37.1	0.104	24.2	0.236	43.2	0.669	25.5
Non-Colorado	0.749	70.9	0.062	23.2	0.064	28.1	0.032	32.2	0.079	18.6	0.145	26.4	1.131	43.1
Coal-fired PP	0.550	52.1	0.189	71.1	0.003	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.743	28.3
All other sources	0.506	47.9	0.077	28.9	0.226	98.5	0.099	100.0	0.427	100.0	0.547	100.0	1.882	71.7
Fires	0.000	0.0	0.017	6.4	0.013	5.8	0.017	16.9	0.211	49.4	0.000	0.0	0.258	9.8

Gilpin Creek
EXTINCTION 1200-1800 95/10/16 6-hour average RH: 33%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.065	-99.0	0.568	-99.0	0.351	-99.0	0.904	-99.0	1.320	-99.0	1.691	-99.0	16.898	-99.0
Estimated w/o fires	2.065	-99.0	0.532	-99.0	0.331	-99.0	0.751	-99.0	0.668	-99.0	1.691	-99.0	16.037	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.265	12.9	0.345	60.8	0.086	24.6	0.125	13.8	0.102	7.7	0.513	30.3	1.437	8.5
Craig 1-3	0.055	2.6	0.123	21.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.178	1.1
Craig 1-2	0.046	2.2	0.086	15.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.132	0.8
Craig 1	0.022	1.0	0.034	6.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.056	0.3
Craig 2	0.024	1.2	0.052	9.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.076	0.5
Craig 3	0.009	0.4	0.037	6.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.046	0.3
Hayden 1-2	0.205	9.9	0.203	35.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.410	2.4
Hayden 1	0.105	5.1	0.151	26.5	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.256	1.5
Hayden 2	0.101	4.9	0.053	9.3	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.154	0.9

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.0	0.003	0.6	0.003	0.7	0.009	1.0	0.008	0.6	0.013	0.8	0.037	0.2
Other Yampa Valley	0.005	0.2	0.016	2.7	0.082	23.5	0.116	12.9	0.094	7.1	0.499	29.5	0.813	4.8
Non-Yampa Valley	1.799	87.1	0.186	32.8	0.244	69.6	0.626	69.3	0.566	42.9	1.178	69.7	4.599	27.2
Denver	0.113	5.5	0.002	0.4	0.005	1.5	0.016	1.8	0.017	1.3	0.001	0.1	0.155	0.9
Colorado w/ Denver	0.336	16.3	0.054	9.6	0.146	41.5	0.336	37.1	0.320	24.2	0.731	43.2	1.922	11.4
Non-Colorado	1.464	70.9	0.132	23.2	0.099	28.1	0.291	32.2	0.246	18.6	0.447	26.4	2.678	15.8
Coal-fired PP	1.075	52.1	0.404	71.1	0.005	1.5	0.000	0.0	0.000	0.0	0.001	0.0	1.485	8.8
All other sources	0.989	47.9	0.164	28.9	0.346	98.5	0.904	100.0	1.320	100.0	1.690	100.0	15.413	91.2
Fires	0.000	0.0	0.036	6.4	0.020	5.8	0.152	16.9	0.652	49.4	0.000	0.0	0.861	5.1

Gilpin Creek
CONCENTRATION 0600-1200 95/10/17

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		7.128	
Estimated w/ fires	1.931	-99.0	0.487	-99.0	0.510	-99.0	0.223	-99.0	0.722	-99.0	1.254	-99.0	5.127	-28.1
Estimated w/o fires	1.931	-99.0	0.480	-99.0	0.499	-99.0	0.209	-99.0	0.545	-99.0	1.254	-99.0	4.918	-31.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.152	7.9	0.206	42.2	0.071	13.9	0.017	7.5	0.039	5.4	0.333	26.6	0.817	15.9
Craig 1-3	0.037	1.9	0.070	14.3	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.107	2.1
Craig 1-2	0.033	1.7	0.051	10.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.085	1.7
Craig 1	0.018	0.9	0.024	5.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.042	0.8
Craig 2	0.016	0.8	0.026	5.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.042	0.8
Craig 3	0.004	0.2	0.019	3.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.022	0.4
Hayden 1-2	0.113	5.8	0.125	25.6	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.239	4.7
Hayden 1	0.044	2.3	0.067	13.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.111	2.2
Hayden 2	0.069	3.6	0.057	11.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.127	2.5
Steamboat Springs	0.000	0.0	0.002	0.4	0.002	0.4	0.001	0.6	0.003	0.5	0.004	0.3	0.013	0.3
Other Yampa Valley	0.002	0.1	0.010	2.0	0.067	13.1	0.015	6.9	0.035	4.9	0.329	26.3	0.459	8.9
Non-Yampa Valley	1.779	92.1	0.274	56.3	0.428	83.9	0.192	86.2	0.507	70.2	0.921	73.4	4.101	80.0
Denver	0.098	5.1	0.008	1.6	0.019	3.7	0.010	4.4	0.031	4.3	0.002	0.1	0.167	3.3
Colorado w/ Denver	0.369	19.1	0.080	16.5	0.240	47.1	0.096	43.1	0.279	38.6	0.493	39.3	1.557	30.4
Non-Colorado	1.410	73.0	0.194	39.8	0.188	36.8	0.096	43.1	0.228	31.6	0.428	34.1	2.544	49.6
Coal-fired PP	0.803	41.6	0.274	56.2	0.006	1.1	0.000	0.0	0.000	0.0	0.000	0.0	1.083	21.1
All other sources	1.129	58.4	0.213	43.8	0.504	98.9	0.223	100.0	0.722	100.0	1.254	100.0	4.045	78.9
Fires	0.000	0.0	0.007	1.5	0.011	2.2	0.014	6.3	0.177	24.5	0.000	0.0	0.209	4.1

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/10/17 6-hour average RH: 51%

Source Region	Sulfate (1/Mm)	Sulfate (%)	Nitrate (1/Mm)	Nitrate (%)	PPM2.5 (1/Mm)	PPM2.5 (%)	EC2.5 (1/Mm)	EC2.5 (%)	POC (1/Mm)	POC (%)	SOA (1/Mm)	SOA (%)	Total Bext (1/Mm)	Total Bext (%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	4.557	-99.0	1.237	-99.0	0.831	-99.0	2.029	-99.0	2.439	-99.0	4.238	-99.0	25.331	-99.0
Estimated w/o fires	4.557	-99.0	1.218	-99.0	0.813	-99.0	1.901	-99.0	1.842	-99.0	4.238	-99.0	24.571	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.358	7.9	0.522	42.2	0.116	13.9	0.152	7.5	0.131	5.4	1.126	26.6	2.405	9.5
Craig 1-3	0.087	1.9	0.177	14.3	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.264	1.0
Craig 1-2	0.078	1.7	0.129	10.5	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.209	0.8
Craig 1	0.041	0.9	0.062	5.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.104	0.4
Craig 2	0.037	0.8	0.067	5.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.104	0.4
Craig 3	0.008	0.2	0.047	3.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.056	0.2
Hayden 1-2	0.267	5.8	0.316	25.6	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.585	2.3
Hayden 1	0.103	2.3	0.171	13.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.275	1.1
Hayden 2	0.164	3.6	0.146	11.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.310	1.2
Steamboat Springs	0.001	0.0	0.005	0.4	0.004	0.4	0.012	0.6	0.012	0.5	0.013	0.3	0.045	0.2
Other Yampa Valley	0.004	0.1	0.025	2.0	0.109	13.1	0.139	6.9	0.119	4.9	1.113	26.3	1.510	6.0
Non-Yampa Valley	4.199	92.1	0.696	56.3	0.697	83.9	1.750	86.2	1.712	70.2	3.112	73.4	12.165	48.0
Denver	0.231	5.1	0.019	1.6	0.030	3.7	0.090	4.4	0.105	4.3	0.006	0.1	0.481	1.9
Colorado w/ Denver	0.871	19.1	0.204	16.5	0.391	47.1	0.875	43.1	0.941	38.6	1.665	39.3	4.948	19.5
Non-Colorado	3.328	73.0	0.492	39.8	0.306	36.8	0.874	43.1	0.770	31.6	1.447	34.1	7.217	28.5
Coal-fired PP	1.894	41.6	0.696	56.2	0.009	1.1	0.000	0.0	0.000	0.0	0.001	0.0	2.600	10.3
All other sources	2.663	58.4	0.541	43.8	0.822	98.9	2.029	100.0	2.439	100.0	4.237	100.0	22.731	89.7
Fires	0.000	0.0	0.018	1.5	0.018	2.2	0.128	6.3	0.596	24.5	0.000	0.0	0.761	3.0

Gilpin Creek
CONCENTRATION 1200-1800 95/10/17

Source Region	Sulfate (ug/m3)	Sulfate (%)	Nitrate (ug/m3)	Nitrate (%)	PPM2.5 (ug/m3)	PPM2.5 (%)	EC2.5 (ug/m3)	EC2.5 (%)	POC (ug/m3)	POC (%)	SOA (ug/m3)	SOA (%)	PM25 (ug/m3)	PM25 (%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		7.128	
Estimated w/ fires	1.892	-99.0	0.483	-99.0	0.434	-99.0	0.200	-99.0	0.696	-99.0	0.808	-99.0	4.514	-36.7
Estimated w/o fires	1.892	-99.0	0.474	-99.0	0.422	-99.0	0.185	-99.0	0.501	-99.0	0.808	-99.0	4.283	-39.9

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.229	12.1	0.296	61.3	0.040	9.2	0.010	5.1	0.020	2.8	0.183	22.6	0.777	17.2
Craig 1-3	0.100	5.3	0.146	30.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.247	5.5
Craig 1-2	0.089	4.7	0.105	21.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.195	4.3
Craig 1	0.046	2.4	0.050	10.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.096	2.1
Craig 2	0.044	2.3	0.056	11.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.100	2.2
Craig 3	0.011	0.6	0.041	8.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.052	1.1
Hayden 1-2	0.127	6.7	0.142	29.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.270	6.0
Hayden 1	0.076	4.0	0.114	23.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.190	4.2
Hayden 2	0.051	2.7	0.029	5.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.080	1.8
Steamboat Springs	0.000	0.0	0.001	0.1	0.001	0.2	0.000	0.2	0.001	0.2	0.002	0.2	0.005	0.1
Other Yampa Valley	0.001	0.1	0.007	1.4	0.038	8.7	0.010	4.9	0.019	2.7	0.181	22.4	0.255	5.6
Non-Yampa Valley	1.663	87.9	0.178	36.9	0.382	88.0	0.174	87.1	0.481	69.2	0.626	77.4	3.505	77.6
Denver	0.125	6.6	0.013	2.6	0.039	8.9	0.020	10.1	0.063	9.1	0.004	0.4	0.263	5.8
Colorado w/ Denver	0.437	23.1	0.068	14.1	0.248	57.1	0.107	53.2	0.315	45.3	0.329	40.6	1.503	33.3
Non-Colorado	1.227	64.8	0.110	22.8	0.134	30.9	0.068	33.9	0.166	23.9	0.297	36.7	2.002	44.3
Coal-fired PP	0.794	42.0	0.332	68.7	0.004	0.9	0.000	0.0	0.000	0.0	0.000	0.0	1.130	25.0
All other sources	1.098	58.0	0.151	31.3	0.430	99.1	0.200	100.0	0.696	100.0	0.808	100.0	3.384	75.0
Fires	0.000	0.0	0.009	1.8	0.012	2.8	0.015	7.7	0.195	28.0	0.000	0.0	0.232	5.1

Gilpin Creek
EXTINCTION 1200-1800 95/10/17 6-hour average RH: 41%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	3.949	-99.0	1.095	-99.0	0.679	-99.0	1.822	-99.0	2.216	-99.0	2.574	-99.0	22.334	-99.0
Estimated w/o fires	3.949	-99.0	1.075	-99.0	0.660	-99.0	1.681	-99.0	1.596	-99.0	2.574	-99.0	21.533	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.477	12.1	0.671	61.3	0.062	9.2	0.094	5.1	0.063	2.8	0.582	22.6	1.949	8.7
Craig 1-3	0.210	5.3	0.331	30.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.542	2.4
Craig 1-2	0.187	4.7	0.239	21.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.427	1.9
Craig 1	0.095	2.4	0.113	10.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.208	0.9
Craig 2	0.092	2.3	0.126	11.5	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.218	1.0
Craig 3	0.023	0.6	0.092	8.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.115	0.5
Hayden 1-2	0.265	6.7	0.323	29.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.589	2.6
Hayden 1	0.158	4.0	0.258	23.6	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.416	1.9
Hayden 2	0.107	2.7	0.065	5.9	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.173	0.8

Table B.2.3.11b (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.0	0.001	0.1	0.001	0.2	0.004	0.2	0.004	0.2	0.006	0.2	0.017	0.1
Other Yampa Valley	0.003	0.1	0.016	1.4	0.059	8.7	0.090	4.9	0.059	2.7	0.575	22.4	0.801	3.6
Non-Yampa Valley	3.471	87.9	0.404	36.9	0.597	88.0	1.587	87.1	1.533	69.2	1.992	77.4	9.584	42.9
Denver	0.260	6.6	0.029	2.6	0.061	8.9	0.184	10.1	0.202	9.1	0.011	0.4	0.747	3.3
Colorado w/ Denver	0.911	23.1	0.155	14.1	0.387	57.1	0.970	53.2	1.004	45.3	1.046	40.6	4.473	20.0
Non-Colorado	2.560	64.8	0.249	22.8	0.210	30.9	0.618	33.9	0.529	23.9	0.946	36.7	5.111	22.9
Coal-fired PP	1.657	42.0	0.753	68.7	0.006	0.9	0.000	0.0	0.000	0.0	0.001	0.0	2.417	10.8
All other sources	2.292	58.0	0.342	31.3	0.673	99.1	1.822	100.0	2.216	100.0	2.573	100.0	19.917	89.2
Fires	0.000	0.0	0.020	1.8	0.019	2.8	0.141	7.7	0.620	28.0	0.000	0.0	0.801	3.6

Gilpin Creek
CONCENTRATION 0600-1200 95/10/18

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		3.488	
Estimated w/ fires	1.717	-99.0	0.442	-99.0	0.606	-99.0	0.260	-99.0	0.809	-99.0	1.188	-99.0	5.022	44.0
Estimated w/o fires	1.717	-99.0	0.437	-99.0	0.599	-99.0	0.251	-99.0	0.698	-99.0	1.188	-99.0	4.890	40.2
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.098	5.7	0.078	17.7	0.070	11.6	0.018	6.7	0.043	5.3	0.254	21.4	0.561	11.2
Craig 1-3	0.015	0.9	0.006	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.021	0.4
Craig 1-2	0.013	0.8	0.005	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.018	0.4
Craig 1	0.006	0.4	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.2
Craig 2	0.007	0.4	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.2
Craig 3	0.001	0.1	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.1
Hayden 1-2	0.080	4.7	0.060	13.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.141	2.8
Hayden 1	0.074	4.3	0.059	13.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.133	2.7
Hayden 2	0.006	0.4	0.001	0.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.2
Steamboat Springs	0.001	0.0	0.002	0.5	0.002	0.4	0.001	0.5	0.004	0.4	0.005	0.4	0.015	0.3
Other Yampa Valley	0.003	0.1	0.010	2.3	0.066	11.0	0.016	6.3	0.039	4.9	0.249	21.0	0.384	7.6
Non-Yampa Valley	1.619	94.3	0.359	81.1	0.529	87.3	0.234	89.9	0.655	81.0	0.934	78.6	4.330	86.2
Denver	0.190	11.1	0.047	10.5	0.068	11.3	0.033	12.8	0.106	13.0	0.006	0.5	0.450	9.0
Colorado w/ Denver	0.551	32.1	0.225	50.9	0.388	64.0	0.161	61.9	0.474	58.6	0.625	52.6	2.423	48.3
Non-Colorado	1.068	62.2	0.134	30.3	0.141	23.3	0.073	28.0	0.182	22.4	0.309	26.0	1.906	38.0
Coal-fired PP	0.656	38.2	0.132	29.9	0.004	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.793	15.8
All other sources	1.060	61.8	0.310	70.1	0.603	99.4	0.260	100.0	0.809	100.0	1.188	100.0	4.230	84.2
Fires	0.000	0.0	0.005	1.2	0.007	1.2	0.009	3.4	0.111	13.7	0.000	0.0	0.132	2.6

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/10/18 6-hour average RH: 42%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	3.650	-99.0	1.019	-99.0	0.953	-99.0	2.366	-99.0	2.598	-99.0	3.816	-99.0	24.402	-99.0
Estimated w/o fires	3.650	-99.0	1.007	-99.0	0.942	-99.0	2.286	-99.0	2.243	-99.0	3.816	-99.0	23.943	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.209	5.7	0.180	17.7	0.110	11.6	0.160	6.7	0.137	5.3	0.817	21.4	1.612	6.6
Craig 1-3	0.031	0.9	0.014	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.045	0.2
Craig 1-2	0.028	0.8	0.011	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.039	0.2
Craig 1	0.014	0.4	0.005	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.019	0.1
Craig 2	0.015	0.4	0.006	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.021	0.1
Craig 3	0.003	0.1	0.003	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.0
Hayden 1-2	0.171	4.7	0.137	13.5	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.310	1.3
Hayden 1	0.157	4.3	0.136	13.3	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.293	1.2
Hayden 2	0.014	0.4	0.002	0.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.017	0.1
Steamboat Springs	0.001	0.0	0.005	0.5	0.004	0.4	0.012	0.5	0.011	0.4	0.016	0.4	0.049	0.2
Other Yampa Valley	0.005	0.1	0.023	2.3	0.105	11.0	0.148	6.3	0.126	4.9	0.800	21.0	1.207	4.9
Non-Yampa Valley	3.441	94.3	0.827	81.1	0.832	87.3	2.126	89.9	2.105	81.0	2.999	78.6	12.331	50.5
Denver	0.405	11.1	0.107	10.5	0.107	11.3	0.302	12.8	0.339	13.0	0.019	0.5	1.280	5.2
Colorado w/ Denver	1.170	32.1	0.518	50.9	0.610	64.0	1.464	61.9	1.522	58.6	2.007	52.6	7.293	29.9
Non-Colorado	2.271	62.2	0.308	30.3	0.222	23.3	0.662	28.0	0.583	22.4	0.992	26.0	5.038	20.6
Coal-fired PP	1.396	38.2	0.305	29.9	0.006	0.6	0.000	0.0	0.000	0.0	0.001	0.0	1.707	7.0
All other sources	2.254	61.8	0.714	70.1	0.948	99.4	2.366	100.0	2.598	100.0	3.815	100.0	22.695	93.0
Fires	0.000	0.0	0.012	1.2	0.011	1.2	0.080	3.4	0.355	13.7	0.000	0.0	0.458	1.9

Gilpin Creek
CONCENTRATION 1200-1800 95/10/18

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		3.488	
Estimated w/ fires	1.349	-99.0	0.368	-99.0	0.242	-99.0	0.116	-99.0	0.473	-99.0	0.558	-99.0	3.105	-11.0
Estimated w/o fires	1.349	-99.0	0.348	-99.0	0.227	-99.0	0.098	-99.0	0.251	-99.0	0.558	-99.0	2.832	-18.8

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.069	5.1	0.144	39.0	0.038	15.7	0.009	8.0	0.019	4.0	0.140	25.1	0.419	13.5
Craig 1-3	0.035	2.6	0.080	21.8	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.116	3.7
Craig 1-2	0.032	2.4	0.058	15.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.090	2.9
Craig 1	0.015	1.1	0.030	8.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.046	1.5
Craig 2	0.017	1.2	0.028	7.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.045	1.4
Craig 3	0.003	0.2	0.022	6.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.026	0.8
Hayden 1-2	0.033	2.5	0.056	15.2	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.090	2.9
Hayden 1	0.033	2.4	0.056	15.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.089	2.9
Hayden 2	0.001	0.0	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Steamboat Springs	0.000	0.0	0.001	0.3	0.001	0.3	0.000	0.3	0.001	0.2	0.002	0.3	0.005	0.2
Other Yampa Valley	0.001	0.1	0.006	1.7	0.036	15.0	0.009	7.7	0.018	3.8	0.138	24.8	0.208	6.7
Non-Yampa Valley	1.280	94.9	0.205	55.6	0.189	78.4	0.089	76.8	0.232	49.2	0.418	74.9	2.413	77.7
Denver	0.035	2.6	0.001	0.4	0.010	4.2	0.005	4.2	0.016	3.3	0.001	0.2	0.068	2.2
Colorado w/ Denver	0.150	11.1	0.021	5.8	0.086	35.5	0.036	31.4	0.102	21.5	0.202	36.3	0.597	19.2
Non-Colorado	1.130	83.7	0.184	49.9	0.104	43.0	0.052	45.3	0.131	27.6	0.216	38.7	1.816	58.5
Coal-fired PP	0.571	42.3	0.243	66.1	0.004	1.8	0.000	0.0	0.000	0.0	0.000	0.1	0.819	26.4
All other sources	0.778	57.7	0.125	33.9	0.237	98.2	0.116	100.0	0.473	100.0	0.557	99.9	2.286	73.6
Fires	0.000	0.0	0.020	5.3	0.014	5.8	0.018	15.2	0.221	46.8	0.000	0.0	0.273	8.8

Gilpin Creek
EXTINCTION 1200-1800 95/10/18 6-hour average RH: 40%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.788	-99.0	0.827	-99.0	0.376	-99.0	1.053	-99.0	1.498	-99.0	1.767	-99.0	18.309	-99.0
Estimated w/o fires	2.788	-99.0	0.783	-99.0	0.354	-99.0	0.893	-99.0	0.796	-99.0	1.767	-99.0	17.382	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.144	5.1	0.323	39.0	0.059	15.7	0.084	8.0	0.060	4.0	0.443	25.1	1.113	6.1
Craig 1-3	0.073	2.6	0.180	21.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.254	1.4
Craig 1-2	0.066	2.4	0.130	15.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.197	1.1
Craig 1	0.032	1.1	0.068	8.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.100	0.5
Craig 2	0.035	1.2	0.062	7.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.097	0.5
Craig 3	0.007	0.2	0.050	6.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.057	0.3
Hayden 1-2	0.069	2.5	0.126	15.2	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.196	1.1
Hayden 1	0.067	2.4	0.126	15.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.194	1.1
Hayden 2	0.001	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.000	0.0	0.002	0.3	0.001	0.3	0.003	0.3	0.003	0.2	0.005	0.3	0.016	0.1
Other Yampa Valley	0.002	0.1	0.014	1.7	0.057	15.0	0.081	7.7	0.057	3.8	0.438	24.8	0.648	3.5
Non-Yampa Valley	2.645	94.9	0.460	55.6	0.295	78.4	0.808	76.8	0.736	49.2	1.324	74.9	6.269	34.2
Denver	0.073	2.6	0.003	0.4	0.016	4.2	0.045	4.2	0.050	3.3	0.003	0.2	0.189	1.0
Colorado w/ Denver	0.310	11.1	0.048	5.8	0.133	35.5	0.331	31.4	0.322	21.5	0.641	36.3	1.785	9.8
Non-Colorado	2.335	83.7	0.412	49.9	0.162	43.0	0.477	45.3	0.414	27.6	0.683	38.7	4.484	24.5
Coal-fired PP	1.180	42.3	0.547	66.1	0.007	1.8	0.000	0.0	0.000	0.0	0.001	0.1	1.734	9.5
All other sources	1.609	57.7	0.280	33.9	0.369	98.2	1.053	100.0	1.498	100.0	1.766	99.9	16.575	90.5
Fires	0.000	0.0	0.044	5.3	0.022	5.8	0.160	15.2	0.702	46.8	0.000	0.0	0.927	5.1

Gilpin Creek
CONCENTRATION 0600-1200 95/10/19

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.263	-99.0	0.954	-99.0	0.272	-99.0	0.132	-99.0	0.428	-99.0	0.708	-99.0	3.757	-99.0
Estimated w/o fires	1.263	-99.0	0.918	-99.0	0.264	-99.0	0.122	-99.0	0.298	-99.0	0.708	-99.0	3.572	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.000	0.0	0.012	1.3	0.022	8.1	0.005	3.7	0.010	2.3	0.174	24.6	0.224	6.0
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Other Yampa Valley	0.000	0.0	0.012	1.3	0.022	8.1	0.005	3.6	0.010	2.3	0.174	24.6	0.223	5.9
Non-Yampa Valley	1.262	100.0	0.905	95.0	0.242	88.9	0.117	88.5	0.288	67.2	0.533	75.4	3.348	89.1
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.016	1.2	0.081	8.5	0.038	13.9	0.015	11.2	0.039	9.2	0.117	16.6	0.306	8.2
Non-Colorado	1.247	98.7	0.824	86.4	0.204	74.9	0.102	77.3	0.248	58.0	0.416	58.8	3.042	81.0
Coal-fired PP	0.123	9.7	0.168	17.6	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.292	7.8
All other sources	1.140	90.3	0.786	82.4	0.271	99.3	0.132	100.0	0.428	100.0	0.708	100.0	3.465	92.2
Fires	0.000	0.0	0.036	3.8	0.008	3.0	0.010	7.8	0.131	30.5	0.000	0.0	0.185	4.9

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/10/19 6-hour average RH: 56%

Source Region	Sulfate (1/Mm)	Sulfate (%)	Nitrate (1/Mm)	Nitrate (%)	PPM2.5 (1/Mm)	PPM2.5 (%)	EC2.5 (1/Mm)	EC2.5 (%)	POC (1/Mm)	POC (%)	SOA (1/Mm)	SOA (%)	Total Bext (1/Mm)	Total Bext (%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	3.180	-99.0	2.574	-99.0	0.455	-99.0	1.203	-99.0	1.496	-99.0	2.471	-99.0	21.380	-99.0
Estimated w/o fires	3.180	-99.0	2.477	-99.0	0.441	-99.0	1.109	-99.0	1.040	-99.0	2.471	-99.0	20.718	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.001	0.0	0.033	1.3	0.037	8.1	0.044	3.7	0.035	2.3	0.609	24.6	0.758	3.5
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Steamboat Springs	0.000	0.0	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Other Yampa Valley	0.001	0.0	0.033	1.3	0.037	8.1	0.044	3.6	0.035	2.3	0.608	24.6	0.757	3.5
Non-Yampa Valley	3.180	100.0	2.444	95.0	0.404	88.9	1.065	88.5	1.005	67.2	1.862	75.4	9.960	46.6
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.039	1.2	0.219	8.5	0.063	13.9	0.135	11.2	0.137	9.2	0.410	16.6	1.004	4.7
Non-Colorado	3.140	98.7	2.224	86.4	0.341	74.9	0.930	77.3	0.868	58.0	1.452	58.8	8.956	41.9
Coal-fired PP	0.309	9.7	0.452	17.6	0.003	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.764	3.6
All other sources	2.872	90.3	2.122	82.4	0.452	99.3	1.203	100.0	1.496	100.0	2.471	100.0	20.615	96.4
Fires	0.000	0.0	0.097	3.8	0.014	3.0	0.094	7.8	0.456	30.5	0.000	0.0	0.661	3.1

Gilpin Creek
CONCENTRATION 1200-1800 95/10/19

Source Region	Sulfate (ug/m3)	Sulfate (%)	Nitrate (ug/m3)	Nitrate (%)	PPM2.5 (ug/m3)	PPM2.5 (%)	EC2.5 (ug/m3)	EC2.5 (%)	POC (ug/m3)	POC (%)	SOA (ug/m3)	SOA (%)	PM25 (ug/m3)	PM25 (%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.909	-99.0	0.494	-99.0	0.166	-99.0	0.082	-99.0	0.290	-99.0	0.406	-99.0	2.348	-99.0
Estimated w/o fires	0.909	-99.0	0.467	-99.0	0.158	-99.0	0.073	-99.0	0.171	-99.0	0.406	-99.0	2.185	-99.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.000	0.0	0.012	2.5	0.023	13.7	0.006	6.8	0.008	2.9	0.125	30.8	0.175	7.4
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Other Yampa Valley	0.000	0.0	0.012	2.5	0.023	13.7	0.006	6.8	0.008	2.9	0.125	30.8	0.175	7.4
Non-Yampa Valley	0.909	100.0	0.455	92.1	0.136	81.7	0.067	81.6	0.163	56.1	0.281	69.2	2.010	85.6
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.012	1.3	0.041	8.3	0.022	13.1	0.010	11.9	0.025	8.6	0.054	13.3	0.164	7.0
Non-Colorado	0.896	98.6	0.414	83.8	0.114	68.6	0.057	69.8	0.138	47.5	0.227	55.9	1.847	78.6
Coal-fired PP	0.109	12.0	0.068	13.7	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.177	7.6
All other sources	0.800	88.0	0.426	86.3	0.165	99.5	0.082	100.0	0.290	100.0	0.406	100.0	2.171	92.4
Fires	0.000	0.0	0.027	5.5	0.008	4.6	0.009	11.5	0.119	41.0	0.000	0.0	0.163	6.9

Gilpin Creek
EXTINCTION 1200-1800 95/10/19 6-hour average RH: 31%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.739	-99.0	1.035	-99.0	0.252	-99.0	0.746	-99.0	0.889	-99.0	1.244	-99.0	15.904	-99.0
Estimated w/o fires	1.739	-99.0	0.978	-99.0	0.241	-99.0	0.660	-99.0	0.525	-99.0	1.244	-99.0	15.386	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.001	0.0	0.026	2.5	0.035	13.7	0.051	6.8	0.026	2.9	0.383	30.8	0.521	3.3
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Other Yampa Valley	0.001	0.0	0.026	2.5	0.035	13.7	0.051	6.8	0.026	2.9	0.383	30.8	0.521	3.3
Non-Yampa Valley	1.738	100.0	0.952	92.1	0.206	81.7	0.609	81.6	0.499	56.1	0.861	69.2	4.864	30.6
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.023	1.3	0.086	8.3	0.033	13.1	0.088	11.9	0.076	8.6	0.165	13.3	0.472	3.0
Non-Colorado	1.715	98.6	0.867	83.8	0.173	68.6	0.520	69.8	0.422	47.5	0.695	55.9	4.392	27.6
Coal-fired PP	0.208	12.0	0.142	13.7	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.351	2.2
All other sources	1.531	88.0	0.893	86.3	0.251	99.5	0.746	100.0	0.889	100.0	1.244	100.0	15.553	97.8
Fires	0.000	0.0	0.056	5.5	0.011	4.6	0.086	11.5	0.364	41.0	0.000	0.0	0.518	3.3

Table B.2.3.11c

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

[This table also presents six-hour concentrations from filter measurements, as well as extinction estimated from the filter measurements using identical extinction efficiencies as applied to predicted concentrations. Source attributions are presented for all 12 source regions/types modeled with CALPUFF, and present results from each six-hour daylight period (0600-1200, and 1200-1800 LST).]

Mad Creek
CONCENTRATION 0600-1200 95/10/ 7

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.337	-99.0	0.057	-99.0	0.263	-99.0	0.102	-99.0	0.285	-99.0	0.613	-99.0	1.657	-99.0
Estimated w/o fires	0.337	-99.0	0.057	-99.0	0.263	-99.0	0.102	-99.0	0.285	-99.0	0.613	-99.0	1.657	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.057	16.8	0.004	7.6	0.029	11.0	0.008	8.2	0.020	6.9	0.157	25.6	0.275	16.6
Craig 1-3	0.021	6.1	0.001	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.021	1.3
Craig 1-2	0.021	6.1	0.001	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.021	1.3
Craig 1	0.009	2.6	0.000	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.6
Craig 2	0.012	3.5	0.000	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.012	0.7
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.034	10.1	0.002	3.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.036	2.2
Hayden 1	0.014	4.2	0.001	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.015	0.9
Hayden 2	0.020	6.0	0.001	2.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.022	1.3
Steamboat Springs	0.000	0.1	0.001	1.0	0.003	1.2	0.002	1.8	0.005	1.7	0.006	1.0	0.017	1.0
Other Yampa Valley	0.001	0.4	0.001	2.0	0.026	9.7	0.007	6.4	0.015	5.2	0.151	24.6	0.200	12.1
Non-Yampa Valley	0.280	83.2	0.052	92.4	0.234	89.0	0.094	91.8	0.265	93.1	0.456	74.4	1.382	83.4
Denver	0.038	11.4	0.005	8.7	0.020	7.5	0.008	8.3	0.027	9.6	0.002	0.3	0.100	6.1
Colorado w/ Denver	0.146	43.3	0.043	75.8	0.215	81.6	0.084	81.8	0.247	86.7	0.393	64.2	1.128	68.1
Non-Colorado	0.134	39.9	0.009	16.6	0.020	7.5	0.010	9.9	0.018	6.4	0.063	10.3	0.254	15.4
Coal-fired PP	0.124	36.9	0.005	9.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.130	7.9
All other sources	0.213	63.1	0.051	90.5	0.263	99.8	0.102	100.0	0.285	100.0	0.613	100.0	1.527	92.1
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/10/ 7 6-hour average RH: 37%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.682	-99.0	0.125	-99.0	0.408	-99.0	0.931	-99.0	0.894	-99.0	1.924	-99.0	14.964	-99.0
Estimated w/o fires	0.682	-99.0	0.125	-99.0	0.408	-99.0	0.931	-99.0	0.894	-99.0	1.924	-99.0	14.964	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.115	16.8	0.009	7.6	0.045	11.0	0.077	8.2	0.062	6.9	0.492	25.6	0.800	5.3
Craig 1-3	0.042	6.1	0.002	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.043	0.3
Craig 1-2	0.042	6.1	0.002	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.043	0.3
Craig 1	0.018	2.6	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.019	0.1
Craig 2	0.024	3.5	0.001	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.025	0.2
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.069	10.1	0.004	3.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.074	0.5
Hayden 1	0.029	4.2	0.001	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.030	0.2
Hayden 2	0.041	6.0	0.003	2.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.044	0.3
Steamboat Springs	0.001	0.1	0.001	1.0	0.005	1.2	0.017	1.8	0.015	1.7	0.018	1.0	0.057	0.4
Other Yampa Valley	0.003	0.4	0.002	2.0	0.040	9.7	0.060	6.4	0.046	5.2	0.474	24.6	0.625	4.2
Non-Yampa Valley	0.568	83.2	0.116	92.4	0.363	89.0	0.855	91.8	0.832	93.1	1.431	74.4	4.164	27.8
Denver	0.078	11.4	0.011	8.7	0.030	7.5	0.077	8.3	0.086	9.6	0.005	0.3	0.287	1.9
Colorado w/ Denver	0.296	43.3	0.095	75.8	0.332	81.6	0.762	81.8	0.775	86.7	1.234	64.2	3.495	23.4
Non-Colorado	0.272	39.9	0.021	16.6	0.030	7.5	0.093	9.9	0.057	6.4	0.197	10.3	0.670	4.5
Coal-fired PP	0.252	36.9	0.012	9.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.265	1.8
All other sources	0.431	63.1	0.113	90.5	0.407	99.8	0.931	100.0	0.894	100.0	1.924	100.0	14.699	98.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
CONCENTRATION 1200-1800 95/10/ 7

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.461	-99.0	0.308	-99.0	0.239	-99.0	0.077	-99.0	0.226	-99.0	0.377	-99.0	1.688	-99.0
Estimated w/o fires	0.461	-99.0	0.308	-99.0	0.239	-99.0	0.077	-99.0	0.226	-99.0	0.377	-99.0	1.688	-99.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.209	45.4	0.158	51.4	0.110	46.0	0.024	31.5	0.077	34.1	0.120	31.8	0.699	41.4
Craig 1-3	0.065	14.0	0.065	21.1	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.130	7.7
Craig 1-2	0.065	14.0	0.065	21.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.130	7.7
Craig 1	0.031	6.8	0.033	10.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.064	3.8
Craig 2	0.033	7.2	0.032	10.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.066	3.9
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.139	30.2	0.074	24.0	0.003	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.216	12.8
Hayden 1	0.012	2.7	0.001	0.3	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.015	0.9
Hayden 2	0.127	27.5	0.073	23.7	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.201	11.9
Steamboat Springs	0.000	0.1	0.005	1.8	0.003	1.4	0.002	2.6	0.005	2.3	0.007	1.9	0.024	1.4
Other Yampa Valley	0.005	1.1	0.014	4.6	0.103	43.2	0.022	29.0	0.072	31.8	0.113	29.9	0.330	19.5
Non-Yampa Valley	0.251	54.6	0.149	48.6	0.129	54.0	0.053	68.5	0.149	65.9	0.257	68.2	0.989	58.6
Denver	0.042	9.2	0.008	2.6	0.013	5.5	0.006	8.2	0.020	8.9	0.001	0.3	0.091	5.4
Colorado w/ Denver	0.152	33.0	0.100	32.6	0.114	47.8	0.046	58.9	0.134	59.4	0.209	55.5	0.756	44.8
Non-Colorado	0.099	21.6	0.049	15.9	0.015	6.2	0.007	9.6	0.015	6.5	0.048	12.7	0.233	13.8
Coal-fired PP	0.275	59.8	0.153	49.8	0.004	1.5	0.000	0.0	0.000	0.0	0.000	0.1	0.432	25.6
All other sources	0.185	40.2	0.155	50.2	0.236	98.5	0.077	100.0	0.226	100.0	0.377	99.9	1.256	74.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
EXTINCTION 1200-1800 95/10/ 7 6-hour average RH: 25%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.845	-99.0	0.619	-99.0	0.359	-99.0	0.703	-99.0	0.680	-99.0	1.133	-99.0	14.339	-99.0
Estimated w/o fires	0.845	-99.0	0.619	-99.0	0.359	-99.0	0.703	-99.0	0.680	-99.0	1.133	-99.0	14.339	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.384	45.4	0.318	51.4	0.165	46.0	0.222	31.5	0.232	34.1	0.361	31.8	1.682	11.7
Craig 1-3	0.118	14.0	0.131	21.1	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.250	1.7
Craig 1-2	0.118	14.0	0.131	21.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.250	1.7
Craig 1	0.057	6.8	0.066	10.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.124	0.9
Craig 2	0.061	7.2	0.065	10.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.126	0.9
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.255	30.2	0.148	24.0	0.004	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.408	2.8
Hayden 1	0.023	2.7	0.002	0.3	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.027	0.2
Hayden 2	0.232	27.5	0.147	23.7	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.381	2.7

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.1	0.011	1.8	0.005	1.4	0.018	2.6	0.016	2.3	0.021	1.9	0.072	0.5
Other Yampa Valley	0.009	1.1	0.028	4.6	0.155	43.2	0.204	29.0	0.216	31.8	0.339	29.9	0.951	6.6
Non-Yampa Valley	0.461	54.6	0.301	48.6	0.194	54.0	0.482	68.5	0.448	65.9	0.772	68.2	2.657	18.5
Denver	0.078	9.2	0.016	2.6	0.020	5.5	0.058	8.2	0.060	8.9	0.004	0.3	0.235	1.6
Colorado w/ Denver	0.279	33.0	0.202	32.6	0.172	47.8	0.414	58.9	0.404	59.4	0.628	55.5	2.099	14.6
Non-Colorado	0.182	21.6	0.099	15.9	0.022	6.2	0.067	9.6	0.044	6.5	0.144	12.7	0.558	3.9
Coal-fired PP	0.505	59.8	0.308	49.8	0.005	1.5	0.000	0.0	0.000	0.0	0.001	0.1	0.819	5.7
All other sources	0.340	40.2	0.311	50.2	0.354	98.5	0.703	100.0	0.680	100.0	1.132	99.9	13.519	94.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
CONCENTRATION 0600-1200 95/10/ 8

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.115	-99.0	1.355	-99.0	0.315	-99.0	0.129	-99.0	0.326	-99.0	0.819	-99.0	4.058	-99.0
Estimated w/o fires	1.115	-99.0	1.355	-99.0	0.315	-99.0	0.129	-99.0	0.326	-99.0	0.819	-99.0	4.058	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.038	3.4	0.076	5.6	0.043	13.5	0.013	10.2	0.030	9.1	0.218	26.6	0.417	10.3
Craig 1-3	0.005	0.4	0.002	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.2
Craig 1-2	0.005	0.4	0.002	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.2
Craig 1	0.002	0.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.1
Craig 2	0.002	0.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.1
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.032	2.9	0.033	2.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.066	1.6
Hayden 1	0.008	0.7	0.002	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.3
Hayden 2	0.024	2.2	0.031	2.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.055	1.4
Steamboat Springs	0.000	0.0	0.012	0.9	0.005	1.6	0.003	2.4	0.007	2.2	0.013	1.6	0.041	1.0
Other Yampa Valley	0.001	0.1	0.029	2.1	0.037	11.7	0.010	7.9	0.023	7.0	0.205	25.0	0.304	7.5
Non-Yampa Valley	1.077	96.6	1.280	94.4	0.272	86.5	0.115	89.8	0.296	90.9	0.601	73.4	3.642	89.7
Denver	0.078	7.0	0.052	3.8	0.028	8.8	0.013	10.3	0.042	12.8	0.002	0.3	0.215	5.3
Colorado w/ Denver	0.178	15.9	0.271	20.0	0.159	50.4	0.062	47.9	0.179	54.8	0.311	38.0	1.158	28.5
Non-Colorado	0.899	80.7	1.009	74.4	0.113	36.1	0.054	41.8	0.118	36.1	0.290	35.5	2.483	61.2
Coal-fired PP	0.245	22.0	0.277	20.4	0.003	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.526	13.0
All other sources	0.870	78.0	1.078	79.6	0.312	99.1	0.129	100.0	0.326	100.0	0.818	100.0	3.533	87.0
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11c (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/10/ 8 6-hour average RH: 64%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	3.189	-99.0	4.120	-99.0	0.552	-99.0	1.170	-99.0	1.217	-99.0	3.057	-99.0	23.306	-99.0
Estimated w/o fires	3.189	-99.0	4.120	-99.0	0.552	-99.0	1.170	-99.0	1.217	-99.0	3.057	-99.0	23.306	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.109	3.4	0.230	5.6	0.075	13.5	0.120	10.2	0.111	9.1	0.813	26.6	1.457	6.2
Craig 1-3	0.013	0.4	0.005	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.018	0.1
Craig 1-2	0.013	0.4	0.005	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.018	0.1
Craig 1	0.006	0.2	0.003	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.0
Craig 2	0.007	0.2	0.002	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.093	2.9	0.100	2.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.193	0.8
Hayden 1	0.023	0.7	0.006	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.030	0.1
Hayden 2	0.070	2.2	0.093	2.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.164	0.7
Steamboat Springs	0.001	0.0	0.037	0.9	0.009	1.6	0.028	2.4	0.027	2.2	0.048	1.6	0.150	0.6
Other Yampa Valley	0.002	0.1	0.088	2.1	0.065	11.7	0.092	7.9	0.085	7.0	0.764	25.0	1.095	4.7
Non-Yampa Valley	3.081	96.6	3.891	94.4	0.477	86.5	1.050	89.8	1.106	90.9	2.245	73.4	11.849	50.8
Denver	0.223	7.0	0.157	3.8	0.048	8.8	0.121	10.3	0.156	12.8	0.009	0.3	0.714	3.1
Colorado w/ Denver	0.508	15.9	0.824	20.0	0.278	50.4	0.561	47.9	0.667	54.8	1.160	38.0	3.999	17.2
Non-Colorado	2.573	80.7	3.066	74.4	0.199	36.1	0.489	41.8	0.439	36.1	1.084	35.5	7.851	33.7
Coal-fired PP	0.702	22.0	0.843	20.4	0.005	0.9	0.000	0.0	0.000	0.0	0.001	0.0	1.550	6.7
All other sources	2.487	78.0	3.278	79.6	0.546	99.1	1.170	100.0	1.217	100.0	3.057	100.0	21.756	93.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
CONCENTRATION 1200-1800 95/10/ 8

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.628	-99.0	0.622	-99.0	0.211	-99.0	0.082	-99.0	0.220	-99.0	0.409	-99.0	3.173	-99.0
Estimated w/o fires	1.628	-99.0	0.622	-99.0	0.211	-99.0	0.082	-99.0	0.220	-99.0	0.409	-99.0	3.173	-99.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.713	43.8	0.389	62.5	0.047	22.4	0.013	15.5	0.032	14.4	0.115	28.1	1.308	41.2
Craig 1-3	0.150	9.2	0.094	15.0	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.245	7.7
Craig 1-2	0.150	9.2	0.094	15.0	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.245	7.7
Craig 1	0.086	5.3	0.053	8.5	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.140	4.4
Craig 2	0.064	3.9	0.040	6.5	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.105	3.3
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.561	34.4	0.273	43.9	0.007	3.3	0.000	0.0	0.000	0.0	0.000	0.1	0.841	26.5
Hayden 1	0.007	0.4	0.000	0.1	0.003	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.3
Hayden 2	0.554	34.0	0.273	43.9	0.004	2.0	0.000	0.0	0.000	0.0	0.000	0.0	0.831	26.2
Steamboat Springs	0.001	0.0	0.011	1.8	0.005	2.5	0.003	3.6	0.008	3.7	0.010	2.4	0.038	1.2
Other Yampa Valley	0.001	0.1	0.011	1.8	0.034	16.2	0.010	11.9	0.023	10.7	0.105	25.6	0.184	5.8
Non-Yampa Valley	0.916	56.2	0.233	37.5	0.163	77.6	0.070	84.5	0.188	85.6	0.294	71.9	1.864	58.8
Denver	0.103	6.3	0.009	1.4	0.023	10.9	0.011	13.6	0.035	16.0	0.002	0.5	0.183	5.8
Colorado w/ Denver	0.204	12.5	0.046	7.4	0.106	50.1	0.043	51.8	0.126	57.4	0.164	40.1	0.688	21.7
Non-Colorado	0.712	43.7	0.187	30.1	0.058	27.5	0.027	32.7	0.062	28.3	0.130	31.8	1.176	37.1
Coal-fired PP	0.930	57.1	0.411	66.1	0.009	4.3	0.000	0.0	0.000	0.0	0.000	0.1	1.351	42.6
All other sources	0.698	42.9	0.211	33.9	0.202	95.7	0.082	100.0	0.220	100.0	0.409	99.9	1.822	57.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
EXTINCTION 1200-1800 95/10/ 8 6-hour average RH: 24%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.972	-99.0	1.248	-99.0	0.316	-99.0	0.749	-99.0	0.659	-99.0	1.226	-99.0	17.169	-99.0
Estimated w/o fires	2.972	-99.0	1.248	-99.0	0.316	-99.0	0.749	-99.0	0.659	-99.0	1.226	-99.0	17.169	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.300	43.8	0.780	62.5	0.071	22.4	0.116	15.5	0.095	14.4	0.345	28.1	2.707	15.8
Craig 1-3	0.274	9.2	0.188	15.0	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.464	2.7
Craig 1-2	0.274	9.2	0.188	15.0	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.463	2.7
Craig 1	0.158	5.3	0.106	8.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.265	1.5
Craig 2	0.116	3.9	0.081	6.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.198	1.2
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	1.023	34.4	0.548	43.9	0.010	3.3	0.000	0.0	0.000	0.0	0.001	0.1	1.582	9.2
Hayden 1	0.013	0.4	0.001	0.1	0.004	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.018	0.1
Hayden 2	1.010	34.0	0.547	43.9	0.006	2.0	0.000	0.0	0.000	0.0	0.000	0.0	1.564	9.1

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.0	0.022	1.8	0.008	2.5	0.027	3.6	0.024	3.7	0.030	2.4	0.112	0.7
Other Yampa Valley	0.002	0.1	0.022	1.8	0.051	16.2	0.089	11.9	0.070	10.7	0.314	25.6	0.549	3.2
Non-Yampa Valley	1.671	56.2	0.467	37.5	0.245	77.6	0.633	84.5	0.565	85.6	0.881	71.9	4.462	26.0
Denver	0.188	6.3	0.018	1.4	0.034	10.9	0.102	13.6	0.105	16.0	0.006	0.5	0.453	2.6
Colorado w/ Denver	0.373	12.5	0.092	7.4	0.158	50.1	0.388	51.8	0.378	57.4	0.491	40.1	1.880	11.0
Non-Colorado	1.298	43.7	0.375	30.1	0.087	27.5	0.245	32.7	0.187	28.3	0.390	31.8	2.582	15.0
Coal-fired PP	1.697	57.1	0.825	66.1	0.014	4.3	0.000	0.0	0.000	0.0	0.001	0.1	2.537	14.8
All other sources	1.274	42.9	0.423	33.9	0.302	95.7	0.749	100.0	0.659	100.0	1.224	99.9	14.632	85.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
CONCENTRATION 0600-1200 95/10/ 9

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.559	-99.0	0.525	-99.0	0.646	-99.0	0.267	-99.0	0.771	-99.0	1.125	-99.0	4.894	-99.0
Estimated w/o fires	1.559	-99.0	0.525	-99.0	0.646	-99.0	0.267	-99.0	0.771	-99.0	1.125	-99.0	4.894	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.143	9.2	0.088	16.7	0.069	10.7	0.019	7.3	0.046	6.0	0.288	25.6	0.654	13.4
Craig 1-3	0.079	5.0	0.049	9.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.128	2.6
Craig 1-2	0.079	5.0	0.049	9.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.128	2.6
Craig 1	0.043	2.7	0.030	5.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.073	1.5
Craig 2	0.036	2.3	0.019	3.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.055	1.1
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.062	3.9	0.023	4.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.086	1.8
Hayden 1	0.007	0.4	0.001	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.2
Hayden 2	0.055	3.5	0.023	4.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.078	1.6
Steamboat Springs	0.001	0.0	0.004	0.8	0.005	0.8	0.003	1.1	0.008	1.0	0.013	1.2	0.034	0.7
Other Yampa Valley	0.002	0.2	0.011	2.1	0.062	9.6	0.016	6.1	0.038	5.0	0.275	24.4	0.405	8.3
Non-Yampa Valley	1.415	90.8	0.437	83.3	0.577	89.3	0.248	92.7	0.725	94.0	0.838	74.4	4.240	86.6
Denver	0.310	19.9	0.099	18.9	0.122	18.8	0.064	23.9	0.198	25.7	0.011	1.0	0.804	16.4
Colorado w/ Denver	0.584	37.5	0.313	59.6	0.464	71.8	0.192	71.9	0.588	76.3	0.578	51.4	2.720	55.6
Non-Colorado	0.832	53.3	0.124	23.7	0.113	17.5	0.056	20.9	0.136	17.7	0.259	23.0	1.520	31.1
Coal-fired PP	0.499	32.0	0.126	24.0	0.003	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.629	12.8
All other sources	1.060	68.0	0.399	76.0	0.643	99.5	0.267	100.0	0.771	100.0	1.125	100.0	4.265	87.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/10/ 9 6-hour average RH: 35%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	3.091	-99.0	1.136	-99.0	0.994	-99.0	2.434	-99.0	2.397	-99.0	3.500	-99.0	23.552	-99.0
Estimated w/o fires	3.091	-99.0	1.136	-99.0	0.994	-99.0	2.434	-99.0	2.397	-99.0	3.500	-99.0	23.552	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.284	9.2	0.190	16.7	0.106	10.7	0.177	7.3	0.144	6.0	0.895	25.6	1.796	7.6
Craig 1-3	0.156	5.0	0.106	9.4	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.263	1.1
Craig 1-2	0.156	5.0	0.106	9.4	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.263	1.1
Craig 1	0.085	2.7	0.065	5.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.149	0.6
Craig 2	0.071	2.3	0.042	3.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.113	0.5
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.122	3.9	0.051	4.5	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.175	0.7
Hayden 1	0.013	0.4	0.001	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.1
Hayden 2	0.109	3.5	0.050	4.4	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.159	0.7
Steamboat Springs	0.001	0.0	0.009	0.8	0.008	0.8	0.028	1.1	0.024	1.0	0.041	1.2	0.111	0.5
Other Yampa Valley	0.005	0.2	0.024	2.1	0.095	9.6	0.149	6.1	0.120	5.0	0.854	24.4	1.246	5.3
Non-Yampa Valley	2.807	90.8	0.946	83.3	0.887	89.3	2.257	92.7	2.253	94.0	2.605	74.4	11.756	49.9
Denver	0.614	19.9	0.214	18.9	0.187	18.8	0.581	23.9	0.617	25.7	0.035	1.0	2.248	9.5
Colorado w/ Denver	1.158	37.5	0.677	59.6	0.714	71.8	1.749	71.9	1.829	76.3	1.799	51.4	7.926	33.7
Non-Colorado	1.649	53.3	0.269	23.7	0.174	17.5	0.508	20.9	0.424	17.7	0.806	23.0	3.830	16.3
Coal-fired PP	0.989	32.0	0.273	24.0	0.005	0.5	0.000	0.0	0.000	0.0	0.001	0.0	1.268	5.4
All other sources	2.102	68.0	0.863	76.0	0.988	99.5	2.434	100.0	2.397	100.0	3.499	100.0	22.284	94.6
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
CONCENTRATION 1200-1800 95/10/ 9

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.514	-99.0	0.472	-99.0	0.324	-99.0	0.127	-99.0	0.354	-99.0	0.571	-99.0	3.361	-99.0
Estimated w/o fires	1.514	-99.0	0.472	-99.0	0.324	-99.0	0.127	-99.0	0.354	-99.0	0.571	-99.0	3.361	-99.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.415	27.4	0.300	63.5	0.083	25.8	0.022	17.0	0.056	15.8	0.183	32.1	1.059	31.5
Craig 1-3	0.200	13.2	0.193	40.8	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.1	0.395	11.7
Craig 1-2	0.200	13.2	0.193	40.8	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.394	11.7
Craig 1	0.107	7.1	0.106	22.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.213	6.3
Craig 2	0.093	6.2	0.087	18.4	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.181	5.4
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.211	13.9	0.086	18.3	0.004	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.301	9.0
Hayden 1	0.003	0.2	0.000	0.0	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.2
Hayden 2	0.208	13.7	0.086	18.3	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.296	8.8
Steamboat Springs	0.001	0.0	0.005	1.0	0.004	1.2	0.002	1.7	0.006	1.7	0.008	1.4	0.025	0.8
Other Yampa Valley	0.003	0.2	0.016	3.4	0.074	22.8	0.019	15.3	0.050	14.1	0.175	30.6	0.337	10.0
Non-Yampa Valley	1.100	72.6	0.172	36.5	0.240	74.2	0.105	83.0	0.298	84.2	0.388	67.9	2.303	68.5
Denver	0.169	11.1	0.021	4.5	0.040	12.5	0.021	16.2	0.064	18.2	0.004	0.6	0.319	9.5
Colorado w/ Denver	0.322	21.3	0.083	17.6	0.170	52.5	0.070	55.2	0.209	59.1	0.245	42.9	1.099	32.7
Non-Colorado	0.777	51.3	0.089	18.9	0.070	21.7	0.035	27.7	0.089	25.1	0.143	25.0	1.203	35.8
Coal-fired PP	0.678	44.8	0.312	66.1	0.007	2.1	0.000	0.0	0.000	0.0	0.001	0.1	0.997	29.7
All other sources	0.836	55.2	0.160	33.9	0.317	97.9	0.127	100.0	0.354	100.0	0.571	99.9	2.364	70.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
EXTINCTION 1200-1800 95/10/ 9 6-hour average RH: 27%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.813	-99.0	0.961	-99.0	0.487	-99.0	1.155	-99.0	1.068	-99.0	1.725	-99.0	18.210	-99.0
Estimated w/o fires	2.813	-99.0	0.961	-99.0	0.487	-99.0	1.155	-99.0	1.068	-99.0	1.725	-99.0	18.210	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.770	27.4	0.611	63.5	0.126	25.8	0.197	17.0	0.169	15.8	0.554	32.1	2.426	13.3
Craig 1-3	0.372	13.2	0.392	40.8	0.003	0.6	0.000	0.0	0.000	0.0	0.001	0.1	0.768	4.2
Craig 1-2	0.372	13.2	0.392	40.8	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.767	4.2
Craig 1	0.199	7.1	0.215	22.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.415	2.3
Craig 2	0.173	6.2	0.177	18.4	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.352	1.9
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.001	0.0	0.001	0.0
Hayden 1-2	0.392	13.9	0.176	18.3	0.006	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.574	3.2
Hayden 1	0.006	0.2	0.000	0.0	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.1
Hayden 2	0.386	13.7	0.176	18.3	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.565	3.1

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.0	0.010	1.0	0.006	1.2	0.020	1.7	0.018	1.7	0.024	1.4	0.078	0.4
Other Yampa Valley	0.006	0.2	0.032	3.4	0.111	22.8	0.177	15.3	0.151	14.1	0.528	30.6	1.006	5.5
Non-Yampa Valley	2.043	72.6	0.351	36.5	0.362	74.2	0.958	83.0	0.899	84.2	1.171	67.9	5.784	31.8
Denver	0.314	11.1	0.043	4.5	0.061	12.5	0.187	16.2	0.194	18.2	0.011	0.6	0.810	4.4
Colorado w/ Denver	0.599	21.3	0.169	17.6	0.256	52.5	0.638	55.2	0.632	59.1	0.740	42.9	3.033	16.7
Non-Colorado	1.444	51.3	0.181	18.9	0.106	21.7	0.320	27.7	0.268	25.1	0.432	25.0	2.751	15.1
Coal-fired PP	1.260	44.8	0.635	66.1	0.010	2.1	0.000	0.0	0.000	0.0	0.002	0.1	1.907	10.5
All other sources	1.553	55.2	0.326	33.9	0.477	97.9	1.155	100.0	1.068	100.0	1.723	99.9	16.303	89.5
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
CONCENTRATION 0600-1200 95/10/10

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.363	-99.0	0.609	-99.0	0.342	-99.0	0.144	-99.0	0.374	-99.0	0.865	-99.0	3.698	-99.0
Estimated w/o fires	1.363	-99.0	0.609	-99.0	0.342	-99.0	0.144	-99.0	0.374	-99.0	0.865	-99.0	3.698	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.097	7.1	0.238	39.1	0.066	19.2	0.019	13.1	0.044	11.8	0.255	29.5	0.719	19.4
Craig 1-3	0.033	2.5	0.087	14.3	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.121	3.3
Craig 1-2	0.033	2.5	0.087	14.3	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.121	3.3
Craig 1	0.029	2.1	0.081	13.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.110	3.0
Craig 2	0.005	0.3	0.006	1.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.011	0.3
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.061	4.5	0.125	20.5	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.189	5.1
Hayden 1	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 2	0.061	4.5	0.125	20.5	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.188	5.1
Steamboat Springs	0.001	0.0	0.006	1.0	0.006	1.9	0.004	2.5	0.009	2.5	0.017	2.0	0.043	1.2
Other Yampa Valley	0.001	0.1	0.020	3.3	0.056	16.5	0.015	10.6	0.035	9.3	0.238	27.5	0.366	9.9
Non-Yampa Valley	1.266	92.9	0.371	60.9	0.276	80.8	0.125	86.9	0.330	88.2	0.610	70.5	2.979	80.6
Denver	0.071	5.2	0.021	3.4	0.025	7.3	0.013	9.1	0.041	10.9	0.002	0.3	0.173	4.7
Colorado w/ Denver	0.135	9.9	0.106	17.4	0.132	38.5	0.053	36.5	0.152	40.7	0.298	34.4	0.875	23.7
Non-Colorado	1.131	83.0	0.265	43.6	0.145	42.3	0.073	50.4	0.178	47.6	0.312	36.1	2.104	56.9
Coal-fired PP	0.291	21.3	0.272	44.7	0.004	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.567	15.3
All other sources	1.072	78.7	0.337	55.3	0.338	98.8	0.144	100.0	0.374	100.0	0.865	100.0	3.131	84.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/10/10 6-hour average RH: 35%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.699	-99.0	1.315	-99.0	0.526	-99.0	1.313	-99.0	1.163	-99.0	2.690	-99.0	19.706	-99.0
Estimated w/o fires	2.699	-99.0	1.315	-99.0	0.526	-99.0	1.313	-99.0	1.163	-99.0	2.690	-99.0	19.706	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.192	7.1	0.514	39.1	0.101	19.2	0.172	13.1	0.137	11.8	0.794	29.5	1.909	9.7
Craig 1-3	0.066	2.5	0.187	14.3	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.255	1.3
Craig 1-2	0.066	2.5	0.187	14.3	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.255	1.3
Craig 1	0.057	2.1	0.175	13.3	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.232	1.2
Craig 2	0.009	0.3	0.013	1.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.023	0.1
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.122	4.5	0.269	20.5	0.003	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.395	2.0
Hayden 1	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 2	0.122	4.5	0.269	20.5	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.394	2.0
Steamboat Springs	0.001	0.0	0.013	1.0	0.010	1.9	0.033	2.5	0.029	2.5	0.054	2.0	0.140	0.7
Other Yampa Valley	0.003	0.1	0.044	3.3	0.087	16.5	0.139	10.6	0.109	9.3	0.739	27.5	1.120	5.7
Non-Yampa Valley	2.507	92.9	0.801	60.9	0.425	80.8	1.141	86.9	1.026	88.2	1.896	70.5	7.797	39.6
Denver	0.140	5.2	0.045	3.4	0.038	7.3	0.120	9.1	0.127	10.9	0.007	0.3	0.477	2.4
Colorado w/ Denver	0.268	9.9	0.228	17.4	0.202	38.5	0.480	36.5	0.473	40.7	0.926	34.4	2.577	13.1
Non-Colorado	2.239	83.0	0.573	43.6	0.223	42.3	0.662	50.4	0.553	47.6	0.970	36.1	5.219	26.5
Coal-fired PP	0.576	21.3	0.587	44.7	0.006	1.2	0.000	0.0	0.000	0.0	0.001	0.0	1.170	5.9
All other sources	2.123	78.7	0.728	55.3	0.519	98.8	1.313	100.0	1.163	100.0	2.689	100.0	18.536	94.1
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
CONCENTRATION 1200-1800 95/10/10

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.376	-99.0	0.307	-99.0	0.251	-99.0	0.102	-99.0	0.269	-99.0	0.590	-99.0	2.896	-99.0
Estimated w/o fires	1.376	-99.0	0.307	-99.0	0.251	-99.0	0.102	-99.0	0.269	-99.0	0.590	-99.0	2.896	-99.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.356	25.9	0.236	76.6	0.063	25.1	0.017	16.6	0.041	15.1	0.175	29.7	0.888	30.7
Craig 1-3	0.202	14.7	0.146	47.5	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.350	12.1
Craig 1-2	0.202	14.7	0.146	47.5	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.350	12.1
Craig 1	0.179	13.0	0.138	44.9	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.318	11.0
Craig 2	0.023	1.7	0.008	2.7	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.032	1.1
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.152	11.0	0.076	24.7	0.002	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.230	8.0
Hayden 1	0.000	0.0	0.000	0.0	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 2	0.152	11.0	0.076	24.7	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.229	7.9
Steamboat Springs	0.001	0.0	0.004	1.4	0.004	1.5	0.002	2.2	0.006	2.2	0.008	1.4	0.025	0.9
Other Yampa Valley	0.002	0.1	0.009	3.0	0.055	21.9	0.015	14.5	0.035	12.9	0.167	28.3	0.282	9.7
Non-Yampa Valley	1.020	74.1	0.072	23.4	0.188	74.9	0.085	83.4	0.228	84.9	0.415	70.3	2.008	69.3
Denver	0.031	2.2	0.001	0.4	0.014	5.6	0.008	7.7	0.024	9.0	0.001	0.2	0.079	2.7
Colorado w/ Denver	0.078	5.7	0.014	4.6	0.094	37.3	0.038	37.2	0.109	40.5	0.218	36.9	0.551	19.0
Non-Colorado	0.942	68.4	0.058	18.8	0.094	37.6	0.047	46.2	0.119	44.4	0.197	33.4	1.457	50.3
Coal-fired PP	0.536	38.9	0.235	76.4	0.005	2.1	0.000	0.0	0.000	0.0	0.000	0.1	0.776	26.8
All other sources	0.840	61.1	0.072	23.6	0.245	97.9	0.102	100.0	0.269	100.0	0.590	99.9	2.119	73.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
EXTINCTION 1200-1800 95/10/10 6-hour average RH: 31%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.643	-99.0	0.646	-99.0	0.381	-99.0	0.930	-99.0	0.824	-99.0	1.810	-99.0	17.234	-99.0
Estimated w/o fires	2.643	-99.0	0.646	-99.0	0.381	-99.0	0.930	-99.0	0.824	-99.0	1.810	-99.0	17.234	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.684	25.9	0.495	76.6	0.096	25.1	0.155	16.6	0.124	15.1	0.538	29.7	2.092	12.1
Craig 1-3	0.388	14.7	0.307	47.5	0.003	0.7	0.000	0.0	0.000	0.0	0.001	0.0	0.698	4.1
Craig 1-2	0.388	14.7	0.307	47.5	0.003	0.7	0.000	0.0	0.000	0.0	0.001	0.0	0.698	4.0
Craig 1	0.344	13.0	0.290	44.9	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.636	3.7
Craig 2	0.044	1.7	0.017	2.7	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.062	0.4
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.292	11.0	0.160	24.7	0.004	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.455	2.6
Hayden 1	0.000	0.0	0.000	0.0	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Hayden 2	0.292	11.0	0.160	24.7	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.454	2.6

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.0	0.009	1.4	0.006	1.5	0.020	2.2	0.018	2.2	0.025	1.4	0.079	0.5
Other Yampa Valley	0.004	0.1	0.019	3.0	0.083	21.9	0.135	14.5	0.107	12.9	0.511	28.3	0.859	5.0
Non-Yampa Valley	1.959	74.1	0.151	23.4	0.286	74.9	0.776	83.4	0.700	84.9	1.272	70.3	5.142	29.8
Denver	0.059	2.2	0.003	0.4	0.022	5.6	0.072	7.7	0.074	9.0	0.004	0.2	0.233	1.3
Colorado w/ Denver	0.150	5.7	0.029	4.6	0.142	37.3	0.346	37.2	0.334	40.5	0.668	36.9	1.670	9.7
Non-Colorado	1.809	68.4	0.121	18.8	0.143	37.6	0.429	46.2	0.366	44.4	0.604	33.4	3.472	20.1
Coal-fired PP	1.029	38.9	0.494	76.4	0.008	2.1	0.000	0.0	0.000	0.0	0.001	0.1	1.532	8.9
All other sources	1.614	61.1	0.152	23.6	0.373	97.9	0.930	100.0	0.824	100.0	1.808	99.9	15.703	91.1
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
CONCENTRATION 0600-1200 95/10/11

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.157	-99.0	0.412	-99.0	0.323	-99.0	0.135	-99.0	0.359	-99.0	0.826	-99.0	3.211	-99.0
Estimated w/o fires	1.157	-99.0	0.412	-99.0	0.323	-99.0	0.135	-99.0	0.359	-99.0	0.826	-99.0	3.211	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.093	8.1	0.055	13.4	0.041	12.6	0.011	8.2	0.026	7.3	0.173	20.9	0.400	12.4
Craig 1-3	0.033	2.9	0.022	5.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.055	1.7
Craig 1-2	0.033	2.9	0.022	5.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.055	1.7
Craig 1	0.020	1.7	0.011	2.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.031	1.0
Craig 2	0.013	1.1	0.011	2.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.024	0.7
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.058	5.0	0.020	4.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.079	2.4
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.058	5.0	0.020	4.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.078	2.4
Steamboat Springs	0.001	0.0	0.004	1.1	0.004	1.1	0.002	1.4	0.005	1.5	0.007	0.8	0.023	0.7
Other Yampa Valley	0.001	0.1	0.010	2.3	0.036	11.2	0.009	6.8	0.021	5.8	0.166	20.1	0.243	7.6
Non-Yampa Valley	1.064	91.9	0.356	86.6	0.283	87.4	0.124	91.8	0.333	92.7	0.653	79.1	2.812	87.6
Denver	0.039	3.3	0.015	3.6	0.010	3.0	0.006	4.2	0.017	4.8	0.001	0.1	0.087	2.7
Colorado w/ Denver	0.151	13.1	0.181	44.1	0.181	55.8	0.073	54.2	0.203	56.5	0.431	52.2	1.221	38.0
Non-Colorado	0.912	78.8	0.175	42.4	0.102	31.5	0.051	37.6	0.130	36.2	0.222	26.9	1.591	49.5
Coal-fired PP	0.455	39.4	0.137	33.3	0.003	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.596	18.6
All other sources	0.701	60.6	0.275	66.7	0.320	99.0	0.135	100.0	0.359	100.0	0.826	100.0	2.615	81.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/10/11 6-hour average RH: 32%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.234	-99.0	0.869	-99.0	0.493	-99.0	1.225	-99.0	1.103	-99.0	2.538	-99.0	18.461	-99.0
Estimated w/o fires	2.234	-99.0	0.869	-99.0	0.493	-99.0	1.225	-99.0	1.103	-99.0	2.538	-99.0	18.461	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.180	8.1	0.117	13.4	0.062	12.6	0.101	8.2	0.080	7.3	0.531	20.9	1.071	5.8
Craig 1-3	0.064	2.9	0.046	5.3	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.111	0.6
Craig 1-2	0.064	2.9	0.046	5.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.110	0.6
Craig 1	0.039	1.7	0.024	2.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.063	0.3
Craig 2	0.025	1.1	0.022	2.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.048	0.3
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.113	5.0	0.041	4.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.155	0.8
Hayden 1	0.000	0.0	0.000	0.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 2	0.113	5.0	0.041	4.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.154	0.8
Steamboat Springs	0.001	0.0	0.009	1.1	0.005	1.1	0.018	1.4	0.017	1.5	0.021	0.8	0.071	0.4
Other Yampa Valley	0.003	0.1	0.020	2.3	0.055	11.2	0.083	6.8	0.064	5.8	0.510	20.1	0.735	4.0
Non-Yampa Valley	2.054	91.9	0.752	86.6	0.431	87.4	1.124	91.8	1.022	92.7	2.007	79.1	7.389	40.0
Denver	0.074	3.3	0.031	3.6	0.015	3.0	0.051	4.2	0.053	4.8	0.003	0.1	0.227	1.2
Colorado w/ Denver	0.292	13.1	0.383	44.1	0.275	55.8	0.663	54.2	0.623	56.5	1.326	52.2	3.563	19.3
Non-Colorado	1.761	78.8	0.369	42.4	0.155	31.5	0.461	37.6	0.400	36.2	0.681	26.9	3.827	20.7
Coal-fired PP	0.879	39.4	0.289	33.3	0.005	1.0	0.000	0.0	0.000	0.0	0.001	0.0	1.174	6.4
All other sources	1.354	60.6	0.579	66.7	0.488	99.0	1.225	100.0	1.103	100.0	2.537	100.0	17.286	93.6
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
CONCENTRATION 1200-1800 95/10/11

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.767	-99.0	0.050	-99.0	0.181	-99.0	0.070	-99.0	0.186	-99.0	0.451	-99.0	1.706	-99.0
Estimated w/o fires	0.767	-99.0	0.050	-99.0	0.181	-99.0	0.070	-99.0	0.186	-99.0	0.451	-99.0	1.706	-99.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.061	8.0	0.018	36.0	0.043	23.8	0.012	16.6	0.030	16.0	0.101	22.3	0.264	15.5
Craig 1-3	0.008	1.0	0.001	2.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.5
Craig 1-2	0.008	1.0	0.001	2.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.5
Craig 1	0.005	0.6	0.001	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.3
Craig 2	0.003	0.4	0.001	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.2
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.052	6.8	0.014	27.1	0.004	2.4	0.000	0.0	0.000	0.0	0.000	0.0	0.070	4.1
Hayden 1	0.000	0.0	0.000	0.3	0.003	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.2
Hayden 2	0.052	6.8	0.013	26.8	0.002	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.067	3.9
Steamboat Springs	0.001	0.1	0.001	2.3	0.004	2.4	0.002	3.5	0.007	3.7	0.008	1.7	0.023	1.4
Other Yampa Valley	0.001	0.1	0.002	3.8	0.034	18.9	0.009	13.0	0.023	12.3	0.093	20.6	0.162	9.5
Non-Yampa Valley	0.706	92.0	0.032	64.0	0.138	76.2	0.059	83.4	0.157	84.0	0.351	77.7	1.442	84.5
Denver	0.015	1.9	0.001	1.1	0.003	1.9	0.002	2.9	0.006	3.3	0.000	0.1	0.027	1.6
Colorado w/ Denver	0.116	15.2	0.016	32.2	0.093	51.6	0.037	53.2	0.101	54.3	0.243	53.9	0.608	35.6
Non-Colorado	0.590	76.9	0.016	31.7	0.044	24.6	0.021	30.3	0.055	29.7	0.107	23.8	0.834	48.9
Coal-fired PP	0.348	45.4	0.027	54.3	0.006	3.4	0.000	0.0	0.000	0.0	0.000	0.1	0.382	22.4
All other sources	0.419	54.6	0.023	45.7	0.175	96.6	0.070	100.0	0.186	100.0	0.451	99.9	1.324	77.6
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
EXTINCTION 1200-1800 95/10/11 6-hour average RH: 18%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.346	-99.0	0.097	-99.0	0.268	-99.0	0.640	-99.0	0.549	-99.0	1.330	-99.0	14.229	-99.0
Estimated w/o fires	1.346	-99.0	0.097	-99.0	0.268	-99.0	0.640	-99.0	0.549	-99.0	1.330	-99.0	14.229	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.107	8.0	0.035	36.0	0.064	23.8	0.106	16.6	0.088	16.0	0.297	22.3	0.696	4.9
Craig 1-3	0.013	1.0	0.003	2.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.1
Craig 1-2	0.013	1.0	0.003	2.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.1
Craig 1	0.008	0.6	0.001	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.1
Craig 2	0.005	0.4	0.002	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.091	6.8	0.026	27.1	0.006	2.4	0.000	0.0	0.000	0.0	0.001	0.0	0.124	0.9
Hayden 1	0.000	0.0	0.000	0.3	0.004	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.0
Hayden 2	0.091	6.8	0.026	26.8	0.002	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.120	0.8

Table B.2.3.11c (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.1	0.002	2.3	0.006	2.4	0.022	3.5	0.020	3.7	0.023	1.7	0.075	0.5
Other Yampa Valley	0.002	0.1	0.004	3.8	0.051	18.9	0.084	13.0	0.067	12.3	0.274	20.6	0.480	3.4
Non-Yampa Valley	1.238	92.0	0.062	64.0	0.204	76.2	0.534	83.4	0.461	84.0	1.033	77.7	3.533	24.8
Denver	0.026	1.9	0.001	1.1	0.005	1.9	0.018	2.9	0.018	3.3	0.001	0.1	0.070	0.5
Colorado w/ Denver	0.204	15.2	0.031	32.2	0.138	51.6	0.341	53.2	0.298	54.3	0.717	53.9	1.729	12.2
Non-Colorado	1.035	76.9	0.031	31.7	0.066	24.6	0.194	30.3	0.163	29.7	0.316	23.8	1.804	12.7
Coal-fired PP	0.610	45.4	0.052	54.3	0.009	3.4	0.000	0.0	0.000	0.0	0.001	0.1	0.673	4.7
All other sources	0.735	54.6	0.044	45.7	0.258	96.6	0.640	100.0	0.549	100.0	1.329	99.9	13.556	95.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
CONCENTRATION 0600-1200 95/10/12

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.295	-99.0	0.230	-99.0	0.217	-99.0	0.084	-99.0	0.220	-99.0	0.615	-99.0	1.661	-99.0
Estimated w/o fires	0.295	-99.0	0.230	-99.0	0.217	-99.0	0.084	-99.0	0.220	-99.0	0.615	-99.0	1.661	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.060	20.5	0.121	52.4	0.070	32.1	0.019	22.2	0.051	23.0	0.149	24.3	0.469	28.3
Craig 1-3	0.023	7.9	0.045	19.5	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.069	4.2
Craig 1-2	0.023	7.9	0.045	19.5	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.069	4.2
Craig 1	0.012	4.0	0.024	10.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.036	2.1
Craig 2	0.012	3.9	0.021	9.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.033	2.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.036	12.4	0.051	22.4	0.002	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.090	5.4
Hayden 1	0.015	5.0	0.037	16.2	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.053	3.2
Hayden 2	0.022	7.3	0.014	6.1	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.037	2.2
Steamboat Springs	0.000	0.0	0.014	6.0	0.009	4.4	0.005	6.0	0.011	5.1	0.032	5.2	0.072	4.3
Other Yampa Valley	0.001	0.2	0.010	4.5	0.057	26.4	0.014	16.2	0.039	17.9	0.117	19.0	0.238	14.3
Non-Yampa Valley	0.235	79.5	0.110	47.6	0.148	67.9	0.065	77.8	0.169	76.9	0.465	75.7	1.192	71.7
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.052	17.8	0.095	41.3	0.115	52.8	0.049	59.0	0.129	58.6	0.363	59.0	0.803	48.4
Non-Colorado	0.182	61.7	0.014	6.3	0.033	15.1	0.016	18.8	0.040	18.4	0.103	16.7	0.388	23.4
Coal-fired PP	0.101	34.1	0.098	42.6	0.003	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.202	12.2
All other sources	0.194	65.9	0.132	57.4	0.214	98.7	0.084	100.0	0.220	100.0	0.615	100.0	1.459	87.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/10/12 6-hour average RH: 49%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.679	-99.0	0.571	-99.0	0.351	-99.0	0.761	-99.0	0.734	-99.0	2.052	-99.0	15.147	-99.0
Estimated w/o fires	0.679	-99.0	0.571	-99.0	0.351	-99.0	0.761	-99.0	0.733	-99.0	2.052	-99.0	15.147	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.139	20.5	0.299	52.4	0.113	32.1	0.169	22.2	0.169	23.0	0.499	24.3	1.387	9.2
Craig 1-3	0.054	7.9	0.112	19.5	0.001	0.4	0.000	0.0	0.000	0.0	0.001	0.0	0.167	1.1
Craig 1-2	0.054	7.9	0.112	19.5	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.167	1.1
Craig 1	0.027	4.0	0.058	10.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.086	0.6
Craig 2	0.027	3.9	0.053	9.3	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.081	0.5
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.084	12.4	0.128	22.4	0.003	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.215	1.4
Hayden 1	0.034	5.0	0.093	16.2	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.129	0.9
Hayden 2	0.050	7.3	0.035	6.1	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.086	0.6
Steamboat Springs	0.000	0.0	0.034	6.0	0.015	4.4	0.046	6.0	0.037	5.1	0.107	5.2	0.240	1.6
Other Yampa Valley	0.001	0.2	0.026	4.5	0.093	26.4	0.123	16.2	0.132	17.9	0.391	19.0	0.765	5.0
Non-Yampa Valley	0.540	79.5	0.272	47.6	0.238	67.9	0.592	77.8	0.564	76.9	1.553	75.7	3.760	24.8
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.121	17.8	0.236	41.3	0.185	52.8	0.449	59.0	0.430	58.6	1.210	59.0	2.631	17.4
Non-Colorado	0.419	61.7	0.036	6.3	0.053	15.1	0.143	18.8	0.135	18.4	0.343	16.7	1.128	7.4
Coal-fired PP	0.232	34.1	0.243	42.6	0.005	1.3	0.000	0.0	0.000	0.0	0.001	0.0	0.481	3.2
All other sources	0.447	65.9	0.327	57.4	0.346	98.7	0.761	100.0	0.734	100.0	2.051	100.0	14.666	96.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
CONCENTRATION 1200-1800 95/10/12

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.243	-99.0	0.598	-99.0	0.102	-99.0	0.033	-99.0	0.087	-99.0	0.264	-99.0	1.327	-99.0
Estimated w/o fires	0.243	-99.0	0.598	-99.0	0.102	-99.0	0.033	-99.0	0.086	-99.0	0.264	-99.0	1.326	-99.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.126	51.7	0.295	49.4	0.047	46.3	0.010	29.7	0.030	34.1	0.054	20.3	0.561	42.3
Craig 1-3	0.030	12.2	0.107	18.0	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.138	10.4
Craig 1-2	0.030	12.2	0.107	18.0	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.138	10.4
Craig 1	0.015	6.2	0.054	9.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.069	5.2
Craig 2	0.015	6.0	0.054	9.0	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.069	5.2
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.095	39.0	0.178	29.8	0.002	2.0	0.000	0.0	0.000	0.0	0.000	0.0	0.275	20.8
Hayden 1	0.040	16.6	0.138	23.1	0.001	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.180	13.5
Hayden 2	0.055	22.5	0.040	6.7	0.001	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.096	7.2
Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Other Yampa Valley	0.001	0.4	0.010	1.6	0.044	43.7	0.010	29.7	0.030	34.1	0.053	20.2	0.148	11.1
Non-Yampa Valley	0.118	48.3	0.302	50.6	0.055	53.6	0.023	70.2	0.057	65.2	0.210	79.7	0.765	57.6
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.031	12.9	0.059	9.9	0.033	32.5	0.014	41.0	0.035	40.3	0.120	45.3	0.292	22.0
Non-Colorado	0.086	35.4	0.243	40.7	0.021	21.1	0.010	29.1	0.022	24.9	0.091	34.4	0.473	35.6
Coal-fired PP	0.165	67.9	0.494	82.6	0.004	4.2	0.000	0.0	0.000	0.0	0.000	0.1	0.663	50.0
All other sources	0.078	32.1	0.104	17.4	0.098	95.8	0.033	100.0	0.087	100.0	0.264	99.9	0.663	50.0
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.001	0.7	0.000	0.0	0.001	0.1

Mad Creek
EXTINCTION 1200-1800 95/10/12 6-hour average RH: 77%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.981	-99.0	2.519	-99.0	0.208	-99.0	0.300	-99.0	0.398	-99.0	1.207	-99.0	15.613	-99.0
Estimated w/o fires	0.981	-99.0	2.519	-99.0	0.208	-99.0	0.300	-99.0	0.395	-99.0	1.207	-99.0	15.609	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.507	51.7	1.244	49.4	0.096	46.3	0.089	29.7	0.136	34.1	0.245	20.3	2.317	14.8
Craig 1-3	0.120	12.2	0.453	18.0	0.001	0.6	0.000	0.0	0.000	0.0	0.001	0.0	0.574	3.7
Craig 1-2	0.120	12.2	0.453	18.0	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.574	3.7
Craig 1	0.061	6.2	0.227	9.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.288	1.8
Craig 2	0.059	6.0	0.226	9.0	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.285	1.8
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.383	39.0	0.751	29.8	0.004	2.0	0.000	0.0	0.000	0.0	0.000	0.0	1.139	7.3
Hayden 1	0.163	16.6	0.583	23.1	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.748	4.8
Hayden 2	0.221	22.5	0.168	6.7	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.391	2.5

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Other Yampa Valley	0.004	0.4	0.040	1.6	0.091	43.7	0.089	29.7	0.136	34.1	0.244	20.2	0.604	3.9
Non-Yampa Valley	0.474	48.3	1.275	50.6	0.111	53.6	0.211	70.2	0.259	65.2	0.962	79.7	3.292	21.1
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.127	12.9	0.250	9.9	0.068	32.5	0.123	41.0	0.160	40.3	0.546	45.3	1.274	8.2
Non-Colorado	0.347	35.4	1.025	40.7	0.044	21.1	0.087	29.1	0.099	24.9	0.415	34.4	2.018	12.9
Coal-fired PP	0.667	67.9	2.080	82.6	0.009	4.2	0.000	0.0	0.000	0.0	0.001	0.1	2.757	17.7
All other sources	0.315	32.1	0.439	17.4	0.199	95.8	0.300	100.0	0.398	100.0	1.205	99.9	12.856	82.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.003	0.7	0.000	0.0	0.004	0.0

Mad Creek
CONCENTRATION 0600-1200 95/10/13

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.284	-99.0	1.059	-99.0	0.228	-99.0	0.081	-99.0	0.186	-99.0	0.681	-99.0	3.519	-99.0
Estimated w/o fires	1.284	-99.0	1.059	-99.0	0.228	-99.0	0.081	-99.0	0.186	-99.0	0.681	-99.0	3.519	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.770	60.0	0.608	57.5	0.085	37.3	0.020	25.3	0.054	29.3	0.257	37.7	1.795	51.0
Craig 1-3	0.082	6.4	0.070	6.6	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.154	4.4
Craig 1-2	0.082	6.4	0.070	6.6	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.153	4.4
Craig 1	0.047	3.7	0.038	3.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.086	2.4
Craig 2	0.035	2.7	0.032	3.0	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.068	1.9
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.687	53.5	0.520	49.1	0.007	3.2	0.000	0.0	0.000	0.0	0.000	0.0	1.215	34.5
Hayden 1	0.263	20.5	0.383	36.1	0.003	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.649	18.5
Hayden 2	0.424	33.0	0.137	12.9	0.004	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.565	16.1
Steamboat Springs	0.000	0.0	0.004	0.4	0.007	3.0	0.004	5.1	0.009	5.1	0.020	2.9	0.044	1.3
Other Yampa Valley	0.000	0.0	0.015	1.4	0.069	30.4	0.016	20.2	0.045	24.2	0.237	34.8	0.383	10.9
Non-Yampa Valley	0.514	40.0	0.450	42.5	0.143	62.7	0.060	74.7	0.132	70.7	0.424	62.3	1.723	49.0
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.003	0.2	0.031	2.9	0.026	11.4	0.009	11.0	0.021	11.3	0.098	14.3	0.187	5.3
Non-Colorado	0.511	39.8	0.420	39.6	0.117	51.3	0.051	63.8	0.111	59.4	0.326	47.9	1.536	43.7
Coal-fired PP	0.993	77.3	0.765	72.2	0.013	5.6	0.000	0.0	0.000	0.0	0.001	0.1	1.771	50.3
All other sources	0.291	22.7	0.294	27.8	0.215	94.4	0.081	100.0	0.186	100.0	0.680	99.9	1.747	49.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/10/13 6-hour average RH: 57%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	3.292	-99.0	2.906	-99.0	0.383	-99.0	0.733	-99.0	0.656	-99.0	2.400	-99.0	20.371	-99.0
Estimated w/o fires	3.292	-99.0	2.906	-99.0	0.383	-99.0	0.733	-99.0	0.655	-99.0	2.400	-99.0	20.370	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.974	60.0	1.670	57.5	0.143	37.3	0.185	25.3	0.192	29.3	0.906	37.7	5.070	24.9
Craig 1-3	0.211	6.4	0.192	6.6	0.002	0.6	0.000	0.0	0.000	0.0	0.001	0.0	0.405	2.0
Craig 1-2	0.211	6.4	0.192	6.6	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.405	2.0
Craig 1	0.121	3.7	0.104	3.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.226	1.1
Craig 2	0.090	2.7	0.088	3.0	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.179	0.9
Craig 3	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	1.762	53.5	1.426	49.1	0.012	3.2	0.000	0.0	0.000	0.0	0.001	0.0	3.202	15.7
Hayden 1	0.675	20.5	1.050	36.1	0.006	1.5	0.000	0.0	0.000	0.0	0.001	0.0	1.731	8.5
Hayden 2	1.088	33.0	0.376	12.9	0.007	1.7	0.000	0.0	0.000	0.0	0.001	0.0	1.471	7.2
Steamboat Springs	0.001	0.0	0.011	0.4	0.012	3.0	0.037	5.1	0.033	5.1	0.069	2.9	0.162	0.8
Other Yampa Valley	0.001	0.0	0.041	1.4	0.117	30.4	0.148	20.2	0.159	24.2	0.835	34.8	1.301	6.4
Non-Yampa Valley	1.318	40.0	1.236	42.5	0.240	62.7	0.548	74.7	0.464	70.7	1.495	62.3	5.300	26.0
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.008	0.2	0.085	2.9	0.044	11.4	0.080	11.0	0.074	11.3	0.344	14.3	0.635	3.1
Non-Colorado	1.310	39.8	1.152	39.6	0.197	51.3	0.468	63.8	0.389	59.4	1.151	47.9	4.666	22.9
Coal-fired PP	2.546	77.3	2.099	72.2	0.022	5.6	0.000	0.0	0.000	0.0	0.002	0.1	4.669	22.9
All other sources	0.746	22.7	0.807	27.8	0.362	94.4	0.733	100.0	0.656	100.0	2.398	99.9	15.701	77.1
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Mad Creek
CONCENTRATION 1200-1800 95/10/13

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.314	-99.0	1.072	-99.0	0.161	-99.0	0.048	-99.0	0.124	-99.0	0.297	-99.0	3.016	-99.0
Estimated w/o fires	1.314	-99.0	1.072	-99.0	0.161	-99.0	0.048	-99.0	0.124	-99.0	0.297	-99.0	3.016	-99.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.744	56.6	0.704	65.7	0.091	56.5	0.020	42.0	0.060	48.2	0.113	38.2	1.733	57.4
Craig 1-3	0.224	17.1	0.326	30.4	0.003	1.6	0.000	0.0	0.000	0.0	0.000	0.1	0.553	18.3
Craig 1-2	0.224	17.1	0.326	30.4	0.002	1.3	0.000	0.0	0.000	0.0	0.000	0.1	0.553	18.3
Craig 1	0.121	9.2	0.166	15.5	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.289	9.6
Craig 2	0.103	7.8	0.160	14.9	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.264	8.8
Craig 3	0.000	0.0	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.1	0.001	0.0
Hayden 1-2	0.516	39.3	0.355	33.2	0.004	2.4	0.000	0.0	0.000	0.0	0.000	0.1	0.875	29.0
Hayden 1	0.227	17.3	0.276	25.8	0.002	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.505	16.8
Hayden 2	0.289	22.0	0.079	7.4	0.002	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.370	12.3
Steamboat Springs	0.000	0.0	0.003	0.3	0.002	1.3	0.001	2.3	0.003	2.5	0.004	1.3	0.013	0.4
Other Yampa Valley	0.003	0.2	0.020	1.9	0.083	51.3	0.019	39.7	0.057	45.7	0.109	36.7	0.291	9.6
Non-Yampa Valley	0.570	43.4	0.368	34.3	0.070	43.4	0.028	58.0	0.064	51.7	0.184	61.8	1.284	42.6
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.003	0.2	0.019	1.8	0.015	9.0	0.005	11.4	0.013	10.2	0.056	18.9	0.111	3.7
Non-Colorado	0.567	43.2	0.349	32.5	0.056	34.4	0.022	46.6	0.052	41.5	0.127	42.9	1.173	38.9
Coal-fired PP	0.966	73.6	0.872	81.4	0.009	5.9	0.000	0.0	0.000	0.0	0.001	0.2	1.849	61.3
All other sources	0.347	26.4	0.200	18.6	0.152	94.1	0.048	100.0	0.124	100.0	0.296	99.8	1.167	38.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0

Mad Creek
EXTINCTION 1200-1800 95/10/13 6-hour average RH: 28%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.458	-99.0	2.199	-99.0	0.244	-99.0	0.436	-99.0	0.377	-99.0	0.900	-99.0	16.614	-99.0
Estimated w/o fires	2.458	-99.0	2.199	-99.0	0.244	-99.0	0.436	-99.0	0.376	-99.0	0.900	-99.0	16.614	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.392	56.6	1.445	65.7	0.138	56.5	0.183	42.0	0.182	48.2	0.344	38.2	3.683	22.2
Craig 1-3	0.420	17.1	0.669	30.4	0.004	1.6	0.000	0.0	0.000	0.0	0.001	0.1	1.094	6.6
Craig 1-2	0.420	17.1	0.669	30.4	0.003	1.3	0.000	0.0	0.000	0.0	0.001	0.1	1.093	6.6
Craig 1	0.227	9.2	0.341	15.5	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.570	3.4
Craig 2	0.193	7.8	0.328	14.9	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.523	3.1
Craig 3	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.001	0.1	0.001	0.0
Hayden 1-2	0.966	39.3	0.729	33.2	0.006	2.4	0.000	0.0	0.000	0.0	0.000	0.1	1.701	10.2
Hayden 1	0.424	17.3	0.567	25.8	0.003	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.995	6.0
Hayden 2	0.541	22.0	0.162	7.4	0.003	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.706	4.3

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.000	0.0	0.006	0.3	0.003	1.3	0.010	2.3	0.009	2.5	0.012	1.3	0.040	0.2
Other Yampa Valley	0.006	0.2	0.041	1.9	0.125	51.3	0.173	39.7	0.172	45.7	0.330	36.7	0.847	5.1
Non-Yampa Valley	1.067	43.4	0.755	34.3	0.106	43.4	0.253	58.0	0.195	51.7	0.556	61.8	2.931	17.6
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.005	0.2	0.039	1.8	0.022	9.0	0.050	11.4	0.039	10.2	0.171	18.9	0.325	2.0
Non-Colorado	1.061	43.2	0.716	32.5	0.084	34.4	0.203	46.6	0.156	41.5	0.386	42.9	2.606	15.7
Coal-fired PP	1.808	73.6	1.790	81.4	0.014	5.9	0.000	0.0	0.000	0.0	0.002	0.2	3.615	21.8
All other sources	0.650	26.4	0.410	18.6	0.229	94.1	0.436	100.0	0.377	100.0	0.898	99.8	13.000	78.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0

Mad Creek
CONCENTRATION 0600-1200 95/10/14

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.610	-99.0	0.186	-99.0	0.237	-99.0	0.091	-99.0	0.220	-99.0	0.757	-99.0	2.101	-99.0
Estimated w/o fires	0.610	-99.0	0.186	-99.0	0.237	-99.0	0.091	-99.0	0.220	-99.0	0.757	-99.0	2.101	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.015	2.5	0.015	8.1	0.056	23.8	0.016	17.5	0.039	17.5	0.247	32.7	0.388	18.5
Craig 1-3	0.003	0.5	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.2
Craig 1-2	0.003	0.5	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.2
Craig 1	0.002	0.3	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.1
Craig 2	0.001	0.2	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.1
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.010	1.6	0.003	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.6
Hayden 1	0.003	0.5	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.2
Hayden 2	0.007	1.1	0.002	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.4
Steamboat Springs	0.000	0.1	0.003	1.7	0.005	2.3	0.003	3.4	0.008	3.6	0.013	1.7	0.033	1.6
Other Yampa Valley	0.002	0.3	0.008	4.2	0.051	21.4	0.013	14.1	0.031	13.9	0.234	31.0	0.338	16.1
Non-Yampa Valley	0.595	97.5	0.171	91.9	0.180	76.2	0.075	82.5	0.181	82.4	0.510	67.3	1.713	81.5
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.013	2.1	0.034	18.0	0.071	30.1	0.027	29.1	0.066	30.0	0.240	31.6	0.450	21.4
Non-Colorado	0.582	95.4	0.137	73.9	0.109	46.1	0.049	53.4	0.115	52.4	0.270	35.7	1.263	60.1
Coal-fired PP	0.117	19.2	0.040	21.6	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.159	7.6
All other sources	0.493	80.8	0.146	78.4	0.235	99.4	0.091	100.0	0.220	100.0	0.757	100.0	1.942	92.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/10/14 6-hour average RH: 25%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.121	-99.0	0.375	-99.0	0.355	-99.0	0.832	-99.0	0.662	-99.0	2.277	-99.0	15.622	-99.0
Estimated w/o fires	1.121	-99.0	0.375	-99.0	0.355	-99.0	0.832	-99.0	0.661	-99.0	2.277	-99.0	15.621	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.027	2.5	0.031	8.1	0.084	23.8	0.145	17.5	0.116	17.5	0.744	32.7	1.147	7.3
Craig 1-3	0.005	0.5	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.1
Craig 1-2	0.005	0.5	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.1
Craig 1	0.003	0.3	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.0
Craig 2	0.002	0.2	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.018	1.6	0.006	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.024	0.2
Hayden 1	0.006	0.5	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.0
Hayden 2	0.013	1.1	0.004	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.017	0.1
Steamboat Springs	0.001	0.1	0.006	1.7	0.008	2.3	0.028	3.4	0.024	3.6	0.039	1.7	0.106	0.7
Other Yampa Valley	0.003	0.3	0.016	4.2	0.076	21.4	0.117	14.1	0.092	13.9	0.705	31.0	1.009	6.5
Non-Yampa Valley	1.093	97.5	0.345	91.9	0.271	76.2	0.687	82.5	0.545	82.4	1.533	67.3	4.474	28.6
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.024	2.1	0.068	18.0	0.107	30.1	0.242	29.1	0.198	30.0	0.720	31.6	1.359	8.7
Non-Colorado	1.070	95.4	0.277	73.9	0.164	46.1	0.444	53.4	0.347	52.4	0.813	35.7	3.115	19.9
Coal-fired PP	0.216	19.2	0.081	21.6	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.299	1.9
All other sources	0.905	80.8	0.294	78.4	0.353	99.4	0.832	100.0	0.662	100.0	2.276	100.0	15.323	98.1
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.001	0.0

Mad Creek
CONCENTRATION 1200-1800 95/10/14

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.181	-99.0	0.528	-99.0	0.173	-99.0	0.066	-99.0	0.160	-99.0	0.482	-99.0	2.589	-99.0
Estimated w/o fires	1.181	-99.0	0.528	-99.0	0.173	-99.0	0.066	-99.0	0.160	-99.0	0.482	-99.0	2.589	-99.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.727	61.6	0.387	73.4	0.061	35.0	0.018	27.5	0.045	27.8	0.175	36.3	1.412	54.5
Craig 1-3	0.151	12.8	0.076	14.3	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.227	8.8
Craig 1-2	0.136	11.5	0.073	13.8	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.209	8.1
Craig 1	0.071	6.0	0.037	7.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.108	4.2
Craig 2	0.065	5.5	0.036	6.8	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.102	3.9
Craig 3	0.015	1.3	0.003	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.018	0.7
Hayden 1-2	0.573	48.6	0.293	55.4	0.003	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.869	33.6
Hayden 1	0.238	20.2	0.195	37.0	0.001	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.435	16.8
Hayden 2	0.335	28.4	0.097	18.4	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.434	16.8
Steamboat Springs	0.001	0.1	0.008	1.4	0.008	4.8	0.005	7.1	0.013	8.0	0.015	3.2	0.050	1.9
Other Yampa Valley	0.002	0.2	0.011	2.2	0.048	27.9	0.013	20.4	0.032	19.8	0.159	33.1	0.266	10.3
Non-Yampa Valley	0.454	38.4	0.140	26.6	0.112	65.0	0.048	72.5	0.116	72.2	0.307	63.7	1.177	45.4
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.015	1.3	0.028	5.3	0.045	26.1	0.018	26.9	0.044	27.6	0.143	29.8	0.294	11.4
Non-Colorado	0.438	37.1	0.112	21.3	0.067	38.9	0.030	45.7	0.071	44.6	0.163	33.9	0.883	34.1
Coal-fired PP	0.815	69.1	0.405	76.8	0.005	3.0	0.000	0.0	0.000	0.0	0.000	0.1	1.226	47.4
All other sources	0.365	30.9	0.122	23.2	0.168	97.0	0.066	100.0	0.160	100.0	0.481	99.9	1.363	52.6
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0

Mad Creek
EXTINCTION 1200-1800 95/10/14 6-hour average RH: 26%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.175	-99.0	1.067	-99.0	0.260	-99.0	0.600	-99.0	0.483	-99.0	1.449	-99.0	16.033	-99.0
Estimated w/o fires	2.175	-99.0	1.067	-99.0	0.260	-99.0	0.600	-99.0	0.482	-99.0	1.449	-99.0	16.033	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.339	61.6	0.783	73.4	0.091	35.0	0.165	27.5	0.134	27.8	0.526	36.3	3.038	18.9
Craig 1-3	0.278	12.8	0.153	14.3	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.432	2.7
Craig 1-2	0.250	11.5	0.147	13.8	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.399	2.5
Craig 1	0.130	6.0	0.075	7.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.205	1.3
Craig 2	0.120	5.5	0.073	6.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.193	1.2
Craig 3	0.027	1.3	0.006	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.033	0.2
Hayden 1-2	1.056	48.6	0.592	55.4	0.005	1.8	0.000	0.0	0.000	0.0	0.000	0.0	1.653	10.3
Hayden 1	0.439	20.2	0.395	37.0	0.002	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.836	5.2
Hayden 2	0.617	28.4	0.197	18.4	0.003	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.817	5.1

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.002	0.1	0.015	1.4	0.012	4.8	0.042	7.1	0.039	8.0	0.046	3.2	0.157	1.0
Other Yampa Valley	0.004	0.2	0.023	2.2	0.073	27.9	0.122	20.4	0.095	19.8	0.479	33.1	0.796	5.0
Non-Yampa Valley	0.835	38.4	0.284	26.6	0.169	65.0	0.435	72.5	0.348	72.2	0.923	63.7	2.994	18.7
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.029	1.3	0.057	5.3	0.068	26.1	0.161	26.9	0.133	27.6	0.431	29.8	0.879	5.5
Non-Colorado	0.807	37.1	0.227	21.3	0.101	38.9	0.274	45.7	0.215	44.6	0.492	33.9	2.116	13.2
Coal-fired PP	1.502	69.1	0.820	76.8	0.008	3.0	0.000	0.0	0.000	0.0	0.001	0.1	2.330	14.5
All other sources	0.673	30.9	0.247	23.2	0.252	97.0	0.600	100.0	0.483	100.0	1.448	99.9	13.703	85.5
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0

Mad Creek
CONCENTRATION 0600-1200 95/10/15

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.879	-99.0	0.599	-99.0	0.295	-99.0	0.117	-99.0	0.298	-99.0	0.879	-99.0	3.069	-99.0
Estimated w/o fires	0.879	-99.0	0.599	-99.0	0.295	-99.0	0.117	-99.0	0.297	-99.0	0.879	-99.0	3.067	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.201	22.9	0.204	34.1	0.059	19.8	0.017	14.2	0.040	13.3	0.243	27.7	0.764	24.9
Craig 1-3	0.034	3.9	0.027	4.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.062	2.0
Craig 1-2	0.029	3.3	0.022	3.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.052	1.7
Craig 1	0.015	1.7	0.010	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.026	0.8
Craig 2	0.014	1.6	0.012	2.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.026	0.9
Craig 3	0.005	0.6	0.005	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.3
Hayden 1-2	0.164	18.7	0.151	25.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.316	10.3
Hayden 1	0.083	9.4	0.112	18.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.196	6.4
Hayden 2	0.081	9.2	0.039	6.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.120	3.9
Steamboat Springs	0.001	0.1	0.008	1.3	0.005	1.7	0.003	2.4	0.008	2.6	0.010	1.2	0.034	1.1
Other Yampa Valley	0.002	0.3	0.018	3.1	0.053	17.9	0.014	11.7	0.032	10.8	0.233	26.5	0.352	11.5
Non-Yampa Valley	0.678	77.1	0.395	65.9	0.237	80.1	0.101	85.7	0.257	86.3	0.636	72.3	2.304	75.1
Denver	0.013	1.5	0.006	1.0	0.000	0.1	0.000	0.1	0.001	0.2	0.000	0.0	0.020	0.7
Colorado w/ Denver	0.074	8.5	0.184	30.7	0.140	47.2	0.055	47.2	0.148	49.6	0.396	45.0	0.997	32.5
Non-Colorado	0.603	68.6	0.211	35.2	0.097	32.9	0.045	38.5	0.109	36.6	0.240	27.3	1.306	42.6
Coal-fired PP	0.340	38.7	0.233	38.9	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.575	18.7
All other sources	0.539	61.3	0.366	61.1	0.293	99.4	0.117	100.0	0.298	100.0	0.879	100.0	2.494	81.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.001	0.4	0.000	0.0	0.001	0.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/10/15 6-hour average RH: 30%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.675	-99.0	1.250	-99.0	0.448	-99.0	1.067	-99.0	0.911	-99.0	2.686	-99.0	18.037	-99.0
Estimated w/o fires	1.675	-99.0	1.250	-99.0	0.448	-99.0	1.066	-99.0	0.908	-99.0	2.686	-99.0	18.033	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.384	22.9	0.426	34.1	0.089	19.8	0.151	14.2	0.122	13.3	0.743	27.7	1.914	10.6
Craig 1-3	0.066	3.9	0.056	4.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.122	0.7
Craig 1-2	0.056	3.3	0.046	3.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.103	0.6
Craig 1	0.029	1.7	0.021	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.051	0.3
Craig 2	0.027	1.6	0.025	2.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.052	0.3
Craig 3	0.010	0.6	0.010	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.019	0.1
Hayden 1-2	0.313	18.7	0.315	25.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.628	3.5
Hayden 1	0.158	9.4	0.234	18.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.393	2.2
Hayden 2	0.154	9.2	0.081	6.5	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.236	1.3
Steamboat Springs	0.001	0.1	0.016	1.3	0.008	1.7	0.026	2.4	0.023	2.6	0.031	1.2	0.106	0.6
Other Yampa Valley	0.004	0.3	0.039	3.1	0.080	17.9	0.125	11.7	0.098	10.8	0.711	26.5	1.058	5.9
Non-Yampa Valley	1.291	77.1	0.824	65.9	0.359	80.1	0.915	85.7	0.786	86.3	1.943	72.3	6.119	33.9
Denver	0.025	1.5	0.012	1.0	0.001	0.1	0.002	0.1	0.002	0.2	0.000	0.0	0.041	0.2
Colorado w/ Denver	0.142	8.5	0.384	30.7	0.212	47.2	0.504	47.2	0.452	49.6	1.209	45.0	2.903	16.1
Non-Colorado	1.150	68.6	0.440	35.2	0.147	32.9	0.411	38.5	0.334	36.6	0.734	27.3	3.216	17.8
Coal-fired PP	0.648	38.7	0.486	38.9	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	1.137	6.3
All other sources	1.028	61.3	0.764	61.1	0.445	99.4	1.067	100.0	0.911	100.0	2.686	100.0	16.901	93.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1	0.004	0.4	0.000	0.0	0.005	0.0

Mad Creek
CONCENTRATION 1200-1800 95/10/15

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.014	-99.0	0.188	-99.0	0.229	-99.0	0.091	-99.0	0.236	-99.0	0.632	-99.0	2.389	-99.0
Estimated w/o fires	1.014	-99.0	0.188	-99.0	0.229	-99.0	0.091	-99.0	0.232	-99.0	0.632	-99.0	2.385	-99.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.387	38.2	0.128	68.1	0.056	24.3	0.017	18.3	0.040	16.9	0.187	29.6	0.814	34.1
Craig 1-3	0.079	7.8	0.026	13.6	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.105	4.4
Craig 1-2	0.062	6.1	0.023	12.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.085	3.6
Craig 1	0.032	3.1	0.011	6.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.043	1.8
Craig 2	0.030	3.0	0.012	6.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.042	1.8
Craig 3	0.017	1.7	0.003	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.020	0.8
Hayden 1-2	0.305	30.1	0.090	48.1	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.397	16.6
Hayden 1	0.111	10.9	0.050	26.7	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.161	6.8
Hayden 2	0.194	19.2	0.040	21.4	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.236	9.9
Steamboat Springs	0.001	0.1	0.005	2.8	0.006	2.6	0.003	3.7	0.009	4.0	0.011	1.7	0.036	1.5
Other Yampa Valley	0.002	0.2	0.007	3.6	0.048	20.8	0.013	14.5	0.030	12.9	0.176	27.8	0.276	11.6
Non-Yampa Valley	0.627	61.8	0.060	31.9	0.173	75.6	0.074	81.4	0.192	81.6	0.445	70.4	1.571	65.8
Denver	0.026	2.5	0.001	0.4	0.001	0.5	0.001	0.7	0.002	0.8	0.000	0.0	0.030	1.3
Colorado w/ Denver	0.095	9.3	0.027	14.2	0.103	44.8	0.041	44.8	0.110	46.8	0.282	44.6	0.657	27.5
Non-Colorado	0.532	52.5	0.033	17.7	0.071	30.8	0.033	36.6	0.082	34.8	0.163	25.8	0.914	38.3
Coal-fired PP	0.541	53.4	0.124	66.2	0.003	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.668	28.0
All other sources	0.473	46.6	0.064	33.8	0.226	98.7	0.091	100.0	0.236	100.0	0.632	100.0	1.721	72.0
Fires	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.3	0.004	1.5	0.000	0.0	0.004	0.2

Mad Creek
EXTINCTION 1200-1800 95/10/15 6-hour average RH: 20%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.799	-99.0	0.367	-99.0	0.340	-99.0	0.829	-99.0	0.698	-99.0	1.871	-99.0	15.903	-99.0
Estimated w/o fires	1.799	-99.0	0.367	-99.0	0.340	-99.0	0.826	-99.0	0.687	-99.0	1.871	-99.0	15.889	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.687	38.2	0.250	68.1	0.083	24.3	0.151	18.3	0.118	16.9	0.554	29.6	1.842	11.6
Craig 1-3	0.140	7.8	0.050	13.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.191	1.2
Craig 1-2	0.109	6.1	0.045	12.3	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.155	1.0
Craig 1	0.056	3.1	0.022	6.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.078	0.5
Craig 2	0.053	3.0	0.023	6.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.077	0.5
Craig 3	0.031	1.7	0.005	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.036	0.2
Hayden 1-2	0.541	30.1	0.176	48.1	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.720	4.5
Hayden 1	0.196	10.9	0.098	26.7	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.295	1.9
Hayden 2	0.345	19.2	0.078	21.4	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.425	2.7

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.002	0.1	0.010	2.8	0.009	2.6	0.031	3.7	0.028	4.0	0.032	1.7	0.112	0.7
Other Yampa Valley	0.004	0.2	0.013	3.6	0.071	20.8	0.120	14.5	0.090	12.9	0.521	27.8	0.819	5.1
Non-Yampa Valley	1.112	61.8	0.117	31.9	0.257	75.6	0.675	81.4	0.569	81.6	1.317	70.4	4.047	25.4
Denver	0.046	2.5	0.001	0.4	0.002	0.5	0.005	0.7	0.006	0.8	0.000	0.0	0.060	0.4
Colorado w/ Denver	0.168	9.3	0.052	14.2	0.152	44.8	0.371	44.8	0.327	46.8	0.834	44.6	1.905	12.0
Non-Colorado	0.944	52.5	0.065	17.7	0.105	30.8	0.303	36.6	0.243	34.8	0.483	25.8	2.143	13.5
Coal-fired PP	0.960	53.4	0.243	66.2	0.004	1.3	0.000	0.0	0.000	0.0	0.001	0.0	1.207	7.6
All other sources	0.839	46.6	0.124	33.8	0.336	98.7	0.829	100.0	0.698	100.0	1.871	100.0	14.696	92.4
Fires	0.000	0.0	0.000	0.0	0.000	0.1	0.003	0.3	0.011	1.5	0.000	0.0	0.014	0.1

Mad Creek
CONCENTRATION 0600-1200 95/10/16

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.066	-99.0	0.389	-99.0	0.355	-99.0	0.145	-99.0	0.387	-99.0	0.963	-99.0	3.305	-99.0
Estimated w/o fires	1.066	-99.0	0.389	-99.0	0.354	-99.0	0.145	-99.0	0.382	-99.0	0.963	-99.0	3.299	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.091	8.6	0.055	14.3	0.053	15.1	0.016	11.0	0.039	10.0	0.223	23.1	0.478	14.5
Craig 1-3	0.010	0.9	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.012	0.4
Craig 1-2	0.010	0.9	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.012	0.4
Craig 1	0.006	0.5	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.2
Craig 2	0.004	0.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.1
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.078	7.4	0.039	10.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.118	3.6
Hayden 1	0.036	3.4	0.030	7.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.066	2.0
Hayden 2	0.042	4.0	0.009	2.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.052	1.6
Steamboat Springs	0.001	0.1	0.005	1.4	0.007	1.9	0.004	2.7	0.010	2.7	0.014	1.4	0.041	1.2
Other Yampa Valley	0.002	0.2	0.009	2.3	0.046	13.0	0.012	8.2	0.028	7.3	0.209	21.7	0.307	9.3
Non-Yampa Valley	0.974	91.4	0.333	85.7	0.301	84.9	0.129	88.7	0.343	88.7	0.740	76.9	2.821	85.4
Denver	0.092	8.7	0.023	6.0	0.009	2.5	0.005	3.3	0.015	3.8	0.001	0.1	0.145	4.4
Colorado w/ Denver	0.269	25.2	0.186	47.8	0.207	58.5	0.083	57.4	0.231	59.7	0.494	51.3	1.470	44.5
Non-Colorado	0.706	66.2	0.148	37.9	0.094	26.4	0.046	31.4	0.112	29.0	0.246	25.6	1.351	40.9
Coal-fired PP	0.463	43.5	0.114	29.3	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.580	17.6
All other sources	0.603	56.5	0.275	70.7	0.352	99.3	0.145	100.0	0.387	100.0	0.963	100.0	2.725	82.4
Fires	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.3	0.005	1.3	0.000	0.0	0.006	0.2

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/10/16 6-hour average RH: 24%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.943	-99.0	0.779	-99.0	0.531	-99.0	1.321	-99.0	1.159	-99.0	2.885	-99.0	18.618	-99.0
Estimated w/o fires	1.943	-99.0	0.779	-99.0	0.531	-99.0	1.317	-99.0	1.144	-99.0	2.885	-99.0	18.598	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.167	8.6	0.111	14.3	0.080	15.1	0.145	11.0	0.116	10.0	0.668	23.1	1.286	6.9
Craig 1-3	0.018	0.9	0.005	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.023	0.1
Craig 1-2	0.017	0.9	0.004	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.022	0.1
Craig 1	0.010	0.5	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.1
Craig 2	0.007	0.4	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.0
Craig 3	0.001	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.143	7.4	0.078	10.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.222	1.2
Hayden 1	0.066	3.4	0.060	7.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.126	0.7
Hayden 2	0.077	4.0	0.018	2.3	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.096	0.5
Steamboat Springs	0.002	0.1	0.011	1.4	0.010	1.9	0.036	2.7	0.031	2.7	0.041	1.4	0.130	0.7
Other Yampa Valley	0.004	0.2	0.018	2.3	0.069	13.0	0.109	8.2	0.085	7.3	0.627	21.7	0.911	4.9
Non-Yampa Valley	1.776	91.4	0.668	85.7	0.451	84.9	1.172	88.7	1.028	88.7	2.218	76.9	7.312	39.3
Denver	0.168	8.7	0.047	6.0	0.013	2.5	0.043	3.3	0.044	3.8	0.003	0.1	0.318	1.7
Colorado w/ Denver	0.490	25.2	0.372	47.8	0.311	58.5	0.758	57.4	0.692	59.7	1.480	51.3	4.102	22.0
Non-Colorado	1.286	66.2	0.295	37.9	0.140	26.4	0.414	31.4	0.336	29.0	0.738	25.6	3.210	17.2
Coal-fired PP	0.845	43.5	0.229	29.3	0.004	0.7	0.000	0.0	0.000	0.0	0.000	0.0	1.077	5.8
All other sources	1.098	56.5	0.550	70.7	0.528	99.3	1.321	100.0	1.159	100.0	2.885	100.0	17.541	94.2
Fires	0.000	0.0	0.000	0.0	0.000	0.1	0.004	0.3	0.016	1.3	0.000	0.0	0.020	0.1

Mad Creek
CONCENTRATION 1200-1800 95/10/16

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.114	-99.0	0.280	-99.0	0.248	-99.0	0.095	-99.0	0.339	-99.0	0.541	-99.0	2.617	-99.0
Estimated w/o fires	1.114	-99.0	0.275	-99.0	0.241	-99.0	0.087	-99.0	0.232	-99.0	0.541	-99.0	2.490	-99.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.261	23.4	0.190	67.8	0.094	38.0	0.024	24.8	0.065	19.0	0.163	30.1	0.796	30.4
Craig 1-3	0.083	7.4	0.067	24.1	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.151	5.8
Craig 1-2	0.074	6.6	0.052	18.5	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.127	4.8
Craig 1	0.039	3.5	0.025	8.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.064	2.5
Craig 2	0.035	3.1	0.027	9.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.062	2.4
Craig 3	0.009	0.8	0.016	5.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.025	0.9
Hayden 1-2	0.175	15.7	0.110	39.3	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.286	10.9
Hayden 1	0.104	9.4	0.089	31.9	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.194	7.4
Hayden 2	0.070	6.3	0.021	7.4	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.092	3.5
Steamboat Springs	0.001	0.0	0.003	1.1	0.003	1.4	0.002	2.1	0.005	1.5	0.008	1.4	0.022	0.8
Other Yampa Valley	0.003	0.3	0.009	3.3	0.088	35.6	0.022	22.7	0.059	17.5	0.155	28.6	0.336	12.9
Non-Yampa Valley	0.853	76.6	0.085	30.5	0.147	59.2	0.063	66.3	0.167	49.3	0.378	69.9	1.694	64.7
Denver	0.044	4.0	0.001	0.2	0.002	0.9	0.001	1.3	0.004	1.1	0.000	0.0	0.052	2.0
Colorado w/ Denver	0.149	13.4	0.026	9.4	0.087	35.1	0.034	35.4	0.093	27.3	0.246	45.4	0.635	24.3
Non-Colorado	0.703	63.1	0.059	21.0	0.060	24.1	0.029	30.9	0.075	22.0	0.133	24.5	1.059	40.5
Coal-fired PP	0.660	59.2	0.213	76.2	0.005	2.0	0.000	0.0	0.000	0.0	0.000	0.1	0.878	33.6
All other sources	0.454	40.8	0.067	23.8	0.243	98.0	0.095	100.0	0.339	100.0	0.541	99.9	1.739	66.4
Fires	0.000	0.0	0.005	1.7	0.007	2.7	0.009	9.0	0.107	31.7	0.000	0.0	0.128	4.9

Mad Creek
EXTINCTION 1200-1800 95/10/16 6-hour average RH: 19%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.966	-99.0	0.544	-99.0	0.368	-99.0	0.866	-99.0	1.003	-99.0	1.598	-99.0	16.345	-99.0
Estimated w/o fires	1.966	-99.0	0.535	-99.0	0.358	-99.0	0.788	-99.0	0.685	-99.0	1.598	-99.0	15.930	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.461	23.4	0.369	67.8	0.140	38.0	0.215	24.8	0.191	19.0	0.481	30.1	1.856	11.4
Craig 1-3	0.146	7.4	0.131	24.1	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.279	1.7
Craig 1-2	0.130	6.6	0.101	18.5	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.233	1.4
Craig 1	0.069	3.5	0.048	8.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.118	0.7
Craig 2	0.061	3.1	0.052	9.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.115	0.7
Craig 3	0.016	0.8	0.030	5.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.047	0.3
Hayden 1-2	0.308	15.7	0.214	39.3	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.525	3.2
Hayden 1	0.184	9.4	0.174	31.9	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.359	2.2
Hayden 2	0.124	6.3	0.040	7.4	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.166	1.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.0	0.006	1.1	0.005	1.4	0.018	2.1	0.015	1.5	0.023	1.4	0.068	0.4
Other Yampa Valley	0.005	0.3	0.018	3.3	0.131	35.6	0.197	22.7	0.175	17.5	0.457	28.6	0.984	6.0
Non-Yampa Valley	1.505	76.6	0.166	30.5	0.218	59.2	0.574	66.3	0.495	49.3	1.118	69.9	4.075	24.9
Denver	0.078	4.0	0.001	0.2	0.003	0.9	0.011	1.3	0.011	1.1	0.001	0.0	0.106	0.6
Colorado w/ Denver	0.264	13.4	0.051	9.4	0.129	35.1	0.306	35.4	0.274	27.3	0.726	45.4	1.750	10.7
Non-Colorado	1.241	63.1	0.115	21.0	0.089	24.1	0.267	30.9	0.221	22.0	0.392	24.5	2.325	14.2
Coal-fired PP	1.164	59.2	0.415	76.2	0.007	2.0	0.000	0.0	0.000	0.0	0.001	0.1	1.588	9.7
All other sources	0.802	40.8	0.129	23.8	0.360	98.0	0.866	100.0	1.003	100.0	1.597	99.9	14.757	90.3
Fires	0.000	0.0	0.009	1.7	0.010	2.7	0.078	9.0	0.317	31.7	0.000	0.0	0.415	2.5

Mad Creek
CONCENTRATION 0600-1200 95/10/17

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.853	-99.0	0.493	-99.0	0.476	-99.0	0.209	-99.0	0.648	-99.0	1.196	-99.0	4.874	-99.0
Estimated w/o fires	1.853	-99.0	0.488	-99.0	0.467	-99.0	0.198	-99.0	0.513	-99.0	1.196	-99.0	4.715	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.239	12.9	0.274	55.5	0.077	16.2	0.021	9.9	0.049	7.6	0.324	27.1	0.983	20.2
Craig 1-3	0.064	3.4	0.088	17.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.153	3.1
Craig 1-2	0.058	3.1	0.066	13.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.125	2.6
Craig 1	0.030	1.6	0.032	6.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.062	1.3
Craig 2	0.028	1.5	0.034	7.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.063	1.3
Craig 3	0.006	0.3	0.022	4.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.028	0.6
Hayden 1-2	0.173	9.3	0.174	35.3	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.350	7.2
Hayden 1	0.084	4.5	0.118	23.9	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.203	4.2
Hayden 2	0.089	4.8	0.056	11.5	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.147	3.0
Steamboat Springs	0.000	0.0	0.002	0.5	0.006	1.2	0.003	1.6	0.008	1.3	0.013	1.1	0.033	0.7
Other Yampa Valley	0.002	0.1	0.009	1.8	0.068	14.3	0.017	8.3	0.041	6.3	0.311	26.0	0.447	9.2
Non-Yampa Valley	1.614	87.1	0.215	43.5	0.390	82.0	0.177	84.9	0.464	71.6	0.872	72.9	3.731	76.6
Denver	0.073	3.9	0.005	1.0	0.014	2.9	0.007	3.5	0.023	3.5	0.001	0.1	0.122	2.5
Colorado w/ Denver	0.323	17.5	0.066	13.4	0.214	44.9	0.086	41.5	0.245	37.8	0.479	40.1	1.414	29.0
Non-Colorado	1.290	69.6	0.149	30.2	0.176	37.0	0.091	43.5	0.219	33.8	0.392	32.8	2.317	47.5
Coal-fired PP	0.842	45.4	0.328	66.5	0.007	1.4	0.000	0.0	0.000	0.0	0.000	0.0	1.177	24.2
All other sources	1.011	54.6	0.165	33.5	0.469	98.6	0.209	100.0	0.648	100.0	1.195	100.0	3.696	75.8
Fires	0.000	0.0	0.005	1.0	0.009	1.8	0.011	5.1	0.135	20.8	0.000	0.0	0.159	3.3

Table B.2.3.11c (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/10/17 6-hour average RH: 37%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	3.734	-99.0	1.082	-99.0	0.735	-99.0	1.898	-99.0	2.031	-99.0	3.746	-99.0	23.226	-99.0
Estimated w/o fires	3.734	-99.0	1.072	-99.0	0.722	-99.0	1.800	-99.0	1.608	-99.0	3.746	-99.0	22.683	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.482	12.9	0.601	55.5	0.119	16.2	0.188	9.9	0.153	7.6	1.016	27.1	2.559	11.0
Craig 1-3	0.129	3.4	0.194	17.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.325	1.4
Craig 1-2	0.117	3.1	0.146	13.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.265	1.1
Craig 1	0.061	1.6	0.070	6.4	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.132	0.6
Craig 2	0.056	1.5	0.076	7.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.133	0.6
Craig 3	0.011	0.3	0.048	4.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.060	0.3
Hayden 1-2	0.349	9.3	0.382	35.3	0.004	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.735	3.2
Hayden 1	0.169	4.5	0.258	23.9	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.429	1.8
Hayden 2	0.180	4.8	0.124	11.5	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.306	1.3
Steamboat Springs	0.001	0.0	0.005	0.5	0.009	1.2	0.030	1.6	0.026	1.3	0.040	1.1	0.111	0.5
Other Yampa Valley	0.003	0.1	0.019	1.8	0.105	14.3	0.158	8.3	0.127	6.3	0.974	26.0	1.388	6.0
Non-Yampa Valley	3.253	87.1	0.471	43.5	0.603	82.0	1.612	84.9	1.455	71.6	2.731	72.9	10.124	43.6
Denver	0.147	3.9	0.011	1.0	0.021	2.9	0.066	3.5	0.071	3.5	0.004	0.1	0.319	1.4
Colorado w/ Denver	0.652	17.5	0.145	13.4	0.330	44.9	0.787	41.5	0.768	37.8	1.502	40.1	4.184	18.0
Non-Colorado	2.601	69.6	0.327	30.2	0.272	37.0	0.825	43.5	0.687	33.8	1.229	32.8	5.940	25.6
Coal-fired PP	1.697	45.4	0.720	66.5	0.011	1.4	0.000	0.0	0.000	0.0	0.001	0.0	2.429	10.5
All other sources	2.037	54.6	0.362	33.5	0.724	98.6	1.898	100.0	2.031	100.0	3.745	100.0	20.797	89.5
Fires	0.000	0.0	0.010	1.0	0.013	1.8	0.097	5.1	0.423	20.8	0.000	0.0	0.544	2.3

Mad Creek
CONCENTRATION 1200-1800 95/10/17

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.974	-99.0	0.472	-99.0	0.439	-99.0	0.215	-99.0	0.967	-99.0	0.803	-99.0	4.870	-99.0
Estimated w/o fires	1.974	-99.0	0.458	-99.0	0.408	-99.0	0.176	-99.0	0.476	-99.0	0.803	-99.0	4.295	-99.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.449	22.7	0.336	71.2	0.061	13.9	0.018	8.2	0.041	4.3	0.181	22.6	1.086	22.3
Craig 1-3	0.235	11.9	0.180	38.1	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.417	8.6
Craig 1-2	0.211	10.7	0.131	27.7	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.343	7.1
Craig 1	0.106	5.4	0.061	12.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.168	3.5
Craig 2	0.105	5.3	0.070	14.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.175	3.6
Craig 3	0.025	1.2	0.049	10.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.074	1.5
Hayden 1-2	0.212	10.7	0.147	31.1	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.361	7.4
Hayden 1	0.152	7.7	0.125	26.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.277	5.7
Hayden 2	0.060	3.1	0.022	4.7	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.084	1.7
Steamboat Springs	0.000	0.0	0.003	0.6	0.004	0.8	0.002	0.9	0.006	0.6	0.007	0.9	0.021	0.4
Other Yampa Valley	0.001	0.1	0.007	1.4	0.053	12.2	0.016	7.2	0.036	3.7	0.174	21.7	0.287	5.9
Non-Yampa Valley	1.525	77.3	0.122	25.9	0.347	79.0	0.159	73.7	0.434	44.9	0.622	77.4	3.208	65.9
Denver	0.090	4.6	0.007	1.5	0.028	6.5	0.015	6.9	0.046	4.8	0.003	0.3	0.190	3.9
Colorado w/ Denver	0.372	18.8	0.046	9.8	0.217	49.6	0.093	43.4	0.272	28.1	0.339	42.2	1.340	27.5
Non-Colorado	1.153	58.4	0.076	16.1	0.129	29.4	0.065	30.3	0.163	16.8	0.283	35.2	1.868	38.4
Coal-fired PP	0.965	48.9	0.358	75.8	0.006	1.4	0.000	0.0	0.000	0.0	0.001	0.1	1.329	27.3
All other sources	1.009	51.1	0.114	24.2	0.432	98.6	0.215	100.0	0.967	100.0	0.803	99.9	3.540	72.7
Fires	0.000	0.0	0.014	2.9	0.031	7.1	0.039	18.1	0.491	50.8	0.000	0.0	0.575	11.8

Mad Creek
EXTINCTION 1200-1800 95/10/17 6-hour average RH: 24%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	3.597	-99.0	0.945	-99.0	0.657	-99.0	1.958	-99.0	2.896	-99.0	2.407	-99.0	22.460	-99.0
Estimated w/o fires	3.597	-99.0	0.918	-99.0	0.610	-99.0	1.603	-99.0	1.425	-99.0	2.407	-99.0	20.559	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.818	22.7	0.673	71.2	0.091	13.9	0.160	8.2	0.124	4.3	0.544	22.6	2.410	10.7
Craig 1-3	0.429	11.9	0.360	38.1	0.003	0.4	0.000	0.0	0.000	0.0	0.001	0.0	0.793	3.5
Craig 1-2	0.384	10.7	0.262	27.7	0.003	0.4	0.000	0.0	0.000	0.0	0.001	0.0	0.649	2.9
Craig 1	0.194	5.4	0.122	12.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.317	1.4
Craig 2	0.190	5.3	0.140	14.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.332	1.5
Craig 3	0.045	1.2	0.099	10.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.144	0.6
Hayden 1-2	0.386	10.7	0.294	31.1	0.003	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.684	3.0
Hayden 1	0.276	7.7	0.249	26.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.527	2.3
Hayden 2	0.110	3.1	0.045	4.7	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.156	0.7

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.001	0.0	0.005	0.6	0.005	0.8	0.018	0.9	0.017	0.6	0.022	0.9	0.068	0.3
Other Yampa Valley	0.002	0.1	0.013	1.4	0.080	12.2	0.142	7.2	0.107	3.7	0.521	21.7	0.865	3.9
Non-Yampa Valley	2.779	77.3	0.245	25.9	0.519	79.0	1.443	73.7	1.301	44.9	1.863	77.4	8.150	36.3
Denver	0.165	4.6	0.014	1.5	0.042	6.5	0.134	6.9	0.139	4.8	0.008	0.3	0.503	2.2
Colorado w/ Denver	0.677	18.8	0.093	9.8	0.326	49.6	0.850	43.4	0.814	28.1	1.016	42.2	3.776	16.8
Non-Colorado	2.102	58.4	0.152	16.1	0.193	29.4	0.594	30.3	0.487	16.8	0.847	35.2	4.374	19.5
Coal-fired PP	1.759	48.9	0.716	75.8	0.009	1.4	0.000	0.0	0.000	0.0	0.002	0.1	2.486	11.1
All other sources	1.838	51.1	0.229	24.2	0.648	98.6	1.958	100.0	2.896	100.0	2.405	99.9	19.974	88.9
Fires	0.000	0.0	0.027	2.9	0.047	7.1	0.355	18.1	1.472	50.8	0.000	0.0	1.901	8.5

Mad Creek
CONCENTRATION 0600-1200 95/10/18

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.536	-99.0	0.435	-99.0	0.554	-99.0	0.240	-99.0	0.719	-99.0	1.202	-99.0	4.685	-99.0
Estimated w/o fires	1.536	-99.0	0.430	-99.0	0.548	-99.0	0.233	-99.0	0.635	-99.0	1.202	-99.0	4.584	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.045	2.9	0.053	12.1	0.079	14.3	0.024	10.1	0.059	8.2	0.267	22.2	0.527	11.2
Craig 1-3	0.006	0.4	0.003	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.2
Craig 1-2	0.005	0.3	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.2
Craig 1	0.003	0.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.1
Craig 2	0.003	0.2	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.1
Craig 3	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.037	2.4	0.029	6.6	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.066	1.4
Hayden 1	0.035	2.2	0.028	6.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.063	1.3
Hayden 2	0.003	0.2	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.1
Steamboat Springs	0.001	0.0	0.007	1.7	0.007	1.3	0.004	1.8	0.010	1.5	0.017	1.4	0.047	1.0
Other Yampa Valley	0.002	0.1	0.014	3.2	0.071	12.9	0.020	8.3	0.048	6.7	0.250	20.8	0.405	8.6
Non-Yampa Valley	1.490	97.1	0.377	86.7	0.469	84.7	0.209	87.1	0.576	80.2	0.935	77.8	4.057	86.6
Denver	0.131	8.5	0.037	8.5	0.048	8.6	0.023	9.7	0.074	10.3	0.004	0.3	0.317	6.8
Colorado w/ Denver	0.452	29.5	0.230	52.8	0.332	59.9	0.138	57.7	0.398	55.3	0.635	52.9	2.185	46.6
Non-Colorado	1.038	67.6	0.147	33.9	0.137	24.8	0.071	29.4	0.179	24.8	0.300	24.9	1.872	40.0
Coal-fired PP	0.561	36.5	0.104	23.9	0.003	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.668	14.3
All other sources	0.975	63.5	0.331	76.1	0.551	99.5	0.240	100.0	0.719	100.0	1.202	100.0	4.017	85.7
Fires	0.000	0.0	0.005	1.2	0.005	1.0	0.007	2.8	0.084	11.6	0.000	0.0	0.101	2.2

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/10/18 6-hour average RH: 28%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.885	-99.0	0.895	-99.0	0.837	-99.0	2.181	-99.0	2.182	-99.0	3.649	-99.0	22.629	-99.0
Estimated w/o fires	2.885	-99.0	0.884	-99.0	0.829	-99.0	2.121	-99.0	1.928	-99.0	3.649	-99.0	22.296	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.085	2.9	0.109	12.1	0.120	14.3	0.220	10.1	0.178	8.2	0.810	22.2	1.521	6.7
Craig 1-3	0.011	0.4	0.006	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.017	0.1
Craig 1-2	0.010	0.3	0.005	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.015	0.1
Craig 1	0.005	0.2	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.0
Craig 2	0.005	0.2	0.003	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.0
Craig 3	0.001	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Hayden 1-2	0.070	2.4	0.059	6.6	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.129	0.6
Hayden 1	0.065	2.2	0.058	6.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.123	0.5
Hayden 2	0.005	0.2	0.001	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.0
Steamboat Springs	0.001	0.0	0.015	1.7	0.011	1.3	0.040	1.8	0.032	1.5	0.052	1.4	0.150	0.7
Other Yampa Valley	0.003	0.1	0.029	3.2	0.108	12.9	0.180	8.3	0.147	6.7	0.758	20.8	1.224	5.4
Non-Yampa Valley	2.800	97.1	0.776	86.7	0.709	84.7	1.901	87.1	1.750	80.2	2.839	77.8	10.774	47.6
Denver	0.246	8.5	0.076	8.5	0.072	8.6	0.212	9.7	0.225	10.3	0.013	0.3	0.844	3.7
Colorado w/ Denver	0.850	29.5	0.473	52.8	0.502	59.9	1.259	57.7	1.207	55.3	1.929	52.9	6.219	27.5
Non-Colorado	1.950	67.6	0.303	33.9	0.208	24.8	0.642	29.4	0.542	24.8	0.910	24.9	4.555	20.1
Coal-fired PP	1.053	36.5	0.214	23.9	0.004	0.5	0.000	0.0	0.000	0.0	0.001	0.0	1.272	5.6
All other sources	1.832	63.5	0.681	76.1	0.832	99.5	2.181	100.0	2.182	100.0	3.648	100.0	21.357	94.4
Fires	0.000	0.0	0.011	1.2	0.008	1.0	0.060	2.8	0.254	11.6	0.000	0.0	0.334	1.5

Mad Creek
CONCENTRATION 1200-1800 95/10/18

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.341	-99.0	0.315	-99.0	0.272	-99.0	0.143	-99.0	0.796	-99.0	0.571	-99.0	3.438	-99.0
Estimated w/o fires	1.341	-99.0	0.296	-99.0	0.238	-99.0	0.100	-99.0	0.259	-99.0	0.571	-99.0	2.805	-99.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.082	6.2	0.109	34.5	0.055	20.2	0.015	10.4	0.036	4.5	0.139	24.4	0.436	12.7
Craig 1-3	0.033	2.5	0.041	13.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.075	2.2
Craig 1-2	0.031	2.3	0.030	9.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.061	1.8
Craig 1	0.013	1.0	0.015	4.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.029	0.8
Craig 2	0.017	1.3	0.015	4.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.032	0.9
Craig 3	0.003	0.2	0.011	3.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.4
Hayden 1-2	0.048	3.6	0.058	18.5	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.107	3.1
Hayden 1	0.048	3.6	0.058	18.5	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.107	3.1
Hayden 2	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Steamboat Springs	0.000	0.0	0.002	0.6	0.002	0.6	0.001	0.6	0.002	0.3	0.004	0.7	0.011	0.3
Other Yampa Valley	0.001	0.1	0.007	2.3	0.052	19.1	0.014	9.8	0.033	4.2	0.135	23.7	0.243	7.1
Non-Yampa Valley	1.258	93.8	0.187	59.4	0.183	67.3	0.085	59.7	0.223	28.0	0.431	75.6	2.368	68.9
Denver	0.026	1.9	0.001	0.3	0.008	2.8	0.004	2.6	0.012	1.5	0.001	0.1	0.051	1.5
Colorado w/ Denver	0.139	10.4	0.023	7.2	0.083	30.6	0.035	24.5	0.096	12.1	0.225	39.5	0.602	17.5
Non-Colorado	1.119	83.4	0.164	52.2	0.100	36.7	0.050	35.2	0.127	16.0	0.206	36.1	1.767	51.4
Coal-fired PP	0.585	43.6	0.199	63.1	0.005	1.8	0.000	0.0	0.000	0.0	0.000	0.1	0.788	22.9
All other sources	0.756	56.4	0.116	36.9	0.268	98.2	0.143	100.0	0.796	100.0	0.570	99.9	2.650	77.1
Fires	0.000	0.0	0.019	6.1	0.034	12.5	0.043	29.9	0.537	67.5	0.000	0.0	0.633	18.4

Mad Creek
EXTINCTION 1200-1800 95/10/18 6-hour average RH: 24%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.433	-99.0	0.628	-99.0	0.407	-99.0	1.299	-99.0	2.381	-99.0	1.706	-99.0	18.854	-99.0
Estimated w/o fires	2.433	-99.0	0.589	-99.0	0.356	-99.0	0.911	-99.0	0.774	-99.0	1.706	-99.0	16.770	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.150	6.2	0.217	34.5	0.082	20.2	0.136	10.4	0.107	4.5	0.417	24.4	1.108	5.9
Craig 1-3	0.061	2.5	0.082	13.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.143	0.8
Craig 1-2	0.056	2.3	0.060	9.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.117	0.6
Craig 1	0.024	1.0	0.030	4.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.055	0.3
Craig 2	0.031	1.3	0.030	4.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.062	0.3
Craig 3	0.005	0.2	0.021	3.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.026	0.1
Hayden 1-2	0.087	3.6	0.116	18.5	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.205	1.1
Hayden 1	0.087	3.6	0.116	18.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.204	1.1
Hayden 2	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.000	0.0	0.004	0.6	0.002	0.6	0.008	0.6	0.007	0.3	0.011	0.7	0.034	0.2
Other Yampa Valley	0.002	0.1	0.015	2.3	0.078	19.1	0.127	9.8	0.100	4.2	0.405	23.7	0.726	3.9
Non-Yampa Valley	2.283	93.8	0.373	59.4	0.274	67.3	0.775	59.7	0.667	28.0	1.290	75.6	5.661	30.0
Denver	0.047	1.9	0.002	0.3	0.011	2.8	0.034	2.6	0.036	1.5	0.002	0.1	0.133	0.7
Colorado w/ Denver	0.253	10.4	0.045	7.2	0.124	30.6	0.318	24.5	0.287	12.1	0.674	39.5	1.701	9.0
Non-Colorado	2.030	83.4	0.328	52.2	0.150	36.7	0.457	35.2	0.380	16.0	0.616	36.1	3.961	21.0
Coal-fired PP	1.060	43.6	0.396	63.1	0.007	1.8	0.000	0.0	0.000	0.0	0.001	0.1	1.465	7.8
All other sources	1.372	56.4	0.232	36.9	0.400	98.2	1.299	100.0	2.381	100.0	1.705	99.9	17.389	92.2
Fires	0.000	0.0	0.039	6.1	0.051	12.5	0.388	29.9	1.606	67.5	0.000	0.0	2.084	11.1

Mad Creek
CONCENTRATION 0600-1200 95/10/19

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.374	-99.0	0.968	-99.0	0.340	-99.0	0.170	-99.0	0.748	-99.0	0.810	-99.0	4.410	-99.0
Estimated w/o fires	1.374	-99.0	0.902	-99.0	0.315	-99.0	0.137	-99.0	0.340	-99.0	0.810	-99.0	3.879	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.000	0.0	0.017	1.8	0.055	16.1	0.013	7.7	0.034	4.5	0.246	30.3	0.365	8.3
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Steamboat Springs	0.000	0.0	0.001	0.1	0.001	0.2	0.000	0.2	0.001	0.1	0.002	0.2	0.004	0.1
Other Yampa Valley	0.000	0.0	0.017	1.8	0.054	15.9	0.013	7.5	0.033	4.4	0.244	30.1	0.361	8.2
Non-Yampa Valley	1.374	100.0	0.885	91.4	0.260	76.3	0.124	73.2	0.306	41.0	0.565	69.7	3.513	79.7
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.018	1.3	0.069	7.2	0.042	12.5	0.016	9.7	0.043	5.8	0.141	17.4	0.331	7.5
Non-Colorado	1.355	98.6	0.815	84.2	0.217	63.8	0.108	63.5	0.263	35.2	0.424	52.3	3.182	72.2
Coal-fired PP	0.168	12.2	0.255	26.4	0.004	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.427	9.7
All other sources	1.206	87.8	0.712	73.6	0.337	98.9	0.170	100.0	0.748	100.0	0.810	100.0	3.983	90.3
Fires	0.000	0.0	0.066	6.8	0.026	7.6	0.032	19.1	0.407	54.5	0.000	0.0	0.531	12.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/10/19 6-hour average RH: 36%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.757	-99.0	2.116	-99.0	0.525	-99.0	1.543	-99.0	2.338	-99.0	2.534	-99.0	21.813	-99.0
Estimated w/o fires	2.757	-99.0	1.973	-99.0	0.485	-99.0	1.248	-99.0	1.064	-99.0	2.534	-99.0	20.061	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.001	0.0	0.038	1.8	0.085	16.1	0.118	7.7	0.106	4.5	0.768	30.3	1.116	5.1
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Steamboat Springs	0.000	0.0	0.001	0.1	0.001	0.2	0.003	0.2	0.003	0.1	0.006	0.2	0.014	0.1
Other Yampa Valley	0.001	0.0	0.037	1.8	0.083	15.9	0.115	7.5	0.103	4.4	0.762	30.1	1.102	5.1
Non-Yampa Valley	2.756	100.0	1.934	91.4	0.401	76.3	1.130	73.2	0.958	41.0	1.766	69.7	8.945	41.0
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.037	1.3	0.152	7.2	0.065	12.5	0.150	9.7	0.136	5.8	0.440	17.4	0.980	4.5
Non-Colorado	2.719	98.6	1.782	84.2	0.335	63.8	0.980	63.5	0.822	35.2	1.326	52.3	7.965	36.5
Coal-fired PP	0.337	12.2	0.559	26.4	0.006	1.1	0.000	0.0	0.000	0.0	0.001	0.0	0.902	4.1
All other sources	2.421	87.8	1.558	73.6	0.519	98.9	1.543	100.0	2.338	100.0	2.533	100.0	20.911	95.9
Fires	0.000	0.0	0.144	6.8	0.040	7.6	0.294	19.1	1.274	54.5	0.000	0.0	1.752	8.0

Mad Creek
CONCENTRATION 1200-1800 95/10/19

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.974	-99.0	0.554	-99.0	0.195	-99.0	0.097	-99.0	0.406	-99.0	0.424	-99.0	2.650	-99.0
Estimated w/o fires	0.974	-99.0	0.505	-99.0	0.182	-99.0	0.081	-99.0	0.198	-99.0	0.424	-99.0	2.362	-99.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.001	0.1	0.033	5.9	0.042	21.7	0.012	12.6	0.028	6.9	0.143	33.7	0.259	9.8
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Steamboat Springs	0.000	0.0	0.006	1.2	0.002	1.2	0.001	1.3	0.004	0.9	0.004	0.9	0.018	0.7
Other Yampa Valley	0.001	0.1	0.026	4.7	0.040	20.5	0.011	11.3	0.024	6.0	0.139	32.8	0.241	9.1
Non-Yampa Valley	0.973	99.9	0.472	85.1	0.140	71.5	0.068	70.4	0.169	41.8	0.281	66.3	2.104	79.4
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.013	1.4	0.044	8.0	0.023	11.8	0.010	10.3	0.026	6.4	0.064	15.0	0.180	6.8
Non-Colorado	0.960	98.5	0.428	77.2	0.117	59.7	0.058	60.0	0.144	35.4	0.217	51.3	1.923	72.6
Coal-fired PP	0.113	11.6	0.094	16.9	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.208	7.8
All other sources	0.861	88.4	0.461	83.1	0.194	99.5	0.097	100.0	0.406	100.0	0.424	100.0	2.442	92.2
Fires	0.000	0.0	0.050	9.0	0.013	6.8	0.017	17.0	0.208	51.3	0.000	0.0	0.288	10.9

Mad Creek
EXTINCTION 1200-1800 95/10/19 6-hour average RH: 15%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.673	-99.0	1.052	-99.0	0.287	-99.0	0.884	-99.0	1.184	-99.0	1.237	-99.0	16.317	-99.0
Estimated w/o fires	1.673	-99.0	0.957	-99.0	0.268	-99.0	0.734	-99.0	0.577	-99.0	1.237	-99.0	15.446	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.002	0.1	0.062	5.9	0.062	21.7	0.112	12.6	0.082	6.9	0.417	33.7	0.736	4.5
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

Table B.2.3.11c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 10/07/95 to 10/19/95 Episode

Steamboat Springs	0.000	0.0	0.012	1.2	0.003	1.2	0.012	1.3	0.011	0.9	0.011	0.9	0.050	0.3
Other Yampa Valley	0.001	0.1	0.050	4.7	0.059	20.5	0.100	11.3	0.072	6.0	0.405	32.8	0.686	4.2
Non-Yampa Valley	1.671	99.9	0.895	85.1	0.206	71.5	0.622	70.4	0.495	41.8	0.820	66.3	4.709	28.9
Denver	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Colorado w/ Denver	0.023	1.4	0.084	8.0	0.034	11.8	0.091	10.3	0.075	6.4	0.186	15.0	0.494	3.0
Non-Colorado	1.648	98.5	0.812	77.2	0.172	59.7	0.531	60.0	0.419	35.4	0.635	51.3	4.216	25.8
Coal-fired PP	0.194	11.6	0.178	16.9	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.373	2.3
All other sources	1.479	88.4	0.874	83.1	0.286	99.5	0.884	100.0	1.184	100.0	1.237	100.0	15.944	97.7
Fires	0.000	0.0	0.095	9.0	0.019	6.8	0.150	17.0	0.608	51.3	0.000	0.0	0.872	5.3

Table B.2.3.12a

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

[The tables also present six-hour concentrations from filter measurements, as well as extinction estimated from the filter measurements using identical extinction efficiencies as applied to predicted concentrations. Source attributions are presented for all 12 source regions/types modeled with CALPUFF, and present results from each six-hour daylight period (0600-1200, and 1200-1800 LST).]

Buffalo Pass
CONCENTRATION 0600-1200 95/ 8/21

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.110		0.187		-99.000		-99.000		2.332		2.332		4.492	
Estimated w/ fires	0.512	-75.7	0.321	71.1	0.257	-99.0	0.102	-99.0	0.290	-87.6	0.586	-74.9	2.067	-54.0
Estimated w/o fires	0.512	-75.7	0.320	71.0	0.257	-99.0	0.102	-99.0	0.288	-87.6	0.586	-74.9	2.065	-54.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.102	19.8	0.074	23.1	0.035	13.7	0.010	10.3	0.024	8.2	0.203	34.7	0.448	21.7
Craig 1-3	0.014	2.7	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.8
Craig 1-2	0.012	2.3	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.6
Craig 1	0.005	1.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.3
Craig 2	0.007	1.3	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.4
Craig 3	0.002	0.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.1
Hayden 1-2	0.085	16.7	0.058	18.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.143	6.9
Hayden 1	0.069	13.5	0.056	17.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.125	6.0
Hayden 2	0.017	3.2	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.019	0.9
Steamboat Springs	0.001	0.1	0.004	1.4	0.005	1.8	0.003	2.6	0.007	2.4	0.010	1.7	0.029	1.4
Other Yampa Valley	0.001	0.3	0.010	3.1	0.030	11.9	0.008	7.6	0.017	5.8	0.194	33.0	0.260	12.6
Non-Yampa Valley	0.410	80.2	0.246	76.8	0.222	86.3	0.091	89.6	0.264	91.3	0.383	65.3	1.617	78.2
Denver	0.181	35.3	0.057	17.6	0.041	16.1	0.022	21.3	0.068	23.4	0.004	0.6	0.372	18.0
Colorado w/ Denver	0.353	68.9	0.227	70.7	0.209	81.3	0.085	83.1	0.252	87.0	0.345	58.9	1.470	71.1
Non-Colorado	0.058	11.2	0.020	6.1	0.013	4.9	0.007	6.5	0.012	4.3	0.038	6.4	0.146	7.1
Coal-fired PP	0.188	36.8	0.068	21.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.257	12.4
All other sources	0.324	63.2	0.252	78.7	0.257	99.9	0.102	100.0	0.290	100.0	0.586	100.0	1.810	87.6
Fires	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.1	0.001	0.5	0.000	0.0	0.002	0.1

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/ 8/21 6-hour average RH: 85%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	12.200		1.117		-99.000		-99.000		13.560		13.560		-99.000	
Estimated w/ fires	2.959	-75.7	1.912	71.1	0.636	-99.0	0.925	-99.0	1.684	-87.6	3.409	-74.9	21.525	-99.0
Estimated w/o fires	2.959	-75.7	1.911	71.0	0.636	-99.0	0.924	-99.0	1.675	-87.6	3.409	-74.9	21.514	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.587	19.8	0.442	23.1	0.087	13.7	0.095	10.3	0.138	8.2	1.182	34.7	2.532	11.8
Craig 1-3	0.081	2.7	0.012	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.093	0.4
Craig 1-2	0.069	2.3	0.009	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.077	0.4
Craig 1	0.029	1.0	0.004	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.032	0.2
Craig 2	0.040	1.3	0.005	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.045	0.2
Craig 3	0.012	0.4	0.003	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.1
Hayden 1-2	0.494	16.7	0.344	18.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.839	3.9
Hayden 1	0.398	13.5	0.333	17.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.731	3.4
Hayden 2	0.096	3.2	0.011	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.107	0.5
Steamboat Springs	0.004	0.1	0.026	1.4	0.011	1.8	0.024	2.6	0.040	2.4	0.057	1.7	0.162	0.8
Other Yampa Valley	0.008	0.3	0.060	3.1	0.075	11.9	0.071	7.6	0.098	5.8	1.125	33.0	1.438	6.7
Non-Yampa Valley	2.372	80.2	1.469	76.8	0.549	86.3	0.829	89.6	1.537	91.3	2.227	65.3	8.982	41.7
Denver	1.044	35.3	0.337	17.6	0.103	16.1	0.197	21.3	0.393	23.4	0.022	0.6	2.096	9.7
Colorado w/ Denver	2.039	68.9	1.351	70.7	0.517	81.3	0.769	83.1	1.465	87.0	2.009	58.9	8.150	37.9
Non-Colorado	0.333	11.2	0.117	6.1	0.031	4.9	0.060	6.5	0.072	4.3	0.218	6.4	0.832	3.9
Coal-fired PP	1.088	36.8	0.407	21.3	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	1.496	6.9
All other sources	1.871	63.2	1.505	78.7	0.635	99.9	0.925	100.0	1.684	100.0	3.409	100.0	20.029	93.1
Fires	0.000	0.0	0.001	0.1	0.000	0.0	0.001	0.1	0.009	0.5	0.000	0.0	0.011	0.1

Buffalo Pass
CONCENTRATION 1200-1800 95/ 8/21

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.540		0.135		0.488		0.166		1.955		1.955		4.866	
Estimated w/ fires	0.568	-77.6	0.147	8.8	0.112	-77.1	0.046	-72.1	0.129	-93.4	0.233	-88.1	1.235	-74.6
Estimated w/o fires	0.568	-77.6	0.146	8.6	0.112	-77.1	0.046	-72.2	0.128	-93.5	0.233	-88.1	1.233	-74.7

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.343	60.4	0.129	88.2	0.031	27.7	0.011	24.7	0.029	22.5	0.090	38.6	0.634	51.3
Craig 1-3	0.025	4.5	0.008	5.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.033	2.7
Craig 1-2	0.020	3.5	0.004	3.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.024	2.0
Craig 1	0.014	2.5	0.004	2.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.018	1.5
Craig 2	0.006	1.0	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.5
Craig 3	0.005	1.0	0.004	2.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.7
Hayden 1-2	0.315	55.5	0.112	76.3	0.001	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.429	34.7
Hayden 1	0.155	27.3	0.072	48.9	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.227	18.4
Hayden 2	0.160	28.2	0.040	27.3	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.201	16.3
Steamboat Springs	0.001	0.2	0.007	5.1	0.010	8.6	0.005	11.7	0.015	11.6	0.017	7.2	0.055	4.5
Other Yampa Valley	0.001	0.2	0.002	1.5	0.020	17.9	0.006	13.0	0.014	10.9	0.073	31.4	0.116	9.4
Non-Yampa Valley	0.225	39.6	0.017	11.6	0.081	72.2	0.035	75.0	0.099	76.4	0.143	61.4	0.599	48.5
Denver	0.098	17.3	0.003	1.9	0.016	14.0	0.008	17.8	0.026	19.9	0.001	0.6	0.152	12.3
Colorado w/ Denver	0.201	35.4	0.015	9.9	0.076	67.5	0.032	69.0	0.093	72.3	0.127	54.7	0.544	44.0
Non-Colorado	0.024	4.2	0.002	1.6	0.005	4.7	0.003	6.0	0.005	4.1	0.015	6.7	0.055	4.5
Coal-fired PP	0.404	71.1	0.120	82.1	0.001	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.526	42.6
All other sources	0.164	28.9	0.026	17.9	0.111	98.8	0.046	100.0	0.129	100.0	0.233	100.0	0.709	57.4
Fires	0.000	0.0	0.000	0.2	0.000	0.1	0.000	0.3	0.001	1.1	0.000	0.0	0.002	0.2

Buffalo Pass
EXTINCTION 1200-1800 95/ 8/21 6-hour average RH: 68%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	7.920		0.444		0.887		1.510		7.662		7.662		28.422	
Estimated w/ fires	1.771	-77.6	0.483	8.8	0.203	-77.1	0.421	-72.1	0.506	-93.4	0.912	-88.1	14.297	-49.7
Estimated w/o fires	1.771	-77.6	0.482	8.6	0.203	-77.1	0.420	-72.2	0.500	-93.5	0.912	-88.1	14.288	-49.7
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.070	60.4	0.426	88.2	0.056	27.7	0.104	24.7	0.114	22.5	0.352	38.6	2.123	14.8
Craig 1-3	0.079	4.5	0.026	5.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.106	0.7
Craig 1-2	0.062	3.5	0.014	3.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.077	0.5
Craig 1	0.045	2.5	0.012	2.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.057	0.4
Craig 2	0.017	1.0	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.020	0.1
Craig 3	0.017	1.0	0.012	2.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.029	0.2
Hayden 1-2	0.983	55.5	0.369	76.3	0.002	1.1	0.000	0.0	0.000	0.0	0.000	0.0	1.355	9.5
Hayden 1	0.484	27.3	0.237	48.9	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.721	5.0
Hayden 2	0.500	28.2	0.132	27.3	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.633	4.4

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.004	0.2	0.025	5.1	0.017	8.6	0.049	11.7	0.059	11.6	0.065	7.2	0.220	1.5
Other Yampa Valley	0.003	0.2	0.007	1.5	0.037	17.9	0.055	13.0	0.055	10.9	0.286	31.4	0.443	3.1
Non-Yampa Valley	0.701	39.6	0.056	11.6	0.147	72.2	0.316	75.0	0.386	76.4	0.560	61.4	2.166	15.1
Denver	0.306	17.3	0.009	1.9	0.028	14.0	0.075	17.8	0.101	19.9	0.005	0.6	0.525	3.7
Colorado w/ Denver	0.627	35.4	0.048	9.9	0.137	67.5	0.291	69.0	0.366	72.3	0.499	54.7	1.968	13.8
Non-Colorado	0.074	4.2	0.008	1.6	0.010	4.7	0.025	6.0	0.021	4.1	0.061	6.7	0.198	1.4
Coal-fired PP	1.259	71.1	0.397	82.1	0.002	1.2	0.000	0.0	0.000	0.0	0.000	0.0	1.659	11.6
All other sources	0.512	28.9	0.086	17.9	0.201	98.8	0.421	100.0	0.506	100.0	0.911	100.0	12.638	88.4
Fires	0.000	0.0	0.001	0.2	0.000	0.1	0.001	0.3	0.006	1.1	0.000	0.0	0.008	0.1

Buffalo Pass
CONCENTRATION 0600-1200 95/ 8/22

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.307		0.152		0.082		0.269		0.936		0.936		2.117	
Estimated w/ fires	0.202	-84.6	0.116	-23.2	0.142	73.5	0.055	-79.5	0.155	-83.4	0.413	-55.9	1.083	-48.8
Estimated w/o fires	0.202	-84.6	0.115	-23.8	0.142	73.1	0.055	-79.7	0.150	-84.0	0.413	-55.9	1.077	-49.1
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.012	6.0	0.016	13.4	0.029	20.5	0.009	16.4	0.022	13.9	0.156	37.9	0.244	22.5
Craig 1-3	0.002	0.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.2
Craig 1-2	0.001	0.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 3	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.010	4.7	0.001	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	1.0
Hayden 1	0.008	3.9	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.8
Hayden 2	0.002	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.2
Steamboat Springs	0.001	0.3	0.008	6.6	0.006	4.4	0.004	6.5	0.009	5.8	0.016	3.9	0.043	4.0
Other Yampa Valley	0.001	0.3	0.007	5.9	0.023	16.1	0.005	9.9	0.013	8.1	0.141	34.0	0.189	17.4
Non-Yampa Valley	0.189	94.0	0.100	85.8	0.113	79.3	0.046	82.9	0.129	82.9	0.257	62.1	0.833	76.9
Denver	0.080	39.7	0.010	8.4	0.015	10.3	0.007	13.4	0.023	14.9	0.001	0.3	0.136	12.6
Colorado w/ Denver	0.181	89.6	0.093	79.9	0.105	74.2	0.042	76.5	0.122	78.4	0.224	54.3	0.767	70.8
Non-Colorado	0.009	4.4	0.007	5.9	0.007	5.1	0.004	6.4	0.007	4.4	0.032	7.8	0.066	6.1
Coal-fired PP	0.052	25.8	0.002	1.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.054	5.0
All other sources	0.150	74.2	0.114	98.1	0.142	100.0	0.055	100.0	0.155	100.0	0.413	100.0	1.029	95.0
Fires	0.000	0.0	0.001	0.8	0.000	0.2	0.000	0.7	0.005	3.2	0.000	0.0	0.007	0.6

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/ 8/22 6-hour average RH: 86%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	7.862		0.939		0.207		2.452		5.601		5.601		27.061	
Estimated w/ fires	1.213	-84.6	0.721	-23.2	0.359	73.5	0.502	-79.5	0.928	-83.4	2.470	-55.9	16.193	-40.2
Estimated w/o fires	1.213	-84.6	0.715	-23.8	0.358	73.1	0.498	-79.7	0.898	-84.0	2.470	-55.9	16.153	-40.3
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.073	6.0	0.097	13.4	0.074	20.5	0.082	16.4	0.129	13.9	0.936	37.9	1.391	8.6
Craig 1-3	0.009	0.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.1
Craig 1-2	0.008	0.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.1
Craig 1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 2	0.007	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.0
Craig 3	0.001	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.057	4.7	0.006	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.063	0.4
Hayden 1	0.047	3.9	0.005	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.052	0.3
Hayden 2	0.010	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.011	0.1
Steamboat Springs	0.003	0.3	0.048	6.6	0.016	4.4	0.032	6.5	0.054	5.8	0.095	3.9	0.248	1.5
Other Yampa Valley	0.003	0.3	0.043	5.9	0.058	16.1	0.050	9.9	0.075	8.1	0.841	34.0	1.070	6.6
Non-Yampa Valley	1.139	94.0	0.618	85.8	0.285	79.3	0.416	82.9	0.769	82.9	1.534	62.1	4.762	29.4
Denver	0.482	39.7	0.061	8.4	0.037	10.3	0.067	13.4	0.138	14.9	0.008	0.3	0.792	4.9
Colorado w/ Denver	1.086	89.6	0.576	79.9	0.266	74.2	0.384	76.5	0.728	78.4	1.340	54.3	4.381	27.1
Non-Colorado	0.053	4.4	0.043	5.9	0.018	5.1	0.032	6.4	0.041	4.4	0.194	7.8	0.381	2.4
Coal-fired PP	0.312	25.8	0.014	1.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.326	2.0
All other sources	0.900	74.2	0.707	98.1	0.359	100.0	0.502	100.0	0.928	100.0	2.470	100.0	15.866	98.0
Fires	0.000	0.0	0.006	0.8	0.001	0.2	0.004	0.7	0.030	3.2	0.000	0.0	0.040	0.2

Buffalo Pass
CONCENTRATION 1200-1800 95/ 8/22

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.389		0.062		0.319		0.317		3.215		3.215		4.367	
Estimated w/ fires	0.173	-87.6	0.042	-32.7	0.098	-69.2	0.041	-87.2	0.111	-96.5	0.254	-92.1	0.718	-83.6
Estimated w/o fires	0.173	-87.6	0.041	-33.4	0.098	-69.3	0.040	-87.3	0.108	-96.7	0.254	-92.1	0.714	-83.7

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.034	19.5	0.013	31.2	0.036	36.8	0.014	35.3	0.037	33.2	0.111	43.7	0.245	34.1
Craig 1-3	0.001	0.5	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.2
Craig 1-2	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 3	0.000	0.1	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.030	17.6	0.003	7.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.034	4.7
Hayden 1	0.006	3.4	0.001	2.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.9
Hayden 2	0.025	14.3	0.002	5.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.027	3.8
Steamboat Springs	0.001	0.8	0.007	15.9	0.015	14.8	0.008	19.5	0.023	20.4	0.025	9.7	0.078	10.8
Other Yampa Valley	0.001	0.5	0.003	7.4	0.021	21.9	0.006	15.8	0.014	12.8	0.086	34.0	0.132	18.4
Non-Yampa Valley	0.139	80.5	0.028	67.8	0.062	63.0	0.026	64.1	0.071	63.7	0.143	56.3	0.469	65.3
Denver	0.048	27.8	0.002	4.4	0.006	6.5	0.003	8.0	0.010	9.2	0.001	0.2	0.070	9.8
Colorado w/ Denver	0.130	75.4	0.025	60.8	0.056	57.5	0.023	57.5	0.066	59.0	0.120	47.3	0.421	58.6
Non-Colorado	0.009	5.2	0.003	7.1	0.005	5.5	0.003	6.6	0.005	4.7	0.023	9.0	0.048	6.7
Coal-fired PP	0.064	37.4	0.004	10.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.069	9.6
All other sources	0.108	62.6	0.037	89.8	0.098	99.9	0.041	100.0	0.111	100.0	0.254	100.0	0.649	90.4
Fires	0.000	0.0	0.000	0.9	0.000	0.2	0.000	0.7	0.003	3.1	0.000	0.0	0.004	0.6

Buffalo Pass
EXTINCTION 1200-1800 95/ 8/22 6-hour average RH: 71%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	4.692		0.221		0.599		2.885		13.192		13.192		31.589	
Estimated w/ fires	0.583	-87.6	0.148	-32.7	0.185	-69.2	0.370	-87.2	0.455	-96.5	1.043	-92.1	12.784	-59.5
Estimated w/o fires	0.583	-87.6	0.147	-33.4	0.184	-69.3	0.368	-87.3	0.441	-96.7	1.043	-92.1	12.766	-59.6
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.114	19.5	0.046	31.2	0.068	36.8	0.131	35.3	0.151	33.2	0.456	43.7	0.966	7.6
Craig 1-3	0.003	0.5	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.0
Craig 1-2	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 3	0.001	0.1	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.103	17.6	0.011	7.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.114	0.9
Hayden 1	0.020	3.4	0.003	2.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.023	0.2
Hayden 2	0.083	14.3	0.008	5.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.091	0.7

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.005	0.8	0.024	15.9	0.027	14.8	0.072	19.5	0.093	20.4	0.101	9.7	0.322	2.5
Other Yampa Valley	0.003	0.5	0.011	7.4	0.040	21.9	0.058	15.8	0.058	12.8	0.355	34.0	0.526	4.1
Non-Yampa Valley	0.469	80.5	0.101	67.8	0.116	63.0	0.237	64.1	0.290	63.7	0.587	56.3	1.800	14.1
Denver	0.162	27.8	0.007	4.4	0.012	6.5	0.030	8.0	0.042	9.2	0.002	0.2	0.254	2.0
Colorado w/ Denver	0.439	75.4	0.090	60.8	0.106	57.5	0.213	57.5	0.269	59.0	0.493	47.3	1.610	12.6
Non-Colorado	0.030	5.2	0.010	7.1	0.010	5.5	0.024	6.6	0.021	4.7	0.093	9.0	0.190	1.5
Coal-fired PP	0.218	37.4	0.015	10.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.233	1.8
All other sources	0.365	62.6	0.133	89.8	0.184	99.9	0.370	100.0	0.455	100.0	1.043	100.0	12.551	98.2
Fires	0.000	0.0	0.001	0.9	0.000	0.2	0.002	0.7	0.014	3.1	0.000	0.0	0.018	0.1

Buffalo Pass
CONCENTRATION 0600-1200 95/ 8/23

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.277		0.057		-99.000		0.345		0.504		0.504		2.038	
Estimated w/ fires	0.145	-88.6	0.141	149.3	0.133	-99.0	0.051	-85.1	0.134	-73.4	0.468	-7.0	1.074	-47.3
Estimated w/o fires	0.145	-88.6	0.141	147.8	0.133	-99.0	0.051	-85.2	0.131	-74.0	0.468	-7.0	1.069	-47.5
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.014	9.6	0.024	16.6	0.038	28.3	0.012	22.9	0.028	20.7	0.209	44.7	0.324	30.2
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.012	8.2	0.005	3.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.017	1.6
Hayden 1	0.003	2.3	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.3
Hayden 2	0.009	5.9	0.005	3.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.014	1.3
Steamboat Springs	0.001	0.7	0.008	5.4	0.008	5.9	0.005	8.9	0.012	8.9	0.018	3.8	0.051	4.7
Other Yampa Valley	0.001	0.8	0.011	7.4	0.030	22.3	0.007	14.0	0.016	11.8	0.191	40.9	0.256	23.8
Non-Yampa Valley	0.131	90.4	0.117	82.8	0.095	71.5	0.039	76.6	0.103	76.9	0.259	55.3	0.746	69.4
Denver	0.029	20.2	0.003	2.1	0.004	3.1	0.002	4.2	0.007	5.0	0.000	0.1	0.046	4.3
Colorado w/ Denver	0.111	76.3	0.099	69.8	0.085	63.9	0.034	66.7	0.094	69.8	0.222	47.5	0.645	60.1
Non-Colorado	0.020	14.0	0.018	12.9	0.010	7.6	0.005	9.9	0.010	7.1	0.037	7.8	0.100	9.3
Coal-fired PP	0.042	29.0	0.007	5.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.050	4.6
All other sources	0.103	71.0	0.134	94.9	0.133	99.9	0.051	100.0	0.134	100.0	0.468	100.0	1.025	95.4
Fires	0.000	0.0	0.001	0.6	0.000	0.2	0.000	0.5	0.003	2.5	0.000	0.0	0.005	0.4

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/ 8/23 6-hour average RH: 83%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	6.636		0.305		-99.000		3.140		2.719		2.719		-99.000	
Estimated w/ fires	0.756	-88.6	0.761	149.3	0.310	-99.0	0.468	-85.1	0.725	-73.4	2.528	-7.0	15.547	-99.0
Estimated w/o fires	0.756	-88.6	0.756	147.8	0.310	-99.0	0.466	-85.2	0.707	-74.0	2.528	-7.0	15.522	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.073	9.6	0.126	16.6	0.088	28.3	0.107	22.9	0.150	20.7	1.129	44.7	1.673	10.8
Craig 1-3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.062	8.2	0.029	3.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.091	0.6
Hayden 1	0.017	2.3	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.019	0.1
Hayden 2	0.044	5.9	0.027	3.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.071	0.5
Steamboat Springs	0.005	0.7	0.041	5.4	0.018	5.9	0.042	8.9	0.065	8.9	0.095	3.8	0.266	1.7
Other Yampa Valley	0.006	0.8	0.057	7.4	0.069	22.3	0.065	14.0	0.085	11.8	1.034	40.9	1.316	8.5
Non-Yampa Valley	0.683	90.4	0.630	82.8	0.222	71.5	0.358	76.6	0.557	76.9	1.399	55.3	3.849	24.8
Denver	0.153	20.2	0.016	2.1	0.010	3.1	0.020	4.2	0.037	5.0	0.002	0.1	0.237	1.5
Colorado w/ Denver	0.577	76.3	0.531	69.8	0.198	63.9	0.312	66.7	0.505	69.8	1.201	47.5	3.325	21.4
Non-Colorado	0.106	14.0	0.098	12.9	0.024	7.6	0.046	9.9	0.051	7.1	0.198	7.8	0.524	3.4
Coal-fired PP	0.219	29.0	0.039	5.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.258	1.7
All other sources	0.536	71.0	0.722	94.9	0.310	99.9	0.468	100.0	0.725	100.0	2.528	100.0	15.289	98.3
Fires	0.000	0.0	0.004	0.6	0.000	0.2	0.002	0.5	0.018	2.5	0.000	0.0	0.025	0.2

Buffalo Pass
CONCENTRATION 1200-1800 95/ 8/23

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.981		0.041		1.215		0.178		1.643		1.643		4.761	
Estimated w/ fires	0.093	-95.3	0.020	-52.2	0.068	-94.4	0.029	-83.7	0.075	-95.4	0.183	-88.9	0.467	-90.2
Estimated w/o fires	0.093	-95.3	0.019	-52.4	0.067	-94.4	0.029	-83.8	0.073	-95.5	0.183	-88.9	0.466	-90.2

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.025	26.4	0.009	45.4	0.022	32.3	0.008	28.6	0.020	26.2	0.077	42.3	0.161	34.4
Craig 1-3	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.023	24.7	0.005	26.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.028	6.1
Hayden 1	0.008	8.7	0.003	14.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.011	2.4
Hayden 2	0.015	16.0	0.002	11.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.017	3.7
Steamboat Springs	0.001	0.9	0.002	10.6	0.007	9.8	0.004	13.2	0.010	13.9	0.012	6.4	0.035	7.6
Other Yampa Valley	0.001	0.8	0.002	8.4	0.015	22.3	0.004	15.4	0.009	12.3	0.066	35.9	0.097	20.7
Non-Yampa Valley	0.069	73.6	0.011	54.2	0.046	67.6	0.021	71.0	0.054	71.9	0.106	57.7	0.305	65.3
Denver	0.012	12.6	0.000	0.5	0.002	2.4	0.001	2.9	0.003	3.5	0.000	0.1	0.017	3.6
Colorado w/ Denver	0.062	66.9	0.010	51.2	0.042	62.1	0.019	64.6	0.050	67.2	0.094	51.1	0.277	59.3
Non-Colorado	0.006	6.7	0.001	3.0	0.004	5.5	0.002	6.4	0.004	4.7	0.012	6.6	0.028	6.0
Coal-fired PP	0.037	39.5	0.005	26.8	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.042	9.0
All other sources	0.056	60.5	0.014	73.2	0.067	99.8	0.029	100.0	0.075	100.0	0.183	100.0	0.425	91.0
Fires	0.000	0.0	0.000	0.4	0.000	0.1	0.000	0.4	0.001	1.9	0.000	0.0	0.002	0.4

Buffalo Pass
EXTINCTION 1200-1800 95/ 8/23 6-hour average RH: 86%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	11.793		0.251		3.057		1.624		9.756		9.756		36.481	
Estimated w/ fires	0.556	-95.3	0.120	-52.2	0.170	-94.4	0.264	-83.7	0.445	-95.4	1.087	-88.9	12.641	-65.3
Estimated w/o fires	0.556	-95.3	0.119	-52.4	0.170	-94.4	0.263	-83.8	0.436	-95.5	1.087	-88.9	12.631	-65.4
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.147	26.4	0.054	45.4	0.055	32.3	0.076	28.6	0.117	26.2	0.460	42.3	0.908	7.2
Craig 1-3	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.137	24.7	0.031	26.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.169	1.3
Hayden 1	0.049	8.7	0.017	14.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.066	0.5
Hayden 2	0.089	16.0	0.014	11.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.103	0.8

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.005	0.9	0.013	10.6	0.017	9.8	0.035	13.2	0.062	13.9	0.070	6.4	0.201	1.6
Other Yampa Valley	0.005	0.8	0.010	8.4	0.038	22.3	0.041	15.4	0.055	12.3	0.390	35.9	0.538	4.3
Non-Yampa Valley	0.409	73.6	0.065	54.2	0.115	67.6	0.188	71.0	0.320	71.9	0.627	57.7	1.723	13.6
Denver	0.070	12.6	0.001	0.5	0.004	2.4	0.008	2.9	0.015	3.5	0.001	0.1	0.099	0.8
Colorado w/ Denver	0.372	66.9	0.061	51.2	0.106	62.1	0.171	64.6	0.299	67.2	0.556	51.1	1.564	12.4
Non-Colorado	0.037	6.7	0.004	3.0	0.009	5.5	0.017	6.4	0.021	4.7	0.071	6.6	0.159	1.3
Coal-fired PP	0.220	39.5	0.032	26.8	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.252	2.0
All other sources	0.336	60.5	0.088	73.2	0.170	99.8	0.264	100.0	0.445	100.0	1.087	100.0	12.389	98.0
Fires	0.000	0.0	0.000	0.4	0.000	0.1	0.001	0.4	0.008	1.9	0.000	0.0	0.010	0.1

Buffalo Pass
CONCENTRATION 0600-1200 95/ 8/24

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.052		0.096		3.675		0.364		3.526		3.526		9.114	
Estimated w/ fires	0.126	-93.9	0.233	143.0	0.158	-95.7	0.063	-82.6	0.165	-95.3	0.486	-86.2	1.231	-86.5
Estimated w/o fires	0.126	-93.9	0.233	142.9	0.158	-95.7	0.063	-82.6	0.164	-95.3	0.486	-86.2	1.231	-86.5
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.031	24.3	0.087	37.4	0.036	23.0	0.013	19.7	0.030	18.0	0.185	38.0	0.381	31.0
Craig 1-3	0.003	2.4	0.008	3.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.011	0.9
Craig 1-2	0.002	1.9	0.006	2.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.6
Craig 1	0.002	1.5	0.004	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.5
Craig 2	0.001	0.4	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.2
Craig 3	0.001	0.5	0.003	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.3
Hayden 1-2	0.026	20.6	0.053	22.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.080	6.5
Hayden 1	0.024	18.7	0.051	22.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.075	6.1
Hayden 2	0.002	1.9	0.002	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.4
Steamboat Springs	0.001	0.8	0.015	6.2	0.010	6.1	0.005	8.7	0.014	8.5	0.024	4.9	0.069	5.6
Other Yampa Valley	0.001	0.6	0.011	4.7	0.027	16.8	0.007	11.1	0.016	9.5	0.161	33.1	0.222	18.0
Non-Yampa Valley	0.095	75.7	0.146	62.6	0.122	77.0	0.051	80.2	0.135	81.6	0.301	62.0	0.849	69.0
Denver	0.006	4.5	0.002	1.0	0.002	1.3	0.001	1.6	0.003	2.0	0.000	0.0	0.015	1.2
Colorado w/ Denver	0.089	71.1	0.137	58.7	0.116	73.7	0.048	76.2	0.130	78.6	0.280	57.6	0.801	65.0
Non-Colorado	0.006	4.5	0.009	3.8	0.005	3.3	0.003	4.0	0.005	3.1	0.021	4.4	0.049	3.9
Coal-fired PP	0.031	24.2	0.062	26.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.093	7.5
All other sources	0.095	75.8	0.171	73.4	0.158	99.9	0.063	100.0	0.165	100.0	0.486	100.0	1.139	92.5
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.001	0.3	0.000	0.0	0.001	0.1

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/ 8/24 6-hour average RH: 94%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	27.448		1.299		15.970		3.311		39.575		39.575		97.603	
Estimated w/ fires	1.682	-93.9	3.157	143.0	0.686	-95.7	0.577	-82.6	1.850	-95.3	5.459	-86.2	23.412	-76.0
Estimated w/o fires	1.682	-93.9	3.155	142.9	0.686	-95.7	0.577	-82.6	1.844	-95.3	5.459	-86.2	23.404	-76.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.409	24.3	1.180	37.4	0.158	23.0	0.114	19.7	0.334	18.0	2.075	38.0	4.271	18.2
Craig 1-3	0.040	2.4	0.112	3.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.151	0.6
Craig 1-2	0.032	1.9	0.075	2.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.107	0.5
Craig 1	0.025	1.5	0.054	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.079	0.3
Craig 2	0.007	0.4	0.021	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.028	0.1
Craig 3	0.008	0.5	0.037	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.045	0.2
Hayden 1-2	0.347	20.6	0.723	22.9	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	1.071	4.6
Hayden 1	0.315	18.7	0.695	22.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	1.011	4.3
Hayden 2	0.032	1.9	0.028	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.060	0.3
Steamboat Springs	0.013	0.8	0.197	6.2	0.042	6.1	0.050	8.7	0.157	8.5	0.269	4.9	0.727	3.1
Other Yampa Valley	0.010	0.6	0.149	4.7	0.115	16.8	0.064	11.1	0.177	9.5	1.806	33.1	2.321	9.9
Non-Yampa Valley	1.273	75.7	1.975	62.6	0.528	77.0	0.463	80.2	1.511	81.6	3.384	62.0	9.134	39.0
Denver	0.076	4.5	0.032	1.0	0.009	1.3	0.009	1.6	0.037	2.0	0.002	0.0	0.166	0.7
Colorado w/ Denver	1.197	71.1	1.854	58.7	0.506	73.7	0.440	76.2	1.454	78.6	3.146	57.6	8.597	36.7
Non-Colorado	0.076	4.5	0.120	3.8	0.023	3.3	0.023	4.0	0.056	3.1	0.238	4.4	0.537	2.3
Coal-fired PP	0.408	24.2	0.839	26.6	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	1.249	5.3
All other sources	1.274	75.8	2.317	73.4	0.685	99.9	0.577	100.0	1.850	100.0	5.459	100.0	22.164	94.7
Fires	0.000	0.0	0.001	0.0	0.000	0.0	0.000	0.1	0.006	0.3	0.000	0.0	0.008	0.0

Buffalo Pass
CONCENTRATION 1200-1800 95/ 8/24

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.839		0.126		0.379		0.534		1.261		1.261		4.844	
Estimated w/ fires	0.403	-85.8	0.220	74.3	0.089	-76.6	0.034	-93.6	0.086	-93.1	0.247	-80.4	1.079	-77.7
Estimated w/o fires	0.403	-85.8	0.220	74.3	0.089	-76.6	0.034	-93.6	0.086	-93.2	0.247	-80.4	1.079	-77.7

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.336	83.4	0.194	88.1	0.041	45.9	0.013	39.1	0.033	37.8	0.128	52.0	0.745	69.0
Craig 1-3	0.018	4.5	0.023	10.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.041	3.8
Craig 1-2	0.016	4.0	0.018	8.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.035	3.2
Craig 1	0.005	1.2	0.004	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.8
Craig 2	0.011	2.8	0.015	6.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.026	2.4
Craig 3	0.002	0.5	0.005	2.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.6
Hayden 1-2	0.316	78.2	0.153	69.8	0.001	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.470	43.6
Hayden 1	0.156	38.6	0.117	53.3	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.273	25.3
Hayden 2	0.160	39.7	0.036	16.5	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.197	18.3
Steamboat Springs	0.001	0.3	0.010	4.4	0.008	9.4	0.005	13.4	0.013	14.7	0.016	6.4	0.052	4.8
Other Yampa Valley	0.001	0.3	0.008	3.6	0.031	35.1	0.009	25.7	0.020	23.1	0.112	45.6	0.182	16.8
Non-Yampa Valley	0.067	16.6	0.026	11.9	0.048	54.1	0.021	60.8	0.054	61.9	0.118	48.0	0.334	30.9
Denver	0.001	0.2	0.000	0.0	0.000	0.4	0.000	0.5	0.001	0.7	0.000	0.0	0.002	0.2
Colorado w/ Denver	0.050	12.4	0.022	9.9	0.043	49.0	0.018	53.9	0.049	56.8	0.100	40.7	0.283	26.2
Non-Colorado	0.017	4.2	0.004	1.9	0.005	5.1	0.002	6.9	0.004	5.1	0.018	7.3	0.051	4.7
Coal-fired PP	0.341	84.5	0.177	80.7	0.001	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.519	48.1
All other sources	0.063	15.5	0.042	19.3	0.087	98.6	0.034	100.0	0.086	100.0	0.247	100.0	0.560	51.9
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.3	0.000	0.0	0.000	0.0

Buffalo Pass
EXTINCTION 1200-1800 95/ 8/24 6-hour average RH: 76%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	11.200		0.520		0.766		4.857		5.686		5.686		33.028	
Estimated w/ fires	1.591	-85.8	0.907	74.3	0.179	-76.6	0.310	-93.6	0.390	-93.1	1.112	-80.4	14.489	-56.1
Estimated w/o fires	1.591	-85.8	0.907	74.3	0.179	-76.6	0.310	-93.6	0.389	-93.2	1.112	-80.4	14.487	-56.1
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.327	83.4	0.799	88.1	0.082	45.9	0.121	39.1	0.147	37.8	0.578	52.0	3.055	21.1
Craig 1-3	0.071	4.5	0.094	10.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.166	1.1
Craig 1-2	0.064	4.0	0.075	8.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.139	1.0
Craig 1	0.019	1.2	0.015	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.035	0.2
Craig 2	0.045	2.8	0.060	6.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.105	0.7
Craig 3	0.007	0.5	0.019	2.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.026	0.2
Hayden 1-2	1.245	78.2	0.633	69.8	0.002	1.3	0.000	0.0	0.000	0.0	0.000	0.0	1.880	13.0
Hayden 1	0.614	38.6	0.483	53.3	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	1.098	7.6
Hayden 2	0.632	39.7	0.149	16.5	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.782	5.4

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.005	0.3	0.040	4.4	0.017	9.4	0.042	13.4	0.057	14.7	0.071	6.4	0.231	1.6
Other Yampa Valley	0.005	0.3	0.033	3.6	0.063	35.1	0.080	25.7	0.090	23.1	0.507	45.6	0.777	5.4
Non-Yampa Valley	0.265	16.6	0.108	11.9	0.097	54.1	0.188	60.8	0.241	61.9	0.534	48.0	1.432	9.9
Denver	0.003	0.2	0.000	0.0	0.001	0.4	0.002	0.5	0.003	0.7	0.000	0.0	0.008	0.1
Colorado w/ Denver	0.198	12.4	0.090	9.9	0.088	49.0	0.167	53.9	0.222	56.8	0.452	40.7	1.216	8.4
Non-Colorado	0.067	4.2	0.018	1.9	0.009	5.1	0.021	6.9	0.020	5.1	0.082	7.3	0.216	1.5
Coal-fired PP	1.344	84.5	0.732	80.7	0.003	1.4	0.000	0.0	0.000	0.0	0.000	0.0	2.079	14.3
All other sources	0.247	15.5	0.175	19.3	0.176	98.6	0.310	100.0	0.390	100.0	1.112	100.0	12.410	85.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.001	0.3	0.000	0.0	0.001	0.0

Buffalo Pass
CONCENTRATION 0600-1200 95/ 8/25

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.865		0.114		0.244		0.427		1.571		1.571		2.942	
Estimated w/ fires	0.233	-73.1	0.302	165.3	0.175	-28.1	0.062	-85.4	0.161	-89.7	0.643	-59.1	1.577	-46.4
Estimated w/o fires	0.233	-73.1	0.302	165.3	0.175	-28.1	0.062	-85.4	0.161	-89.7	0.643	-59.1	1.577	-46.4
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.076	32.6	0.090	29.6	0.040	22.6	0.011	17.5	0.025	15.4	0.211	32.8	0.452	28.7
Craig 1-3	0.022	9.6	0.038	12.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.060	3.8
Craig 1-2	0.021	9.0	0.033	10.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.054	3.4
Craig 1	0.006	2.6	0.010	3.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	1.0
Craig 2	0.015	6.3	0.023	7.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.038	2.4
Craig 3	0.002	0.7	0.005	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.4
Hayden 1-2	0.051	21.8	0.027	9.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.078	5.0
Hayden 1	0.026	11.4	0.018	5.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.044	2.8
Hayden 2	0.024	10.4	0.010	3.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.034	2.2
Steamboat Springs	0.001	0.4	0.007	2.4	0.004	2.5	0.003	4.2	0.007	4.3	0.009	1.4	0.031	2.0
Other Yampa Valley	0.002	0.8	0.017	5.6	0.035	20.0	0.008	13.3	0.018	11.2	0.202	31.5	0.282	17.9
Non-Yampa Valley	0.157	67.4	0.213	70.4	0.136	77.4	0.052	82.4	0.136	84.4	0.432	67.2	1.125	71.3
Denver	0.011	4.6	0.003	0.9	0.002	1.3	0.001	1.6	0.003	2.0	0.000	0.0	0.020	1.3
Colorado w/ Denver	0.083	35.6	0.173	57.1	0.118	67.5	0.042	67.9	0.120	74.1	0.358	55.6	0.894	56.7
Non-Colorado	0.074	31.8	0.040	13.2	0.017	9.8	0.009	14.5	0.017	10.3	0.074	11.5	0.231	14.7
Coal-fired PP	0.097	41.6	0.070	23.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.167	10.6
All other sources	0.136	58.4	0.232	76.8	0.175	99.9	0.062	100.0	0.161	100.0	0.643	100.0	1.410	89.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/ 8/25 6-hour average RH: 71%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.910		0.404		0.457		3.889		6.430		6.430		24.090	
Estimated w/ fires	0.783	-73.1	1.071	165.3	0.329	-28.1	0.569	-85.4	0.661	-89.7	2.632	-59.1	16.044	-33.4
Estimated w/o fires	0.783	-73.1	1.071	165.3	0.329	-28.1	0.568	-85.4	0.659	-89.7	2.632	-59.1	16.043	-33.4
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.255	32.6	0.317	29.6	0.074	22.6	0.100	17.5	0.102	15.4	0.864	32.8	1.713	10.7
Craig 1-3	0.075	9.6	0.135	12.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.210	1.3
Craig 1-2	0.070	9.0	0.116	10.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.187	1.2
Craig 1	0.021	2.6	0.036	3.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.056	0.4
Craig 2	0.050	6.3	0.081	7.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.131	0.8
Craig 3	0.005	0.7	0.018	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.023	0.1
Hayden 1-2	0.171	21.8	0.097	9.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.268	1.7
Hayden 1	0.089	11.4	0.062	5.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.152	0.9
Hayden 2	0.081	10.4	0.035	3.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.117	0.7
Steamboat Springs	0.003	0.4	0.026	2.4	0.008	2.5	0.024	4.2	0.028	4.3	0.036	1.4	0.125	0.8
Other Yampa Valley	0.006	0.8	0.060	5.6	0.066	20.0	0.076	13.3	0.074	11.2	0.828	31.5	1.110	6.9
Non-Yampa Valley	0.528	67.4	0.754	70.4	0.254	77.4	0.469	82.4	0.557	84.4	1.768	67.2	4.330	27.0
Denver	0.036	4.6	0.010	0.9	0.004	1.3	0.009	1.6	0.013	2.0	0.001	0.0	0.073	0.5
Colorado w/ Denver	0.279	35.6	0.612	57.1	0.222	67.5	0.386	67.9	0.490	74.1	1.465	55.6	3.453	21.5
Non-Colorado	0.249	31.8	0.142	13.2	0.032	9.8	0.083	14.5	0.068	10.3	0.303	11.5	0.878	5.5
Coal-fired PP	0.326	41.6	0.248	23.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.574	3.6
All other sources	0.458	58.4	0.823	76.8	0.328	99.9	0.569	100.0	0.661	100.0	2.632	100.0	15.470	96.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.002	0.0

Buffalo Pass
CONCENTRATION 1200-1800 95/ 8/25

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.232		0.233		0.444		0.270		2.046		2.046		3.772	
Estimated w/ fires	0.376	-69.5	0.057	-75.4	0.109	-75.5	0.042	-84.3	0.105	-94.8	0.336	-83.6	1.025	-72.8
Estimated w/o fires	0.376	-69.5	0.057	-75.4	0.109	-75.5	0.042	-84.3	0.105	-94.9	0.336	-83.6	1.025	-72.8

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.244	64.9	0.032	56.2	0.041	37.9	0.014	32.5	0.033	31.0	0.148	44.1	0.512	49.9
Craig 1-3	0.050	13.4	0.014	24.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.065	6.3
Craig 1-2	0.043	11.6	0.012	20.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.056	5.4
Craig 1	0.018	4.7	0.003	5.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.021	2.0
Craig 2	0.026	6.9	0.009	15.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.035	3.4
Craig 3	0.007	1.9	0.002	4.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.9
Hayden 1-2	0.191	50.7	0.013	22.4	0.000	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.204	19.9
Hayden 1	0.096	25.7	0.008	13.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.104	10.2
Hayden 2	0.094	25.0	0.005	9.1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.100	9.7
Steamboat Springs	0.001	0.3	0.002	3.7	0.009	8.0	0.005	11.7	0.014	13.0	0.015	4.5	0.046	4.4
Other Yampa Valley	0.002	0.5	0.003	5.2	0.032	29.3	0.009	20.8	0.019	18.1	0.133	39.6	0.198	19.3
Non-Yampa Valley	0.132	35.1	0.025	43.8	0.068	62.1	0.029	67.5	0.072	68.7	0.188	55.9	0.513	50.0
Denver	0.009	2.4	0.000	0.5	0.001	1.0	0.001	1.2	0.002	1.6	0.000	0.0	0.013	1.3
Colorado w/ Denver	0.072	19.1	0.020	34.3	0.058	52.9	0.023	55.2	0.063	59.8	0.152	45.2	0.387	37.8
Non-Colorado	0.060	16.0	0.005	9.5	0.010	9.2	0.005	12.2	0.009	8.9	0.036	10.7	0.126	12.3
Coal-fired PP	0.271	72.1	0.029	49.9	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.300	29.3
All other sources	0.105	27.9	0.029	50.1	0.108	99.3	0.042	100.0	0.105	100.0	0.336	100.0	0.725	70.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0

Buffalo Pass
EXTINCTION 1200-1800 95/ 8/25 6-hour average RH: 50%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.851		0.581		0.718		2.460		6.847		6.847		23.457	
Estimated w/ fires	0.870	-69.5	0.143	-75.4	0.176	-75.5	0.385	-84.3	0.353	-94.8	1.123	-83.6	13.051	-44.4
Estimated w/o fires	0.870	-69.5	0.143	-75.4	0.176	-75.5	0.385	-84.3	0.352	-94.9	1.123	-83.6	13.050	-44.4
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.565	64.9	0.080	56.2	0.067	37.9	0.125	32.5	0.109	31.0	0.495	44.1	1.442	11.0
Craig 1-3	0.117	13.4	0.036	24.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.153	1.2
Craig 1-2	0.101	11.6	0.030	20.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.131	1.0
Craig 1	0.041	4.7	0.008	5.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.049	0.4
Craig 2	0.060	6.9	0.022	15.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.082	0.6
Craig 3	0.016	1.9	0.006	4.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.022	0.2
Hayden 1-2	0.441	50.7	0.032	22.4	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.474	3.6
Hayden 1	0.223	25.7	0.019	13.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.243	1.9
Hayden 2	0.218	25.0	0.013	9.1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.231	1.8

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.003	0.3	0.005	3.7	0.014	8.0	0.045	11.7	0.046	13.0	0.050	4.5	0.163	1.2
Other Yampa Valley	0.004	0.5	0.007	5.2	0.052	29.3	0.080	20.8	0.064	18.1	0.445	39.6	0.652	5.0
Non-Yampa Valley	0.305	35.1	0.062	43.8	0.109	62.1	0.260	67.5	0.242	68.7	0.628	55.9	1.608	12.3
Denver	0.021	2.4	0.001	0.5	0.002	1.0	0.005	1.2	0.006	1.6	0.000	0.0	0.034	0.3
Colorado w/ Denver	0.166	19.1	0.049	34.3	0.093	52.9	0.213	55.2	0.211	59.8	0.508	45.2	1.240	9.5
Non-Colorado	0.139	16.0	0.014	9.5	0.016	9.2	0.047	12.2	0.032	8.9	0.120	10.7	0.368	2.8
Coal-fired PP	0.627	72.1	0.071	49.9	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.700	5.4
All other sources	0.243	27.9	0.072	50.1	0.175	99.3	0.385	100.0	0.353	100.0	1.123	100.0	12.351	94.6
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.001	0.0

Buffalo Pass
CONCENTRATION 0600-1200 95/ 8/26

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.413		-99.000		0.582		0.316		3.034		3.034		4.907	
Estimated w/ fires	0.771	-45.4	0.549	-99.0	0.240	-58.7	0.089	-71.9	0.236	-92.2	0.711	-76.6	2.596	-47.1
Estimated w/o fires	0.771	-45.4	0.549	-99.0	0.240	-58.7	0.089	-71.9	0.235	-92.2	0.711	-76.6	2.596	-47.1
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.506	65.7	0.332	60.6	0.052	21.6	0.015	16.8	0.036	15.4	0.234	32.9	1.176	45.3
Craig 1-3	0.116	15.1	0.121	22.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.237	9.1
Craig 1-2	0.102	13.2	0.082	14.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.184	7.1
Craig 1	0.043	5.6	0.037	6.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.080	3.1
Craig 2	0.058	7.6	0.045	8.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.104	4.0
Craig 3	0.014	1.9	0.039	7.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.053	2.0
Hayden 1-2	0.386	50.1	0.193	35.1	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.580	22.3
Hayden 1	0.220	28.6	0.135	24.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.356	13.7
Hayden 2	0.166	21.5	0.058	10.5	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.224	8.6
Steamboat Springs	0.001	0.2	0.007	1.2	0.006	2.7	0.004	4.4	0.010	4.3	0.012	1.7	0.040	1.5
Other Yampa Valley	0.003	0.4	0.013	2.3	0.044	18.3	0.011	12.5	0.026	11.1	0.222	31.2	0.318	12.3
Non-Yampa Valley	0.265	34.3	0.216	39.4	0.188	78.4	0.074	83.2	0.199	84.4	0.478	67.1	1.420	54.7
Denver	0.031	4.0	0.008	1.5	0.004	1.8	0.002	2.4	0.007	2.8	0.000	0.1	0.052	2.0
Colorado w/ Denver	0.158	20.4	0.147	26.8	0.169	70.3	0.064	71.9	0.180	76.4	0.389	54.6	1.106	42.6
Non-Colorado	0.107	13.9	0.069	12.6	0.020	8.2	0.010	11.3	0.019	8.0	0.089	12.5	0.314	12.1
Coal-fired PP	0.572	74.1	0.329	60.0	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.902	34.8
All other sources	0.200	25.9	0.220	40.0	0.239	99.4	0.089	100.0	0.236	100.0	0.711	100.0	1.694	65.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/ 8/26 6-hour average RH: 47%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	3.154		-99.000		0.930		2.872		9.975		9.975		-99.000	
Estimated w/ fires	1.722	-45.4	1.325	-99.0	0.384	-58.7	0.807	-71.9	0.775	-92.2	2.339	-76.6	17.352	-99.0
Estimated w/o fires	1.722	-45.4	1.325	-99.0	0.384	-58.7	0.807	-71.9	0.774	-92.2	2.339	-76.6	17.350	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.131	65.7	0.802	60.6	0.083	21.6	0.136	16.8	0.119	15.4	0.768	32.9	3.039	17.5
Craig 1-3	0.259	15.1	0.291	22.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.551	3.2
Craig 1-2	0.227	13.2	0.198	14.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.426	2.5
Craig 1	0.097	5.6	0.089	6.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.186	1.1
Craig 2	0.130	7.6	0.109	8.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.240	1.4
Craig 3	0.032	1.9	0.093	7.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.125	0.7
Hayden 1-2	0.863	50.1	0.465	35.1	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	1.330	7.7
Hayden 1	0.492	28.6	0.326	24.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.819	4.7
Hayden 2	0.371	21.5	0.139	10.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.511	2.9
Steamboat Springs	0.003	0.2	0.016	1.2	0.010	2.7	0.035	4.4	0.034	4.3	0.039	1.7	0.136	0.8
Other Yampa Valley	0.006	0.4	0.030	2.3	0.070	18.3	0.101	12.5	0.086	11.1	0.729	31.2	1.022	5.9
Non-Yampa Valley	0.591	34.3	0.522	39.4	0.301	78.4	0.671	83.2	0.654	84.4	1.571	67.1	4.311	24.8
Denver	0.069	4.0	0.020	1.5	0.007	1.8	0.019	2.4	0.021	2.8	0.001	0.1	0.138	0.8
Colorado w/ Denver	0.352	20.4	0.355	26.8	0.270	70.3	0.580	71.9	0.592	76.4	1.277	54.6	3.426	19.7
Non-Colorado	0.239	13.9	0.168	12.6	0.031	8.2	0.091	11.3	0.062	8.0	0.293	12.5	0.885	5.1
Coal-fired PP	1.276	74.1	0.794	60.0	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	2.073	11.9
All other sources	0.446	25.9	0.530	40.0	0.382	99.4	0.807	100.0	0.775	100.0	2.339	100.0	15.279	88.1
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.002	0.0

Buffalo Pass
CONCENTRATION 1200-1800 95/ 8/26

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.144		-99.000		1.622		0.149		2.112		2.112		4.753	
Estimated w/ fires	0.808	-29.4	0.081	-99.0	0.189	-88.4	0.075	-50.1	0.206	-90.2	0.401	-81.0	1.760	-63.0
Estimated w/o fires	0.808	-29.4	0.081	-99.0	0.189	-88.4	0.075	-50.1	0.206	-90.2	0.401	-81.0	1.759	-63.0

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.529	65.5	0.057	70.8	0.047	24.9	0.017	22.7	0.042	20.5	0.158	39.3	0.850	48.3
Craig 1-3	0.149	18.5	0.025	31.6	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.175	9.9
Craig 1-2	0.128	15.9	0.014	17.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.143	8.1
Craig 1	0.056	6.9	0.007	8.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.063	3.6
Craig 2	0.072	8.9	0.008	9.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.080	4.5
Craig 3	0.021	2.6	0.011	13.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.032	1.8
Hayden 1-2	0.376	46.5	0.026	32.3	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.402	22.9
Hayden 1	0.188	23.3	0.015	18.6	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.204	11.6
Hayden 2	0.187	23.2	0.011	13.8	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.199	11.3
Steamboat Springs	0.002	0.3	0.004	4.4	0.013	7.1	0.007	10.0	0.021	10.2	0.023	5.6	0.070	4.0
Other Yampa Valley	0.002	0.3	0.002	2.5	0.033	17.3	0.009	12.6	0.021	10.3	0.135	33.6	0.203	11.5
Non-Yampa Valley	0.279	34.5	0.024	29.2	0.142	75.1	0.058	77.3	0.164	79.3	0.244	60.7	0.909	51.7
Denver	0.061	7.5	0.002	2.4	0.010	5.5	0.005	6.8	0.016	7.6	0.001	0.2	0.095	5.4
Colorado w/ Denver	0.194	24.0	0.019	23.4	0.132	69.8	0.053	70.8	0.154	74.8	0.203	50.7	0.755	42.9
Non-Colorado	0.085	10.6	0.005	5.8	0.010	5.2	0.005	6.5	0.009	4.5	0.040	10.0	0.154	8.8
Coal-fired PP	0.635	78.6	0.054	67.4	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.690	39.2
All other sources	0.173	21.4	0.026	32.6	0.188	99.4	0.075	100.0	0.206	100.0	0.401	100.0	1.069	60.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0

Buffalo Pass
EXTINCTION 1200-1800 95/ 8/26 6-hour average RH: 38%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.323		-99.000		2.512		1.360		6.641		6.641		-99.000	
Estimated w/ fires	1.641	-29.4	0.178	-99.0	0.292	-88.4	0.679	-50.1	0.649	-90.2	1.261	-81.0	14.701	-99.0
Estimated w/o fires	1.641	-29.4	0.178	-99.0	0.292	-88.4	0.679	-50.1	0.648	-90.2	1.261	-81.0	14.700	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.075	65.5	0.126	70.8	0.073	24.9	0.154	22.7	0.133	20.5	0.495	39.3	2.057	14.0
Craig 1-3	0.303	18.5	0.056	31.6	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.360	2.4
Craig 1-2	0.260	15.9	0.031	17.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.292	2.0
Craig 1	0.114	6.9	0.015	8.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.129	0.9
Craig 2	0.146	8.9	0.017	9.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.163	1.1
Craig 3	0.043	2.6	0.025	13.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.068	0.5
Hayden 1-2	0.763	46.5	0.058	32.3	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.822	5.6
Hayden 1	0.383	23.3	0.033	18.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.416	2.8
Hayden 2	0.380	23.2	0.025	13.8	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.405	2.8

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.004	0.3	0.008	4.4	0.021	7.1	0.068	10.0	0.066	10.2	0.071	5.6	0.238	1.6
Other Yampa Valley	0.005	0.3	0.004	2.5	0.051	17.3	0.086	12.6	0.067	10.3	0.424	33.6	0.637	4.3
Non-Yampa Valley	0.566	34.5	0.052	29.2	0.220	75.1	0.525	77.3	0.515	79.3	0.766	60.7	2.643	18.0
Denver	0.123	7.5	0.004	2.4	0.016	5.5	0.046	6.8	0.049	7.6	0.003	0.2	0.242	1.6
Colorado w/ Denver	0.393	24.0	0.042	23.4	0.204	69.8	0.481	70.8	0.485	74.8	0.639	50.7	2.244	15.3
Non-Colorado	0.173	10.6	0.010	5.8	0.015	5.2	0.044	6.5	0.029	4.5	0.126	10.0	0.399	2.7
Coal-fired PP	1.289	78.6	0.120	67.4	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	1.412	9.6
All other sources	0.352	21.4	0.058	32.6	0.291	99.4	0.679	100.0	0.649	100.0	1.261	100.0	13.289	90.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1	0.000	0.0	0.001	0.0

Buffalo Pass
CONCENTRATION 0600-1200 95/ 8/27

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.401		-99.000		1.096		0.223		2.037		2.037		4.514	
Estimated w/ fires	1.313	-6.3	0.554	-99.0	0.537	-51.0	0.209	-6.3	0.649	-68.2	0.839	-58.8	4.101	-9.2
Estimated w/o fires	1.313	-6.3	0.554	-99.0	0.537	-51.0	0.209	-6.4	0.648	-68.2	0.839	-58.8	4.100	-9.2
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.421	32.0	0.136	24.4	0.048	8.9	0.014	6.9	0.047	7.2	0.221	26.3	0.886	21.6
Craig 1-3	0.121	9.2	0.056	10.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.178	4.3
Craig 1-2	0.099	7.6	0.035	6.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.134	3.3
Craig 1	0.047	3.6	0.020	3.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.067	1.6
Craig 2	0.053	4.0	0.014	2.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.067	1.6
Craig 3	0.022	1.6	0.021	3.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.043	1.1
Hayden 1-2	0.296	22.5	0.070	12.6	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.367	8.9
Hayden 1	0.160	12.2	0.050	9.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.210	5.1
Hayden 2	0.136	10.3	0.020	3.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.156	3.8
Steamboat Springs	0.001	0.1	0.001	0.2	0.004	0.8	0.003	1.2	0.007	1.0	0.008	1.0	0.024	0.6
Other Yampa Valley	0.003	0.2	0.008	1.5	0.042	7.9	0.012	5.7	0.040	6.2	0.212	25.3	0.318	7.7
Non-Yampa Valley	0.893	68.0	0.419	75.6	0.489	91.1	0.195	93.1	0.601	92.7	0.618	73.7	3.215	78.4
Denver	0.354	27.0	0.061	11.0	0.072	13.4	0.036	17.1	0.112	17.3	0.006	0.8	0.642	15.6
Colorado w/ Denver	0.817	62.2	0.402	72.4	0.471	87.7	0.186	88.7	0.583	89.9	0.539	64.2	2.997	73.1
Non-Colorado	0.075	5.7	0.017	3.1	0.019	3.5	0.009	4.3	0.018	2.8	0.079	9.5	0.218	5.3
Coal-fired PP	0.806	61.4	0.159	28.7	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.967	23.6
All other sources	0.507	38.6	0.395	71.3	0.536	99.8	0.209	100.0	0.649	100.0	0.839	100.0	3.134	76.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.001	0.0

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Buffalo Pass
EXTINCTION 0600-1200 95/ 8/27 6-hour average RH: 54%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	3.445		-99.000		1.813		2.034		7.025		7.025		-99.000	
Estimated w/ fires	3.229	-6.3	1.463	-99.0	0.888	-51.0	1.905	-6.3	2.237	-68.2	2.893	-58.8	22.613	-99.0
Estimated w/o fires	3.229	-6.3	1.463	-99.0	0.888	-51.0	1.904	-6.4	2.235	-68.2	2.893	-58.8	22.611	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.034	32.0	0.358	24.4	0.079	8.9	0.132	6.9	0.161	7.2	0.761	26.3	2.525	11.2
Craig 1-3	0.297	9.2	0.148	10.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.446	2.0
Craig 1-2	0.244	7.6	0.091	6.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.336	1.5
Craig 1	0.115	3.6	0.054	3.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.169	0.7
Craig 2	0.129	4.0	0.038	2.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.167	0.7
Craig 3	0.053	1.6	0.057	3.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.110	0.5
Hayden 1-2	0.728	22.5	0.184	12.6	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.913	4.0
Hayden 1	0.394	12.2	0.131	9.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.526	2.3
Hayden 2	0.334	10.3	0.053	3.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.387	1.7
Steamboat Springs	0.002	0.1	0.003	0.2	0.007	0.8	0.023	1.2	0.023	1.0	0.029	1.0	0.088	0.4
Other Yampa Valley	0.007	0.2	0.022	1.5	0.070	7.9	0.109	5.7	0.138	6.2	0.732	25.3	1.077	4.8
Non-Yampa Valley	2.195	68.0	1.105	75.6	0.809	91.1	1.773	93.1	2.074	92.7	2.131	73.7	10.087	44.6
Denver	0.871	27.0	0.161	11.0	0.119	13.4	0.326	17.1	0.387	17.3	0.022	0.8	1.886	8.3
Colorado w/ Denver	2.010	62.2	1.060	72.4	0.778	87.7	1.690	88.7	2.011	89.9	1.858	64.2	9.407	41.6
Non-Colorado	0.185	5.7	0.046	3.1	0.031	3.5	0.082	4.3	0.063	2.8	0.274	9.5	0.680	3.0
Coal-fired PP	1.983	61.4	0.420	28.7	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	2.405	10.6
All other sources	1.246	38.6	1.042	71.3	0.886	99.8	1.905	100.0	2.237	100.0	2.892	100.0	20.208	89.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.1	0.000	0.0	0.002	0.0

Buffalo Pass
CONCENTRATION 1200-1800 95/ 8/27

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.146		-99.000		0.915		0.122		2.803		2.803		4.615	
Estimated w/ fires	1.438	25.5	0.358	-99.0	0.321	-64.9	0.129	5.6	0.391	-86.0	0.444	-84.2	3.082	-33.2
Estimated w/o fires	1.438	25.5	0.358	-99.0	0.321	-64.9	0.129	5.6	0.391	-86.0	0.444	-84.2	3.081	-33.2

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.674	46.8	0.196	54.8	0.046	14.4	0.017	12.9	0.045	11.5	0.138	31.1	1.116	36.2
Craig 1-3	0.175	12.1	0.076	21.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.251	8.1
Craig 1-2	0.142	9.9	0.047	13.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.190	6.2
Craig 1	0.070	4.9	0.029	8.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.100	3.2
Craig 2	0.072	5.0	0.018	5.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.090	2.9
Craig 3	0.033	2.3	0.028	7.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.061	2.0
Hayden 1-2	0.495	34.4	0.107	29.9	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.603	19.6
Hayden 1	0.245	17.0	0.062	17.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.308	10.0
Hayden 2	0.250	17.4	0.045	12.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.296	9.6
Steamboat Springs	0.002	0.1	0.009	2.5	0.013	3.9	0.007	5.5	0.020	5.0	0.022	4.9	0.072	2.3
Other Yampa Valley	0.002	0.2	0.005	1.3	0.032	10.0	0.010	7.4	0.025	6.5	0.116	26.1	0.190	6.2
Non-Yampa Valley	0.764	53.2	0.162	45.2	0.275	85.6	0.112	87.1	0.346	88.5	0.306	68.9	1.966	63.8
Denver	0.335	23.3	0.036	9.9	0.051	16.0	0.025	19.7	0.080	20.4	0.004	1.0	0.531	17.2
Colorado w/ Denver	0.707	49.2	0.156	43.6	0.267	82.9	0.108	83.9	0.338	86.4	0.267	60.2	1.843	59.8
Non-Colorado	0.057	4.0	0.006	1.6	0.008	2.6	0.004	3.2	0.008	2.1	0.039	8.8	0.123	4.0
Coal-fired PP	1.034	71.9	0.206	57.6	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	1.243	40.3
All other sources	0.404	28.1	0.152	42.4	0.320	99.4	0.129	100.0	0.391	100.0	0.444	100.0	1.839	59.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0

Buffalo Pass
EXTINCTION 1200-1800 95/ 8/27 6-hour average RH: 55%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.824		-99.000		1.514		1.108		9.678		9.678		-99.000	
Estimated w/ fires	3.544	25.5	0.948	-99.0	0.532	-64.9	1.170	5.6	1.352	-86.0	1.533	-84.2	19.078	-99.0
Estimated w/o fires	3.544	25.5	0.948	-99.0	0.532	-64.9	1.170	5.6	1.351	-86.0	1.533	-84.2	19.077	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.660	46.8	0.519	54.8	0.077	14.4	0.151	12.9	0.155	11.5	0.476	31.1	3.038	15.9
Craig 1-3	0.430	12.1	0.200	21.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.632	3.3
Craig 1-2	0.350	9.9	0.125	13.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.476	2.5
Craig 1	0.173	4.9	0.077	8.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.250	1.3
Craig 2	0.177	5.0	0.048	5.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.226	1.2
Craig 3	0.080	2.3	0.075	7.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.156	0.8
Hayden 1-2	1.220	34.4	0.284	29.9	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	1.506	7.9
Hayden 1	0.603	17.0	0.165	17.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.769	4.0
Hayden 2	0.617	17.4	0.119	12.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.737	3.9

Table B.2.3.12a (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Buffalo Pass for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.004	0.1	0.023	2.5	0.021	3.9	0.064	5.5	0.068	5.0	0.076	4.9	0.256	1.3
Other Yampa Valley	0.006	0.2	0.012	1.3	0.053	10.0	0.087	7.4	0.087	6.5	0.400	26.1	0.645	3.4
Non-Yampa Valley	1.884	53.2	0.429	45.2	0.455	85.6	1.019	87.1	1.196	88.5	1.057	68.9	6.039	31.7
Denver	0.824	23.3	0.094	9.9	0.085	16.0	0.231	19.7	0.275	20.4	0.015	1.0	1.525	8.0
Colorado w/ Denver	1.743	49.2	0.414	43.6	0.441	82.9	0.982	83.9	1.167	86.4	0.922	60.2	5.668	29.7
Non-Colorado	0.141	4.0	0.015	1.6	0.014	2.6	0.037	3.2	0.028	2.1	0.135	8.8	0.370	1.9
Coal-fired PP	2.549	71.9	0.546	57.6	0.003	0.6	0.000	0.0	0.000	0.0	0.001	0.0	3.099	16.2
All other sources	0.995	28.1	0.402	42.4	0.529	99.4	1.170	100.0	1.352	100.0	1.532	100.0	15.979	83.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1	0.000	0.0	0.001	0.0

Table B.2.3.12b

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

[This table also presents six-hour concentrations from filter measurements, as well as extinction estimated from the filter measurements using identical extinction efficiencies as applied to predicted concentrations. Source attributions are presented for all 12 source regions/types modeled with CALPUFF, and present results from each six-hour daylight period (0600-1200, and 1200-1800 LST).]

Gilpin Creek
CONCENTRATION 0600-1200 95/ 8/21

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.045		-99.000		0.170		1.002		4.409		4.409		7.069	
Estimated w/ fires	0.600	-70.7	0.369	-99.0	0.261	53.7	0.101	-89.9	0.286	-93.5	0.619	-86.0	2.237	-68.4
Estimated w/o fires	0.600	-70.7	0.369	-99.0	0.261	53.6	0.101	-89.9	0.285	-93.5	0.619	-86.0	2.235	-68.4
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.156	26.0	0.130	35.3	0.034	13.1	0.008	8.2	0.019	6.5	0.198	31.9	0.545	24.4
Craig 1-3	0.018	3.0	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.020	0.9
Craig 1-2	0.015	2.5	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.017	0.7
Craig 1	0.006	1.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.3
Craig 2	0.009	1.4	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.4
Craig 3	0.003	0.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.2
Hayden 1-2	0.136	22.6	0.114	30.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.250	11.2
Hayden 1	0.109	18.2	0.109	29.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.219	9.8
Hayden 2	0.026	4.4	0.005	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.031	1.4
Steamboat Springs	0.001	0.1	0.003	0.9	0.002	0.6	0.001	0.8	0.002	0.8	0.003	0.5	0.012	0.5
Other Yampa Valley	0.002	0.3	0.011	2.9	0.032	12.4	0.008	7.4	0.016	5.7	0.195	31.4	0.263	11.8
Non-Yampa Valley	0.444	74.0	0.239	64.7	0.227	86.9	0.093	91.6	0.266	92.9	0.422	68.1	1.690	75.5
Denver	0.183	30.5	0.050	13.7	0.040	15.2	0.021	20.6	0.065	22.7	0.004	0.6	0.363	16.2
Colorado w/ Denver	0.359	59.8	0.209	56.6	0.208	79.5	0.082	81.6	0.247	86.4	0.356	57.5	1.462	65.3
Non-Colorado	0.085	14.1	0.030	8.0	0.019	7.3	0.010	10.0	0.019	6.5	0.065	10.6	0.228	10.2
Coal-fired PP	0.249	41.6	0.124	33.6	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.374	16.7
All other sources	0.350	58.4	0.245	66.4	0.261	99.8	0.101	100.0	0.286	100.0	0.619	100.0	1.864	83.3
Fires	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.1	0.002	0.6	0.000	0.0	0.002	0.1

Table B.2.3.12b (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/ 8/21 6-hour average RH: 63%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	5.812		-99.000		0.297		9.119		16.410		16.410		-99.000	
Estimated w/ fires	1.705	-70.7	1.116	-99.0	0.457	53.7	0.920	-89.9	1.066	-93.5	2.305	-86.0	17.568	-99.0
Estimated w/o fires	1.705	-70.7	1.115	-99.0	0.457	53.6	0.919	-89.9	1.059	-93.5	2.305	-86.0	17.560	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.444	26.0	0.394	35.3	0.060	13.1	0.076	8.2	0.069	6.5	0.737	31.9	1.779	10.1
Craig 1-3	0.050	3.0	0.007	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.058	0.3
Craig 1-2	0.043	2.5	0.005	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.048	0.3
Craig 1	0.018	1.1	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.021	0.1
Craig 2	0.024	1.4	0.003	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.027	0.2
Craig 3	0.008	0.5	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.1
Hayden 1-2	0.386	22.6	0.344	30.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.730	4.2
Hayden 1	0.311	18.2	0.329	29.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.640	3.6
Hayden 2	0.075	4.4	0.015	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.090	0.5
Steamboat Springs	0.002	0.1	0.010	0.9	0.003	0.6	0.007	0.8	0.008	0.8	0.012	0.5	0.043	0.2
Other Yampa Valley	0.006	0.3	0.032	2.9	0.057	12.4	0.068	7.4	0.061	5.7	0.724	31.4	0.948	5.4
Non-Yampa Valley	1.261	74.0	0.721	64.7	0.397	86.9	0.843	91.6	0.990	92.9	1.569	68.1	5.781	32.9
Denver	0.521	30.5	0.152	13.7	0.069	15.2	0.190	20.6	0.242	22.7	0.013	0.6	1.187	6.8
Colorado w/ Denver	1.020	59.8	0.632	56.6	0.364	79.5	0.751	81.6	0.921	86.4	1.326	57.5	5.012	28.5
Non-Colorado	0.241	14.1	0.090	8.0	0.034	7.3	0.092	10.0	0.070	6.5	0.243	10.6	0.769	4.4
Coal-fired PP	0.709	41.6	0.375	33.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	1.084	6.2
All other sources	0.996	58.4	0.741	66.4	0.456	99.8	0.920	100.0	1.066	100.0	2.305	100.0	16.484	93.8
Fires	0.000	0.0	0.001	0.1	0.000	0.0	0.001	0.1	0.006	0.6	0.000	0.0	0.009	0.0

Gilpin Creek
CONCENTRATION 1200-1800 95/ 8/21

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.045		-99.000		0.170		1.002		4.409		4.409		7.069	
Estimated w/ fires	0.543	-73.4	0.137	-99.0	0.102	-40.1	0.040	-96.0	0.110	-97.5	0.235	-94.7	1.167	-83.5
Estimated w/o fires	0.543	-73.4	0.137	-99.0	0.102	-40.2	0.040	-96.0	0.108	-97.5	0.235	-94.7	1.165	-83.5

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.303	55.8	0.120	87.7	0.024	23.3	0.006	15.6	0.013	12.1	0.097	41.6	0.564	48.3
Craig 1-3	0.049	9.0	0.022	15.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.071	6.1
Craig 1-2	0.039	7.2	0.012	9.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.052	4.4
Craig 1	0.026	4.9	0.009	6.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.035	3.0
Craig 2	0.013	2.4	0.003	2.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	1.4
Craig 3	0.010	1.8	0.009	6.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.019	1.7
Hayden 1-2	0.252	46.4	0.095	69.5	0.001	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.349	29.9
Hayden 1	0.139	25.5	0.065	47.3	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.204	17.5
Hayden 2	0.114	20.9	0.031	22.3	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.145	12.4
Steamboat Springs	0.001	0.1	0.001	0.9	0.002	1.5	0.001	2.4	0.002	2.2	0.003	1.4	0.010	0.9
Other Yampa Valley	0.001	0.2	0.002	1.3	0.021	20.8	0.005	13.3	0.011	9.9	0.094	40.2	0.135	11.5
Non-Yampa Valley	0.240	44.2	0.017	12.0	0.078	76.6	0.034	84.0	0.095	86.4	0.137	58.4	0.600	51.5
Denver	0.100	18.5	0.003	2.1	0.015	15.2	0.008	20.3	0.025	23.2	0.001	0.6	0.154	13.2
Colorado w/ Denver	0.203	37.4	0.013	9.3	0.070	68.4	0.029	73.1	0.086	78.9	0.111	47.5	0.513	44.0
Non-Colorado	0.037	6.8	0.004	2.8	0.008	8.2	0.004	11.0	0.008	7.5	0.026	11.0	0.088	7.5
Coal-fired PP	0.367	67.6	0.118	86.0	0.001	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.486	41.7
All other sources	0.176	32.4	0.019	14.0	0.101	99.0	0.040	100.0	0.110	100.0	0.234	100.0	0.680	58.3
Fires	0.000	0.0	0.000	0.3	0.000	0.1	0.000	0.3	0.002	1.5	0.000	0.0	0.002	0.2

Gilpin Creek
EXTINCTION 1200-1800 95/ 8/21 6-hour average RH: 45%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	4.473		-99.000		0.270		9.119		14.354		14.354		-99.000	
Estimated w/ fires	1.188	-73.4	0.325	-99.0	0.162	-40.1	0.365	-96.0	0.357	-97.5	0.764	-94.7	13.161	-99.0
Estimated w/o fires	1.188	-73.4	0.324	-99.0	0.161	-40.2	0.364	-96.0	0.352	-97.5	0.764	-94.7	13.153	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.663	55.8	0.285	87.7	0.038	23.3	0.057	15.6	0.043	12.1	0.317	41.6	1.403	10.7
Craig 1-3	0.107	9.0	0.052	15.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.159	1.2
Craig 1-2	0.086	7.2	0.029	9.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.115	0.9
Craig 1	0.058	4.9	0.021	6.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.079	0.6
Craig 2	0.028	2.4	0.008	2.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.036	0.3
Craig 3	0.022	1.8	0.022	6.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.044	0.3
Hayden 1-2	0.552	46.4	0.226	69.5	0.001	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.779	5.9
Hayden 1	0.303	25.5	0.154	47.3	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.458	3.5
Hayden 2	0.248	20.9	0.072	22.3	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.321	2.4

Table B.2.3.12b (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.001	0.1	0.003	0.9	0.002	1.5	0.009	2.4	0.008	2.2	0.010	1.4	0.034	0.3
Other Yampa Valley	0.002	0.2	0.004	1.3	0.034	20.8	0.048	13.3	0.035	9.9	0.307	40.2	0.431	3.3
Non-Yampa Valley	0.526	44.2	0.039	12.0	0.124	76.6	0.307	84.0	0.308	86.4	0.446	58.4	1.750	13.3
Denver	0.220	18.5	0.007	2.1	0.025	15.2	0.074	20.3	0.083	23.2	0.005	0.6	0.413	3.1
Colorado w/ Denver	0.445	37.4	0.030	9.3	0.111	68.4	0.267	73.1	0.282	78.9	0.362	47.5	1.496	11.4
Non-Colorado	0.081	6.8	0.009	2.8	0.013	8.2	0.040	11.0	0.027	7.5	0.084	11.0	0.254	1.9
Coal-fired PP	0.803	67.6	0.280	86.0	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	1.084	8.2
All other sources	0.385	32.4	0.045	14.0	0.160	99.0	0.365	100.0	0.357	100.0	0.763	100.0	12.076	91.8
Fires	0.000	0.0	0.001	0.3	0.000	0.1	0.001	0.3	0.005	1.5	0.000	0.0	0.008	0.1

Gilpin Creek
CONCENTRATION 0600-1200 95/ 8/22

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.549		-99.000		0.208		0.297		1.320		1.320		3.310	
Estimated w/ fires	0.235	-84.9	0.124	-99.0	0.136	-34.4	0.051	-82.7	0.146	-89.0	0.400	-69.7	1.092	-67.0
Estimated w/o fires	0.235	-84.9	0.123	-99.0	0.136	-34.6	0.051	-82.9	0.139	-89.4	0.400	-69.7	1.084	-67.3
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.026	11.0	0.021	16.5	0.023	16.8	0.006	10.7	0.012	8.5	0.145	36.2	0.232	21.2
Craig 1-3	0.003	1.1	0.002	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.4
Craig 1-2	0.002	0.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.2
Craig 1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.1
Craig 3	0.001	0.3	0.001	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.2
Hayden 1-2	0.022	9.4	0.006	4.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.028	2.6
Hayden 1	0.017	7.1	0.005	4.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.022	2.0
Hayden 2	0.005	2.3	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.6
Steamboat Springs	0.000	0.2	0.005	4.4	0.002	1.3	0.001	2.0	0.003	1.8	0.004	0.9	0.015	1.4
Other Yampa Valley	0.001	0.3	0.008	6.2	0.021	15.6	0.004	8.7	0.010	6.6	0.141	35.3	0.185	16.9
Non-Yampa Valley	0.209	89.0	0.103	82.6	0.113	82.9	0.045	88.3	0.127	87.2	0.255	63.8	0.852	78.0
Denver	0.086	36.6	0.011	8.5	0.015	11.3	0.008	15.1	0.024	16.7	0.001	0.3	0.145	13.3
Colorado w/ Denver	0.192	81.7	0.089	71.4	0.101	74.5	0.040	77.2	0.116	79.8	0.203	50.8	0.741	67.9
Non-Colorado	0.017	7.2	0.014	11.2	0.011	8.4	0.006	11.1	0.011	7.4	0.052	13.0	0.111	10.1
Coal-fired PP	0.071	30.1	0.009	7.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.080	7.3
All other sources	0.164	69.9	0.116	93.0	0.136	100.0	0.051	100.0	0.146	100.0	0.400	100.0	1.012	92.7
Fires	0.000	0.0	0.001	0.8	0.000	0.3	0.000	1.0	0.006	4.3	0.000	0.0	0.008	0.8

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/ 8/22 6-hour average RH: 66%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	4.626		-99.000		0.370		2.702		5.050		5.050		-99.000	
Estimated w/ fires	0.701	-84.9	0.394	-99.0	0.243	-34.4	0.468	-82.7	0.557	-89.0	1.528	-69.7	13.891	-99.0
Estimated w/o fires	0.701	-84.9	0.391	-99.0	0.242	-34.6	0.463	-82.9	0.534	-89.4	1.528	-69.7	13.858	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.077	11.0	0.065	16.5	0.041	16.8	0.050	10.7	0.047	8.5	0.553	36.2	0.834	6.0
Craig 1-3	0.008	1.1	0.005	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.1
Craig 1-2	0.005	0.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.0
Craig 1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 2	0.004	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.0
Craig 3	0.002	0.3	0.005	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.0
Hayden 1-2	0.066	9.4	0.019	4.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.085	0.6
Hayden 1	0.050	7.1	0.016	4.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.066	0.5
Hayden 2	0.016	2.3	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.018	0.1
Steamboat Springs	0.001	0.2	0.017	4.4	0.003	1.3	0.009	2.0	0.010	1.8	0.014	0.9	0.055	0.4
Other Yampa Valley	0.002	0.3	0.024	6.2	0.038	15.6	0.041	8.7	0.037	6.6	0.540	35.3	0.682	4.9
Non-Yampa Valley	0.623	89.0	0.326	82.6	0.201	82.9	0.413	88.3	0.486	87.2	0.975	63.8	3.024	21.8
Denver	0.257	36.6	0.033	8.5	0.027	11.3	0.071	15.1	0.093	16.7	0.005	0.3	0.486	3.5
Colorado w/ Denver	0.573	81.7	0.282	71.4	0.181	74.5	0.361	77.2	0.445	79.8	0.776	50.8	2.617	18.8
Non-Colorado	0.051	7.2	0.044	11.2	0.020	8.4	0.052	11.1	0.042	7.4	0.199	13.0	0.407	2.9
Coal-fired PP	0.211	30.1	0.028	7.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.239	1.7
All other sources	0.490	69.9	0.366	93.0	0.243	100.0	0.468	100.0	0.557	100.0	1.528	100.0	13.652	98.3
Fires	0.000	0.0	0.003	0.8	0.001	0.3	0.005	1.0	0.024	4.3	0.000	0.0	0.033	0.2

Gilpin Creek
CONCENTRATION 1200-1800 95/ 8/22

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.549		-99.000		0.208		0.297		1.320		1.320		3.310	
Estimated w/ fires	0.209	-86.5	0.044	-99.0	0.086	-58.5	0.033	-88.8	0.088	-93.3	0.255	-80.7	0.715	-78.4
Estimated w/o fires	0.209	-86.5	0.043	-99.0	0.086	-58.6	0.033	-88.9	0.084	-93.6	0.255	-80.7	0.710	-78.5

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.059	28.4	0.015	34.5	0.024	28.2	0.007	20.6	0.014	15.9	0.114	44.8	0.234	32.7
Craig 1-3	0.004	1.9	0.002	5.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.9
Craig 1-2	0.002	0.8	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.3
Craig 1	0.001	0.4	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 2	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 3	0.002	1.1	0.002	5.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.6
Hayden 1-2	0.054	25.8	0.008	18.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.062	8.7
Hayden 1	0.018	8.6	0.004	9.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.022	3.1
Hayden 2	0.036	17.2	0.004	8.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.040	5.5
Steamboat Springs	0.001	0.3	0.002	4.7	0.003	3.0	0.001	4.5	0.004	4.6	0.005	1.9	0.016	2.2
Other Yampa Valley	0.001	0.4	0.003	6.5	0.022	25.0	0.005	16.2	0.010	11.4	0.109	42.8	0.150	20.9
Non-Yampa Valley	0.150	71.6	0.028	64.5	0.062	71.5	0.026	78.4	0.070	79.5	0.141	55.2	0.476	66.6
Denver	0.051	24.6	0.002	4.3	0.007	7.9	0.003	10.5	0.011	12.4	0.001	0.2	0.075	10.5
Colorado w/ Denver	0.131	62.7	0.023	53.1	0.053	61.0	0.021	64.5	0.061	69.7	0.105	41.1	0.394	55.2
Non-Colorado	0.019	9.0	0.005	11.4	0.009	10.5	0.005	13.9	0.009	9.8	0.036	14.1	0.082	11.5
Coal-fired PP	0.095	45.3	0.011	25.8	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.106	14.9
All other sources	0.115	54.7	0.032	74.2	0.086	99.8	0.033	100.0	0.088	100.0	0.255	100.0	0.609	85.1
Fires	0.000	0.0	0.000	1.0	0.000	0.3	0.000	1.0	0.004	4.6	0.000	0.0	0.005	0.7

Gilpin Creek
EXTINCTION 1200-1800 95/ 8/22 6-hour average RH: 48%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	3.507		-99.000		0.333		2.702		4.371		4.371		-99.000	
Estimated w/ fires	0.474	-86.5	0.107	-99.0	0.138	-58.5	0.303	-88.8	0.291	-93.3	0.843	-80.7	12.156	-99.0
Estimated w/o fires	0.474	-86.5	0.106	-99.0	0.138	-58.6	0.300	-88.9	0.278	-93.6	0.843	-80.7	12.138	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.134	28.4	0.037	34.5	0.039	28.2	0.062	20.6	0.046	15.9	0.377	44.8	0.697	5.7
Craig 1-3	0.009	1.9	0.006	5.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.015	0.1
Craig 1-2	0.004	0.8	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.0
Craig 1	0.002	0.4	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 2	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 3	0.005	1.1	0.005	5.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.1
Hayden 1-2	0.122	25.8	0.019	18.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.142	1.2
Hayden 1	0.041	8.6	0.011	9.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.051	0.4
Hayden 2	0.081	17.2	0.009	8.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.090	0.7

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.001	0.3	0.005	4.7	0.004	3.0	0.014	4.5	0.013	4.6	0.016	1.9	0.054	0.4
Other Yampa Valley	0.002	0.4	0.007	6.5	0.035	25.0	0.049	16.2	0.033	11.4	0.361	42.8	0.487	4.0
Non-Yampa Valley	0.340	71.6	0.069	64.5	0.099	71.5	0.237	78.4	0.231	79.5	0.465	55.2	1.441	11.9
Denver	0.116	24.6	0.005	4.3	0.011	7.9	0.032	10.5	0.036	12.4	0.002	0.2	0.202	1.7
Colorado w/ Denver	0.297	62.7	0.057	53.1	0.084	61.0	0.195	64.5	0.203	69.7	0.347	41.1	1.183	9.7
Non-Colorado	0.043	9.0	0.012	11.4	0.015	10.5	0.042	13.9	0.029	9.8	0.119	14.1	0.259	2.1
Coal-fired PP	0.215	45.3	0.028	25.8	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.243	2.0
All other sources	0.259	54.7	0.079	74.2	0.138	99.8	0.303	100.0	0.291	100.0	0.843	100.0	11.913	98.0
Fires	0.000	0.0	0.001	1.0	0.000	0.3	0.003	1.0	0.013	4.6	0.000	0.0	0.018	0.1

Gilpin Creek
CONCENTRATION 0600-1200 95/ 8/23

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.910		-99.000		0.189		1.342		4.015		4.015		6.859	
Estimated w/ fires	0.158	-91.7	0.095	-99.0	0.121	-35.9	0.046	-96.6	0.118	-97.1	0.445	-88.9	0.983	-85.7
Estimated w/o fires	0.158	-91.7	0.094	-99.0	0.121	-36.1	0.045	-96.6	0.114	-97.2	0.445	-88.9	0.978	-85.7
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.008	4.9	0.011	12.1	0.028	23.3	0.007	15.9	0.016	13.8	0.191	42.8	0.262	26.6
Craig 1-3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.006	3.5	0.001	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.7
Hayden 1	0.005	3.0	0.001	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.6
Hayden 2	0.001	0.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Steamboat Springs	0.001	0.5	0.003	3.6	0.003	2.4	0.002	3.7	0.005	3.8	0.005	1.2	0.019	1.9
Other Yampa Valley	0.001	0.8	0.007	7.4	0.025	20.9	0.006	12.2	0.012	10.0	0.185	41.6	0.236	24.1
Non-Yampa Valley	0.150	95.1	0.083	87.2	0.093	76.5	0.038	83.5	0.098	83.1	0.255	57.2	0.716	72.9
Denver	0.033	20.8	0.002	2.2	0.004	3.7	0.002	5.2	0.007	6.2	0.000	0.1	0.049	5.0
Colorado w/ Denver	0.116	73.7	0.062	65.5	0.077	63.7	0.030	66.1	0.083	70.8	0.194	43.5	0.563	57.3
Non-Colorado	0.034	21.4	0.021	21.7	0.015	12.8	0.008	17.4	0.015	12.3	0.061	13.6	0.153	15.6
Coal-fired PP	0.043	27.0	0.003	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.045	4.6
All other sources	0.115	73.0	0.092	97.2	0.121	100.0	0.046	100.0	0.118	100.0	0.445	100.0	0.937	95.4
Fires	0.000	0.0	0.001	0.8	0.000	0.2	0.000	0.6	0.004	3.1	0.000	0.0	0.005	0.5

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/ 8/23 6-hour average RH: 65%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	5.628		-99.000		0.335		12.214		15.240		15.240		-99.000	
Estimated w/ fires	0.465	-91.7	0.297	-99.0	0.215	-35.9	0.414	-96.6	0.448	-97.1	1.690	-88.9	13.529	-99.0
Estimated w/o fires	0.465	-91.7	0.295	-99.0	0.214	-36.1	0.411	-96.6	0.434	-97.2	1.690	-88.9	13.510	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.023	4.9	0.036	12.1	0.050	23.3	0.066	15.9	0.062	13.8	0.724	42.8	0.960	7.1
Craig 1-3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.016	3.5	0.003	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.020	0.1
Hayden 1	0.014	3.0	0.003	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.017	0.1
Hayden 2	0.002	0.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.0
Steamboat Springs	0.002	0.5	0.011	3.6	0.005	2.4	0.015	3.7	0.017	3.8	0.020	1.2	0.071	0.5
Other Yampa Valley	0.004	0.8	0.022	7.4	0.045	20.9	0.050	12.2	0.045	10.0	0.704	41.6	0.870	6.4
Non-Yampa Valley	0.442	95.1	0.259	87.2	0.164	76.5	0.346	83.5	0.372	83.1	0.966	57.2	2.549	18.8
Denver	0.097	20.8	0.007	2.2	0.008	3.7	0.021	5.2	0.028	6.2	0.002	0.1	0.162	1.2
Colorado w/ Denver	0.343	73.7	0.195	65.5	0.137	63.7	0.274	66.1	0.317	70.8	0.736	43.5	2.000	14.8
Non-Colorado	0.100	21.4	0.064	21.7	0.027	12.8	0.072	17.4	0.055	12.3	0.230	13.6	0.549	4.1
Coal-fired PP	0.126	27.0	0.008	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.134	1.0
All other sources	0.339	73.0	0.289	97.2	0.215	100.0	0.414	100.0	0.448	100.0	1.690	100.0	13.395	99.0
Fires	0.000	0.0	0.002	0.8	0.000	0.2	0.003	0.6	0.014	3.1	0.000	0.0	0.019	0.1

Gilpin Creek
CONCENTRATION 1200-1800 95/ 8/23

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.910		-99.000		0.189		1.342		4.015		4.015		6.859	
Estimated w/ fires	0.337	-82.4	0.099	-99.0	0.065	-65.6	0.026	-98.1	0.065	-98.4	0.193	-95.2	0.785	-88.6
Estimated w/o fires	0.337	-82.4	0.098	-99.0	0.065	-65.6	0.026	-98.1	0.064	-98.4	0.193	-95.2	0.783	-88.6

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.263	78.0	0.086	87.5	0.023	34.7	0.007	26.0	0.014	21.8	0.096	49.6	0.488	62.2
Craig 1-3	0.013	3.9	0.007	7.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.020	2.6
Craig 1-2	0.010	2.9	0.003	3.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.013	1.6
Craig 1	0.004	1.3	0.002	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.8
Craig 2	0.005	1.6	0.002	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.9
Craig 3	0.003	1.0	0.004	4.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.9
Hayden 1-2	0.248	73.6	0.074	75.2	0.001	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.323	41.2
Hayden 1	0.100	29.5	0.043	43.5	0.000	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.143	18.2
Hayden 2	0.149	44.1	0.031	31.6	0.001	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.180	23.0
Steamboat Springs	0.001	0.3	0.003	2.6	0.004	5.5	0.002	8.0	0.006	8.5	0.007	3.5	0.022	2.7
Other Yampa Valley	0.001	0.2	0.002	2.4	0.018	27.5	0.005	18.0	0.009	13.2	0.089	46.0	0.123	15.7
Non-Yampa Valley	0.074	22.0	0.012	12.4	0.042	65.1	0.019	73.6	0.050	76.1	0.098	50.4	0.295	37.6
Denver	0.013	4.0	0.000	0.1	0.002	2.5	0.001	3.2	0.003	4.0	0.000	0.1	0.019	2.4
Colorado w/ Denver	0.064	19.0	0.011	11.2	0.037	56.7	0.016	62.7	0.044	68.2	0.080	41.6	0.253	32.2
Non-Colorado	0.010	3.0	0.001	1.2	0.005	8.4	0.003	10.8	0.005	7.9	0.017	8.8	0.042	5.3
Coal-fired PP	0.279	82.9	0.081	82.6	0.001	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.362	46.1
All other sources	0.058	17.1	0.017	17.4	0.064	98.2	0.026	100.0	0.065	100.0	0.193	100.0	0.423	53.9
Fires	0.000	0.0	0.000	0.1	0.000	0.1	0.000	0.4	0.001	2.1	0.000	0.0	0.002	0.2

Gilpin Creek
EXTINCTION 1200-1800 95/ 8/23 6-hour average RH: 59%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	5.031		-99.000		0.321		12.214		14.347		14.347		-99.000	
Estimated w/ fires	0.887	-82.4	0.277	-99.0	0.110	-65.6	0.236	-98.1	0.233	-98.4	0.691	-95.2	12.435	-99.0
Estimated w/o fires	0.887	-82.4	0.277	-99.0	0.110	-65.6	0.235	-98.1	0.228	-98.4	0.691	-95.2	12.428	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.692	78.0	0.243	87.5	0.038	34.7	0.061	26.0	0.051	21.8	0.342	49.6	1.428	11.5
Craig 1-3	0.034	3.9	0.020	7.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.055	0.4
Craig 1-2	0.025	2.9	0.009	3.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.035	0.3
Craig 1	0.012	1.3	0.004	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.1
Craig 2	0.014	1.6	0.005	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.019	0.2
Craig 3	0.009	1.0	0.011	4.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.020	0.2
Hayden 1-2	0.653	73.6	0.208	75.2	0.002	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.864	6.9
Hayden 1	0.262	29.5	0.121	43.5	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.383	3.1
Hayden 2	0.391	44.1	0.088	31.6	0.001	1.1	0.000	0.0	0.000	0.0	0.000	0.0	0.480	3.9

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.002	0.3	0.007	2.6	0.006	5.5	0.019	8.0	0.020	8.5	0.024	3.5	0.079	0.6
Other Yampa Valley	0.002	0.2	0.007	2.4	0.030	27.5	0.042	18.0	0.031	13.2	0.318	46.0	0.430	3.5
Non-Yampa Valley	0.195	22.0	0.034	12.4	0.072	65.1	0.174	73.6	0.177	76.1	0.348	50.4	1.001	8.0
Denver	0.035	4.0	0.000	0.1	0.003	2.5	0.008	3.2	0.009	4.0	0.001	0.1	0.056	0.4
Colorado w/ Denver	0.168	19.0	0.031	11.2	0.063	56.7	0.148	62.7	0.159	68.2	0.287	41.6	0.856	6.9
Non-Colorado	0.027	3.0	0.003	1.2	0.009	8.4	0.025	10.8	0.018	7.9	0.061	8.8	0.144	1.2
Coal-fired PP	0.735	82.9	0.229	82.6	0.002	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.967	7.8
All other sources	0.152	17.1	0.048	17.4	0.108	98.2	0.236	100.0	0.233	100.0	0.691	100.0	11.468	92.2
Fires	0.000	0.0	0.000	0.1	0.000	0.1	0.001	0.4	0.005	2.1	0.000	0.0	0.006	0.1

Gilpin Creek
CONCENTRATION 0600-1200 95/ 8/24

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.514		-99.000		0.234		0.694		0.128		0.128		1.707	
Estimated w/ fires	0.142	-72.3	0.239	-99.0	0.156	-33.3	0.059	-91.4	0.156	21.9	0.498	288.8	1.251	-26.7
Estimated w/o fires	0.142	-72.3	0.239	-99.0	0.156	-33.3	0.059	-91.5	0.156	21.5	0.498	288.8	1.251	-26.8
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.038	26.8	0.088	36.9	0.033	21.0	0.009	14.6	0.020	12.8	0.201	40.4	0.389	31.1
Craig 1-3	0.002	1.2	0.012	5.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.014	1.1
Craig 1-2	0.002	1.1	0.010	4.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.012	0.9
Craig 1	0.000	0.3	0.003	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.3
Craig 2	0.001	0.8	0.007	3.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.7
Craig 3	0.000	0.1	0.002	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.2
Hayden 1-2	0.035	24.3	0.054	22.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.089	7.1
Hayden 1	0.021	15.0	0.039	16.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.061	4.9
Hayden 2	0.013	9.3	0.015	6.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.028	2.2
Steamboat Springs	0.001	0.6	0.009	3.6	0.004	2.4	0.002	3.6	0.006	3.7	0.008	1.6	0.029	2.3
Other Yampa Valley	0.001	0.8	0.013	5.6	0.029	18.5	0.007	11.0	0.014	9.1	0.193	38.8	0.257	20.6
Non-Yampa Valley	0.104	73.2	0.151	63.1	0.123	78.9	0.051	85.3	0.136	86.8	0.297	59.6	0.861	68.8
Denver	0.007	5.3	0.004	1.5	0.003	1.9	0.001	2.4	0.005	2.9	0.000	0.1	0.020	1.6
Colorado w/ Denver	0.092	64.5	0.134	55.9	0.115	73.3	0.046	77.8	0.127	81.4	0.257	51.6	0.770	61.6
Non-Colorado	0.012	8.7	0.017	7.2	0.009	5.6	0.004	7.5	0.008	5.4	0.040	8.0	0.091	7.3
Coal-fired PP	0.039	27.5	0.067	28.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.106	8.5
All other sources	0.103	72.5	0.172	71.9	0.156	99.9	0.059	100.0	0.156	100.0	0.498	100.0	1.145	91.5
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.001	0.4	0.000	0.0	0.001	0.1

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/ 8/24 6-hour average RH: 75%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.914		-99.000		0.460		6.318		0.557		0.557		-99.000	
Estimated w/ fires	0.529	-72.3	0.933	-99.0	0.307	-33.3	0.541	-91.4	0.680	21.9	2.167	288.8	15.157	-99.0
Estimated w/o fires	0.529	-72.3	0.933	-99.0	0.307	-33.3	0.540	-91.5	0.677	21.5	2.167	288.8	15.153	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.142	26.8	0.344	36.9	0.065	21.0	0.079	14.6	0.087	12.8	0.876	40.4	1.592	10.5
Craig 1-3	0.006	1.2	0.047	5.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.053	0.4
Craig 1-2	0.006	1.1	0.040	4.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.045	0.3
Craig 1	0.001	0.3	0.012	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.1
Craig 2	0.004	0.8	0.028	3.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.032	0.2
Craig 3	0.000	0.1	0.007	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.1
Hayden 1-2	0.128	24.3	0.211	22.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.340	2.2
Hayden 1	0.079	15.0	0.154	16.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.233	1.5
Hayden 2	0.049	9.3	0.058	6.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.107	0.7
Steamboat Springs	0.003	0.6	0.033	3.6	0.007	2.4	0.019	3.6	0.025	3.7	0.036	1.6	0.124	0.8
Other Yampa Valley	0.004	0.8	0.053	5.6	0.057	18.5	0.059	11.0	0.062	9.1	0.840	38.8	1.075	7.1
Non-Yampa Valley	0.387	73.2	0.589	63.1	0.242	78.9	0.461	85.3	0.590	86.8	1.291	59.6	3.561	23.5
Denver	0.028	5.3	0.014	1.5	0.006	1.9	0.013	2.4	0.020	2.9	0.001	0.1	0.082	0.5
Colorado w/ Denver	0.341	64.5	0.522	55.9	0.225	73.3	0.421	77.8	0.553	81.4	1.118	51.6	3.180	21.0
Non-Colorado	0.046	8.7	0.067	7.2	0.017	5.6	0.041	7.5	0.037	5.4	0.173	8.0	0.381	2.5
Coal-fired PP	0.146	27.5	0.262	28.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.408	2.7
All other sources	0.384	72.5	0.671	71.9	0.307	99.9	0.541	100.0	0.680	100.0	2.167	100.0	14.749	97.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.003	0.4	0.000	0.0	0.004	0.0

Gilpin Creek
CONCENTRATION 1200-1800 95/ 8/24

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	0.514		-99.000		0.234		0.694		0.128		0.128		1.707	
Estimated w/ fires	0.290	-43.6	0.100	-99.0	0.076	-67.4	0.028	-95.9	0.068	-46.6	0.241	87.7	0.804	-52.9
Estimated w/o fires	0.290	-43.6	0.100	-99.0	0.076	-67.4	0.028	-95.9	0.068	-46.9	0.241	87.7	0.803	-52.9

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.213	73.5	0.077	77.0	0.029	37.8	0.007	26.4	0.015	22.6	0.123	51.3	0.465	57.9
Craig 1-3	0.014	4.8	0.011	11.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.025	3.1
Craig 1-2	0.012	4.1	0.009	8.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.021	2.6
Craig 1	0.006	2.2	0.003	2.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	1.2
Craig 2	0.005	1.8	0.006	5.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.011	1.4
Craig 3	0.002	0.7	0.003	2.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.6
Hayden 1-2	0.197	68.1	0.059	58.5	0.001	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.257	31.9
Hayden 1	0.090	31.0	0.042	41.9	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.132	16.4
Hayden 2	0.108	37.1	0.017	16.6	0.000	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.125	15.5
Steamboat Springs	0.001	0.2	0.002	2.2	0.001	1.9	0.001	2.9	0.002	3.2	0.003	1.4	0.010	1.3
Other Yampa Valley	0.001	0.4	0.005	5.3	0.027	34.9	0.007	23.5	0.013	19.4	0.120	49.9	0.173	21.5
Non-Yampa Valley	0.077	26.5	0.023	23.0	0.048	62.2	0.021	73.5	0.053	77.0	0.117	48.7	0.338	42.0
Denver	0.001	0.3	0.000	0.1	0.001	0.7	0.000	0.9	0.001	1.2	0.000	0.0	0.003	0.3
Colorado w/ Denver	0.047	16.3	0.016	15.7	0.040	52.0	0.017	58.8	0.045	66.0	0.086	35.6	0.250	31.1
Non-Colorado	0.030	10.3	0.007	7.3	0.008	10.2	0.004	14.7	0.008	11.0	0.032	13.1	0.088	11.0
Coal-fired PP	0.222	76.7	0.072	71.7	0.001	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.295	36.7
All other sources	0.068	23.3	0.028	28.3	0.076	99.0	0.028	100.0	0.068	100.0	0.241	100.0	0.509	63.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.5	0.000	0.0	0.000	0.0

Gilpin Creek
EXTINCTION 1200-1800 95/ 8/24 6-hour average RH: 71%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.729		-99.000		0.439		6.318		0.525		0.525		-99.000	
Estimated w/ fires	0.975	-43.6	0.355	-99.0	0.143	-67.4	0.257	-95.9	0.280	-46.6	0.985	87.7	12.995	-99.0
Estimated w/o fires	0.975	-43.6	0.355	-99.0	0.143	-67.4	0.256	-95.9	0.279	-46.9	0.985	87.7	12.993	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.716	73.5	0.274	77.0	0.054	37.8	0.068	26.4	0.063	22.6	0.505	51.3	1.681	12.9
Craig 1-3	0.047	4.8	0.040	11.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.087	0.7
Craig 1-2	0.040	4.1	0.031	8.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.070	0.5
Craig 1	0.022	2.2	0.010	2.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.032	0.2
Craig 2	0.018	1.8	0.020	5.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.038	0.3
Craig 3	0.007	0.7	0.009	2.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.1
Hayden 1-2	0.664	68.1	0.208	58.5	0.001	0.9	0.000	0.0	0.000	0.0	0.000	0.0	0.873	6.7
Hayden 1	0.302	31.0	0.149	41.9	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.451	3.5
Hayden 2	0.362	37.1	0.059	16.6	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.421	3.2

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.002	0.2	0.008	2.2	0.003	1.9	0.007	2.9	0.009	3.2	0.013	1.4	0.042	0.3
Other Yampa Valley	0.004	0.4	0.019	5.3	0.050	34.9	0.060	23.5	0.054	19.4	0.492	49.9	0.679	5.2
Non-Yampa Valley	0.258	26.5	0.082	23.0	0.089	62.2	0.188	73.5	0.215	77.0	0.480	48.7	1.313	10.1
Denver	0.003	0.3	0.000	0.1	0.001	0.7	0.002	0.9	0.003	1.2	0.000	0.0	0.011	0.1
Colorado w/ Denver	0.158	16.3	0.056	15.7	0.075	52.0	0.151	58.8	0.185	66.0	0.350	35.6	0.974	7.5
Non-Colorado	0.100	10.3	0.026	7.3	0.015	10.2	0.038	14.7	0.031	11.0	0.129	13.1	0.338	2.6
Coal-fired PP	0.748	76.7	0.255	71.7	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	1.004	7.7
All other sources	0.227	23.3	0.101	28.3	0.142	99.0	0.257	100.0	0.280	100.0	0.985	100.0	11.991	92.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.001	0.5	0.000	0.0	0.002	0.0

Gilpin Creek
CONCENTRATION 0600-1200 95/ 8/25

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.033		-99.000		0.315		1.099		0.865		0.865		3.284	
Estimated w/ fires	0.289	-72.0	0.277	-99.0	0.151	-52.1	0.055	-95.0	0.138	-84.0	0.555	-35.9	1.466	-55.4
Estimated w/o fires	0.289	-72.0	0.277	-99.0	0.151	-52.1	0.055	-95.0	0.138	-84.0	0.555	-35.9	1.465	-55.4
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.081	28.1	0.070	25.4	0.027	17.6	0.006	11.1	0.013	9.4	0.155	28.0	0.353	24.1
Craig 1-3	0.025	8.8	0.033	12.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.059	4.0
Craig 1-2	0.023	7.9	0.027	9.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.050	3.4
Craig 1	0.009	3.2	0.010	3.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.019	1.3
Craig 2	0.014	4.7	0.017	6.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.031	2.1
Craig 3	0.003	0.9	0.006	2.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.6
Hayden 1-2	0.054	18.6	0.022	8.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.076	5.2
Hayden 1	0.028	9.6	0.015	5.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.043	2.9
Hayden 2	0.026	9.0	0.007	2.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.033	2.3
Steamboat Springs	0.000	0.2	0.003	1.0	0.001	0.5	0.000	0.8	0.001	0.8	0.002	0.3	0.007	0.5
Other Yampa Valley	0.002	0.6	0.012	4.4	0.026	17.0	0.006	10.3	0.012	8.5	0.154	27.7	0.211	14.4
Non-Yampa Valley	0.208	71.9	0.207	74.6	0.124	82.4	0.049	88.9	0.125	90.5	0.399	72.0	1.113	75.9
Denver	0.015	5.0	0.004	1.3	0.003	1.9	0.001	2.4	0.004	3.0	0.000	0.0	0.027	1.8
Colorado w/ Denver	0.081	28.0	0.138	49.6	0.098	64.8	0.035	63.2	0.100	72.0	0.280	50.6	0.731	49.9
Non-Colorado	0.127	43.9	0.069	25.0	0.026	17.6	0.014	25.7	0.026	18.4	0.119	21.4	0.381	26.0
Coal-fired PP	0.121	41.8	0.063	22.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.185	12.6
All other sources	0.168	58.2	0.214	77.1	0.151	99.8	0.055	100.0	0.138	100.0	0.555	100.0	1.281	87.4
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0

Table B.2.3.12b (continued)

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/ 8/25 6-hour average RH: 74%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	3.788		-99.000		0.614		9.998		3.726		3.726		-99.000	
Estimated w/ fires	1.061	-72.0	1.068	-99.0	0.294	-52.1	0.502	-95.0	0.596	-84.0	2.390	-35.9	15.912	-99.0
Estimated w/o fires	1.061	-72.0	1.068	-99.0	0.294	-52.1	0.502	-95.0	0.595	-84.0	2.390	-35.9	15.911	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.298	28.1	0.271	25.4	0.052	17.6	0.056	11.1	0.056	9.4	0.669	28.0	1.402	8.8
Craig 1-3	0.093	8.8	0.128	12.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.222	1.4
Craig 1-2	0.083	7.9	0.104	9.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.188	1.2
Craig 1	0.034	3.2	0.037	3.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.071	0.4
Craig 2	0.050	4.7	0.067	6.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.117	0.7
Craig 3	0.010	0.9	0.024	2.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.034	0.2
Hayden 1-2	0.197	18.6	0.086	8.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.283	1.8
Hayden 1	0.102	9.6	0.057	5.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.159	1.0
Hayden 2	0.095	9.0	0.028	2.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.124	0.8
Steamboat Springs	0.002	0.2	0.010	1.0	0.001	0.5	0.004	0.8	0.005	0.8	0.007	0.3	0.029	0.2
Other Yampa Valley	0.006	0.6	0.047	4.4	0.050	17.0	0.052	10.3	0.051	8.5	0.663	27.7	0.868	5.5
Non-Yampa Valley	0.763	71.9	0.796	74.6	0.243	82.4	0.446	88.9	0.539	90.5	1.721	72.0	4.508	28.3
Denver	0.053	5.0	0.014	1.3	0.006	1.9	0.012	2.4	0.018	3.0	0.001	0.0	0.104	0.7
Colorado w/ Denver	0.297	28.0	0.529	49.6	0.191	64.8	0.318	63.2	0.429	72.0	1.209	50.6	2.973	18.7
Non-Colorado	0.465	43.9	0.267	25.0	0.052	17.6	0.129	25.7	0.110	18.4	0.512	21.4	1.535	9.6
Coal-fired PP	0.444	41.8	0.244	22.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.689	4.3
All other sources	0.617	58.2	0.823	77.1	0.294	99.8	0.502	100.0	0.596	100.0	2.390	100.0	15.223	95.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.001	0.0

Gilpin Creek
CONCENTRATION 1200-1800 95/ 8/25

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.033		-99.000		0.315		1.099		0.865		0.865		3.284	
Estimated w/ fires	0.367	-64.5	0.045	-99.0	0.089	-71.7	0.034	-96.9	0.079	-90.9	0.301	-65.2	0.914	-72.2
Estimated w/o fires	0.367	-64.5	0.045	-99.0	0.089	-71.7	0.034	-96.9	0.079	-90.9	0.301	-65.2	0.914	-72.2

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.195	53.2	0.021	47.9	0.026	29.2	0.006	19.0	0.012	15.3	0.125	41.5	0.386	42.2
Craig 1-3	0.047	12.8	0.012	26.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.059	6.4
Craig 1-2	0.040	11.0	0.009	21.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.050	5.4
Craig 1	0.017	4.7	0.003	5.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.020	2.1
Craig 2	0.023	6.3	0.007	15.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.030	3.3
Craig 3	0.007	1.8	0.002	5.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	1.0
Hayden 1-2	0.146	39.8	0.007	15.9	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.154	16.8
Hayden 1	0.076	20.6	0.004	10.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.080	8.8
Hayden 2	0.070	19.2	0.003	5.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.073	8.0
Steamboat Springs	0.000	0.1	0.000	0.5	0.001	0.7	0.000	1.1	0.001	1.2	0.001	0.5	0.004	0.4
Other Yampa Valley	0.002	0.4	0.002	4.9	0.025	28.1	0.006	17.9	0.011	14.1	0.124	41.1	0.170	18.6
Non-Yampa Valley	0.172	46.8	0.023	52.1	0.063	70.8	0.027	81.0	0.066	84.4	0.176	58.5	0.528	57.8
Denver	0.012	3.2	0.000	0.9	0.001	1.6	0.001	1.9	0.002	2.6	0.000	0.0	0.016	1.8
Colorado w/ Denver	0.068	18.5	0.015	33.1	0.047	53.2	0.019	56.6	0.052	65.8	0.120	39.7	0.320	35.0
Non-Colorado	0.104	28.4	0.008	18.9	0.016	17.6	0.008	24.4	0.015	18.6	0.056	18.8	0.208	22.7
Coal-fired PP	0.242	66.0	0.021	47.1	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.264	28.9
All other sources	0.125	34.0	0.024	52.9	0.088	99.4	0.034	100.0	0.079	100.0	0.301	100.0	0.650	71.1
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.3	0.000	0.0	0.000	0.0

Gilpin Creek
EXTINCTION 1200-1800 95/ 8/25 6-hour average RH: 39%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.117		-99.000		0.489		9.998		2.730		2.730		-99.000	
Estimated w/ fires	0.753	-64.5	0.099	-99.0	0.138	-71.7	0.305	-96.9	0.249	-90.9	0.951	-65.2	12.495	-99.0
Estimated w/o fires	0.753	-64.5	0.099	-99.0	0.138	-71.7	0.305	-96.9	0.248	-90.9	0.951	-65.2	12.494	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.400	53.2	0.048	47.9	0.040	29.2	0.058	19.0	0.038	15.3	0.395	41.5	0.979	7.8
Craig 1-3	0.096	12.8	0.026	26.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.123	1.0
Craig 1-2	0.083	11.0	0.021	21.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.104	0.8
Craig 1	0.035	4.7	0.006	5.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.041	0.3
Craig 2	0.048	6.3	0.015	15.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.063	0.5
Craig 3	0.014	1.8	0.006	5.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.019	0.2
Hayden 1-2	0.300	39.8	0.016	15.9	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.316	2.5
Hayden 1	0.155	20.6	0.010	10.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.165	1.3
Hayden 2	0.144	19.2	0.006	5.9	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.150	1.2

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.001	0.1	0.001	0.5	0.001	0.7	0.003	1.1	0.003	1.2	0.004	0.5	0.013	0.1
Other Yampa Valley	0.003	0.4	0.005	4.9	0.039	28.1	0.055	17.9	0.035	14.1	0.390	41.1	0.527	4.2
Non-Yampa Valley	0.353	46.8	0.052	52.1	0.098	70.8	0.247	81.0	0.210	84.4	0.556	58.5	1.515	12.1
Denver	0.024	3.2	0.001	0.9	0.002	1.6	0.006	1.9	0.007	2.6	0.000	0.0	0.040	0.3
Colorado w/ Denver	0.139	18.5	0.033	33.1	0.074	53.2	0.173	56.6	0.164	65.8	0.378	39.7	0.960	7.7
Non-Colorado	0.214	28.4	0.019	18.9	0.024	17.6	0.074	24.4	0.046	18.6	0.178	18.8	0.556	4.4
Coal-fired PP	0.497	66.0	0.047	47.1	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.545	4.4
All other sources	0.256	34.0	0.053	52.9	0.137	99.4	0.305	100.0	0.249	100.0	0.951	100.0	11.950	95.6
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.001	0.3	0.000	0.0	0.001	0.0

Gilpin Creek
CONCENTRATION 0600-1200 95/ 8/26

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.320		-99.000		0.198		1.026		1.082		1.082		3.738	
Estimated w/ fires	0.917	-30.6	0.598	-99.0	0.220	11.6	0.083	-92.0	0.215	-80.1	0.658	-39.2	2.691	-28.0
Estimated w/o fires	0.917	-30.6	0.598	-99.0	0.220	11.6	0.082	-92.0	0.215	-80.1	0.658	-39.2	2.690	-28.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.614	67.0	0.361	60.4	0.048	21.9	0.013	15.6	0.032	14.7	0.210	31.9	1.278	47.5
Craig 1-3	0.146	15.9	0.135	22.5	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.281	10.4
Craig 1-2	0.128	13.9	0.095	15.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.223	8.3
Craig 1	0.054	5.9	0.043	7.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.097	3.6
Craig 2	0.074	8.1	0.052	8.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.126	4.7
Craig 3	0.018	2.0	0.040	6.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.058	2.1
Hayden 1-2	0.465	50.7	0.208	34.9	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.674	25.1
Hayden 1	0.255	27.8	0.140	23.5	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.396	14.7
Hayden 2	0.210	22.9	0.068	11.4	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.278	10.3
Steamboat Springs	0.001	0.1	0.005	0.8	0.003	1.5	0.002	2.3	0.005	2.3	0.006	0.9	0.021	0.8
Other Yampa Valley	0.003	0.3	0.013	2.2	0.044	19.8	0.011	13.3	0.027	12.4	0.204	31.0	0.301	11.2
Non-Yampa Valley	0.303	33.0	0.237	39.6	0.172	78.1	0.070	84.4	0.183	85.1	0.448	68.1	1.413	52.5
Denver	0.031	3.4	0.009	1.5	0.004	1.8	0.002	2.3	0.006	2.8	0.000	0.1	0.052	1.9
Colorado w/ Denver	0.151	16.5	0.133	22.3	0.143	64.9	0.055	66.1	0.155	72.1	0.314	47.7	0.951	35.3
Non-Colorado	0.152	16.5	0.104	17.4	0.029	13.2	0.015	18.3	0.028	13.0	0.134	20.4	0.462	17.2
Coal-fired PP	0.684	74.6	0.363	60.8	0.002	0.8	0.000	0.0	0.000	0.0	0.000	0.0	1.049	39.0
All other sources	0.233	25.4	0.234	39.2	0.219	99.2	0.083	100.0	0.215	100.0	0.658	100.0	1.641	61.0
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/ 8/26 6-hour average RH: 50%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	3.069		-99.000		0.320		9.333		3.629		3.629		-99.000	
Estimated w/ fires	2.131	-30.6	1.498	-99.0	0.357	11.6	0.751	-92.0	0.722	-80.1	2.206	-39.2	17.665	-99.0
Estimated w/o fires	2.131	-30.6	1.498	-99.0	0.357	11.6	0.751	-92.0	0.721	-80.1	2.206	-39.2	17.663	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.428	67.0	0.904	60.4	0.078	21.9	0.117	15.6	0.106	14.7	0.703	31.9	3.336	18.9
Craig 1-3	0.339	15.9	0.337	22.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.677	3.8
Craig 1-2	0.297	13.9	0.237	15.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.535	3.0
Craig 1	0.125	5.9	0.107	7.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.232	1.3
Craig 2	0.172	8.1	0.131	8.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.303	1.7
Craig 3	0.042	2.0	0.100	6.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.142	0.8
Hayden 1-2	1.080	50.7	0.522	34.9	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	1.604	9.1
Hayden 1	0.593	27.8	0.352	23.5	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.945	5.4
Hayden 2	0.487	22.9	0.170	11.4	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.659	3.7
Steamboat Springs	0.002	0.1	0.012	0.8	0.005	1.5	0.017	2.3	0.017	2.3	0.019	0.9	0.072	0.4
Other Yampa Valley	0.007	0.3	0.033	2.2	0.071	19.8	0.100	13.3	0.089	12.4	0.683	31.0	0.983	5.6
Non-Yampa Valley	0.703	33.0	0.594	39.6	0.279	78.1	0.634	84.4	0.614	85.1	1.503	68.1	4.327	24.5
Denver	0.072	3.4	0.022	1.5	0.006	1.8	0.018	2.3	0.020	2.8	0.001	0.1	0.140	0.8
Colorado w/ Denver	0.351	16.5	0.333	22.3	0.232	64.9	0.496	66.1	0.521	72.1	1.053	47.7	2.986	16.9
Non-Colorado	0.352	16.5	0.260	17.4	0.047	13.2	0.137	18.3	0.094	13.0	0.450	20.4	1.341	7.6
Coal-fired PP	1.590	74.6	0.911	60.8	0.003	0.8	0.000	0.0	0.000	0.0	0.000	0.0	2.504	14.2
All other sources	0.541	25.4	0.587	39.2	0.355	99.2	0.751	100.0	0.722	100.0	2.205	100.0	15.161	85.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.002	0.0

Gilpin Creek
CONCENTRATION 1200-1800 95/ 8/26

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.320		-99.000		0.198		1.026		1.082		1.082		3.738	
Estimated w/ fires	0.878	-33.5	0.076	-99.0	0.163	-17.5	0.062	-94.0	0.167	-84.6	0.384	-64.5	1.730	-53.7
Estimated w/o fires	0.878	-33.5	0.076	-99.0	0.163	-17.5	0.062	-94.0	0.167	-84.6	0.384	-64.5	1.730	-53.7

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.594	67.6	0.054	71.2	0.035	21.6	0.009	15.2	0.021	12.6	0.148	38.5	0.861	49.8
Craig 1-3	0.171	19.4	0.026	34.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.197	11.4
Craig 1-2	0.147	16.8	0.015	19.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.162	9.4
Craig 1	0.064	7.3	0.007	9.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.072	4.1
Craig 2	0.083	9.5	0.008	10.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.091	5.3
Craig 3	0.023	2.6	0.011	14.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.034	2.0
Hayden 1-2	0.420	47.8	0.026	34.7	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.447	25.8
Hayden 1	0.212	24.2	0.015	20.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.228	13.2
Hayden 2	0.207	23.6	0.011	14.5	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.219	12.6
Steamboat Springs	0.001	0.1	0.001	0.7	0.002	1.4	0.001	2.1	0.004	2.1	0.004	1.1	0.013	0.7
Other Yampa Valley	0.002	0.3	0.001	1.8	0.032	19.5	0.008	13.1	0.017	10.5	0.144	37.4	0.205	11.9
Non-Yampa Valley	0.284	32.4	0.022	28.8	0.128	78.4	0.052	84.7	0.146	87.2	0.236	61.5	0.868	50.2
Denver	0.054	6.2	0.002	2.1	0.008	4.9	0.004	6.3	0.012	7.2	0.001	0.2	0.081	4.7
Colorado w/ Denver	0.180	20.5	0.016	20.9	0.113	69.3	0.045	72.8	0.132	78.8	0.176	45.7	0.661	38.2
Non-Colorado	0.105	11.9	0.006	7.9	0.015	9.1	0.007	12.0	0.014	8.4	0.061	15.7	0.208	12.0
Coal-fired PP	0.697	79.4	0.055	72.5	0.001	0.8	0.000	0.0	0.000	0.0	0.000	0.0	0.753	43.5
All other sources	0.181	20.6	0.021	27.5	0.162	99.2	0.062	100.0	0.167	100.0	0.384	100.0	0.977	56.5
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0

Gilpin Creek
EXTINCTION 1200-1800 95/ 8/26 6-hour average RH: 27%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	2.459		-99.000		0.298		9.333		3.273		3.273		-99.000	
Estimated w/ fires	1.635	-33.5	0.155	-99.0	0.246	-17.5	0.563	-94.0	0.505	-84.6	1.163	-64.5	14.266	-99.0
Estimated w/o fires	1.635	-33.5	0.155	-99.0	0.246	-17.5	0.563	-94.0	0.504	-84.6	1.163	-64.5	14.265	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.105	67.6	0.110	71.2	0.053	21.6	0.086	15.2	0.064	12.6	0.448	38.5	1.866	13.1
Craig 1-3	0.318	19.4	0.053	34.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.371	2.6
Craig 1-2	0.275	16.8	0.030	19.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.305	2.1
Craig 1	0.120	7.3	0.014	9.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.134	0.9
Craig 2	0.155	9.5	0.016	10.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.171	1.2
Craig 3	0.043	2.6	0.023	14.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.066	0.5
Hayden 1-2	0.781	47.8	0.054	34.7	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.836	5.9
Hayden 1	0.396	24.2	0.031	20.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.427	3.0
Hayden 2	0.386	23.6	0.022	14.5	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.409	2.9

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.002	0.1	0.001	0.7	0.003	1.4	0.012	2.1	0.011	2.1	0.013	1.1	0.041	0.3
Other Yampa Valley	0.005	0.3	0.003	1.8	0.048	19.5	0.074	13.1	0.053	10.5	0.435	37.4	0.617	4.3
Non-Yampa Valley	0.530	32.4	0.045	28.8	0.193	78.4	0.477	84.7	0.440	87.2	0.715	61.5	2.399	16.8
Denver	0.101	6.2	0.003	2.1	0.012	4.9	0.035	6.3	0.037	7.2	0.002	0.2	0.191	1.3
Colorado w/ Denver	0.335	20.5	0.032	20.9	0.170	69.3	0.410	72.8	0.398	78.8	0.532	45.7	1.877	13.2
Non-Colorado	0.195	11.9	0.012	7.9	0.022	9.1	0.067	12.0	0.042	8.4	0.183	15.7	0.522	3.7
Coal-fired PP	1.298	79.4	0.112	72.5	0.002	0.8	0.000	0.0	0.000	0.0	0.000	0.0	1.413	9.9
All other sources	0.337	20.6	0.042	27.5	0.244	99.2	0.563	100.0	0.505	100.0	1.162	100.0	12.854	90.1
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.001	0.0

Gilpin Creek
CONCENTRATION 0600-1200 95/ 8/27

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.510		-99.000		0.279		0.750		0.042		0.042		2.751	
Estimated w/ fires	1.342	-11.1	0.472	-99.0	0.462	65.4	0.180	-76.0	0.542	999.9	0.822	999.9	3.820	38.9
Estimated w/o fires	1.342	-11.1	0.472	-99.0	0.462	65.3	0.180	-76.0	0.541	999.9	0.822	999.9	3.819	38.8
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.503	37.4	0.137	28.9	0.046	9.9	0.012	6.9	0.039	7.2	0.220	26.7	0.956	25.0
Craig 1-3	0.133	9.9	0.054	11.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.188	4.9
Craig 1-2	0.111	8.3	0.034	7.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.146	3.8
Craig 1	0.051	3.8	0.019	4.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.070	1.8
Craig 2	0.060	4.5	0.015	3.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.076	2.0
Craig 3	0.022	1.7	0.020	4.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.043	1.1
Hayden 1-2	0.365	27.2	0.073	15.5	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.439	11.5
Hayden 1	0.183	13.6	0.046	9.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.229	6.0
Hayden 2	0.183	13.6	0.027	5.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.211	5.5
Steamboat Springs	0.001	0.1	0.001	0.2	0.001	0.3	0.001	0.4	0.002	0.3	0.002	0.3	0.008	0.2
Other Yampa Valley	0.003	0.2	0.008	1.8	0.043	9.4	0.012	6.5	0.037	6.9	0.217	26.4	0.321	8.4
Non-Yampa Valley	0.840	62.6	0.335	71.1	0.416	90.1	0.168	93.1	0.502	92.7	0.602	73.3	2.863	75.0
Denver	0.314	23.4	0.042	8.8	0.056	12.2	0.028	15.8	0.089	16.3	0.005	0.6	0.534	14.0
Colorado w/ Denver	0.730	54.4	0.306	64.8	0.388	84.0	0.154	85.3	0.475	87.6	0.478	58.2	2.531	66.2
Non-Colorado	0.110	8.2	0.029	6.2	0.028	6.1	0.014	7.8	0.027	5.1	0.123	15.0	0.333	8.7
Coal-fired PP	0.874	65.1	0.155	32.9	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	1.031	27.0
All other sources	0.469	34.9	0.317	67.1	0.460	99.7	0.180	100.0	0.542	100.0	0.821	100.0	2.789	73.0
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1	0.000	0.0	0.001	0.0

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

Gilpin Creek
EXTINCTION 0600-1200 95/ 8/27 6-hour average RH: 53%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	3.653		-99.000		0.459		6.823		0.143		0.143		-99.000	
Estimated w/ fires	3.247	-11.1	1.227	-99.0	0.759	65.4	1.639	-76.0	1.853	999.9	2.810	999.9	21.535	-99.0
Estimated w/o fires	3.247	-11.1	1.227	-99.0	0.759	65.3	1.638	-76.0	1.852	999.9	2.810	999.9	21.533	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.216	37.4	0.355	28.9	0.075	9.9	0.113	6.9	0.134	7.2	0.751	26.7	2.643	12.3
Craig 1-3	0.323	9.9	0.141	11.5	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.465	2.2
Craig 1-2	0.269	8.3	0.089	7.2	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.358	1.7
Craig 1	0.122	3.8	0.050	4.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.172	0.8
Craig 2	0.146	4.5	0.039	3.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.186	0.9
Craig 3	0.054	1.7	0.053	4.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.106	0.5
Hayden 1-2	0.884	27.2	0.190	15.5	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	1.075	5.0
Hayden 1	0.441	13.6	0.119	9.7	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.561	2.6
Hayden 2	0.442	13.6	0.071	5.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.514	2.4
Steamboat Springs	0.002	0.1	0.002	0.2	0.002	0.3	0.006	0.4	0.006	0.3	0.008	0.3	0.026	0.1
Other Yampa Valley	0.008	0.2	0.021	1.8	0.071	9.4	0.107	6.5	0.128	6.9	0.742	26.4	1.077	5.0
Non-Yampa Valley	2.031	62.6	0.872	71.1	0.684	90.1	1.526	93.1	1.718	92.7	2.059	73.3	8.889	41.3
Denver	0.759	23.4	0.108	8.8	0.093	12.2	0.258	15.8	0.303	16.3	0.017	0.6	1.538	7.1
Colorado w/ Denver	1.765	54.4	0.795	64.8	0.638	84.0	1.398	85.3	1.624	87.6	1.637	58.2	7.857	36.5
Non-Colorado	0.266	8.2	0.076	6.2	0.046	6.1	0.127	7.8	0.094	5.1	0.422	15.0	1.033	4.8
Coal-fired PP	2.113	65.1	0.404	32.9	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	2.520	11.7
All other sources	1.134	34.9	0.823	67.1	0.757	99.7	1.639	100.0	1.853	100.0	2.810	100.0	19.015	88.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.1	0.000	0.0	0.002	0.0

Gilpin Creek
CONCENTRATION 1200-1800 95/ 8/27

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	1.510		-99.000		0.279		0.750		0.042		0.042		2.751	
Estimated w/ fires	1.706	12.9	0.417	-99.0	0.296	6.1	0.116	-84.5	0.349	733.2	0.459	995.5	3.343	21.5
Estimated w/o fires	1.706	12.9	0.417	-99.0	0.296	6.1	0.116	-84.5	0.349	732.4	0.459	995.5	3.343	21.5

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.955	56.0	0.289	69.2	0.045	15.3	0.013	11.5	0.035	10.1	0.156	33.9	1.494	44.7
Craig 1-3	0.198	11.6	0.071	17.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.270	8.1
Craig 1-2	0.163	9.6	0.044	10.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.208	6.2
Craig 1	0.078	4.6	0.026	6.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.104	3.1
Craig 2	0.086	5.0	0.018	4.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.104	3.1
Craig 3	0.035	2.1	0.027	6.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.062	1.9
Hayden 1-2	0.753	44.1	0.209	50.0	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.963	28.8
Hayden 1	0.344	20.2	0.123	29.5	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.468	14.0
Hayden 2	0.408	23.9	0.086	20.5	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.495	14.8
Steamboat Springs	0.001	0.1	0.004	1.0	0.005	1.7	0.003	2.4	0.008	2.2	0.009	2.0	0.030	0.9
Other Yampa Valley	0.003	0.2	0.005	1.2	0.038	12.9	0.011	9.1	0.027	7.9	0.146	31.9	0.231	6.9
Non-Yampa Valley	0.750	44.0	0.128	30.8	0.251	84.6	0.103	88.4	0.314	89.9	0.303	66.1	1.849	55.3
Denver	0.324	19.0	0.029	7.0	0.047	15.8	0.024	20.2	0.074	21.1	0.004	0.9	0.501	15.0
Colorado w/ Denver	0.672	39.4	0.122	29.3	0.238	80.3	0.097	83.0	0.301	86.3	0.246	53.6	1.676	50.1
Non-Colorado	0.079	4.6	0.006	1.5	0.013	4.3	0.006	5.4	0.012	3.5	0.057	12.4	0.173	5.2
Coal-fired PP	1.328	77.8	0.300	71.9	0.003	0.9	0.000	0.0	0.000	0.0	0.000	0.0	1.630	48.8
All other sources	0.378	22.2	0.117	28.1	0.294	99.1	0.116	100.0	0.349	100.0	0.459	100.0	1.713	51.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0

Gilpin Creek
EXTINCTION 1200-1800 95/ 8/27 6-hour average RH: 49%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	3.447		-99.000		0.450		6.823		0.139		0.139		-99.000	
Estimated w/ fires	3.893	12.9	1.027	-99.0	0.477	6.1	1.058	-84.5	1.160	733.2	1.525	995.5	19.139	-99.0
Estimated w/o fires	3.893	12.9	1.027	-99.0	0.477	6.1	1.058	-84.5	1.158	732.4	1.525	995.5	19.138	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	2.180	56.0	0.711	69.2	0.073	15.3	0.122	11.5	0.117	10.1	0.518	33.9	3.720	19.4
Craig 1-3	0.453	11.6	0.175	17.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.629	3.3
Craig 1-2	0.373	9.6	0.109	10.6	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.483	2.5
Craig 1	0.177	4.6	0.065	6.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.243	1.3
Craig 2	0.195	5.0	0.044	4.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.240	1.3
Craig 3	0.080	2.1	0.066	6.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.146	0.8
Hayden 1-2	1.718	44.1	0.514	50.0	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	2.235	11.7
Hayden 1	0.786	20.2	0.303	29.5	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	1.090	5.7
Hayden 2	0.932	23.9	0.211	20.5	0.002	0.4	0.000	0.0	0.000	0.0	0.000	0.0	1.145	6.0

Table B.2.3.12b (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Gilpin Creek for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.003	0.1	0.010	1.0	0.008	1.7	0.026	2.4	0.025	2.2	0.030	2.0	0.102	0.5
Other Yampa Valley	0.007	0.2	0.012	1.2	0.062	12.9	0.096	9.1	0.091	7.9	0.487	31.9	0.755	3.9
Non-Yampa Valley	1.712	44.0	0.316	30.8	0.404	84.6	0.936	88.4	1.042	89.9	1.007	66.1	5.418	28.3
Denver	0.739	19.0	0.072	7.0	0.075	15.8	0.214	20.2	0.245	21.1	0.014	0.9	1.359	7.1
Colorado w/ Denver	1.533	39.4	0.301	29.3	0.383	80.3	0.879	83.0	1.001	86.3	0.817	53.6	4.915	25.7
Non-Colorado	0.179	4.6	0.015	1.5	0.021	4.3	0.057	5.4	0.041	3.5	0.190	12.4	0.503	2.6
Coal-fired PP	3.030	77.8	0.738	71.9	0.004	0.9	0.000	0.0	0.000	0.0	0.001	0.0	3.773	19.7
All other sources	0.863	22.2	0.289	28.1	0.473	99.1	1.058	100.0	1.160	100.0	1.524	100.0	15.366	80.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1	0.000	0.0	0.001	0.0

Table B.2.3.12c

CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

[This table also presents six-hour concentrations from filter measurements, as well as extinction estimated from the filter measurements using identical extinction efficiencies as applied to predicted concentrations. Source attributions are presented for all 12 source regions/types modeled with CALPUFF, and present results from each six-hour daylight period (0600-1200, and 1200-1800 LST).]

Mad Creek
CONCENTRATION 0600-1200 95/ 8/21

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.508	-99.0	0.317	-99.0	0.234	-99.0	0.093	-99.0	0.262	-99.0	0.576	-99.0	1.989	-99.0
Estimated w/o fires	0.508	-99.0	0.316	-99.0	0.234	-99.0	0.093	-99.0	0.260	-99.0	0.576	-99.0	1.986	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.125	24.6	0.096	30.3	0.042	17.8	0.012	13.4	0.029	11.2	0.229	39.8	0.534	26.8
Craig 1-3	0.014	2.7	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.8
Craig 1-2	0.012	2.3	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.7
Craig 1	0.005	1.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.3
Craig 2	0.007	1.3	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.008	0.4
Craig 3	0.002	0.4	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.1
Hayden 1-2	0.109	21.4	0.076	24.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.185	9.3
Hayden 1	0.084	16.6	0.073	23.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.157	7.9
Hayden 2	0.025	4.8	0.003	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.028	1.4
Steamboat Springs	0.001	0.2	0.007	2.1	0.006	2.4	0.003	3.6	0.008	3.2	0.014	2.4	0.039	1.9
Other Yampa Valley	0.002	0.3	0.011	3.5	0.036	15.3	0.009	9.8	0.021	8.0	0.216	37.4	0.294	14.8
Non-Yampa Valley	0.383	75.4	0.220	69.6	0.192	82.1	0.080	86.4	0.230	88.0	0.346	60.2	1.452	73.0
Denver	0.162	31.9	0.051	16.0	0.037	15.8	0.020	21.1	0.061	23.3	0.003	0.6	0.333	16.8
Colorado w/ Denver	0.317	62.4	0.198	62.5	0.179	76.3	0.073	78.8	0.217	82.8	0.303	52.6	1.287	64.7
Non-Colorado	0.066	13.0	0.022	7.1	0.014	5.8	0.007	7.6	0.014	5.2	0.043	7.5	0.166	8.3
Coal-fired PP	0.197	38.8	0.085	26.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.282	14.2
All other sources	0.311	61.2	0.232	73.3	0.234	99.8	0.093	100.0	0.262	100.0	0.576	100.0	1.707	85.8
Fires	0.000	0.0	0.000	0.1	0.000	0.1	0.000	0.2	0.002	0.8	0.000	0.0	0.003	0.1

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/ 8/21 6-hour average RH: 58%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.322	-99.0	0.882	-99.0	0.396	-99.0	0.844	-99.0	0.931	-99.0	2.045	-99.0	16.420	-99.0
Estimated w/o fires	1.322	-99.0	0.881	-99.0	0.396	-99.0	0.843	-99.0	0.923	-99.0	2.045	-99.0	16.410	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.325	24.6	0.267	30.3	0.071	17.8	0.113	13.4	0.104	11.2	0.814	39.8	1.695	10.3
Craig 1-3	0.036	2.7	0.006	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.041	0.3
Craig 1-2	0.030	2.3	0.004	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.034	0.2
Craig 1	0.013	1.0	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.014	0.1
Craig 2	0.018	1.3	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.020	0.1
Craig 3	0.005	0.4	0.002	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.0
Hayden 1-2	0.283	21.4	0.212	24.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.496	3.0
Hayden 1	0.219	16.6	0.203	23.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.423	2.6
Hayden 2	0.064	4.8	0.009	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.073	0.4
Steamboat Springs	0.002	0.2	0.018	2.1	0.010	2.4	0.030	3.6	0.030	3.2	0.048	2.4	0.139	0.8
Other Yampa Valley	0.004	0.3	0.031	3.5	0.060	15.3	0.083	9.8	0.074	8.0	0.766	37.4	1.018	6.2
Non-Yampa Valley	0.997	75.4	0.614	69.6	0.325	82.1	0.730	86.4	0.819	88.0	1.231	60.2	4.715	28.7
Denver	0.421	31.9	0.141	16.0	0.062	15.8	0.178	21.1	0.217	23.3	0.012	0.6	1.031	6.3
Colorado w/ Denver	0.825	62.4	0.551	62.5	0.302	76.3	0.665	78.8	0.771	82.8	1.076	52.6	4.191	25.5
Non-Colorado	0.171	13.0	0.062	7.1	0.023	5.8	0.064	7.6	0.048	5.2	0.154	7.5	0.524	3.2
Coal-fired PP	0.513	38.8	0.235	26.7	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.749	4.6
All other sources	0.809	61.2	0.646	73.3	0.396	99.8	0.844	100.0	0.931	100.0	2.045	100.0	15.671	95.4
Fires	0.000	0.0	0.001	0.1	0.000	0.1	0.002	0.2	0.008	0.8	0.000	0.0	0.011	0.1

Mad Creek
CONCENTRATION 1200-1800 95/ 8/21

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.923	-99.0	0.174	-99.0	0.107	-99.0	0.041	-99.0	0.114	-99.0	0.242	-99.0	1.602	-99.0
Estimated w/o fires	0.923	-99.0	0.174	-99.0	0.107	-99.0	0.041	-99.0	0.112	-99.0	0.242	-99.0	1.599	-99.0

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.718	77.9	0.159	91.4	0.034	32.0	0.010	24.8	0.025	21.4	0.102	42.2	1.049	65.5
Craig 1-3	0.077	8.3	0.020	11.8	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.098	6.1
Craig 1-2	0.061	6.6	0.012	6.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.073	4.6
Craig 1	0.045	4.9	0.009	5.1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.054	3.4
Craig 2	0.016	1.7	0.003	1.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.019	1.2
Craig 3	0.016	1.7	0.009	5.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.025	1.5
Hayden 1-2	0.640	69.3	0.135	77.4	0.003	2.8	0.000	0.0	0.000	0.0	0.000	0.0	0.777	48.5
Hayden 1	0.312	33.8	0.087	50.2	0.001	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.400	25.0
Hayden 2	0.328	35.5	0.047	27.2	0.002	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.377	23.5
Steamboat Springs	0.001	0.1	0.002	1.2	0.004	3.9	0.003	6.0	0.007	5.7	0.008	3.4	0.025	1.5
Other Yampa Valley	0.001	0.1	0.002	1.1	0.027	25.0	0.008	18.7	0.018	15.7	0.094	38.7	0.149	9.3
Non-Yampa Valley	0.204	22.1	0.014	8.3	0.073	67.9	0.031	74.9	0.088	76.9	0.140	57.8	0.550	34.3
Denver	0.086	9.4	0.002	1.3	0.014	13.3	0.008	18.3	0.024	20.6	0.001	0.5	0.135	8.5
Colorado w/ Denver	0.177	19.2	0.012	6.7	0.067	62.8	0.028	68.0	0.082	72.0	0.122	50.4	0.489	30.5
Non-Colorado	0.027	2.9	0.003	1.6	0.005	5.1	0.003	6.9	0.006	4.9	0.018	7.3	0.061	3.8
Coal-fired PP	0.767	83.1	0.156	89.5	0.003	3.1	0.000	0.0	0.000	0.0	0.000	0.1	0.926	57.8
All other sources	0.156	16.9	0.018	10.5	0.104	96.9	0.041	100.0	0.114	100.0	0.242	99.9	0.675	42.2
Fires	0.000	0.0	0.000	0.2	0.000	0.1	0.000	0.4	0.002	1.7	0.000	0.0	0.003	0.2

Mad Creek
EXTINCTION 1200-1800 95/ 8/21 6-hour average RH: 46%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.040	-99.0	0.416	-99.0	0.171	-99.0	0.377	-99.0	0.374	-99.0	0.792	-99.0	14.171	-99.0
Estimated w/o fires	2.040	-99.0	0.415	-99.0	0.171	-99.0	0.376	-99.0	0.368	-99.0	0.792	-99.0	14.162	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.589	77.9	0.381	91.4	0.055	32.0	0.093	24.8	0.080	21.4	0.335	42.2	2.533	17.9
Craig 1-3	0.170	8.3	0.049	11.8	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.220	1.6
Craig 1-2	0.135	6.6	0.028	6.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.164	1.2
Craig 1	0.100	4.9	0.021	5.1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.122	0.9
Craig 2	0.035	1.7	0.007	1.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.042	0.3
Craig 3	0.035	1.7	0.021	5.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.056	0.4
Hayden 1-2	1.415	69.3	0.322	77.4	0.005	2.8	0.000	0.0	0.000	0.0	0.000	0.0	1.742	12.3
Hayden 1	0.689	33.8	0.209	50.2	0.002	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.901	6.4
Hayden 2	0.725	35.5	0.113	27.2	0.003	1.6	0.000	0.0	0.000	0.0	0.000	0.0	0.841	5.9

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.002	0.1	0.005	1.2	0.007	3.9	0.023	6.0	0.021	5.7	0.027	3.4	0.085	0.6
Other Yampa Valley	0.002	0.1	0.004	1.1	0.043	25.0	0.071	18.7	0.059	15.7	0.307	38.7	0.486	3.4
Non-Yampa Valley	0.451	22.1	0.035	8.3	0.116	67.9	0.282	74.9	0.288	76.9	0.457	57.8	1.630	11.5
Denver	0.191	9.4	0.006	1.3	0.023	13.3	0.069	18.3	0.077	20.6	0.004	0.5	0.370	2.6
Colorado w/ Denver	0.392	19.2	0.028	6.7	0.107	62.8	0.256	68.0	0.270	72.0	0.399	50.4	1.453	10.3
Non-Colorado	0.059	2.9	0.007	1.6	0.009	5.1	0.026	6.9	0.018	4.9	0.058	7.3	0.177	1.2
Coal-fired PP	1.696	83.1	0.373	89.5	0.005	3.1	0.000	0.0	0.000	0.0	0.001	0.1	2.075	14.6
All other sources	0.344	16.9	0.044	10.5	0.166	96.9	0.377	100.0	0.374	100.0	0.791	99.9	12.097	85.4
Fires	0.000	0.0	0.001	0.2	0.000	0.1	0.001	0.4	0.006	1.7	0.000	0.0	0.009	0.1

Mad Creek
CONCENTRATION 0600-1200 95/ 8/22

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.192	-99.0	0.114	-99.0	0.131	-99.0	0.050	-99.0	0.141	-99.0	0.405	-99.0	1.032	-99.0
Estimated w/o fires	0.192	-99.0	0.112	-99.0	0.130	-99.0	0.049	-99.0	0.135	-99.0	0.405	-99.0	1.024	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.021	10.8	0.020	17.8	0.033	25.1	0.010	19.8	0.024	17.1	0.171	42.1	0.278	27.0
Craig 1-3	0.002	0.9	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.2
Craig 1-2	0.001	0.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 3	0.000	0.2	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Hayden 1-2	0.018	9.3	0.003	2.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.021	2.0
Hayden 1	0.010	5.2	0.002	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.012	1.2
Hayden 2	0.008	4.0	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.009	0.8
Steamboat Springs	0.001	0.3	0.010	8.7	0.007	5.2	0.004	7.2	0.009	6.3	0.022	5.3	0.051	5.0
Other Yampa Valley	0.001	0.3	0.007	6.1	0.026	19.8	0.006	12.5	0.015	10.7	0.149	36.8	0.204	19.7
Non-Yampa Valley	0.171	89.2	0.092	81.2	0.097	74.6	0.039	79.2	0.111	78.3	0.235	57.9	0.746	72.2
Denver	0.069	36.1	0.009	8.0	0.013	10.0	0.007	13.3	0.021	14.6	0.001	0.3	0.120	11.6
Colorado w/ Denver	0.162	84.4	0.085	74.8	0.090	68.7	0.036	71.7	0.103	73.0	0.197	48.6	0.673	65.1
Non-Colorado	0.009	4.8	0.007	6.4	0.008	5.9	0.004	7.5	0.007	5.3	0.038	9.3	0.073	7.1
Coal-fired PP	0.051	26.8	0.004	3.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.056	5.4
All other sources	0.141	73.2	0.109	96.2	0.131	99.9	0.050	100.0	0.141	100.0	0.405	100.0	0.977	94.6
Fires	0.000	0.0	0.001	1.0	0.000	0.3	0.001	1.0	0.006	4.6	0.000	0.0	0.009	0.8

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/ 8/22 6-hour average RH: 64%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.558	-99.0	0.351	-99.0	0.231	-99.0	0.452	-99.0	0.532	-99.0	1.528	-99.0	13.651	-99.0
Estimated w/o fires	0.558	-99.0	0.347	-99.0	0.230	-99.0	0.447	-99.0	0.508	-99.0	1.528	-99.0	13.617	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.060	10.8	0.062	17.8	0.058	25.1	0.089	19.8	0.091	17.1	0.643	42.1	1.004	7.4
Craig 1-3	0.005	0.9	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.1
Craig 1-2	0.004	0.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.0
Craig 1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 2	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.0
Craig 3	0.001	0.2	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.0
Hayden 1-2	0.052	9.3	0.009	2.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.061	0.4
Hayden 1	0.029	5.2	0.006	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.036	0.3
Hayden 2	0.023	4.0	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.025	0.2
Steamboat Springs	0.002	0.3	0.031	8.7	0.012	5.2	0.033	7.2	0.034	6.3	0.081	5.3	0.192	1.4
Other Yampa Valley	0.002	0.3	0.021	6.1	0.046	19.8	0.057	12.5	0.057	10.7	0.562	36.8	0.744	5.5
Non-Yampa Valley	0.498	89.2	0.285	81.2	0.172	74.6	0.358	79.2	0.417	78.3	0.884	57.9	2.613	19.1
Denver	0.201	36.1	0.028	8.0	0.023	10.0	0.060	13.3	0.078	14.6	0.004	0.3	0.395	2.9
Colorado w/ Denver	0.471	84.4	0.262	74.8	0.158	68.7	0.324	71.7	0.389	73.0	0.743	48.6	2.347	17.2
Non-Colorado	0.027	4.8	0.022	6.4	0.014	5.9	0.034	7.5	0.028	5.3	0.142	9.3	0.267	2.0
Coal-fired PP	0.149	26.8	0.013	3.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.163	1.2
All other sources	0.408	73.2	0.337	96.2	0.230	99.9	0.452	100.0	0.532	100.0	1.528	100.0	13.488	98.8
Fires	0.000	0.0	0.004	1.0	0.001	0.3	0.005	1.0	0.024	4.6	0.000	0.0	0.033	0.2

Mad Creek
CONCENTRATION 1200-1800 95/ 8/22

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.272	-99.0	0.045	-99.0	0.092	-99.0	0.037	-99.0	0.101	-99.0	0.247	-99.0	0.794	-99.0
Estimated w/o fires	0.272	-99.0	0.044	-99.0	0.092	-99.0	0.036	-99.0	0.097	-99.0	0.247	-99.0	0.789	-99.0

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.146	53.5	0.021	48.1	0.037	40.6	0.014	37.6	0.035	34.7	0.112	45.2	0.365	46.0
Craig 1-3	0.002	0.8	0.001	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.4
Craig 1-2	0.001	0.5	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.2
Craig 1	0.001	0.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 2	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 3	0.001	0.3	0.001	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.2
Hayden 1-2	0.141	51.9	0.014	31.6	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.156	19.7
Hayden 1	0.014	5.1	0.003	7.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.017	2.2
Hayden 2	0.127	46.8	0.011	24.4	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.139	17.5
Steamboat Springs	0.001	0.5	0.004	9.7	0.010	11.3	0.006	15.7	0.016	16.0	0.019	7.5	0.057	7.1
Other Yampa Valley	0.001	0.3	0.002	5.3	0.026	28.7	0.008	21.9	0.019	18.7	0.093	37.7	0.150	18.8
Non-Yampa Valley	0.127	46.5	0.023	50.8	0.055	59.1	0.023	61.5	0.062	61.2	0.135	54.8	0.424	53.4
Denver	0.041	15.1	0.001	3.3	0.006	6.3	0.003	8.1	0.009	9.2	0.001	0.2	0.061	7.7
Colorado w/ Denver	0.117	43.1	0.020	45.0	0.049	53.1	0.020	54.1	0.056	55.8	0.110	44.4	0.372	46.9
Non-Colorado	0.009	3.4	0.003	5.9	0.006	6.1	0.003	7.4	0.005	5.3	0.026	10.4	0.051	6.5
Coal-fired PP	0.169	62.1	0.015	34.7	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.185	23.3
All other sources	0.103	37.9	0.029	65.3	0.092	99.3	0.037	100.0	0.101	100.0	0.247	100.0	0.609	76.7
Fires	0.000	0.0	0.000	1.1	0.000	0.3	0.000	0.9	0.004	4.1	0.000	0.0	0.005	0.7

Mad Creek
EXTINCTION 1200-1800 95/ 8/22 6-hour average RH: 46%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.601	-99.0	0.107	-99.0	0.147	-99.0	0.335	-99.0	0.330	-99.0	0.808	-99.0	12.327	-99.0
Estimated w/o fires	0.601	-99.0	0.105	-99.0	0.147	-99.0	0.332	-99.0	0.316	-99.0	0.808	-99.0	12.309	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.322	53.5	0.051	48.1	0.060	40.6	0.126	37.6	0.114	34.7	0.365	45.2	1.038	8.4
Craig 1-3	0.005	0.8	0.002	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.1
Craig 1-2	0.003	0.5	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.0
Craig 1	0.002	0.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 2	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.0
Craig 3	0.002	0.3	0.001	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.0
Hayden 1-2	0.312	51.9	0.034	31.6	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.347	2.8
Hayden 1	0.031	5.1	0.008	7.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.039	0.3
Hayden 2	0.281	46.8	0.026	24.4	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.308	2.5

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.003	0.5	0.010	9.7	0.017	11.3	0.053	15.7	0.053	16.0	0.061	7.5	0.196	1.6
Other Yampa Valley	0.002	0.3	0.006	5.3	0.042	28.7	0.073	21.9	0.062	18.7	0.304	37.7	0.489	4.0
Non-Yampa Valley	0.280	46.5	0.054	50.8	0.087	59.1	0.206	61.5	0.202	61.2	0.443	54.8	1.271	10.3
Denver	0.091	15.1	0.004	3.3	0.009	6.3	0.027	8.1	0.030	9.2	0.002	0.2	0.163	1.3
Colorado w/ Denver	0.259	43.1	0.048	45.0	0.078	53.1	0.181	54.1	0.184	55.8	0.358	44.4	1.109	9.0
Non-Colorado	0.020	3.4	0.006	5.9	0.009	6.1	0.025	7.4	0.018	5.3	0.084	10.4	0.162	1.3
Coal-fired PP	0.374	62.1	0.037	34.7	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.412	3.3
All other sources	0.228	37.9	0.070	65.3	0.146	99.3	0.335	100.0	0.330	100.0	0.808	100.0	11.915	96.7
Fires	0.000	0.0	0.001	1.1	0.000	0.3	0.003	0.9	0.014	4.1	0.000	0.0	0.018	0.1

Mad Creek
CONCENTRATION 0600-1200 95/ 8/23

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.191	-99.0	0.138	-99.0	0.119	-99.0	0.045	-99.0	0.117	-99.0	0.445	-99.0	1.054	-99.0
Estimated w/o fires	0.191	-99.0	0.138	-99.0	0.119	-99.0	0.044	-99.0	0.113	-99.0	0.445	-99.0	1.049	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.066	34.4	0.034	24.8	0.040	33.9	0.012	26.6	0.029	24.6	0.220	49.4	0.401	38.0
Craig 1-3	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.063	33.2	0.015	11.1	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.080	7.5
Hayden 1	0.025	13.2	0.007	5.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.033	3.1
Hayden 2	0.038	20.0	0.008	5.9	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.047	4.5
Steamboat Springs	0.001	0.6	0.009	6.6	0.007	6.2	0.004	9.3	0.011	9.3	0.017	3.9	0.050	4.7
Other Yampa Valley	0.001	0.6	0.010	7.0	0.032	27.2	0.008	17.2	0.018	15.3	0.202	45.5	0.271	25.7
Non-Yampa Valley	0.125	65.6	0.103	74.5	0.078	65.9	0.033	72.8	0.084	72.4	0.225	50.6	0.649	61.5
Denver	0.027	14.0	0.003	2.0	0.004	3.2	0.002	4.6	0.006	5.4	0.000	0.1	0.042	4.0
Colorado w/ Denver	0.103	53.9	0.084	60.8	0.068	56.9	0.027	60.9	0.074	63.7	0.184	41.3	0.540	51.2
Non-Colorado	0.022	11.7	0.019	13.7	0.011	9.0	0.005	11.9	0.010	8.7	0.041	9.3	0.109	10.3
Coal-fired PP	0.090	46.8	0.017	12.4	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.107	10.2
All other sources	0.102	53.2	0.121	87.6	0.118	99.4	0.045	100.0	0.117	100.0	0.445	100.0	0.947	89.8
Fires	0.000	0.0	0.001	0.7	0.000	0.2	0.000	0.6	0.004	3.0	0.000	0.0	0.005	0.5

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/ 8/23 6-hour average RH: 57%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.489	-99.0	0.379	-99.0	0.200	-99.0	0.407	-99.0	0.410	-99.0	1.565	-99.0	13.449	-99.0
Estimated w/o fires	0.489	-99.0	0.377	-99.0	0.199	-99.0	0.404	-99.0	0.398	-99.0	1.565	-99.0	13.431	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.168	34.4	0.094	24.8	0.068	33.9	0.108	26.6	0.101	24.6	0.773	49.4	1.312	9.8
Craig 1-3	0.001	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 1-2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 3	0.001	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.162	33.2	0.042	11.1	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.206	1.5
Hayden 1	0.064	13.2	0.020	5.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.084	0.6
Hayden 2	0.098	20.0	0.022	5.9	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.121	0.9
Steamboat Springs	0.003	0.6	0.025	6.6	0.012	6.2	0.038	9.3	0.038	9.3	0.061	3.9	0.177	1.3
Other Yampa Valley	0.003	0.6	0.027	7.0	0.054	27.2	0.070	17.2	0.063	15.3	0.712	45.5	0.928	6.9
Non-Yampa Valley	0.321	65.6	0.282	74.5	0.132	65.9	0.296	72.8	0.297	72.4	0.792	50.6	2.119	15.8
Denver	0.069	14.0	0.008	2.0	0.006	3.2	0.019	4.6	0.022	5.4	0.001	0.1	0.125	0.9
Colorado w/ Denver	0.263	53.9	0.231	60.8	0.114	56.9	0.248	60.9	0.261	63.7	0.646	41.3	1.763	13.1
Non-Colorado	0.057	11.7	0.052	13.7	0.018	9.0	0.048	11.9	0.036	8.7	0.146	9.3	0.357	2.7
Coal-fired PP	0.229	46.8	0.047	12.4	0.001	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.277	2.1
All other sources	0.260	53.2	0.332	87.6	0.198	99.4	0.407	100.0	0.410	100.0	1.565	100.0	13.172	97.9
Fires	0.000	0.0	0.003	0.7	0.000	0.2	0.003	0.6	0.012	3.0	0.000	0.0	0.018	0.1

Mad Creek
CONCENTRATION 1200-1800 95/ 8/23

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.366	-99.0	0.020	-99.0	0.069	-99.0	0.028	-99.0	0.072	-99.0	0.192	-99.0	0.747	-99.0
Estimated w/o fires	0.366	-99.0	0.020	-99.0	0.069	-99.0	0.028	-99.0	0.070	-99.0	0.192	-99.0	0.745	-99.0

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.302	82.5	0.014	72.8	0.032	46.9	0.012	41.9	0.029	40.1	0.097	50.5	0.486	65.1
Craig 1-3	0.004	1.0	0.000	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.6
Craig 1-2	0.002	0.6	0.000	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.3
Craig 1	0.001	0.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1
Craig 2	0.001	0.3	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.2
Craig 3	0.002	0.4	0.000	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.3
Hayden 1-2	0.296	80.8	0.011	58.3	0.002	2.9	0.000	0.0	0.000	0.0	0.000	0.0	0.309	41.4
Hayden 1	0.158	43.2	0.008	40.8	0.001	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.167	22.4
Hayden 2	0.138	37.6	0.003	17.5	0.001	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.142	19.0
Steamboat Springs	0.001	0.4	0.002	8.8	0.010	14.9	0.006	20.4	0.016	22.2	0.019	9.6	0.054	7.2
Other Yampa Valley	0.001	0.2	0.001	4.0	0.020	29.0	0.006	21.5	0.013	17.9	0.079	40.8	0.119	15.9
Non-Yampa Valley	0.064	17.5	0.005	27.0	0.036	53.0	0.016	57.7	0.042	58.0	0.095	49.5	0.259	34.7
Denver	0.010	2.8	0.000	0.2	0.001	1.9	0.001	2.4	0.002	2.9	0.000	0.1	0.015	1.9
Colorado w/ Denver	0.058	15.7	0.005	25.0	0.033	47.7	0.014	51.3	0.038	53.1	0.082	42.6	0.230	30.8
Non-Colorado	0.007	1.8	0.000	1.9	0.004	5.3	0.002	6.4	0.003	4.8	0.013	6.9	0.029	3.9
Coal-fired PP	0.312	85.2	0.012	60.4	0.002	3.0	0.000	0.0	0.000	0.0	0.000	0.0	0.326	43.6
All other sources	0.054	14.8	0.008	39.6	0.067	97.0	0.028	100.0	0.072	100.0	0.192	100.0	0.421	56.4
Fires	0.000	0.0	0.000	0.2	0.000	0.1	0.000	0.4	0.001	1.9	0.000	0.0	0.002	0.2

Mad Creek
EXTINCTION 1200-1800 95/ 8/23 6-hour average RH: 68%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.146	-99.0	0.065	-99.0	0.125	-99.0	0.255	-99.0	0.282	-99.0	0.756	-99.0	12.628	-99.0
Estimated w/o fires	1.146	-99.0	0.065	-99.0	0.125	-99.0	0.254	-99.0	0.277	-99.0	0.756	-99.0	12.622	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.945	82.5	0.047	72.8	0.059	46.9	0.107	41.9	0.113	40.1	0.381	50.5	1.652	13.1
Craig 1-3	0.012	1.0	0.001	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.013	0.1
Craig 1-2	0.007	0.6	0.000	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.1
Craig 1	0.003	0.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.003	0.0
Craig 2	0.004	0.3	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.0
Craig 3	0.005	0.4	0.001	1.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.006	0.0
Hayden 1-2	0.926	80.8	0.038	58.3	0.004	2.9	0.000	0.0	0.000	0.0	0.000	0.0	0.968	7.7
Hayden 1	0.495	43.2	0.027	40.8	0.002	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.524	4.1
Hayden 2	0.431	37.6	0.011	17.5	0.002	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.444	3.5

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.005	0.4	0.006	8.8	0.019	14.9	0.052	20.4	0.063	22.2	0.073	9.6	0.216	1.7
Other Yampa Valley	0.002	0.2	0.003	4.0	0.036	29.0	0.055	21.5	0.051	17.9	0.308	40.8	0.455	3.6
Non-Yampa Valley	0.201	17.5	0.018	27.0	0.066	53.0	0.147	57.7	0.164	58.0	0.374	49.5	0.970	7.7
Denver	0.032	2.8	0.000	0.2	0.002	1.9	0.006	2.4	0.008	2.9	0.000	0.1	0.050	0.4
Colorado w/ Denver	0.180	15.7	0.016	25.0	0.060	47.7	0.131	51.3	0.150	53.1	0.322	42.6	0.859	6.8
Non-Colorado	0.021	1.8	0.001	1.9	0.007	5.3	0.016	6.4	0.014	4.8	0.052	6.9	0.110	0.9
Coal-fired PP	0.976	85.2	0.039	60.4	0.004	3.0	0.000	0.0	0.000	0.0	0.000	0.0	1.019	8.1
All other sources	0.170	14.8	0.026	39.6	0.121	97.0	0.255	100.0	0.282	100.0	0.755	100.0	11.609	91.9
Fires	0.000	0.0	0.000	0.2	0.000	0.1	0.001	0.4	0.005	1.9	0.000	0.0	0.007	0.1

Mad Creek
CONCENTRATION 0600-1200 95/ 8/24

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.115	-99.0	0.178	-99.0	0.142	-99.0	0.056	-99.0	0.144	-99.0	0.481	-99.0	1.116	-99.0
Estimated w/o fires	0.115	-99.0	0.178	-99.0	0.142	-99.0	0.056	-99.0	0.144	-99.0	0.481	-99.0	1.115	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.028	24.4	0.049	27.4	0.040	28.1	0.013	23.9	0.032	22.5	0.208	43.3	0.371	33.2
Craig 1-3	0.002	2.0	0.003	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.5
Craig 1-2	0.002	1.9	0.002	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.005	0.4
Craig 1	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Craig 2	0.002	1.8	0.002	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.004	0.4
Craig 3	0.000	0.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Hayden 1-2	0.024	20.7	0.018	10.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.042	3.8
Hayden 1	0.017	14.7	0.015	8.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.032	2.9
Hayden 2	0.007	6.0	0.003	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.010	0.9
Steamboat Springs	0.001	0.9	0.016	8.9	0.009	6.6	0.005	9.2	0.013	9.3	0.025	5.3	0.070	6.3
Other Yampa Valley	0.001	0.7	0.012	6.7	0.030	21.3	0.008	14.7	0.019	13.2	0.183	38.0	0.253	22.7
Non-Yampa Valley	0.087	75.6	0.130	72.6	0.102	71.9	0.043	76.0	0.111	77.1	0.272	56.7	0.745	66.7
Denver	0.004	3.8	0.002	1.0	0.002	1.1	0.001	1.4	0.002	1.7	0.000	0.0	0.011	1.0
Colorado w/ Denver	0.080	69.6	0.120	67.2	0.096	67.9	0.040	71.2	0.106	73.3	0.247	51.5	0.689	61.8
Non-Colorado	0.007	6.0	0.010	5.4	0.006	3.9	0.003	4.9	0.005	3.8	0.025	5.2	0.055	5.0
Coal-fired PP	0.028	24.3	0.022	12.1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.050	4.5
All other sources	0.087	75.7	0.157	87.9	0.141	99.8	0.056	100.0	0.144	100.0	0.481	100.0	1.066	95.5
Fires	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.1	0.001	0.4	0.000	0.0	0.001	0.1

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/ 8/24 6-hour average RH: 69%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.372	-99.0	0.610	-99.0	0.262	-99.0	0.510	-99.0	0.578	-99.0	1.925	-99.0	14.257	-99.0
Estimated w/o fires	0.372	-99.0	0.610	-99.0	0.262	-99.0	0.510	-99.0	0.576	-99.0	1.925	-99.0	14.255	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.091	24.4	0.167	27.4	0.074	28.1	0.122	23.9	0.130	22.5	0.833	43.3	1.417	9.9
Craig 1-3	0.008	2.0	0.009	1.5	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.017	0.1
Craig 1-2	0.007	1.9	0.008	1.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	0.1
Craig 1	0.001	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Craig 2	0.007	1.8	0.008	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.014	0.1
Craig 3	0.000	0.1	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.0
Hayden 1-2	0.077	20.7	0.063	10.3	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.140	1.0
Hayden 1	0.055	14.7	0.052	8.6	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.107	0.8
Hayden 2	0.022	6.0	0.011	1.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.033	0.2
Steamboat Springs	0.004	0.9	0.054	8.9	0.017	6.6	0.047	9.2	0.053	9.3	0.101	5.3	0.277	1.9
Other Yampa Valley	0.003	0.7	0.041	6.7	0.056	21.3	0.075	14.7	0.077	13.2	0.732	38.0	0.983	6.9
Non-Yampa Valley	0.282	75.6	0.443	72.6	0.188	71.9	0.388	76.0	0.446	77.1	1.091	56.7	2.838	19.9
Denver	0.014	3.8	0.006	1.0	0.003	1.1	0.007	1.4	0.010	1.7	0.001	0.0	0.041	0.3
Colorado w/ Denver	0.259	69.6	0.410	67.2	0.178	67.9	0.363	71.2	0.424	73.3	0.991	51.5	2.625	18.4
Non-Colorado	0.022	6.0	0.033	5.4	0.010	3.9	0.025	4.9	0.022	3.8	0.100	5.2	0.213	1.5
Coal-fired PP	0.090	24.3	0.074	12.1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.165	1.2
All other sources	0.282	75.7	0.536	87.9	0.261	99.8	0.510	100.0	0.578	100.0	1.925	100.0	14.092	98.8
Fires	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.1	0.002	0.4	0.000	0.0	0.003	0.0

Mad Creek
CONCENTRATION 1200-1800 95/ 8/24

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.718	-99.0	0.185	-99.0	0.094	-99.0	0.031	-99.0	0.082	-99.0	0.234	-99.0	1.344	-99.0
Estimated w/o fires	0.718	-99.0	0.185	-99.0	0.094	-99.0	0.031	-99.0	0.081	-99.0	0.234	-99.0	1.344	-99.0

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.649	90.4	0.161	86.8	0.053	56.1	0.014	44.4	0.037	45.0	0.121	51.8	1.034	77.0
Craig 1-3	0.043	5.9	0.020	10.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.063	4.7
Craig 1-2	0.036	5.1	0.014	7.8	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.051	3.8
Craig 1	0.019	2.7	0.006	3.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.025	1.9
Craig 2	0.017	2.4	0.009	4.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.026	1.9
Craig 3	0.006	0.9	0.005	2.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.012	0.9
Hayden 1-2	0.603	84.1	0.130	70.5	0.002	2.3	0.000	0.0	0.000	0.0	0.000	0.0	0.736	54.8
Hayden 1	0.269	37.5	0.087	47.0	0.001	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.357	26.6
Hayden 2	0.334	46.5	0.044	23.5	0.001	1.3	0.000	0.0	0.000	0.0	0.000	0.0	0.379	28.2
Steamboat Springs	0.001	0.1	0.004	2.2	0.003	3.4	0.002	5.6	0.005	5.9	0.007	2.9	0.021	1.6
Other Yampa Valley	0.002	0.3	0.006	3.4	0.047	50.2	0.012	38.8	0.032	39.1	0.114	48.9	0.214	16.0
Non-Yampa Valley	0.069	9.6	0.024	13.2	0.041	43.9	0.017	55.5	0.045	54.6	0.113	48.2	0.309	23.0
Denver	0.000	0.1	0.000	0.0	0.000	0.3	0.000	0.4	0.000	0.5	0.000	0.0	0.001	0.1
Colorado w/ Denver	0.046	6.4	0.019	10.2	0.037	38.8	0.015	47.6	0.040	48.9	0.092	39.2	0.248	18.4
Non-Colorado	0.023	3.2	0.006	3.0	0.005	5.1	0.002	7.9	0.005	5.7	0.021	9.0	0.061	4.6
Coal-fired PP	0.657	91.5	0.152	82.3	0.002	2.6	0.000	0.0	0.000	0.0	0.000	0.1	0.812	60.4
All other sources	0.061	8.5	0.033	17.7	0.092	97.4	0.031	100.0	0.082	100.0	0.234	99.9	0.532	39.6
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.4	0.000	0.0	0.000	0.0

Mad Creek
EXTINCTION 1200-1800 95/ 8/24 6-hour average RH: 62%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.003	-99.0	0.549	-99.0	0.163	-99.0	0.286	-99.0	0.301	-99.0	0.862	-99.0	14.163	-99.0
Estimated w/o fires	2.003	-99.0	0.549	-99.0	0.163	-99.0	0.285	-99.0	0.299	-99.0	0.862	-99.0	14.162	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.811	90.4	0.477	86.8	0.092	56.1	0.127	44.4	0.135	45.0	0.446	51.8	3.088	21.8
Craig 1-3	0.119	5.9	0.059	10.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.178	1.3
Craig 1-2	0.101	5.1	0.043	7.8	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.145	1.0
Craig 1	0.053	2.7	0.017	3.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.071	0.5
Craig 2	0.048	2.4	0.026	4.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.074	0.5
Craig 3	0.017	0.9	0.016	2.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.033	0.2
Hayden 1-2	1.683	84.1	0.387	70.5	0.004	2.3	0.000	0.0	0.000	0.0	0.000	0.0	2.075	14.6
Hayden 1	0.752	37.5	0.258	47.0	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	1.011	7.1
Hayden 2	0.932	46.5	0.129	23.5	0.002	1.3	0.000	0.0	0.000	0.0	0.000	0.0	1.063	7.5

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.002	0.1	0.012	2.2	0.006	3.4	0.016	5.6	0.018	5.9	0.025	2.9	0.078	0.5
Other Yampa Valley	0.007	0.3	0.018	3.4	0.082	50.2	0.111	38.8	0.118	39.1	0.421	48.9	0.757	5.3
Non-Yampa Valley	0.192	9.6	0.073	13.2	0.072	43.9	0.159	55.5	0.164	54.6	0.415	48.2	1.074	7.6
Denver	0.001	0.1	0.000	0.0	0.000	0.3	0.001	0.4	0.002	0.5	0.000	0.0	0.005	0.0
Colorado w/ Denver	0.128	6.4	0.056	10.2	0.063	38.8	0.136	47.6	0.147	48.9	0.338	39.2	0.868	6.1
Non-Colorado	0.064	3.2	0.017	3.0	0.008	5.1	0.022	7.9	0.017	5.7	0.077	9.0	0.206	1.5
Coal-fired PP	1.833	91.5	0.452	82.3	0.004	2.6	0.000	0.0	0.000	0.0	0.000	0.1	2.290	16.2
All other sources	0.170	8.5	0.097	17.7	0.159	97.4	0.286	100.0	0.301	100.0	0.861	99.9	11.874	83.8
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.001	0.4	0.000	0.0	0.001	0.0

Mad Creek
CONCENTRATION 0600-1200 95/ 8/25

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.259	-99.0	0.285	-99.0	0.157	-99.0	0.056	-99.0	0.142	-99.0	0.607	-99.0	1.505	-99.0
Estimated w/o fires	0.259	-99.0	0.285	-99.0	0.157	-99.0	0.056	-99.0	0.142	-99.0	0.607	-99.0	1.505	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.095	36.6	0.091	31.8	0.042	26.8	0.011	20.6	0.027	18.8	0.221	36.4	0.487	32.3
Craig 1-3	0.022	8.4	0.034	11.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.056	3.7
Craig 1-2	0.020	7.7	0.029	10.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.049	3.2
Craig 1	0.007	2.7	0.009	3.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	1.1
Craig 2	0.013	5.0	0.020	7.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.033	2.2
Craig 3	0.002	0.8	0.005	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.007	0.5
Hayden 1-2	0.070	27.1	0.035	12.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.105	7.0
Hayden 1	0.038	14.6	0.025	8.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.063	4.2
Hayden 2	0.032	12.5	0.009	3.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.042	2.8
Steamboat Springs	0.001	0.3	0.006	2.1	0.004	2.8	0.003	4.8	0.007	4.8	0.009	1.4	0.030	2.0
Other Yampa Valley	0.002	0.8	0.016	5.6	0.038	23.9	0.009	15.8	0.020	14.0	0.212	35.0	0.296	19.7
Non-Yampa Valley	0.164	63.4	0.194	68.2	0.115	73.2	0.044	79.4	0.115	80.9	0.386	63.6	1.018	67.6
Denver	0.008	3.0	0.002	0.7	0.002	1.2	0.001	1.5	0.003	1.9	0.000	0.0	0.015	1.0
Colorado w/ Denver	0.076	29.3	0.149	52.3	0.096	61.2	0.034	61.5	0.096	68.0	0.299	49.2	0.750	49.8
Non-Colorado	0.088	34.1	0.045	15.9	0.019	12.0	0.010	17.9	0.018	13.0	0.087	14.4	0.268	17.8
Coal-fired PP	0.117	45.2	0.074	26.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.191	12.7
All other sources	0.142	54.8	0.211	74.0	0.157	99.8	0.056	100.0	0.142	100.0	0.607	100.0	1.314	87.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/ 8/25 6-hour average RH: 63%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.737	-99.0	0.864	-99.0	0.275	-99.0	0.507	-99.0	0.529	-99.0	2.262	-99.0	15.174	-99.0
Estimated w/o fires	0.737	-99.0	0.864	-99.0	0.275	-99.0	0.507	-99.0	0.528	-99.0	2.262	-99.0	15.173	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.270	36.6	0.275	31.8	0.074	26.8	0.104	20.6	0.100	18.8	0.823	36.4	1.646	10.8
Craig 1-3	0.062	8.4	0.103	11.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.165	1.1
Craig 1-2	0.057	7.7	0.088	10.1	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.145	1.0
Craig 1	0.020	2.7	0.028	3.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.048	0.3
Craig 2	0.037	5.0	0.060	7.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.097	0.6
Craig 3	0.006	0.8	0.015	1.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.021	0.1
Hayden 1-2	0.200	27.1	0.105	12.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.305	2.0
Hayden 1	0.107	14.6	0.076	8.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.184	1.2
Hayden 2	0.092	12.5	0.028	3.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.121	0.8
Steamboat Springs	0.002	0.3	0.018	2.1	0.008	2.8	0.024	4.8	0.026	4.8	0.033	1.4	0.111	0.7
Other Yampa Valley	0.006	0.8	0.049	5.6	0.066	23.9	0.080	15.8	0.074	14.0	0.791	35.0	1.065	7.0
Non-Yampa Valley	0.467	63.4	0.589	68.2	0.202	73.2	0.403	79.4	0.428	80.9	1.439	63.6	3.527	23.2
Denver	0.022	3.0	0.006	0.7	0.003	1.2	0.008	1.5	0.010	1.9	0.001	0.0	0.050	0.3
Colorado w/ Denver	0.216	29.3	0.452	52.3	0.168	61.2	0.312	61.5	0.360	68.0	1.113	49.2	2.620	17.3
Non-Colorado	0.252	34.1	0.138	15.9	0.033	12.0	0.091	17.9	0.069	13.0	0.325	14.4	0.907	6.0
Coal-fired PP	0.333	45.2	0.224	26.0	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.558	3.7
All other sources	0.404	54.8	0.640	74.0	0.275	99.8	0.507	100.0	0.529	100.0	2.262	100.0	14.617	96.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.002	0.0

Mad Creek
CONCENTRATION 1200-1800 95/ 8/25

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.478	-99.0	0.055	-99.0	0.105	-99.0	0.038	-99.0	0.095	-99.0	0.328	-99.0	1.100	-99.0
Estimated w/o fires	0.478	-99.0	0.055	-99.0	0.105	-99.0	0.038	-99.0	0.095	-99.0	0.328	-99.0	1.100	-99.0

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.342	71.6	0.034	61.4	0.046	43.6	0.014	36.0	0.033	35.1	0.148	45.1	0.617	56.1
Craig 1-3	0.068	14.2	0.015	26.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.083	7.5
Craig 1-2	0.055	11.6	0.011	19.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.066	6.0
Craig 1	0.025	5.3	0.003	6.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.029	2.6
Craig 2	0.030	6.3	0.007	13.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.037	3.4
Craig 3	0.012	2.6	0.004	7.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.016	1.5
Hayden 1-2	0.271	56.7	0.016	28.7	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.288	26.2
Hayden 1	0.150	31.5	0.011	19.8	0.000	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.162	14.7
Hayden 2	0.121	25.3	0.005	8.8	0.000	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.126	11.5
Steamboat Springs	0.001	0.2	0.001	2.2	0.005	5.1	0.003	8.0	0.008	8.8	0.010	3.0	0.029	2.6
Other Yampa Valley	0.002	0.5	0.002	3.7	0.040	37.6	0.011	28.0	0.025	26.3	0.138	42.1	0.218	19.8
Non-Yampa Valley	0.136	28.4	0.021	38.6	0.059	56.3	0.024	64.0	0.061	64.6	0.180	54.9	0.483	43.9
Denver	0.007	1.4	0.000	0.4	0.001	0.9	0.000	1.1	0.001	1.5	0.000	0.0	0.010	0.9
Colorado w/ Denver	0.066	13.8	0.016	28.5	0.049	46.5	0.019	50.1	0.052	54.3	0.139	42.4	0.341	31.0
Non-Colorado	0.070	14.7	0.006	10.1	0.010	9.8	0.005	13.8	0.010	10.3	0.041	12.4	0.142	12.9
Coal-fired PP	0.371	77.7	0.033	58.7	0.001	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.405	36.8
All other sources	0.107	22.3	0.023	41.3	0.104	99.0	0.038	100.0	0.095	100.0	0.328	100.0	0.695	63.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.3	0.000	0.0	0.000	0.0

Mad Creek
EXTINCTION 1200-1800 95/ 8/25 6-hour average RH: 39%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.983	-99.0	0.124	-99.0	0.163	-99.0	0.348	-99.0	0.301	-99.0	1.038	-99.0	12.957	-99.0
Estimated w/o fires	0.983	-99.0	0.124	-99.0	0.163	-99.0	0.348	-99.0	0.300	-99.0	1.038	-99.0	12.956	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.703	71.6	0.076	61.4	0.071	43.6	0.125	36.0	0.106	35.1	0.468	45.1	1.550	12.0
Craig 1-3	0.139	14.2	0.033	26.9	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.173	1.3
Craig 1-2	0.114	11.6	0.024	19.7	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.138	1.1
Craig 1	0.052	5.3	0.008	6.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.060	0.5
Craig 2	0.061	6.3	0.017	13.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.078	0.6
Craig 3	0.025	2.6	0.009	7.3	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.035	0.3
Hayden 1-2	0.558	56.7	0.036	28.7	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.594	4.6
Hayden 1	0.309	31.5	0.025	19.8	0.001	0.4	0.000	0.0	0.000	0.0	0.000	0.0	0.334	2.6
Hayden 2	0.248	25.3	0.011	8.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.260	2.0

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.002	0.2	0.003	2.2	0.008	5.1	0.028	8.0	0.026	8.8	0.031	3.0	0.099	0.8
Other Yampa Valley	0.005	0.5	0.005	3.7	0.061	37.6	0.098	28.0	0.079	26.3	0.437	42.1	0.684	5.3
Non-Yampa Valley	0.280	28.4	0.048	38.6	0.092	56.3	0.223	64.0	0.194	64.6	0.569	54.9	1.406	10.9
Denver	0.014	1.4	0.001	0.4	0.001	0.9	0.004	1.1	0.004	1.5	0.000	0.0	0.025	0.2
Colorado w/ Denver	0.136	13.8	0.035	28.5	0.076	46.5	0.175	50.1	0.163	54.3	0.440	42.4	1.025	7.9
Non-Colorado	0.144	14.7	0.013	10.1	0.016	9.8	0.048	13.8	0.031	10.3	0.129	12.4	0.381	2.9
Coal-fired PP	0.764	77.7	0.073	58.7	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.838	6.5
All other sources	0.219	22.3	0.051	41.3	0.162	99.0	0.348	100.0	0.301	100.0	1.037	100.0	12.119	93.5
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.001	0.3	0.000	0.0	0.001	0.0

Mad Creek
CONCENTRATION 0600-1200 95/ 8/26

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.803	-99.0	0.537	-99.0	0.215	-99.0	0.079	-99.0	0.204	-99.0	0.668	-99.0	2.506	-99.0
Estimated w/o fires	0.803	-99.0	0.537	-99.0	0.215	-99.0	0.079	-99.0	0.204	-99.0	0.668	-99.0	2.506	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.553	68.9	0.340	63.2	0.060	27.8	0.017	21.7	0.042	20.6	0.236	35.4	1.248	49.8
Craig 1-3	0.127	15.9	0.125	23.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.253	10.1
Craig 1-2	0.112	14.0	0.088	16.3	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.200	8.0
Craig 1	0.046	5.8	0.039	7.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.085	3.4
Craig 2	0.066	8.2	0.049	9.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.115	4.6
Craig 3	0.015	1.9	0.037	6.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.052	2.1
Hayden 1-2	0.422	52.5	0.195	36.3	0.001	0.5	0.000	0.0	0.000	0.0	0.000	0.0	0.618	24.7
Hayden 1	0.240	29.9	0.136	25.3	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.376	15.0
Hayden 2	0.181	22.6	0.060	11.1	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.241	9.6
Steamboat Springs	0.001	0.2	0.006	1.2	0.006	2.9	0.004	4.8	0.010	4.8	0.011	1.7	0.039	1.6
Other Yampa Valley	0.003	0.4	0.013	2.4	0.052	24.2	0.013	16.9	0.032	15.8	0.225	33.7	0.339	13.5
Non-Yampa Valley	0.250	31.1	0.198	36.8	0.155	72.2	0.062	78.3	0.162	79.1	0.432	64.6	1.257	50.2
Denver	0.021	2.6	0.006	1.2	0.003	1.3	0.001	1.7	0.004	2.1	0.000	0.0	0.036	1.4
Colorado w/ Denver	0.135	16.8	0.123	23.0	0.134	62.2	0.051	64.4	0.141	69.0	0.330	49.4	0.913	36.4
Non-Colorado	0.115	14.3	0.074	13.8	0.021	9.9	0.011	13.8	0.021	10.1	0.102	15.2	0.344	13.7
Coal-fired PP	0.608	75.7	0.337	62.6	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.946	37.7
All other sources	0.195	24.3	0.201	37.4	0.213	99.3	0.079	100.0	0.204	100.0	0.668	100.0	1.560	62.3
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.001	0.3	0.000	0.0	0.001	0.0

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/ 8/26 6-hour average RH: 49%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.840	-99.0	1.328	-99.0	0.346	-99.0	0.715	-99.0	0.680	-99.0	2.224	-99.0	17.134	-99.0
Estimated w/o fires	1.840	-99.0	1.328	-99.0	0.346	-99.0	0.715	-99.0	0.679	-99.0	2.224	-99.0	17.132	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.268	68.9	0.839	63.2	0.096	27.8	0.155	21.7	0.140	20.6	0.787	35.4	3.286	19.2
Craig 1-3	0.292	15.9	0.308	23.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.601	3.5
Craig 1-2	0.257	14.0	0.217	16.3	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.475	2.8
Craig 1	0.106	5.8	0.096	7.2	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.202	1.2
Craig 2	0.151	8.2	0.121	9.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.273	1.6
Craig 3	0.035	1.9	0.091	6.9	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.126	0.7
Hayden 1-2	0.966	52.5	0.483	36.3	0.002	0.5	0.000	0.0	0.000	0.0	0.000	0.0	1.450	8.5
Hayden 1	0.550	29.9	0.336	25.3	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.887	5.2
Hayden 2	0.416	22.6	0.147	11.1	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.564	3.3
Steamboat Springs	0.003	0.2	0.016	1.2	0.010	2.9	0.034	4.8	0.033	4.8	0.038	1.7	0.134	0.8
Other Yampa Valley	0.007	0.4	0.033	2.4	0.084	24.2	0.121	16.9	0.107	15.8	0.748	33.7	1.100	6.4
Non-Yampa Valley	0.573	31.1	0.489	36.8	0.250	72.2	0.560	78.3	0.538	79.1	1.437	64.6	3.846	22.4
Denver	0.048	2.6	0.016	1.2	0.004	1.3	0.012	1.7	0.014	2.1	0.001	0.0	0.096	0.6
Colorado w/ Denver	0.309	16.8	0.305	23.0	0.216	62.2	0.461	64.4	0.470	69.0	1.098	49.4	2.858	16.7
Non-Colorado	0.263	14.3	0.184	13.8	0.034	9.9	0.099	13.8	0.069	10.1	0.339	15.2	0.989	5.8
Coal-fired PP	1.393	75.7	0.832	62.6	0.003	0.7	0.000	0.0	0.000	0.0	0.000	0.0	2.227	13.0
All other sources	0.448	24.3	0.496	37.4	0.344	99.3	0.715	100.0	0.680	100.0	2.224	100.0	14.907	87.0
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.002	0.3	0.000	0.0	0.002	0.0

Mad Creek
CONCENTRATION 1200-1800 95/ 8/26

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	0.887	-99.0	0.082	-99.0	0.167	-99.0	0.064	-99.0	0.174	-99.0	0.394	-99.0	1.769	-99.0
Estimated w/o fires	0.887	-99.0	0.082	-99.0	0.167	-99.0	0.064	-99.0	0.174	-99.0	0.394	-99.0	1.768	-99.0

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.643	72.6	0.063	76.4	0.051	30.6	0.018	27.3	0.044	25.4	0.160	40.7	0.980	55.4
Craig 1-3	0.156	17.5	0.026	31.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.181	10.3
Craig 1-2	0.133	15.1	0.014	17.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.148	8.4
Craig 1	0.057	6.5	0.007	8.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.064	3.6
Craig 2	0.076	8.6	0.008	9.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.084	4.7
Craig 3	0.022	2.5	0.011	13.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.033	1.9
Hayden 1-2	0.483	54.5	0.033	39.8	0.001	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.517	29.2
Hayden 1	0.248	28.0	0.020	23.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.269	15.2
Hayden 2	0.235	26.5	0.013	16.1	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.249	14.1
Steamboat Springs	0.002	0.2	0.003	3.4	0.011	6.7	0.006	9.7	0.017	10.0	0.019	4.9	0.059	3.3
Other Yampa Valley	0.003	0.3	0.002	2.1	0.039	23.1	0.011	17.6	0.027	15.4	0.141	35.8	0.222	12.6
Non-Yampa Valley	0.243	27.4	0.019	23.6	0.116	69.4	0.047	72.7	0.130	74.4	0.233	59.3	0.789	44.6
Denver	0.040	4.5	0.001	1.5	0.006	3.9	0.003	4.8	0.010	5.6	0.001	0.2	0.061	3.5
Colorado w/ Denver	0.155	17.4	0.015	17.7	0.105	63.1	0.042	64.7	0.120	68.7	0.188	47.7	0.624	35.3
Non-Colorado	0.089	10.0	0.005	5.9	0.011	6.3	0.005	8.0	0.010	5.7	0.046	11.6	0.165	9.3
Coal-fired PP	0.730	82.3	0.061	74.1	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	0.793	44.8
All other sources	0.157	17.7	0.021	25.9	0.166	99.0	0.064	100.0	0.174	100.0	0.394	100.0	0.976	55.2
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.2	0.000	0.0	0.000	0.0

Mad Creek
EXTINCTION 1200-1800 95/ 8/26 6-hour average RH: 26%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.637	-99.0	0.167	-99.0	0.251	-99.0	0.585	-99.0	0.526	-99.0	1.186	-99.0	14.353	-99.0
Estimated w/o fires	1.637	-99.0	0.167	-99.0	0.251	-99.0	0.585	-99.0	0.525	-99.0	1.186	-99.0	14.351	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.188	72.6	0.127	76.4	0.077	30.6	0.160	27.3	0.134	25.4	0.483	40.7	2.169	15.1
Craig 1-3	0.287	17.5	0.052	31.0	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.340	2.4
Craig 1-2	0.246	15.1	0.029	17.2	0.000	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.276	1.9
Craig 1	0.106	6.5	0.013	8.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.120	0.8
Craig 2	0.140	8.6	0.015	9.1	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.156	1.1
Craig 3	0.041	2.5	0.023	13.8	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.064	0.4
Hayden 1-2	0.892	54.5	0.066	39.8	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.960	6.7
Hayden 1	0.459	28.0	0.040	23.8	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.499	3.5
Hayden 2	0.434	26.5	0.027	16.1	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.461	3.2

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.004	0.2	0.006	3.4	0.017	6.7	0.057	9.7	0.053	10.0	0.058	4.9	0.194	1.3
Other Yampa Valley	0.005	0.3	0.003	2.1	0.058	23.1	0.103	17.6	0.081	15.4	0.425	35.8	0.675	4.7
Non-Yampa Valley	0.449	27.4	0.039	23.6	0.174	69.4	0.425	72.7	0.391	74.4	0.703	59.3	2.182	15.2
Denver	0.074	4.5	0.002	1.5	0.010	3.9	0.028	4.8	0.029	5.6	0.002	0.2	0.146	1.0
Colorado w/ Denver	0.285	17.4	0.030	17.7	0.159	63.1	0.379	64.7	0.361	68.7	0.565	47.7	1.778	12.4
Non-Colorado	0.164	10.0	0.010	5.9	0.016	6.3	0.047	8.0	0.030	5.7	0.137	11.6	0.404	2.8
Coal-fired PP	1.348	82.3	0.124	74.1	0.002	1.0	0.000	0.0	0.000	0.0	0.000	0.0	1.475	10.3
All other sources	0.289	17.7	0.043	25.9	0.249	99.0	0.585	100.0	0.526	100.0	1.186	100.0	12.878	89.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.2	0.000	0.0	0.001	0.0

Mad Creek
CONCENTRATION 0600-1200 95/ 8/27

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	1.226	-99.0	0.530	-99.0	0.476	-99.0	0.183	-99.0	0.559	-99.0	0.831	-99.0	3.805	-99.0
Estimated w/o fires	1.226	-99.0	0.530	-99.0	0.476	-99.0	0.183	-99.0	0.559	-99.0	0.831	-99.0	3.804	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	0.480	39.2	0.150	28.4	0.054	11.4	0.016	8.7	0.048	8.6	0.245	29.5	0.994	26.1
Craig 1-3	0.131	10.7	0.063	11.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.195	5.1
Craig 1-2	0.109	8.9	0.041	7.7	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.150	3.9
Craig 1	0.051	4.1	0.023	4.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.075	2.0
Craig 2	0.058	4.7	0.017	3.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.075	2.0
Craig 3	0.023	1.8	0.022	4.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.045	1.2
Hayden 1-2	0.345	28.1	0.077	14.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.422	11.1
Hayden 1	0.178	14.5	0.053	10.0	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.232	6.1
Hayden 2	0.166	13.6	0.024	4.5	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.191	5.0
Steamboat Springs	0.001	0.1	0.002	0.3	0.004	0.9	0.003	1.4	0.007	1.2	0.009	1.1	0.025	0.7
Other Yampa Valley	0.003	0.3	0.009	1.6	0.049	10.3	0.013	7.3	0.042	7.5	0.236	28.4	0.352	9.2
Non-Yampa Valley	0.746	60.8	0.380	71.6	0.421	88.6	0.167	91.2	0.510	91.3	0.586	70.5	2.810	73.9
Denver	0.267	21.8	0.045	8.4	0.051	10.8	0.026	14.0	0.080	14.3	0.005	0.5	0.473	12.4
Colorado w/ Denver	0.667	54.4	0.360	67.9	0.401	84.4	0.157	85.9	0.491	87.7	0.495	59.6	2.572	67.6
Non-Colorado	0.078	6.4	0.020	3.7	0.020	4.2	0.010	5.3	0.020	3.5	0.091	10.9	0.239	6.3
Coal-fired PP	0.782	63.8	0.166	31.4	0.001	0.3	0.000	0.0	0.000	0.0	0.000	0.0	0.950	25.0
All other sources	0.444	36.2	0.363	68.6	0.474	99.7	0.183	100.0	0.559	100.0	0.831	100.0	2.855	75.0
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1	0.000	0.0	0.001	0.0

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

Mad Creek
EXTINCTION 0600-1200 95/ 8/27 6-hour average RH: 47%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.749	-99.0	1.283	-99.0	0.762	-99.0	1.666	-99.0	1.842	-99.0	2.737	-99.0	21.038	-99.0
Estimated w/o fires	2.749	-99.0	1.283	-99.0	0.762	-99.0	1.665	-99.0	1.840	-99.0	2.737	-99.0	21.036	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.077	39.2	0.364	28.4	0.087	11.4	0.145	8.7	0.159	8.6	0.806	29.5	2.638	12.5
Craig 1-3	0.295	10.7	0.152	11.8	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.447	2.1
Craig 1-2	0.244	8.9	0.098	7.7	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.343	1.6
Craig 1	0.114	4.1	0.057	4.4	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.171	0.8
Craig 2	0.130	4.7	0.041	3.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.171	0.8
Craig 3	0.051	1.8	0.054	4.2	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.105	0.5
Hayden 1-2	0.773	28.1	0.186	14.5	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.960	4.6
Hayden 1	0.400	14.5	0.128	10.0	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.528	2.5
Hayden 2	0.373	13.6	0.058	4.5	0.001	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.432	2.1
Steamboat Springs	0.002	0.1	0.004	0.3	0.007	0.9	0.023	1.4	0.021	1.2	0.029	1.1	0.087	0.4
Other Yampa Valley	0.007	0.3	0.021	1.6	0.078	10.3	0.122	7.3	0.137	7.5	0.777	28.4	1.143	5.4
Non-Yampa Valley	1.672	60.8	0.919	71.6	0.675	88.6	1.520	91.2	1.682	91.3	1.931	70.5	8.398	39.9
Denver	0.598	21.8	0.108	8.4	0.082	10.8	0.233	14.0	0.264	14.3	0.015	0.5	1.301	6.2
Colorado w/ Denver	1.496	54.4	0.871	67.9	0.643	84.4	1.431	85.9	1.616	87.7	1.632	59.6	7.689	36.5
Non-Colorado	0.176	6.4	0.048	3.7	0.032	4.2	0.089	5.3	0.065	3.5	0.299	10.9	0.709	3.4
Coal-fired PP	1.753	63.8	0.403	31.4	0.002	0.3	0.000	0.0	0.000	0.0	0.000	0.0	2.159	10.3
All other sources	0.996	36.2	0.880	68.6	0.759	99.7	1.666	100.0	1.842	100.0	2.737	100.0	18.880	89.7
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.002	0.1	0.000	0.0	0.002	0.0

Mad Creek
CONCENTRATION 1200-1800 95/ 8/27

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		PM25	
Source Region	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)	(ug/m3)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	2.016	-99.0	0.513	-99.0	0.300	-99.0	0.116	-99.0	0.349	-99.0	0.460	-99.0	3.753	-99.0
Estimated w/o fires	2.016	-99.0	0.513	-99.0	0.300	-99.0	0.116	-99.0	0.348	-99.0	0.460	-99.0	3.753	-99.0

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	1.360	67.5	0.372	72.6	0.057	19.0	0.018	15.4	0.047	13.5	0.161	34.9	2.015	53.7
Craig 1-3	0.198	9.8	0.076	14.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.275	7.3
Craig 1-2	0.163	8.1	0.047	9.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.211	5.6
Craig 1	0.076	3.8	0.028	5.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.104	2.8
Craig 2	0.087	4.3	0.019	3.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.107	2.9
Craig 3	0.035	1.7	0.029	5.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.064	1.7
Hayden 1-2	1.157	57.4	0.288	56.2	0.004	1.3	0.000	0.0	0.000	0.0	0.000	0.0	1.449	38.6
Hayden 1	0.584	29.0	0.191	37.3	0.002	0.6	0.000	0.0	0.000	0.0	0.000	0.0	0.777	20.7
Hayden 2	0.573	28.4	0.097	18.9	0.002	0.7	0.000	0.0	0.000	0.0	0.000	0.0	0.673	17.9
Steamboat Springs	0.002	0.1	0.003	0.6	0.008	2.8	0.005	4.1	0.013	3.7	0.016	3.5	0.047	1.2
Other Yampa Valley	0.003	0.1	0.005	0.9	0.044	14.7	0.013	11.3	0.034	9.8	0.145	31.4	0.243	6.5
Non-Yampa Valley	0.656	32.5	0.140	27.4	0.243	81.0	0.098	84.6	0.301	86.4	0.300	65.1	1.738	46.3
Denver	0.267	13.2	0.028	5.4	0.040	13.3	0.020	17.0	0.062	17.7	0.003	0.7	0.419	11.2
Colorado w/ Denver	0.597	29.6	0.135	26.3	0.234	78.0	0.094	80.9	0.293	83.9	0.256	55.6	1.608	42.9
Non-Colorado	0.059	2.9	0.006	1.1	0.009	3.0	0.004	3.7	0.009	2.5	0.044	9.5	0.130	3.5
Coal-fired PP	1.656	82.2	0.383	74.7	0.005	1.6	0.000	0.0	0.000	0.0	0.000	0.1	2.044	54.5
All other sources	0.360	17.8	0.130	25.3	0.295	98.4	0.116	100.0	0.349	100.0	0.460	99.9	1.709	45.5
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.1	0.000	0.0	0.000	0.0

Mad Creek
EXTINCTION 1200-1800 95/ 8/27 6-hour average RH: 38%

	Sulfate		Nitrate		PPM2.5		EC2.5		POC		SOA		Total Bext	
Source Region	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)	(1/Mm)	(%)
PERFORMANCE	(%) is difference from Observed													
Observed	-99.000		-99.000		-99.000		-99.000		-99.000		-99.000		-99.000	
Estimated w/ fires	4.088	-99.0	1.132	-99.0	0.465	-99.0	1.053	-99.0	1.096	-99.0	1.446	-99.0	19.279	-99.0
Estimated w/o fires	4.088	-99.0	1.132	-99.0	0.465	-99.0	1.052	-99.0	1.095	-99.0	1.446	-99.0	19.278	-99.0
SOURCE CONTRIBUTIONS	(%) is contribution to Estimated w/ fires													
Total Yampa Valley	2.758	67.5	0.822	72.6	0.088	19.0	0.162	15.4	0.148	13.5	0.505	34.9	4.483	23.3
Craig 1-3	0.402	9.8	0.169	14.9	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.571	3.0
Craig 1-2	0.331	8.1	0.104	9.2	0.001	0.2	0.000	0.0	0.000	0.0	0.000	0.0	0.436	2.3
Craig 1	0.154	3.8	0.061	5.4	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.215	1.1
Craig 2	0.177	4.3	0.043	3.8	0.000	0.1	0.000	0.0	0.000	0.0	0.000	0.0	0.220	1.1
Craig 3	0.071	1.7	0.065	5.7	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.136	0.7
Hayden 1-2	2.347	57.4	0.636	56.2	0.006	1.3	0.000	0.0	0.000	0.0	0.001	0.0	2.990	15.5
Hayden 1	1.184	29.0	0.422	37.3	0.003	0.6	0.000	0.0	0.000	0.0	0.000	0.0	1.609	8.3
Hayden 2	1.163	28.4	0.214	18.9	0.003	0.7	0.000	0.0	0.000	0.0	0.000	0.0	1.380	7.2

Table B.2.3.12c (continued)
CALPUFF-Estimated Source Attributions to Six-Hour Average Total $PM_{2.5}$, Total Extinction (with the nominal value of 10 Mm^{-1}), and Concentration/Extinction by Species at Mad Creek for the 08/21/95 to 08/27/95 Episode

Steamboat Springs	0.003	0.1	0.007	0.6	0.013	2.8	0.043	4.1	0.041	3.7	0.050	3.5	0.157	0.8
Other Yampa Valley	0.006	0.1	0.010	0.9	0.068	14.7	0.119	11.3	0.107	9.8	0.454	31.4	0.765	4.0
Non-Yampa Valley	1.330	32.5	0.310	27.4	0.376	81.0	0.891	84.6	0.947	86.4	0.941	65.1	4.795	24.9
Denver	0.541	13.2	0.061	5.4	0.062	13.3	0.179	17.0	0.194	17.7	0.011	0.7	1.048	5.4
Colorado w/ Denver	1.212	29.6	0.298	26.3	0.362	78.0	0.851	80.9	0.919	83.9	0.804	55.6	4.446	23.1
Non-Colorado	0.119	2.9	0.012	1.1	0.014	3.0	0.039	3.7	0.028	2.5	0.137	9.5	0.349	1.8
Coal-fired PP	3.359	82.2	0.845	74.7	0.007	1.6	0.000	0.0	0.000	0.0	0.001	0.1	4.213	21.9
All other sources	0.730	17.8	0.286	25.3	0.457	98.4	1.053	100.0	1.096	100.0	1.445	99.9	15.067	78.1
Fires	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.001	0.1	0.000	0.0	0.001	0.0

B.3 CHEMICAL MASS BALANCE RECEPTOR MODEL

The Chemical Mass Balance (CMB) receptor model has been extensively applied for the apportionment of suspended particles and volatile organic compounds on both urban and regional scales (e.g. Alpert and Hopke, 1981; Annegarn *et al.*, 1992; Chow, 1985; Chow *et al.*, 1985, 1992a, 1992b, 1994, 1995, 1996; Currie *et al.*, 1984; Daisey, 1985; Daisey and Kneip, 1981; Dzubay *et al.*, 1988; Friedlander, 1973; Fujita *et al.*, 1994, 1995; Gartrell and Friedlander, 1975; Hopke *et al.*, 1976; Kowalczyk *et al.*, 1982; Lewis *et al.*, 1986; Lewis and Stevens, 1985; Li and Kamens, 1992; Lowenthal *et al.*, 1987, 1988a, 1988b, 1992, 1994; Miller *et al.*, 1972; Morandi *et al.*, 1987, 1990; Pratsinis *et al.*, 1988; Pratsinis, 1989; Roscoe *et al.*, 1982; Watson *et al.*, 1979, 1984, 1988, 1990a, 1990b, 1991, 1994a, 1994b, 1995; Thurston and Spengler, 1985; Zeldin *et al.*, 1990). The unique applications of the CMB model in this study include the use of "aged" generating station source profiles and the combination of gaseous (sulfur dioxide) with particulate measurements in source profiles and receptor samples.

The CMB model consists of a least squares solution to a set of linear equations which expresses each receptor concentration of a chemical species as a linear sum of products of source profile species and source contributions. The source profile species (i.e., the fractional amount of the species in the emissions from each source type) and the receptor concentrations, with appropriate uncertainty estimates, serve as input data to the CMB model. The output consists of the amount contributed by each source type to the total mass and each chemical species. The model calculates values for the contributions from each source and the uncertainties of those values. Input data uncertainties are used both to weight the importance of input data values in the solution and to calculate the uncertainties of the source contributions.

B.3.1 CMB Model Assumptions and Effects of Deviations

The CMB model assumptions are: 1) compositions of source emissions are constant over the period of ambient and source sampling; 2) chemical species do not react with each other (i.e., they add linearly); 3) all sources with a potential for significantly contributing to the receptor have been identified and have had their emissions characterized; 4) the number of sources or source categories is less than or equal to the number of species; 5) the source profiles are linearly independent of each other; and 6) measurement uncertainties are random, uncorrelated, and normally distributed. The degree to which these assumptions are met in applications depends to a large extent on the characteristics which are determined at source and receptor.

Solutions to the CMB equations consist of: 1) a tracer solution; 2) a linear programming solution; 3) an ordinary weighted least squares solution with or without an intercept; 4) a ridge regression weighted least squares solution with or without an intercept; and 5) an effective variance least squares solution with or without an intercept. An estimate of the uncertainty associated with the source contributions is an integral part of several of these solution methods. Weighted linear least squares solutions are preferable to the tracer and linear programming solutions because: 1) theoretically they yield the most likely

solutions to the CMB equations providing model assumptions are met; 2) they can make use of all available chemical measurements, not just the so-called tracer species; 3) they are capable of analytically estimating the uncertainty of the source contributions; and 4) there is, in practice, no such thing as a "tracer."

CMB software in current use (Watson *et al.*, 1990a) applies the effective variance solution developed and tested by Watson *et al.* (1984) because this solution: 1) provides realistic estimates of the uncertainties of the source contributions (owing to its incorporation of both source profile and receptor data uncertainties); and 2) chemical species with higher precisions in both the source and receptor measurements are given greater influence than are species with lower precisions.

Watson (1979) observed that individual sources with similar source profiles, such as different soils and road dusts, would yield unreliable values if included in the same chemical mass balance. Henry (1992) proposed a quantitative method of identifying this interference between similar source compositions, which is known as "collinearity."

Henry's (1992) "singular value decomposition" defines an "estimable space into which resolvable sources should lie." The source types which do not fall into this estimable space are collinear, or too similar to be resolved from a combination of one or more of the source types which do lie within the estimable space. Henry (1984) further proposed that linear combinations of source contributions resulting from collinear source compositions would be more representative of the summed contributions of these sources. Analytical measures of collinearity, and Henry's linear combination method, are available in EPA's CMB7 model.

The chemical mass balance modeling procedure requires: 1) identification of the contributing sources types; 2) selection of chemical species to be included; 3) estimation of the fraction of each of the chemical species which is contained in each source type (i.e., the source compositions); 4) estimation of the uncertainty in both ambient concentrations and source compositions; and 5) solution of the chemical mass balance equations. The U.S. Environmental Protection Agency (1987) emphasizes the need for evaluating the effects of deviations from model assumptions. Several studies have addressed the effect of these deviations.

Assumptions 1 through 6 stated above are fairly restrictive and they will never be totally complied with in actual practice. Fortunately, the CMB model can tolerate reasonable deviations from these assumptions, though these deviations increase the stated uncertainties of the source contribution estimates. The CMB model has been subjected to a number of tests to determine its ability to tolerate deviations from model assumptions (Watson, 1979; Gordon *et al.*, 1981; Henry, 1992; Currie *et al.*, 1984; Dzubay *et al.*, 1984; DeCesar *et al.*, 1985; Watson *et al.*, 1987b; Javitz and Watson, 1988; and Lowenthal *et al.*, 1987, 1988a, 1988b, 1992, 1994). These studies all point to the same basic conclusions regarding deviations from the above-stated assumptions.

With regard to Assumption 1, source compositions are known to vary substantially among sources, and even within a single source over an extended period of time. These variations are both systematic and random and are caused by three phenomena: 1) transformation and deposition between the emissions point and the receptor; 2) differences in fuel type and operating processes between similar sources or the same source in time; and 3) uncertainties or differences between the source profile measurement methods.

Evaluation studies have generally compared CMB results from several tests using randomly perturbed input data or substitutions of different source profiles for the same source type. The general conclusions drawn from these tests are: 1) the error in the estimated source contributions due to biases in all of the elements of a source profile is in direct proportion to the magnitude of the biases; and 2) for random errors, the magnitude of the source contribution errors decreases as the number of chemical species measured at sources and receptors increases.

With regard to the nonlinear summation of species, Assumption 2, no studies have been performed to evaluate deviations from this assumption. While these deviations are generally assumed to be small, conversion of gases to particles and reactions between particles are not inherently linear processes. This assumption is especially applicable to the end products of photochemical reactions and their apportionment to the sources of the precursors. Further model evaluation is necessary to determine the tolerance of the CMB model to deviations from this assumption.

A major challenge to the application of the CMB is the identification of the primary contributing sources for inclusion in the model, Assumption 3. Watson (1979) systematically increased the number of sources contributing to the simulated data from four to eight contributors while solving the CMB equations assuming only four sources. Watson (1979) also included more sources in the least squares solutions than those which were actually contributors, with the following results:

- Underestimating the number of sources had little effect on the calculated source contributions if the prominent species contributed by the missing source were excluded from the solution.

- When the number of sources was underestimated, and when prominent species of the omitted sources were included in the calculation of source contributions, the contributions of sources with properties in common with the omitted sources were overestimated.

- When source types actually present were excluded from the solution, ratios of calculated to measured concentrations were often outside of the 0.5 to 2.0 range, and the sum of the source contributions was much less than the total measured mass. The low calculated/measured ratios indicated which source compositions should be included.

- When the number of sources was overestimated, the sources not actually present yielded contributions less than their standard errors if their source profiles were significantly distinct from those of other sources. The over-specification of sources decreased the standard errors of the source contribution estimates.

Recent research suggests that Assumption 3 should be restated to specify that source contributions above detection limits should be included in the CMB. At this time, however, it is not yet possible to determine the "detection limit" of a source contribution at a receptor since this is a complicated and unknown function of the other source contributions, the source composition uncertainties, and the uncertainties of the receptor measurements. Additional model testing is needed to define this "detection limit."

With regard to Assumption 4, it is very unlikely that the true number of individual sources contributing to receptor concentrations is much larger than the number of species that can be measured. It is therefore necessary to group sources into source types of similar compositions so that this assumption is met. For the most commonly measured species, meeting Assumption 5 practically defines these groupings.

The linear independence of source compositions required by Assumption 5 has become a subject of considerable interest since the publication of Henry's (1992) singular value decomposition (SVD) analysis. As previously noted, this analysis provides quantitative measures of collinearity and the sensitivity of CMB results to specific receptor concentrations, which can be calculated analytically in each application. Henry (1992) also proposed an optimal linear combination of source contributions that have been determined to be collinear. Other "regression diagnostics" have been applied to the CMB by DeCesar *et al.* (1985). At this point, the exact values of these diagnostics that correspond to intolerable degrees of collinearity are unknown, though this is an area of active research.

Tests performed on simulated data with obviously collinear source compositions typically result in positive and negative values for the collinear source types. Unless the source compositions are nearly identical, the sum of these large positive and negative values very closely approximates the sum of the true contributions. With most commonly measured species (e.g., ions, elements, and carbon) and source types (e.g., motor vehicle, geological, wood burning, secondary sulfates and nitrates, and various industrial processes), from five to seven sources are linearly independent of each other. Gordon *et al.* (1981) found instabilities in the ordinary weighted least square solutions to the CMB equations when species presumed to be "unique" to a certain source type were removed from the solution.

Using simulated data with known perturbations ranging from 0 to 20%, Watson (1979) found: "In the presence of likely uncertainties, sources such as urban dust and continental background dust cannot be adequately resolved by least squares fitting, even though their compositions are not identical. Several nearly unique ratios must exist for good separation." It is widely recognized at this time that a substantial amount of research is needed to minimize the effects of source composition collinearity in the CMB. The most important finding of current research is that no single species controls the source

apportionment and that reducing variability in the source profile input data is more important than identifying a set of so-called "tracer" species.

Collinearity must be recognized as a potential problem to a certain extent. The most serious collinearity between two source profiles can result in one large and one small source contribution estimate with large uncertainties. Less serious collinearity results in "variance inflation" of the source contribution estimates, which implies that both source contribution estimates are associated with larger uncertainty intervals than they would be in the absence of collinearity. Variance inflation is, however, a random effect. For example, the effects of collinearity on source contribution estimates is reduced, on average, over a series of samples.

Therefore, unless collinearity results in negative source contribution estimates, it is useful to retain source profiles which may be indicated in UNCERTAINTY/SIMILARITY clusters. In apportioning the MZVS samples, there were some cases when motor vehicle and vegetative burning profiles appeared in UNCERTAINTY/SIMILARITY clusters, while others, from the same site and in temporal sequence, did not. The relative uncertainties of the source contribution estimates in either case were similar. This implies that the effects of collinearity, even when indicated, were not significant. Removing one of the two profiles in the UNCERTAINTY/SIMILARITY cluster or combining source contribution estimates of "collinear" profiles would have resulted in a loss of information.

One of the criteria for assigning source profiles to UNCERTAINTY/SIMILARITY clusters is that their source contribution estimates are not "estimable" (which means that their uncertainties are large relative to the magnitude of their source contribution estimates). While the criterion is objective, the interpretation of the result is subjective. This is especially true considering that typical CMB regression is done with approximately 20 degrees of freedom (i.e., number of fitting chemical species minus number of fitting sources), while regression modeling in the social sciences, for example, is done with hundreds if not thousands of degrees of freedom.

With respect to Assumption 6, the randomness, normality, and the uncorrelated nature of measurement uncertainties, there are no results available from verification or evaluation studies. Every least squares solution to the CMB equations requires this assumption, as demonstrated by the derivation of Watson *et al.* (1984). In reality, very little is known about the distribution of errors for the source compositions and the ambient concentrations. If anything, the distribution probably follows a log-normal rather than a normal distribution. Ambient concentrations can never be negative, and a normal distribution allows for a substantial proportion of negative values while a log-normal distribution allows no negative values. For small errors (e.g., less than 20%), the actual distribution may not be important; but for large errors, it probably is important. A symmetric distribution becomes less probable as the coefficient of variation of the measurement increases. This is one of the most important assumptions of the solution method that requires testing.

The effective variance solution provides uncertainties of the source contributions estimates calculated directly from the input source and ambient uncertainties. In typical

weighted regression applications, the uncertainties of the regression coefficients are also related to the regression fit by the mean squared error (MSE). In short, the regression coefficient variance based on the propagated effective variances could be multiplied by the weighted MSE. However, in the effective variance case, the expected value of the MSE is unity. In the MZVS apportionments, the MSE was less that unity in 272 out of 367 Cases. This means that the actual fit to the data was better than expected based on the assumed input errors. In these cases, the uncertainties of the source contribution estimates overestimated.

B.3.2 CMB Applications and Validation Protocol

An extensive protocol for CMB model application and validation has been developed for PM_{10} source assessment (U.S. Environmental Protection Agency, 1987; Watson *et al.*, 1991), and elements of that protocol were applied in the MZVS. The protocol consists of seven steps: 1) determination of model applicability; 2) initial source contribution estimates; 3) examination of model outputs and performance measures; 4) identification of deviations from model assumptions; 5) identification and correction of model input errors; 6) verification of the consistency and stability of source contribution estimates; and 7) evaluation of the results of the CMB analysis with respect to other source assessment methods. The activities carried out for each of these steps are described below.

B.3.2.1 CMB Model Applicability

The requirements for CMB model applicability are as follows: 1) a sufficient number of receptor samples are taken with an accepted method to evaluate compliance with standards; 2) samples are analyzed for chemical species which are also present in source emissions; 3) potential source contributors have been identified and chemically characterized; and 4) the number of non-collinear source types is less than the number of measured species.

Samples were taken through well-characterized $PM_{2.5}$ inlets during the MZVS. A selection of these samples was subjected to analysis for mass, elements, carbon, and ion concentrations. All major source types in the Yampa Valley and a three-state region surrounding the Valley were identified, and profiles representing their emissions were measured. Examination of the chemical profiles shows significant differences among profiles for major source types such as primary geological material, primary motor vehicle exhaust, unaged and aged coal-fired generating station emissions, residential wood combustion, prescribed burning, geothermal hot springs, residential coal combustion, and secondary ammonium sulfates and ammonium nitrates. The number of species measured in source and receptor samples is greater than the number of non-collinear sources. The MZVS data set was not randomly obtained over a one-year period. Conditions on sampled days reflect the conditions most conducive to high $PM_{2.5}$ concentrations.

B.3.2.2 Initial Source Contribution Estimates

Initial tests with different combinations of profiles determine which profiles best explain the data at each site, and the CMB performance measures were examined to determine how well the ambient concentrations were explained by the source contribution.

Secondary ammonium sulfate and primary motor vehicle exhaust were always required to account for the chemical concentrations in the $PM_{2.5}$ samples. Vegetative burning and coal-fired generating station contributions were included in many of the samples. The secondary organic carbon profile, which contains only organic carbon, was not needed since the primary sources of carbon were sufficient to account for the measured organic carbon concentration.

The initial source apportionments at each site showed that the following profiles best explained the data across the study area: 1) "MZSOILC" for primary geological material; 2) "MZMVCGC" for primary motor vehicle exhaust; 3) "MZHD2WET" or "MZHD2DRY" for coal-fired generating stations; 4) "MZRWC3" and "MZFIREC" for vegetative burning; 5) "AMSUL" for secondary ammonium sulfate; and 6) "AMNIT" for secondary ammonium nitrate. Residential coal combustion and geothermal hot springs were determined to be negligible contributors by emissions inventories, and these showed collinearity with other sources or negligible CMB contributions when they were included with the other source types.

The initial source apportionments also examined the fitting species that would provide the best indication of the presence or absence of sources. The default fitting species selected were NO_3^-, $SO_4^=$, NH_4^+, K^+, OC, EC, Na, Mg, Al, Si, Cl, K, Ca, Ti, Cr, Mn, Fe, Ni, Cu, Zn, As, Se, Br, Rb, Sr, Zr, Pb, and SO_2. Trace elements that were consistently below detection limits were omitted as fitting species. Sulfate was used in place of S, and Cl^- was normally used in place of Cl, as fitting species owing to the suspected bias in the elemental or ionic data, respectively.

B.3.2.3 Model Outputs and Performance Measures

Watson *et al.* (1991) define several performance measures that are examined with each CMB to eliminate many profiles from further consideration. There may be more than one combination of profiles which attain the performance criteria to the same extent. When this is the case, it is necessary to group these individual sources into source types which are not specific to individual sources.

Evaluations of several different combinations of source profiles were made for every $PM_{2.5}$ sample in this data set. An example of the process was included in Section 6.5 to illustrate the evaluation process and the grouping of similar profiles into source types. Model outputs, ambient concentrations, source profiles, and modeling software are available from the authors for other researchers to reproduce these tests on this and other examples.

B.3.2.4 Deviations from Model Assumptions

The basic assumptions of the CMB and general knowledge about deviations from them were discussed above.

Section 6.3 showed that there is substantial variability among individual profiles, and even among profiles from different source types, and that Assumption 1 is never completely

met. The example in Section 6.5, and other similar examples that were studied, showed that substitution of different profiles usually caused deviations that were within the estimated uncertainty intervals.

With respect to Assumption 2, all of the source types are treated as non-reactive with the exception of the coal-fired generating station profiles, for which transformations were simulated with an aerosol evolution model. This is definitely the case for primary emissions from geological material and motor vehicle exhaust, in which little change is expected between source and receptor.

With respect to Assumption 3, the majority of calculated mass concentrations were reproduced within measured uncertainty intervals, as were the major chemical components. Owing to the low concentrations of most species, relative measurement uncertainties were large compared to those found in urban areas, and these uncertainties were propagated to the source contribution estimates.

With respect to Assumption 4, as many as 28 chemical species and up to 5 source profiles were used in each calculation. The number of chemical species always exceeded the number of source types.

The examples in Section 6.5 show how well Assumption 5 could be met and why it is necessary to group specific profiles into source types defined as primary geological material, coal-fired generating station, vegetative burning, and motor vehicle exhaust. For many cases, the individual profiles within these categories were too collinear to be separated from each other.

The effects of deviations from Assumption 6 have not been studied to a great extent. Non-randomness and correlation among measurement errors would result in biases in the calculated concentrations with respect to measured concentrations.

For this study, all of the CMB assumptions are met to the extent that the source contribution estimates can be considered valid.

B.3.2.5 Identification and Correction of Model Input Errors

In several cases, it was evident that certain chemical species concentrations were physically unreasonable. This was indicated by large CHI-SQUARE values with large differences between calculated and measured concentrations for the related species. In these cases the Level II data validation summary was consulted, and it was usually found that the discrepancy had already been identified by the validation tests. The suspect species was removed from the fit in these cases.

B.3.2.6 Consistency and Stability of Source Contributions

Separate CMBs were performed on $PM_{2.5}$ samples for the six MZVS sites. The stability of these solutions was tested periodically by adding or dropping fitting species and

examining changes in the source contribution estimates. In all but a few cases, the source contribution estimates changed by no more than one uncertainty interval. In those cases where the presence or absence of a single species made a large difference in the source contribution estimates, the species was left in the fit when all performance measures were within target ranges. The species was deleted from the fit when this would bring performance measures into acceptable target ranges.

B.3.2.7 Reconciliation with Other Source Apportionment Methods

The MZVS provided a unique opportunity to reconcile apportionments with other methods, and this reconciliation is carried out in Section 7.

B.4 Light Scattering Efficiencies

B.4.1 Introduction

Atmospheric light extinction is the sum of scattering by gases, absorption by gases, scattering by particles (b_{sp}), and absorption by particles (b_{ap}). Particles that scatter and absorb sunlight can cause significant visibility degradation when present in sufficient numbers in remote and otherwise pristine areas. In order to evaluate the causes of visibility degradation, it is necessary to determine the sources and optical properties of the ambient particles. The approach taken in the MZVS is a two-step process that determines the sources of the major chemical components of the ambient aerosol and estimates the contribution of these components to particle light scattering and absorption.

It is not possible to completely characterize the physical and chemical properties of all of the individual particles which scatter and absorb light, so several approaches have been used to relate aerosol chemical composition to light extinction. All of these models require simplifying assumptions about aerosol properties (particle size, morphology, and chemical composition) which influence their interaction with light, and tests for deviations from these assumptions are an important part of the source attribution..

B.4.2 Light Extinction Models

Three approaches used to estimate the specific scattering and absorption efficiencies of aerosol chemical components are: 1) use "consensus" or literature-based efficiencies; 2) calculate efficiencies using multiple linear regression (MLR) of measured b_{sp} against concentrations of the major aerosol components, e.g., ammonium sulfate, ammonium nitrate, organic carbon, elemental carbon, and soil dust; and 3) calculate efficiencies using Mie theory. The quantity "specific extinction efficiency" (in units of m^2/g) multiplied by a corresponding chemical concentration (in units of $\mu g/m^3$) yields an extinction coefficient (in units of Mm^{-1}). Efficiencies can be used to apportion extinction among chemical components, and thus to the sources which emit those components, and to evaluate the effects of reducing the emissions of the components or their precursors.

B.4.2.1 Consensus Model

The "consensus" approach synthesizes information from applications of the other techniques. For example, the Department of Energy Workshop and the Grand Canyon Visibility and Transport Commission (GCVTC) Aerosols and Optics Meeting held in Las Vegas in February, 1995, recommended the following simple model for calculating specific extinction efficiencies.

$$\text{Extinction} = 3\ f_s(RH)\ AMSUL + 3\ f_s(RH)\ AMNIT + 4\ f_o(RH)\ 1.4\ OC + 10\ EC + 2\ SOIL + 0.6\ COARSE \quad \text{(B.4-1)}$$

where AMSUL, AMNIT, EC, SOIL, and COARSE are the respective concentrations of $PM_{2.5}$ ammonium sulfate, ammonium nitrate, elemental carbon, soil dust, and coarse (PM_{10} -

$PM_{2.5}$) aerosol, and 1.4 times OC is the concentration of organic carbon, plus its associated hydrogen and oxygen. The "dry" (RH <30%) scattering efficiencies for ammonium sulfate, ammonium nitrate, organic carbon, soil dust, and coarse aerosol are assumed to be 3, 3, 4, 2, and 0.6 m^2/g, respectively. The absorption efficiency of elemental carbon is assumed to be 10 m^2/g. At high relative humidities (RH>70%), hygroscopic aerosols absorb water, significantly increasing their volumes. The functions $f_s(RH)$ and $f_o(RH)$ used to account for water growth are 0.7/(1-RH) and 0.5+0.35/(1-RH), respectively, at RH>30%, and unity at RH<30%. This model was based on efficiencies derived from MLR and Mie theory, theoretical considerations about uptake of water by hygroscopic aerosols, and agreement between measured extinction in the desert Southwest and that calculated from the efficiencies.

B.4.2.2 MLR Model

The Multiple Linear Regression (MLR) model for light scattering has the form:

$$b_{sp}=\sum_{j=1}^{n} E_j C_j \qquad \text{(B.4-2)}$$

where b_{sp} is particle scattering, n is the number of chemical components, E_j is the scattering efficiency for species j, and C_j is the measured concentration of the jth chemical component.

The E_j in Equation B.4-2 can be estimated using MLR when a time series of corresponding b_{sp} and C_j have been measured, with b_{sp} as the dependent variable and the C_j as the independent variables. Since both b_{sp} and the C_j are subject to measurement error, it is appropriate to weight the regression using "effective variances" (Watson *et al.*, 1984).

The MLR extinction model has strict physical significance under the following conditions: 1) all components contributing to scattering are included as independent variables; 2) the components are externally mixed; 3) sufficient samples have been taken (typically >50) to provide stable solutions; 4) the scattering efficiency for each component is constant from sample to sample; and 5) chemical concentrations are uncorrelated in time. Conditions 4 and 5 are the most difficult to attain in practice. Particle scattering efficiencies are not constant, as noted earlier, especially when the relative humidity and particle size distributions are variable.

Measured concentrations of different components are often highly correlated with each other and with light extinction, owing to dilution and dispersion that affect all particle concentrations and to the emissions of several components from the same sources (White, 1986; Watson *et al.*, 1988). Biases in the regression estimates may be reduced by stratifying data according to relative humidity (RH) or by explicitly including RH in the model (e.g., Malm *et al.*, 1989). While this approach has been widely used to estimate the extinction efficiencies of aerosol components, few studies have critically examined the effects of deviations from model assumptions on the calculated efficiencies.

B.4.2.3 Mie Scattering Model

The Elastic Light Scattering Interactive Efficiencies (ELSIE, Sloane, 1986) is a commonly-used model that calculates light extinction by hygroscopic aerosols of mixed chemical composition. ELSIE is applied to measurements of the chemical composition of size-resolved aerosols and calculates particle extinction, scattering, and absorption coefficients using Mie theory (Bohren and Huffman, 1983). ELSIE software has evolved into a convenient package that has been applied it to data from recent studies (Watson *et al.,* 1988, 1991; Lowenthal *et al.,* 1995) that related light extinction to aerosol sources.

ELSIE divides bulk particulate chemical concentrations into discrete size bins over a specified size range, for example, 0.05 to 2.5 μm. If size-resolved chemical measurements are not available, ELSIE calculates bimodal-lognormal size distributions based on specified geometric mean diameters (D_g) and standard deviations for each chemical component. For each size bin, estimates are made of the aerosol liquid water content, the number of particles, their volume-average index of refraction, and extinction cross sections. Finally, the extinction, scattering, and absorption coefficients are calculated for each size bin and summed over the entire size range. Specific extinction efficiency, or the amount of light extinction per unit mass of a chemical component, is estimated by removing or adding a fraction of a component's mass and dividing the change in extinction by the amount of mass removed or added.

The particle light extinction coefficient (b_{ep}), in units of m^{-1} or Mm^{-1}, is equal to the number of particles (n) multiplied by their extinction cross sections (σ):

$$b_{ep} = \sigma n(D)dD \qquad \text{(B.4-3)}$$

For spherical particles, σ depends on the incident light wavelength, the particle index of refraction, and the particle diameter. It is calculated by solving the Mie (1908) equations for spherical particles whose chemical composition is assumed to be either homogeneous or distributed between an insoluble core containing carbon and residual mass (dust) and an aqueous shell containing soluble sulfate, nitrate, carbon, and dust (Bohren and Huffman, 1983).

ELSIE is currently configured for five chemical components: ammonium nitrate, ammonium sulfate or ammonium bisulfate, organic carbon, elemental carbon, and residual mass (or geological or soil dust). The aerosol is assumed to be internally mixed (all particles in a size range have the same composition) or externally mixed (each particle is comprised of only one chemical species). ELSIE calculates the extinction and scattering cross sections and the absorption cross section as the difference between extinction and scattering. The index of refraction of a particle is calculated as a volume-weighted average of the indices of refraction of its chemical components, including water. A single incident wavelength is chosen, typically 0.55 μm, which corresponds to the wavelength used in ambient scattering measurements by nephelometry. Scattering, extinction, and absorption are summed over a specified size range in a specified number of size bins. The fractions of the various chemical

masses in each bin are determined from the measured size distributions or from specified bimodal-lognormal parameters.

The number of particles in each bin is calculated from the particle size, volume-averaged density, and total aerosol volume in that bin. Total volume is the sum of the dry volumes of the individual chemical components and the volume of water associated with the soluble components. The liquid water volume is estimated using a growth function, which is a relationship between particle composition and relative humidity derived empirically for chemically-complex aerosols (Hanel, 1976; Hanel and Lehmann, 1981; Sloane, 1984; Sloane, 1986). This function depends on the volume-averaged density and fractional solubility of the dry aerosol:

$$(D/D_o)^3 = 1 + RH/(1\text{-}RH)\, E\rho_o\, EH \qquad \text{(B.4-4)}$$

where D and D_o are the wet and dry Stokes (geometric) diameters, E is the soluble fraction of dry mass, and ρ_o is the dry density. EH is defined by Sloane (1986) as a composite function:

$$EH = \langle i \rangle \langle \varepsilon \rangle M_W/M_S \qquad \text{(B.4-5)}$$

where M_W is the molecular weight of water, i is the van't Hoff factor, ε is the dissolved fraction of the aerosol mass, and M_S is the average molecular weight of the dissolved aerosol constituents. The EH vary with composition and RH and as discussed above, have been determined empirically for various "typical" aerosol mixtures. It is assumed that 20% of the residual mass, 60% of the organic carbon, and 100% of the sulfate and nitrate are soluble.

ELSIE also calculates specific extinction, scattering, and absorption efficiencies, in units of m^2/g, for each chemical compound. These efficiencies vary with particle size and thus liquid water. Sloane (1986) defined specific efficiency in terms of the change in extinction resulting from removing or adding a portion of the mass of a component from the aerosol. It can be assumed that removing mass, for example, will decrease the size of the aerosol particles but would leave their number constant. This model may be appropriate for estimating the effects of reducing emissions of a component such as sulfur, which may enter the particle phase through condensation on existing particles. This model may not be appropriate for a component like elemental carbon, which may constitute the core upon which other species condense.

The issue of how components are mixed in particles is extremely complex. Direct, detailed measurement of the mixing state is difficult, if not impossible. Aerosol formation mechanisms are also extremely complex, involving primary and gaseous emissions from local and distant sources, and chemical transformations within air masses which mix over a continuum of geographical scales.

As discussed by White (1986), the assumption of constant particle number (i.e., removing or adding mass and changing the particle size) leads to a condition of non-additivity: potentially large differences between extinction reconstructed from the efficiencies and concentrations and the extinction estimated by Mie theory for the intact particles. Under

this assumption, the contributions of the individual particle components to extinction do not equal the extinction calculated for the intact particle. The reason for this is that extinction cross section varies with size.

The definition of extinction given in equations B.4-2 and B.4-3 implies additivity: The total extinction equals the sum of the extinctions of the individual particles. For practical purposes such as source apportionment, it is desirable to define specific extinction such that particle extinction equals the sum of the extinctions of the individual chemical components of that particle. If all of the components, including water, had the same refractive index, then the contribution of each component to extinction would be proportional to its volume plus the volume of its associated liquid water. However, the component refractive indices are not equal. The particle refractive index is calculated as a linear average of the individual component refractive indices. Because the relationship between extinction cross section and refractive index is non-linear, it is not possible to analytically determine the relationships between the individual component refractive indices and the total particle extinction cross section. Thus, there is no theoretical basis for assigning extinction to individual chemical components in mixed particles. An approximation to additivity may be achieved by calculating efficiencies under the assumption that removing or adding component mass alters the particle number but not size (Lowenthal *et al.,* 1995). ELSIE may be used to calculate specific efficiencies under the assumptions that removing mass changes the particle size or the particle number.

The ELSIE model was applied to chemical concentrations from samples collected at Buffalo Pass (BP) from August-October, 1995. The important criterion used to evaluate this model is the comparison of measured and estimated b_{sp}. In this study, estimated b_{sp} is compared with b_{sp} measured by the TSI three-color nephelometer. The three colors are blue, green, and red (B, G, and R with nominal wavelengthes of 450, 550, and 700 nm, respectively). The light scattering coefficients for these colors are referred to as $b_{sp}(B)$, $b_{sp}(G)$, and $b_{sp}(R)$, respectively. Estimated particle light absorption (b_{ap}) is compared with b_{abs} determined from densitometry measurements on the Teflon filters.

The size distributions of the aerosol chemical components were not measured. Smaller particles scatter lower-wavelength light more efficiently than do larger particles. Therefore, the ratios of measured blue to green b_{sp} or measured green to red b_{sp} are indicative of the particle size distribution. The measured ratios of scattering coefficients measured at different wavelengths along with an assumed or measured particle refractive index can be used to estimate the parameters of a lognormal size distribution. For example, blue/green b_{sp} ratios were calculated for each six-hour filter sample. b_{sp} was estimated with the ELSIE program for each sample over a range of geometric mean diameters (D_g) from 0.05 to 1 μm with a geometric standard deviation of 2.0 at the blue and green wavelengths. Particles were assumed to be internally and homogeneously mixed. Note that the average RH measured in the TSI nephelometer corresponding to the filter samples ranged from only 13 to 52%. A D_g for each sample was inferred by comparing the measured blue/green b_{sp} ratio to the ratios calculated over the hypothetical size range. The inferred D_g represents an "equivalent" size

distribution. While not unique, it is an adequate first-order approximation to the actual size distribution.

B.4.3 Results

Figure B.4.1 shows the relationships between $b_{sp}(G)$ and concentrations of sulfate, nitrate, and OC measured at Buffalo Pass. Table B.4.1 presents pairwise correlations of $b_{sp}(G)$, sulfate, nitrate, OC, EC, and soil for all valid BP filter samples (N=82). The soil concentration was calculated by converting mineral element concentrations to their oxides according to Zhang *et al.* (1994):

$$\text{Soil} = 1.89\ \text{Al} + 1.57\ \text{Si} + 1.2\ \text{K} + 1.4\ \text{Ca} + 1.43\ \text{Fe}. \qquad \text{(B.4-6)}$$

The correlation of $b_{sp}(G)$ with sulfate (r=0.79) accounts for 62% of the variation of $b_{sp}(G)$. Particulate nitrate and $b_{sp}(G)$ are not significantly correlated. OC is significantly correlated with $b_{sp}(G)$ (r=0.61) but also with sulfate (r=0.42). OC and sulfate are the first and second largest components, respectively, of $PM_{2.5}$ in the samples, so it is not surprising that they are most strongly correlated with light scattering.

B.4.3.1 Multiple Linear Regression (MLR)

MLR was performed for 66 filter samples with valid $b_{sp}(G)$ and chemical concentrations at Buffalo Pass. Sulfate, nitrate, and OC were converted to ammonium sulfate, ammonium nitrate, and OC (with H and O) by multiplying by 1.375, 1.29, and 1.2, respectively. Variations in ambient RH (13 to 52%) were ignored. According to Equation B.4-4, the diameter of a particle with a density of 1.7 g cm^{-1} comprised of 80% soluble material would grow by a factor of only 1.06 at RH = 50%. The regression was weighted by the effective variances (Watson *et al.*, 1984). The regression coefficients, which are the estimated specific scattering efficiencies (m^2/g), are as follows:

$$b_{sp}(G) = 4.6\pm0.6\ [\text{Ammonium sulfate}] + 7.0\pm2.4\ [\text{Ammonium nitrate}] + 0.8\pm0.2\ [\text{OC}] + 0.01\pm1.5\ [\text{EC}] - 1.0\pm0.5\ [\text{SOIL}] + 1.3\pm0.7. \qquad \text{(B.4-7)}$$

Compared with Equation B.4-1, for example, these results are difficult to interpret and are probably not useful. There are no physical reasons why sulfate, nitrate, and OC should not have similar scattering efficiencies. All have approximately similar densities and refractive indices. The low OC efficiency and negative soil efficiency were probably caused by correlations between sulfate and OC and between OC and soil concentrations. As discussed above, collinearity destabilizes the least-squares solution, resulting in regression parameters (coefficients) with large uncertainties.

B.4.3.2 Mie Theory

The sensitivity ELSIE light extinction estimates to model and input data assumptions to these assumptions was discussed in detail by Lowenthal *et al.* (1995). Estimates were found to be largely insensitive to assumptions about mixing state (external versus internal

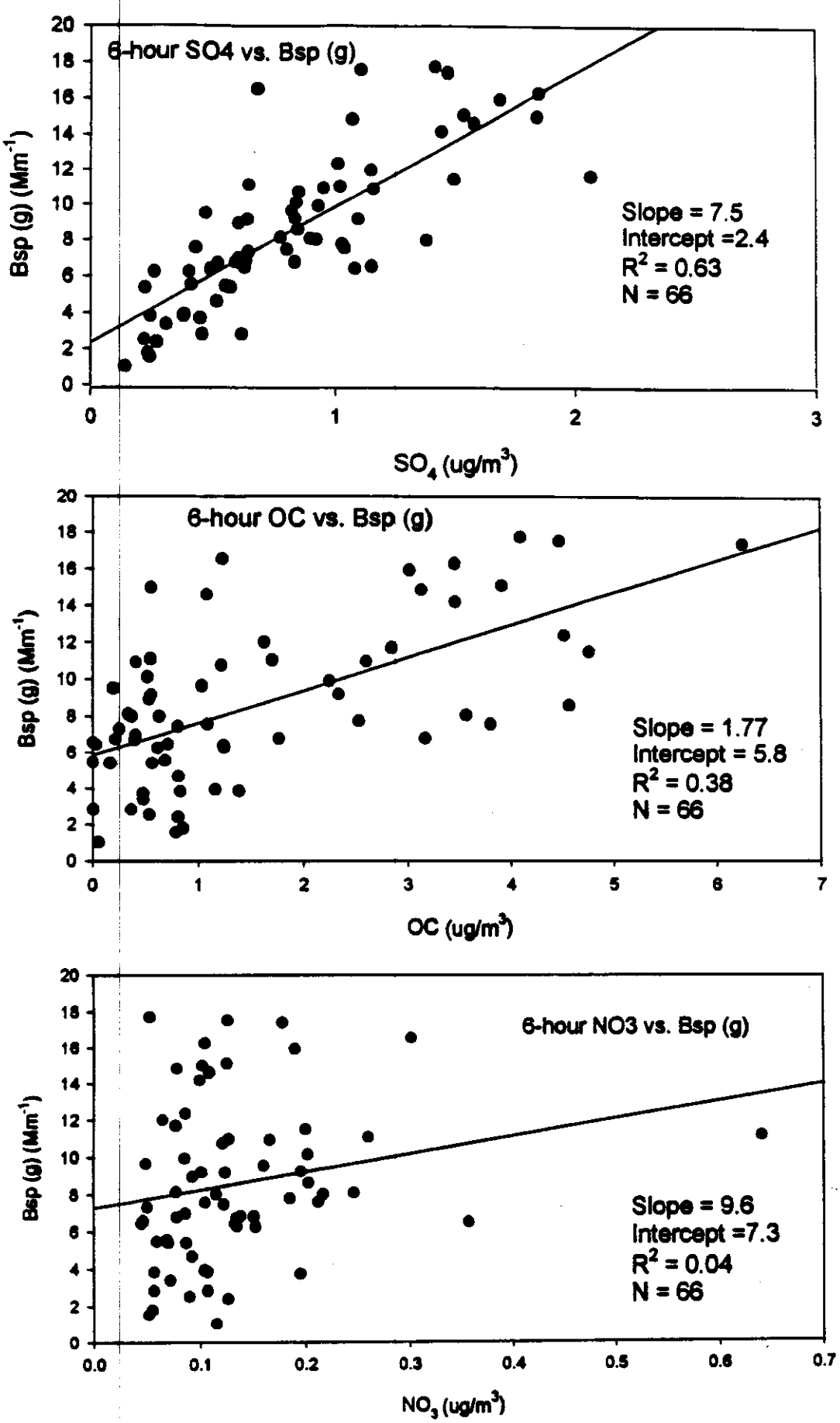


Figure B.4-1 Relationship between sulfate, nitrate, and organic carbon concentrations and B_{sp}(g) measured at Buffalo Pass.

Table B.4.1
Correlations[a] of Chemical Concentrations and $b_{sp}(G)$ at Buffalo Pass

	$b_{sp}(G)$	$SO_4^=$	NO_3^- [b]	OC	EC	SOIL
$b_{sp}(G)$	1.00	0.79	0.20	0.61	0.34	0.26
	0.00	0.00	0.10	0.00	0.01	0.04
	66	66	66	66	66	66
$SO_4^=$	0.80	1.00	0.14	0.42	0.30	0.20
	0.00	0.00	0.22	0.00	0.01	0.07
	66	82	82	82	82	82
NO_3^-	0.20	0.14	1.00	0.07	-0.06	0.13
	0.10	0.22	0.00	0.55	0.60	0.23
	66	82	82	82	82	82
OC	0.61	0.42	0.07	1.00	0.31	0.53
	0.00	0.00	0.55	0.00	0.00	0.00
	66	82	82	82	82	82
EC	0.34	0.30	-0.06	0.31	1.00	0.22
	0.01	0.01	0.60	0.00	0.00	0.04
	66	82	82	82	82	82
SOIL	0.26	0.20	0.13	0.53	0.22	1.00
	0.04	0.07	0.23	0.00	0.04	0.0
	66	82	82	82	82	82

[a] For each species, the first row contains the correlation coefficient, the second row contains the significance, and the third row contains the number of data pairs. Significance (α) > 0.05 implies that the correlation is not significantly different from zero.

[b] Total particulate nitrate.

mixture, core/shell versus homogeneous composition), or whether sulfate was present as ammonium sulfate or ammonium bisulfate. In the case of Grand Canyon aerosols, assumptions about size distribution were also not critical. As will be seen, this was not the case in the MZVS where particle sizes appear to be much smaller than those measured in the Grand Canyon.

ELSIE assumes that particles are spheres. It is also assumes that averages of particle density and refractive index, weighted by the volumes of the individual chemical components, represent these properties in multicomponent particles. The liquid water growth function (LWGF) is an approximation. However, in the absence of accurate measurements of size-resolved aerosol liquid water or a thermodynamic treatment that accounts for hygroscopic organic compounds, the LWGF produces reasonable results as determined by comparing calculated and measured light extinction in the MZVS and other studies. Lowenthal *et al.* (1995) showed that b_{sp} estimates based on the LWGF were similar to those estimated by Zhang *et al.* (1994), who measured Hopi Point aerosol liquid water directly with a tandem differential mobility analyzer.

B.4.3.2a Sensitivity to Variations in Particle Size

Aerosol size distributions for each six-hour average $PM_{2.5}$ sample at Buffalo Pass were inferred from the ratio of the average measured $b_{sp}(B)$ to average measured $b_{sp}(G)$, hereafter referred to as "B/G". A unimodal lognormal size distribution was assumed with geometric mean diameter (D_g) and geometric standard deviation equal to 2.0. b_{sp} was estimated at the blue and green wavelengths over a range of D_g from 0.05 to 1.0 μm. The "inferred" D_g was that which produced an estimated B/G which corresponded most closely to the measured B/G. The inferred D_g for a given sample reflects its chemical composition and water content. Figure B.4.2 shows the relationship between the measured B/G and inferred D_g for each sample. Out of 66 samples, 35 had inferred $D_g < 0.2$ μm, 28 had inferred D_g between 0.2 and 0.3 μm, and 3 had inferred $D_g > 0.3$ μm.

Estimated scattering is very sensitive to variations in particle size at diameters below 0.3 μm. This is illustrated in Figure B.4.3, which plots b_{sp} calculated over a range of assumed geometric mean diameters and geometric standard deviation = 2.0 for a sample collected on 8/8/95 (0600) at Buffalo Pass. Estimated b_{sp} increases by more than a factor of two as D_g increases from 0.1 to 0.2 μm. Estimated b_{sp} varies much less for D_g between 0.4 and 1.0 μm. Note that for a given aerosol volume, doubling the particle size decreases the particle number by a factor of eight, even though the optical cross section increases by nearly the same factor between 0.4 and 1.0 μm (Lowenthal *et al.*, 1995).

Figures 5.3.2 and 5.3.3 indicate the difficulty in estimating light extinction for MAVS aerosols. Lowenthal *et al.* (1995) demonstrated that estimated b_{sp} was relatively insensitive to assumptions about particle size for samples collected in Phoenix, AZ and the Grand Canyon. At these sites, significant fractions of aerosol mass were associated with particles larger than about 0.5 μm. Figure B.4.2 suggests that aerosols at Buffalo Pass were consistently smaller than this. Figure B.4.3 shows that small changes in the assumed size

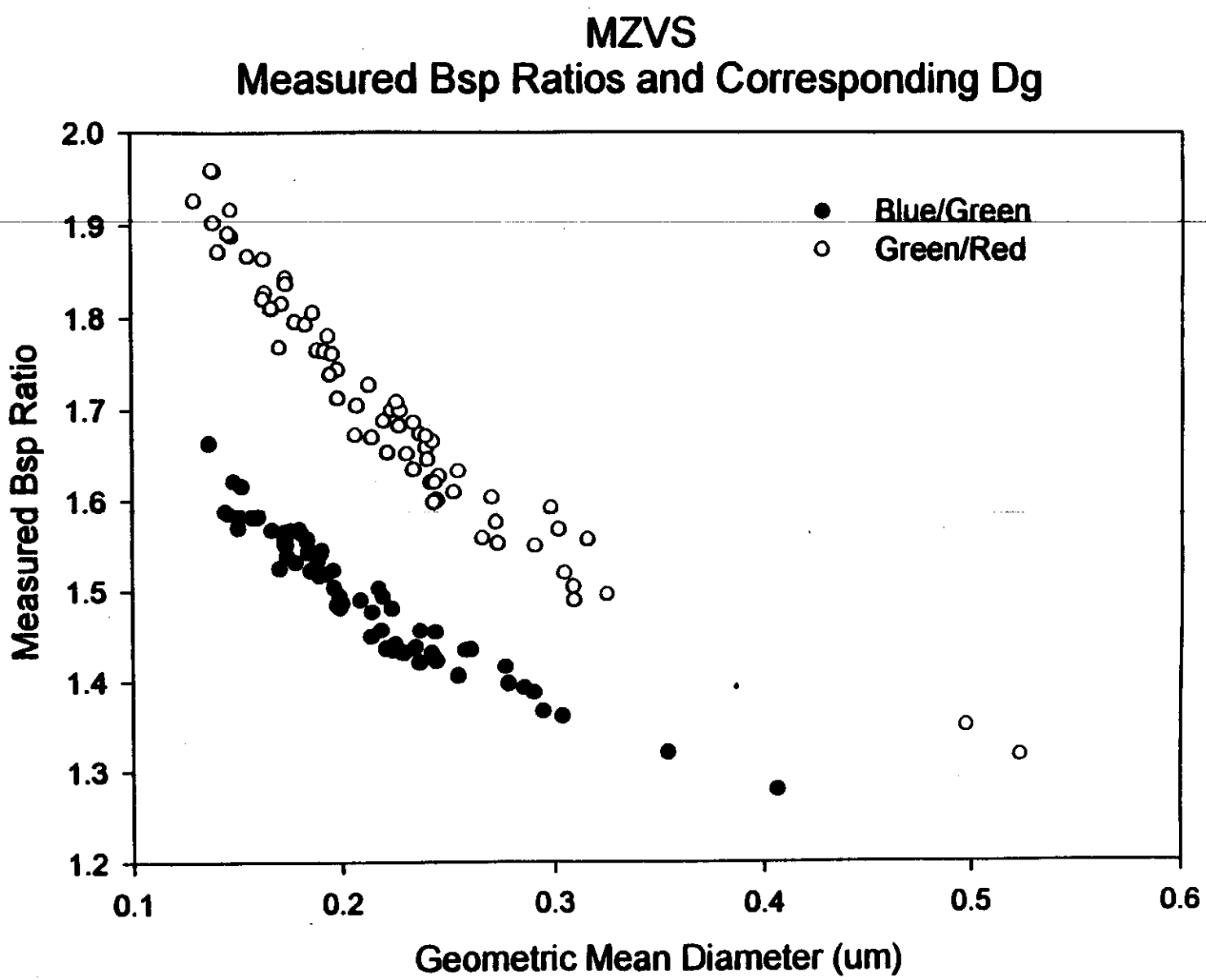


Figure B.4-2 Geometric mean diameters (D_g) inferred from ratios of measured $B_{sp}(b)/B_{sp}(g)$ and $B_{sp}(g)/B_{sp}(r)$ at Buffalo Pass.

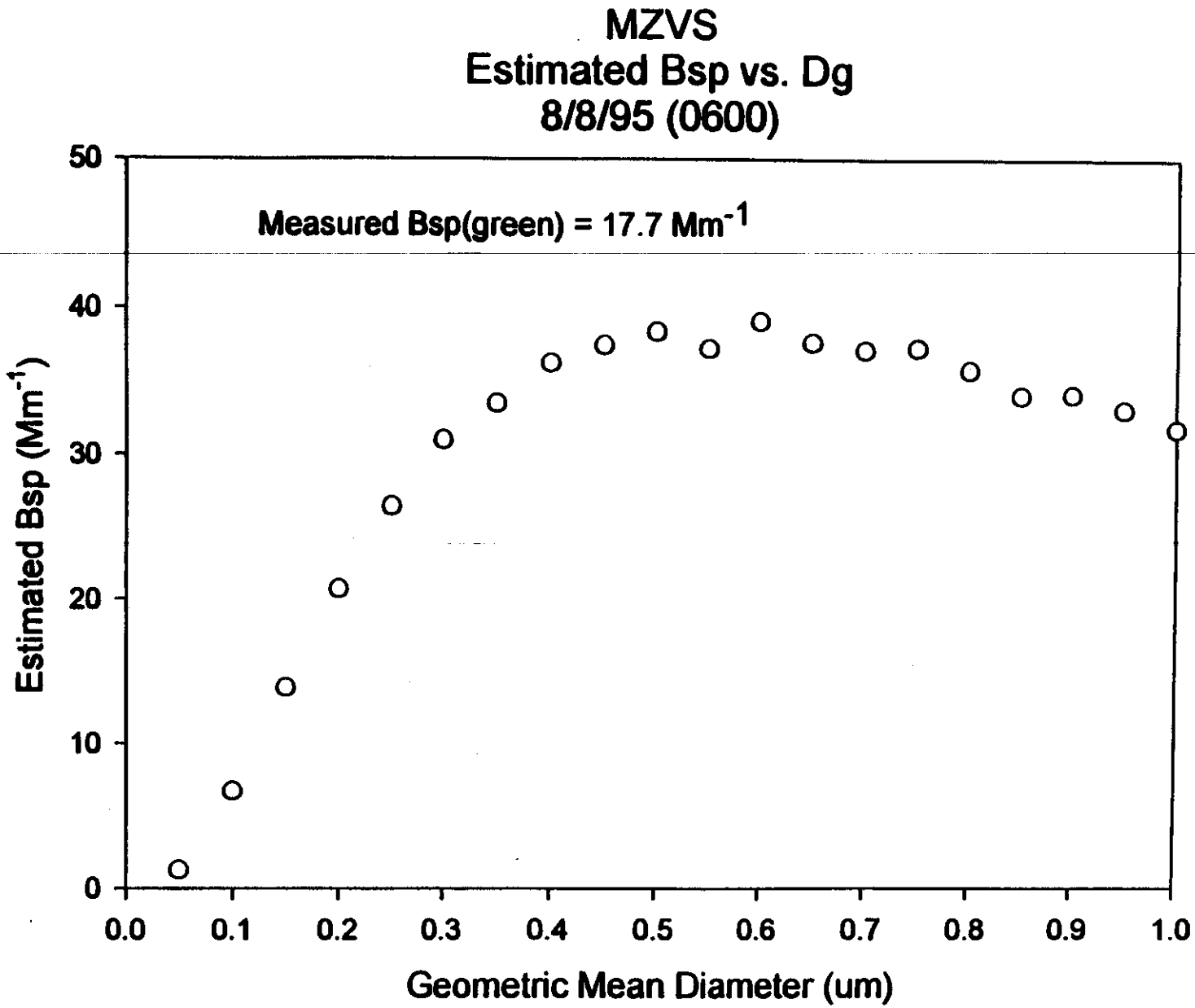


Figure B.4-3 Sensitivity of estimated B_{sp} to assumed size distribution (D_g) for sample collected on 8/8/96 (0600 ... at Buffalo Pass.

distribution at $D_g < 0.3$ can produce large errors in the estimated b_{sp}. Note that b_{sp} estimated at $D_g = 0.18$ μm, the diameter inferred from the measured B/G ratio for the sample collected on 8/8/95 (0600), was 17.9 Mm^{-1}, while the measured b_{sp} was 17.7 Mm^{-1} (Figure B.4.3).

B.4.3.2b Sensitivity to Assumptions about Mixing State

The sensitivity of b_{sp} estimates to assumptions about aerosol mixing state is shown in Figure B.4.4. b_{sp} was estimated using the "inferred" D_g (Figure B.4.2) with three different mixing states: 1) internal-core/shell; 2) internal- homogeneous; and 3) external. There is essentially no difference between estimates for the core/shell and homogeneous internal mixtures. However, b_{sp} estimated for the external mixture is consistently lower, by 14%, than b_{sp} estimated for the internal mixtures. This source of potential error in estimating b_{sp} is small compared with errors associated with assumptions about the size distribution. It is therefore assumed that the aerosol is internally mixed, with the individual soluble and insoluble components distributed homogeneously in each particle. As discussed above, this assumption simplifies the interpretation of estimated specific extinction efficiencies.

B.4.3.2c Estimated Light Extinction

An "error" index for comparing measured and estimated light extinction is defined as follows:

$$ER = 100\ ((b_{sp(measured)} - b_{sp(estimated)})/b_{sp(measured)}) \qquad \text{(B.4-8)}$$

The average error (AE) is the average of the ERs over a series of samples. The average absolute error (AAE) is the average of the absolute values of ER over a series of samples. The AAE is a measure of the estimated precision. The AAE for the estimated b_{sp} based on the inferred D_g was 63% and the average error (AE) was -23%, suggesting a systematic overprediction of b_{sp}. These estimates were made using the STI nephelometer RH. Table B.4.2 summarizes the measured b_{sp}, measured B/G ratios and inferred sizes (D_g) for each sample. Table B.4.2 also includes the "optimum" D_g, the size distributions which gave the best agreement between measured and estimated b_{sp}. These were obtained by varying the D_g from 0.05 to 1.0 μm. There were occasionally two minima in the difference between measured and estimated b_{sp} over this size range. In these cases, the optimum D_g was chosen to maximize agreement between the measured and estimated B/G ratio.

Figure B.4.5 plots estimated and measured $b_{sp}(G)$ for D_g inferred from the measured B/G ratios. There were 8 cases, identified in Figure B.4.5 and in Table B.4.2, where b_{sp} was overestimated (AE = -175%) and where the estimated b_{sp} was larger than 25 Mm^{-1}. Excluding these 8 samples reduced the AAE from 63% to 48%. Figure B.4.5 also compares measured and estimated b_{abs}. The correlation between measured and estimated b_{ap} was 0.3 and the slope of the regression of measured b_{abs} on estimated b_{ap} was 0.32. b_{abs} was zero in 20 out of 60 samples where b_{abs} was measured. In all samples, b_{abs} was less than Rayleigh scattering by air molecules (8.4 Mm^{-1}). This probably explains the lack of agreement between measured and estimated b_{ap}.

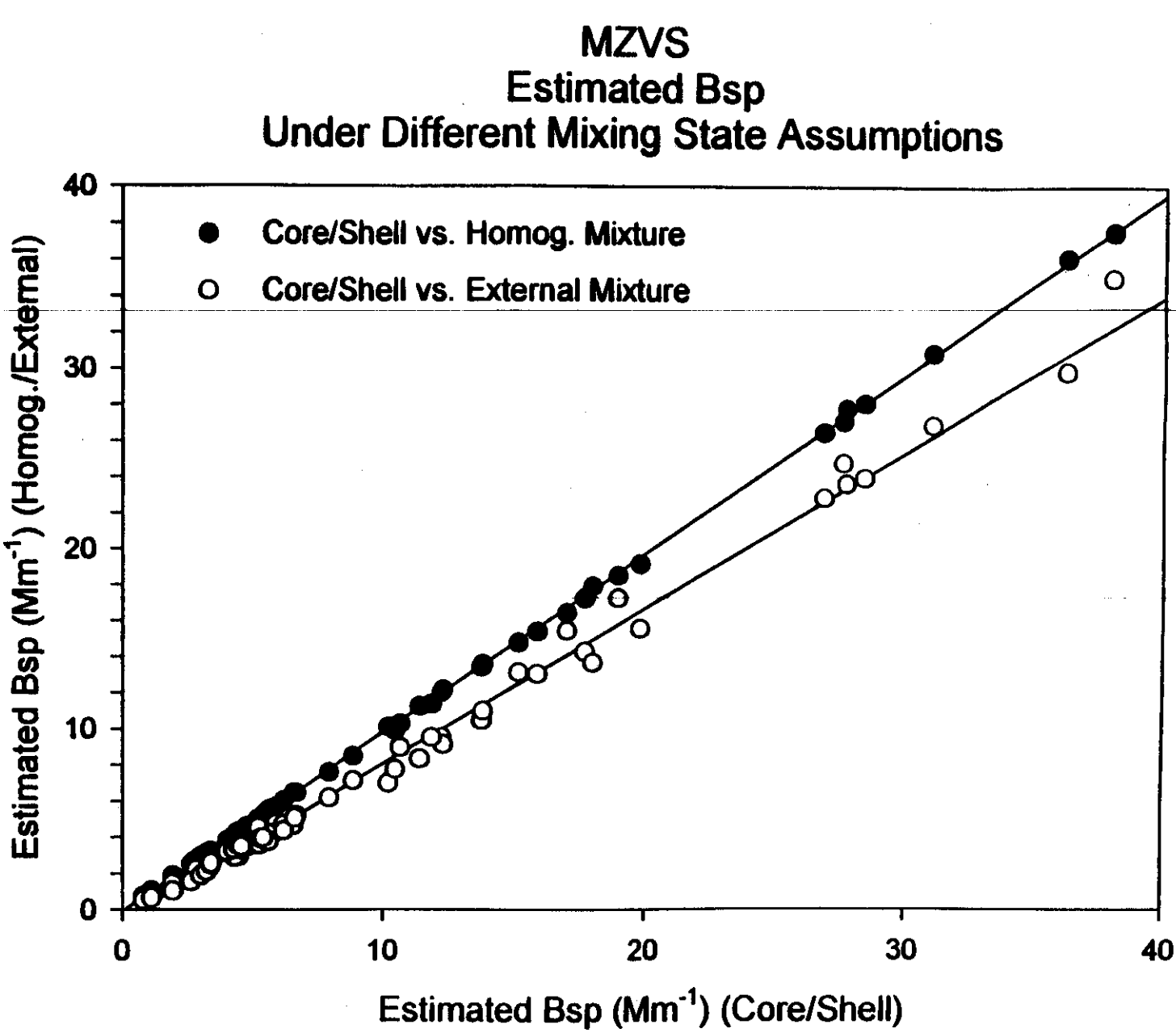
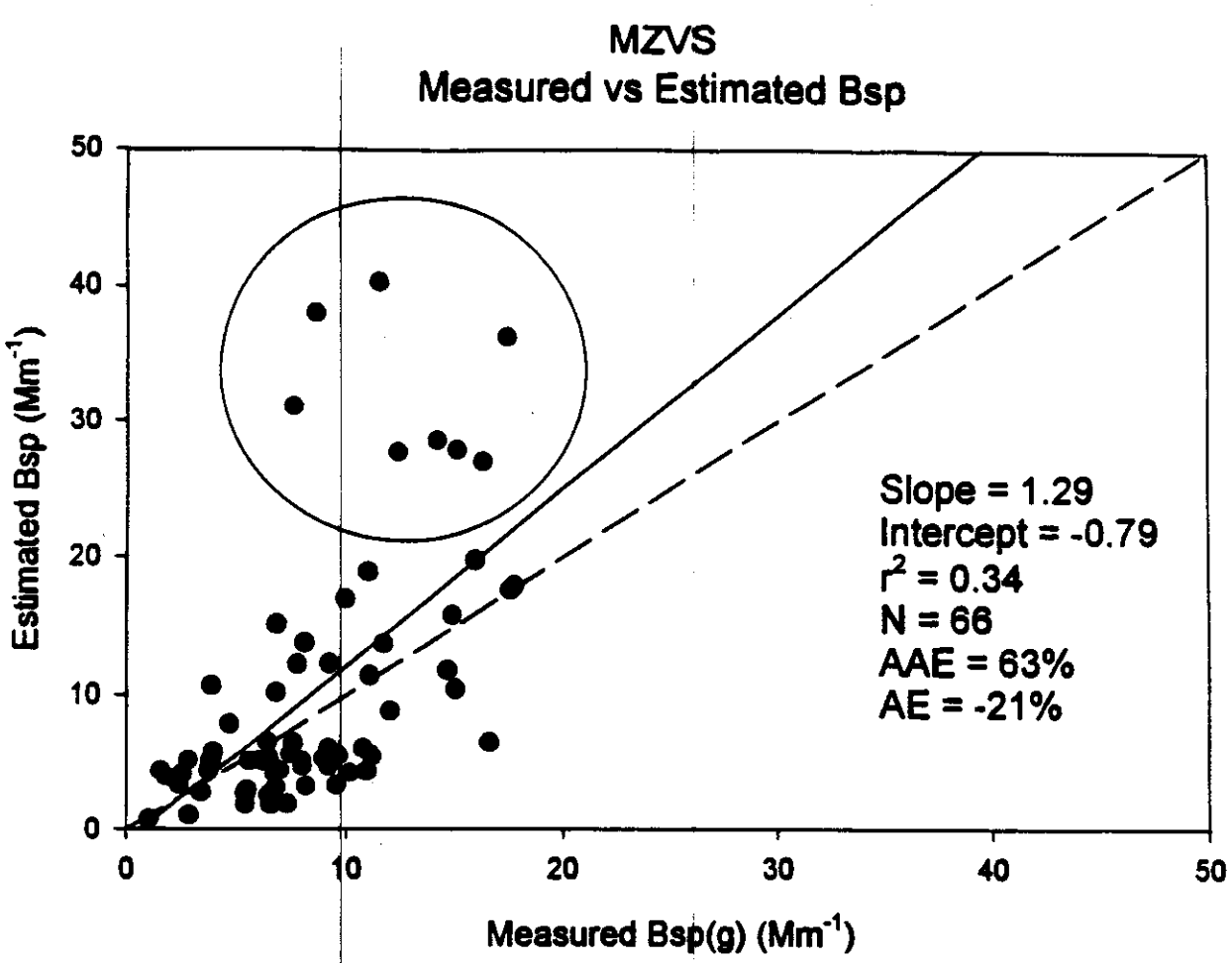


Figure B.4-4 Sensitivity of estimated B_{sp} to assumptions about aerosol chemical mixing state: 1) internal mixture, components distributed between an insoluble core surrounded by an aqueous shell; 2) internal mixture, components homogeneously distributed; and 3) external mixture.



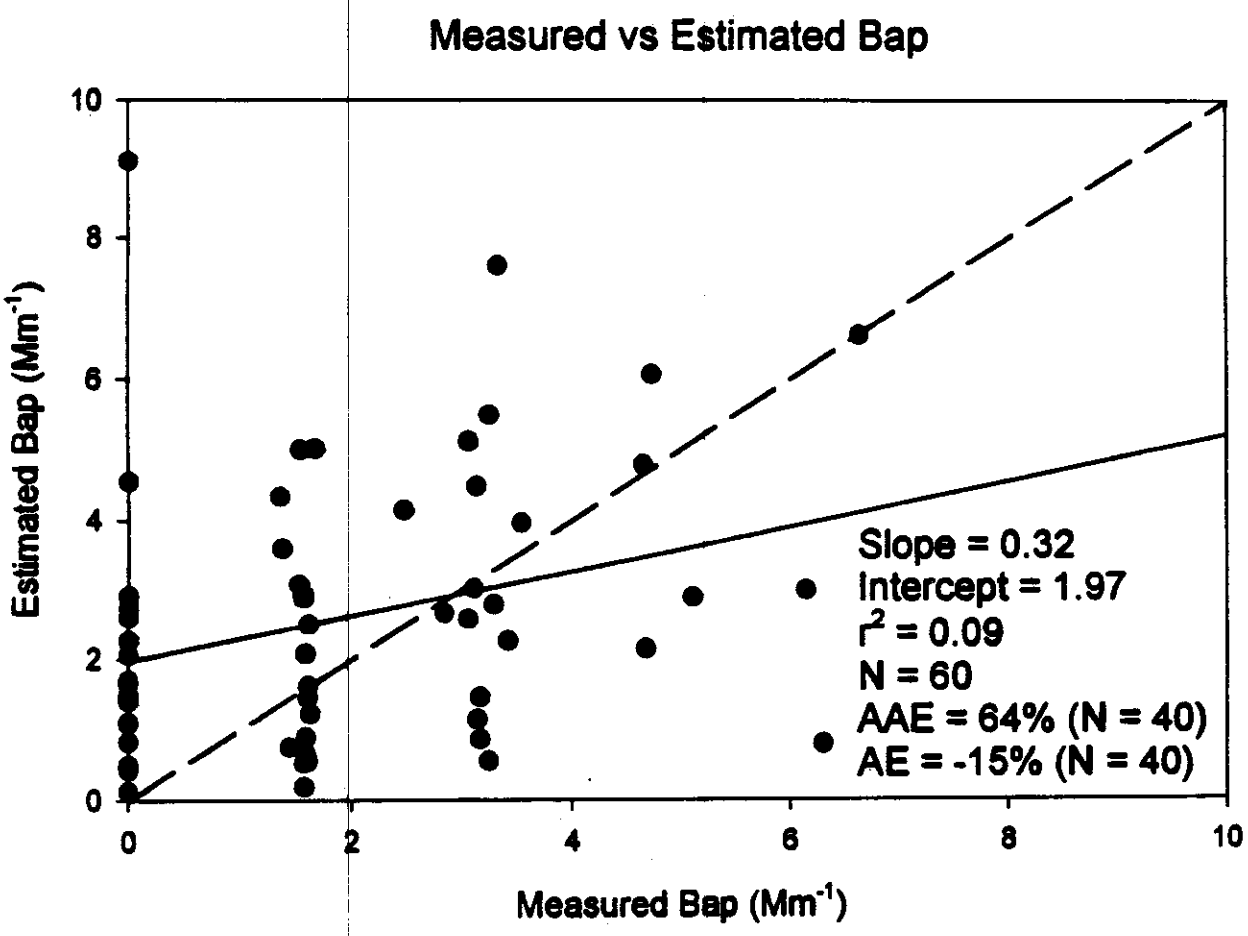


Figure B.4-5 Comparison between estimated and measured B_{sp} and B_{ap} at Buffalo Pass.

Table B.4.2
Comparison of $b_{sp}(G)$ Estimated from Sizes (D_g) Inferred from Measured $b_{sp}(B)/b_{sp}(G)$ Ratios.

(sizes (D_g) which give best agreement between measured and estimated $b_{sp}(G)$ and $b_{sp}(B)/b_{sp}(G)$ ratios)

Date	Start Hour	Meas. b_{sp}[a]	Meas. B/G[b]	Size1[c]	ER[d]	Size2[e]	B/G[f]	ER[g]
08/07/95	6	17.52	1.55	0.17	-0.6	0.15	1.60	16.6
08/07/95	12	14.84	1.49	0.20	-6.6	0.20	1.49	-7.2
08/08/95	6	17.72	1.57	0.18	-1.1	0.20	1.53	-17.1
08/08/95[h]	12	17.39	1.46	0.24	-108.7	0.15	1.62	-13.8
08/09/95[h]	6	7.57	1.32	0.35	-310.2	0.10	1.80	17.8
08/09/95[h]	12	8.60	1.28	0.41	-341.9	0.10	1.79	14.5
08/14/95	6	6.39	1.52	0.18	-3.7	0.20	1.49	-13.2
08/14/95	12	3.92	1.50	0.20	-48.6	0.15	1.60	-4.9
08/21/95[h]	6	15.09	1.42	0.28	-83.6	0.15	1.63	11.3
08/21/95[h]	12	16.27	1.39	0.29	-65.1	0.20	1.52	-17.2
08/22/95	6	10.97	1.36	0.30	-72.4	0.20	1.51	-17.1
08/22/95[h]	12	12.36	1.40	0.28	-123.2	0.15	1.61	-11.5
08/23/95	6	9.93	1.37	0.29	-70.6	0.15	1.60	17.6
08/23/95[h]	12	14.18	1.39	0.29	-100.4	0.15	1.62	5.6
08/24/95[h]	6	11.48	1.44	0.26	-251.4	0.10	1.79	11.1
08/24/95	12	11.69	1.57	0.17	-17.4	0.15	1.60	-1.8
08/25/95	6	6.79	1.49	0.21	-122.5	0.10	1.77	26.9
08/25/95	12	8.06	1.57	0.17	-70.7	0.10	1.78	30.2
08/26/95	6	7.75	1.54	0.18	-57.5	0.15	1.61	-19.4
08/26/95	12	6.77	1.57	0.18	-50.6	0.15	1.62	-21.6
08/27/95	6	11.05	1.52	0.20	-3.1	0.20	1.52	-5.6
08/27/95	12	9.21	1.54	0.19	-33.1	0.15	1.62	4.5
09/02/95	6	14.61	1.43	0.24	19.1	0.35	1.30	-2.1
09/02/95	12	14.99	1.44	0.22	30.3	0.45	1.17	0.5
09/17/95	6	7.44	1.52	0.19	22.9	0.25	1.43	-0.6
09/17/95	12	7.56	1.56	0.18	13.8	0.20	1.53	3.4
09/18/95	6	5.40	1.62	0.15	49.7	0.25	1.45	7.1
09/18/95	12	10.92	1.57	0.18	59.8	0.60	1.16	13.1
09/19/95	6	3.37	1.52	0.19	17.3	0.25	1.42	-11.0
09/19/95	12	10.74	1.56	0.17	43.1	0.30	1.36	1.3
09/20/95	6	6.26	1.54	0.17	18.0	0.20	1.49	3.1
09/20/95	12	9.16	1.48	0.22	48.6	0.50	1.22	17.8
09/21/95	6	6.43	1.58	0.16	59.7	0.50	1.21	8.0

Table B.4.2 (cont.)
Comparison of $b_{sp}(G)$ Estimated from Sizes (D_g) Inferred from Measured $b_{sp}(B)/b_{sp}(G)$ Ratios.

(sizes (D_g) which give best agreement between measured and estimated $b_{sp}(G)$ and $b_{sp}(B)/b_{sp}(G)$ ratios)

Date	Start Hour	Meas. b_{sp}[a]	Meas. B/G[b]	Size1[c]	ER[d]	Size2[e]	B/G[f]	ER[g]
09/21/95	12	7.30	1.62	0.15	73.6	0.60	1.16	28.2
09/24/95	6	9.65	1.56	0.18	42.4	0.30	1.38	1.6
09/24/95	12	8.13	1.53	0.18	59.5	0.40	1.26	26.2
09/27/95	6	8.00	1.49	0.20	40.2	0.40	1.26	5.1
09/27/95	12	9.18	1.49	0.22	33.2	0.35	1.32	2.4
09/30/95	6	1.02	1.59	0.14	21.5	0.15	1.57	16.9
09/30/95	12	8.00	1.59	0.15	35.0	0.20	1.47	4.5
10/01/95	6	10.13	1.58	0.16	57.9	0.50	1.21	3.9
10/01/95	12	6.46	1.55	0.18	15.4	0.20	1.52	5.4
10/02/95	6	11.13	1.55	0.19	50.2	0.60	1.17	0.7
10/02/95	12	3.72	1.48	0.21	-19.8	0.20	1.50	-11.9
10/07/95	6	4.65	1.44	0.22	-69.9	0.15	1.57	-9.8
10/07/95	12	5.46	1.44	0.26	45.5	0.50	1.23	23.1
10/08/95	6	16.55	1.53	0.19	60.3	0.60	1.16	25.3
10/08/95	12	6.76	1.50	0.22	53.0	0.50	1.24	19.7
10/09/95	6	5.56	1.43	0.24	6.9	0.25	1.42	4.6
10/09/95	12	6.24	1.43	0.23	17.5	0.30	1.34	-0.7
10/10/95	6	9.52	1.44	0.23	64.8	0.45	1.17	50.9
10/10/95	12	6.70	1.44	0.22	37.0	0.40	1.25	13.5
10/11/95	6	3.82	1.42	0.24	-35.3	0.20	1.48	-15.0
10/11/95	12	3.83	1.41	0.25	-178.1	0.10	1.75	21.2
10/12/95	6	15.92	1.49	0.20	-24.3	0.15	1.59	13.2
10/12/95	12	12.00	1.53	0.17	26.3	0.95	1.03	-2.1
10/13/95	6	2.38	1.57	0.15	-41.1	0.10	1.73	26.8
10/13/95	12	1.78	1.52	0.19	-123.0	0.10	1.76	17.5
10/14/95	6	2.52	1.45	0.21	-67.5	0.15	1.57	-11.4
10/14/95	12	1.55	1.48	0.20	-183.3	0.10	1.75	-2.6
10/16/95	6	2.81	1.42	0.24	-86.0	0.15	1.59	-6.4
10/17/95	6	8.93	1.46	0.24	40.1	0.50	1.22	12.5
10/18/95	6	6.95	1.44	0.23	35.0	0.40	1.26	11.7
10/19/95	6	5.39	1.46	0.22	64.6	0.40	1.26	48.7
10/22/95	6	2.82	1.58	0.15	61.2	0.40	1.26	12.9
10/23/95	6	6.55	1.66	0.14	70.8	0.50	1.23	8.4

Table B.4.2 (cont.)
Comparison of $b_{sp}(G)$ Estimated from Sizes (D_g) Inferred from Measured $b_{sp}(B)/b_{sp}(G)$ Ratios.

(sizes (D_g) which give best agreement between measured and estimated $b_{sp}(G)$ and $b_{sp}(B)/b_{sp}(G)$ ratios)

Date	Start Hour	Meas. b_{sp}[a]	Meas. B/G[b]	Size1[c]	ER[d]	Size2[e]	B/G[f]	ER[g]

[a] Measured $b_{sp}(G)$.
[b] Measured ratio of $b_{sp}(B)/b_{sp}(G)$.
[c] Size1: D_g corresponding to measured $b_{sp}(B)/b_{sp}(G)$ ratios.
[d] Error (Measured b_{sp} - Estimated b_{sp})/Measured b_{sp} based on Size1 and STI nephelometer RH.
[e] Optimum size (D_g) corresponding to best agreement between estimated and measured b_{sp} and $b_{sp}(B)/b_{sp}(G)$.
[f] Estimated $b_{sp}(B)/b_{sp}(G)$ ratio which corresponds to best agreement between measured and estimated $b_{sp}(G)$ over a range of D_g.
[g] Error (Measured b_{sp} - Estimated b_{sp})/Measured b_{sp} corresponding to optimum size.
[h] Samples where b_{sp} was overpredicted.

B.4.3.2d Sources of Error in Estimated b_{sp}

As discussed above and demonstrated in Table B.4.2, relatively small changes in the assumed lognormal size distribution can cause large differences in the estimated b_{sp}. These estimates are based on six-hour average concentrations and are compared with averages of b_{sp} which was measured over five-minute intervals. Because many of the relationships affecting light scattering are non-linear, it is not necessarily the case that an estimate based on six-hour average data should be the same as the average of shorter-period estimates. Several other sources of estimation error are discussed below.

B.4.3.2e Organic Carbon Sampling Artifact

The potential significance of an organic carbon (OC) sampling artifact on quartz-fiber filters is widely recognized. However, it is not clear that subtracting OC measured on a quartz filter behind a Teflon filter realistically accounts for this artifact. For example, (Chow *et al.*, 1996) noted that subtracting backup- from front-quartz OC resulted in OC concentrations of zero in one-third of the aerosol samples collected during SJVAQS/AUSPEX. However, overestimated OC concentrations will cause overestimation of b_{sp}. Extinction was therefore recalculated as extinction based on OC concentrations corrected for the backup-quartz filter.

There were 20 samples with an error (ER) < -50% and with an average error (AE) of -129%. Correcting for backup OC reduced the AE to -60%, improved the agreement between measured and estimated b_{sp} in these samples by approximately a factor of two. However, there were 12 samples with an error (ER) > 50% with an average error (AE) of 60%. Correcting for backup OC increased the AE in these samples to 68%. Correcting for backup OC does not produce a consistent improvement in the estimated b_{sp} for aerosols measured at Buffalo Pass.

B.4.3.2f Hysteresis Effect on Water Growth

The temperature in the TSI nephelometer was higher than the ambient temperature, lowering the RH in the nephelometer significantly with respect to ambient RH. This is demonstrated in Figure B.4.6 which plots the ratio of ambient RH/nephelometer RH against ambient RH. Because of the high flow rate through the nephelometer (113 L/min), particle residence in the nephelometer sample chamber was short. At high ambient RH, drying of particles in the nephelometer could have been incomplete, that is, the particles could have contained more water than that expected from the RH measured in the nephelometer. The effect of incomplete drying is due to hysteresis. If the sizes of the particles are constrained by the measured B/G (or green/red) b_{sp} ratios, then additional water volume would increase estimated scattering by increasing the number of particles over that calculated based on the nephelometer RH.

The effect of hysteresis was simulated by setting the RH for 22 samples with ambient RH > 80% to 80% and recalculating extinction. For all other samples, the RH was taken as

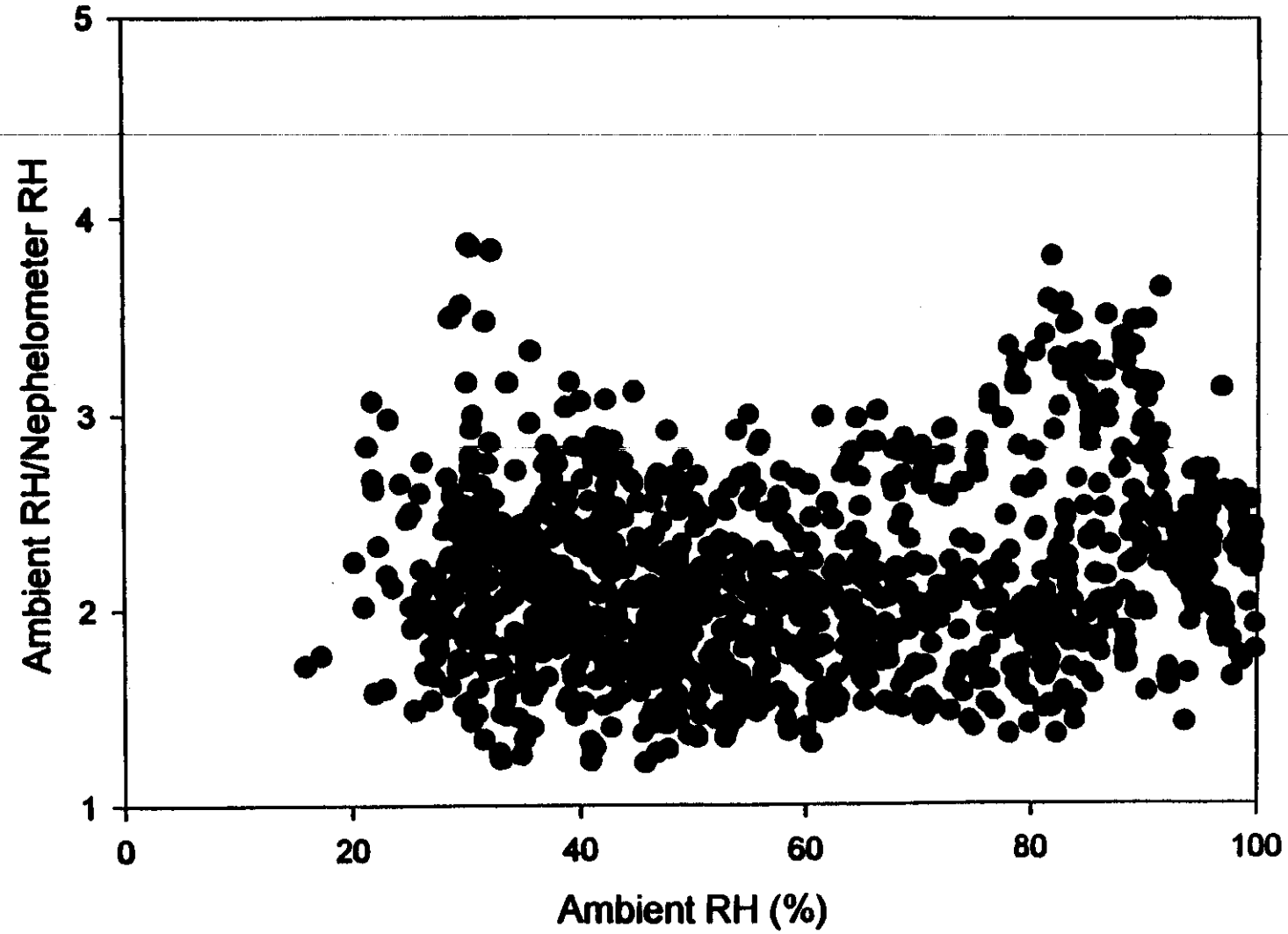


Figure B.4-6 Comparison between ambient relative humidity (RH) and RH measured in the TSI nephelometer.

the nephelometer RH. The AE for the 20 samples with errors (ER) < -50% decreased from -129% to -150%. Adding water to simulate the effect of hysteresis increased the estimated b_{sp} and worsened the agreement with the measured b_{sp}. The AE for the 12 samples with errors (ER) > 50% decreased from 60% to 46%. Adding water and increasing the number of particles increased the estimated b_{sp} and improved the agreement with measured b_{sp}. Attempting to account for a possible hysteresis effect at ambient RH >80% does not produce a consistent improvement in estimated b_{sp}. As expected, increasing aerosol volume by adding water produces results which are opposite to those obtained by removing potentially artifactual OC mass.

B.4.3.2g Ratios of Measured b_{sp}

Inferred D_gs were also obtained from the measured $b_{sp}(G)/b_{sp}(R)$ ratios (G/R) using the procedure described above. The relationship between the measured $b_{sp}(G)/b_{sp}(R)$ ratios and the D_gs inferred from them are also shown in Figure B.4.3. The average absolute difference in D_g determined from the two ratios (B/G and G/R) is 13%. Substituting the D_gs based on the G/R ratios for D_gs based on the B/G ratios results in a difference in estimated b_{sp} of only 12% on average. This differences may be related to the dependence of refractive index on wavelength, which was not explicitly included in these calculations.

Table B.4.2 demonstrates that the best agreement between measured and estimated b_{sp} can be obtained by adjusting the geometric mean diameter within a narrow size range (0.1 - 0.4 μm) in which scattering efficiency varies significantly (Figure B.4.3). The nominal uncertainty of one-hour average nephelometer measurements is 1 Mm^{-1}. If it is assumed that this is also the uncertainty of a six-hour average b_{sp}, then the relative uncertainties of the six-hour average B/G ratios range from 115% at $b_{sp}(G)$ = 1 Mm^{-1} to 7% at $b_{sp}(G)$ = 18 Mm^{-1}. Uncertainties in this ratio may contribute significantly to estimation errors. For example, Table B.4.2 shows that for the sample collected on 8/25/95 (0600), a 19% increase in the B/G ratio corresponds to a halving of the D_g from 0.2 to 0.1 μm and a reduction in the relative difference between measured and estimated b_{sp} from -122% to 27%.

B.4.3.2h Specific Efficiencies

The B/G and G/R b_{sp} ratios are the only available objective criteria for inferring size distributions of the MZVS aerosols. Furthermore, the ratios of measured blue, green, and red b_{sp} should be more robust than the scattering coefficients themselves. It is, therefore, unwarranted to arbitrarily adjust the size distributions or correct for potential hysteresis effects simply to improve the agreement between measured and estimated b_{sp}.

Specific efficiencies were calculated assuming that removing 50% of a component's mass would change the number of particles but not their size. The average scattering efficiencies (N = 66) for ammonium sulfate, ammonium nitrate, organic carbon, and soil were 2.0±0.5, 2.2±0.6, 3.1±0.8, and 1.5±0.5 m^2/g. The average absorption efficiency for elemental carbon was 9.1±1.4 m^2/g. The scattering efficiencies are uniformly smaller by about 1 m^2/g than those chosen as "dry" efficiencies for application to the Grand Canyon

aerosol (Equation B.4-1). This is consistent with the smaller particle sizes observed during the MZVS at Buffalo Pass.

Because the relative humidities in the TSI nephelometer were all 50% or less, there isn't enough variation in RH to derive a meaningful empirical relationship between RH and the extinction efficiencies. The hygroscopic growth factors chosen for the Grand Canyon (Equation B.4-1) are specific to that area and to extinction efficiencies derived by various techniques for that area. Hygroscopic growth factors for application to the MZVS efficiencies are more appropriately derived using the same method used to estimate those efficiencies, ie., the ELSIE Mie scattering model.

Functions to correct dry efficiencies for variations in RH were estimated using the "average" aerosol concentrations. The "base" case was taken as the average concentrations at RH = 28%, with a size distribution characterized by the geometric mean (D_{gave}) of the derived D_gs (Table B.4.2). This provides a dry number distribution (the growth factor calculated for the average aerosol sample at RH = 28% was 1.0095). The calculated scattering efficiencies for ammonium sulfate, ammonium nitrate, organic carbon, and soil for the average aerosol concentrations at the average RH with D_{gave} = 0.2054 μm were 2.0, 2.4, 3.1, and 1.6, respectively. These values are similar to the averages of the efficiencies derived from the individual samples (see above). The dry size distribution at RH = 0% was calculated by dividing D_{gave} by 1.0095. Water was then added according to the empirical growth function in the ELSIE program from RH = 1% to RH = 95%. The estimated scattering efficiencies were then regressed on 1/(1-RH) to. The relationships are plotted in Figure B.4-7. From these results, scattering efficiencies (E) for ammonium sulfate (amsul), ammonium nitrate (amnit), organic carbon (OC), and soil are calculated as a function of RH as follows:

$$E_{amsul} = 0.86 + 0.73[1/(1\text{-}RH)] \quad \text{(B.4-9)}$$

$$E_{amnit} = 1.04 + 0.73[1/(1\text{-}RH)] \quad \text{(B.4-10)}$$

$$E_{OC} = 2.31 + 0.52[1/(1\text{-}RH)] \quad \text{(B.4-11)}$$

$$E_{soil} = 1.26 + 0.18[1/(1\text{-}RH)] \quad \text{(B.4-12)}$$

Fine-particle scattering (b_{sp}) for a 6-hour $PM_{2.5}$ aerosol sample is estimated by applying the average RH during the sample in Equations B.4-9 to B.4-12 and multiplying the resulting scattering efficiencies by the respective chemical concentrations of sulfate as ammonium sulfate, nitrate as ammonium nitrate, organic carbon as 1.2*OC, soil as defined by Equation B.4-6, and elemental carbon as EC. Fine-particle extinction (b_{ep}) is the sum of b_{sp} and the absorption coefficient b_{ap}, which is equal to the elemental carbon concentration (EC) multiplied by 9.1 m^2/g, the average specific absorption efficiency for elemental carbon (see above).

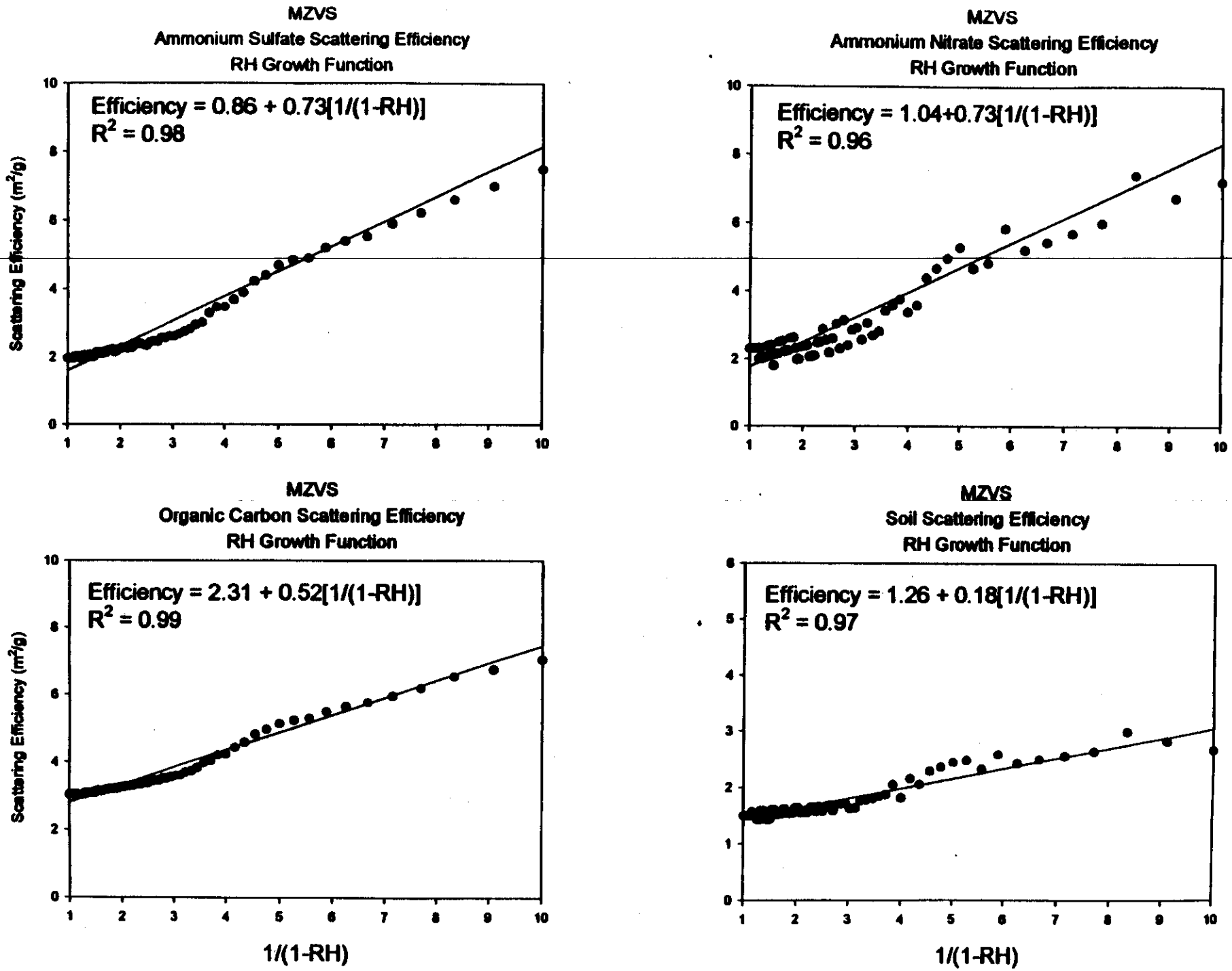


Figure B.4-7 Relationships between relative humidity (1/(1-RH/100)) and specific scattering efficiencies of ammonium sulfate, ammonium nitrate, organic carbon, and soil.

B.4.3.2i Coarse Scattering

Coarse particle mass was not measured during this study. However, it is probably the case that measured fine-particle ($PM_{2.5}$) soil mass represents the lower tail of the coarse-particle size distribution. As such, the fine soil particles are probably somewhat larger than the D_g inferred from the nephelometer ratios.

To estimate the potential contribution of coarse-particle to total scattering, the scattering efficiency, in units of $Mm^{-1}/\mu g$ was calculated for spherical soil particles whose size distribution is lognormal with D_g between 5 μm and 20 μm and geometric standard deviation = 2.0. The results are plotted in Figure B.4.8. The soil material is assumed to be 20% soluble and the RH is assumed to be 80%. These efficiencies therefore represent an upper limit. For a given assumed D_g, the coarse scattering coefficient is equal to corresponding efficiency (Figure B.4.8) multiplied by the measured or assumed coarse particle concentration ($\mu g/m^3$).

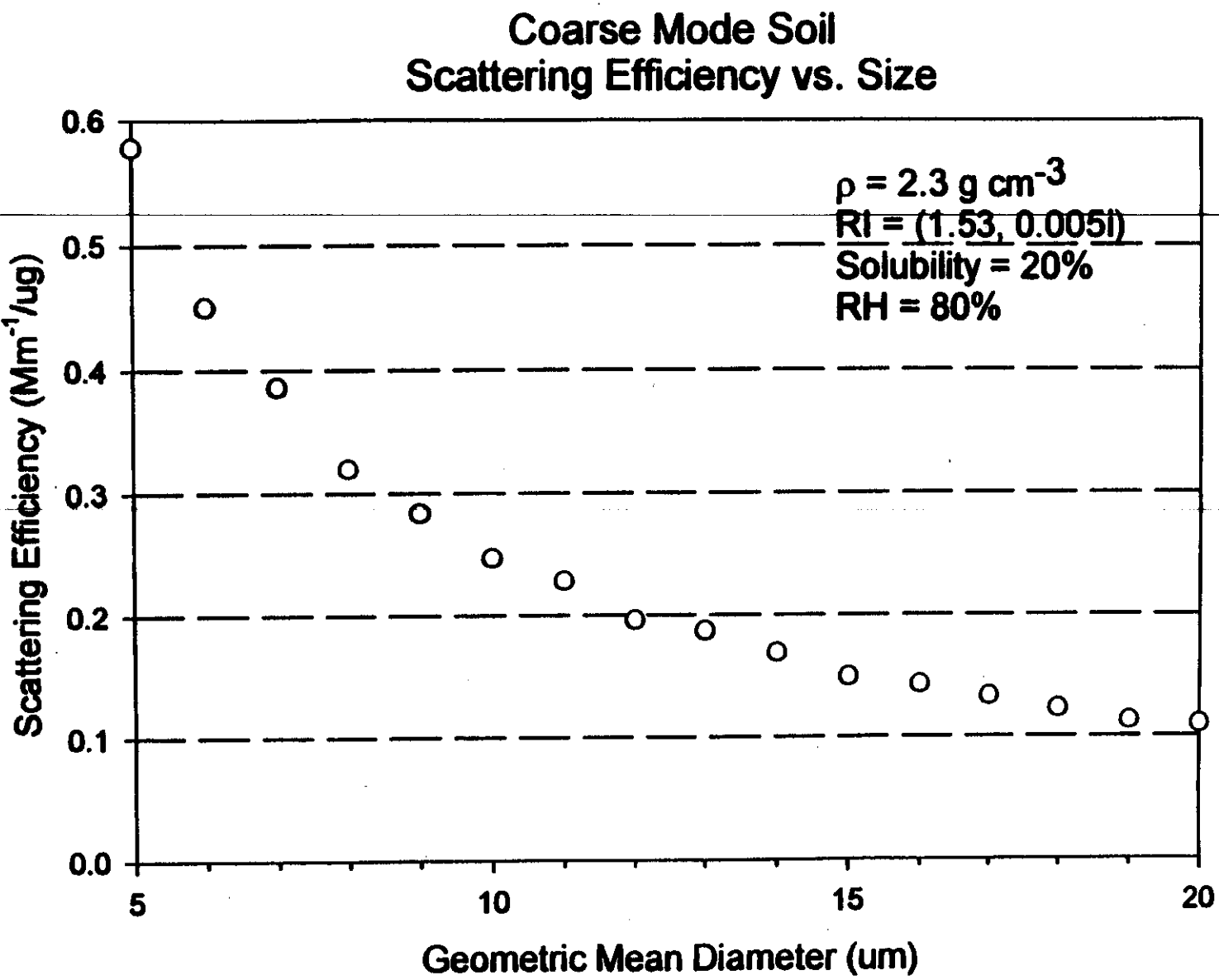


Figure B.4-8 Specific scattering efficiency of coarse soil over a range of size distributions with 5 μm < D_g < 20 μm.

B.5 AEROSOL EVOLUTION MODEL

The Aerosol Evolution Model (AEM) provides a framework to obtain estimates of transformation of sulfur and nitrogen oxides into particulate sulfates and nitrates, to study the effects of different assumptions on these transformations, and to determine the relative importance of different transformation mechanisms. The AEM is an extension to the Simulating Composition of Atmospheric Particles at Equilibrium (SCAPE) model (Kim, *et al.*, 1993a, 1993b). SCAPE apportions sodium, nitrate, sulfate, ammonium, and chloride between gas, liquid, and solid phases by use of thermodynamic equilibrium considerations. The constituents considered by SCAPE are:

Gas Phase - NH_3, HCl, HNO_3, H_2O.

Liquid Phase - H_2O, H^+, NH_4^+, Na^+, OH^-, NO_3^-, Cl^-, SO_4^{2+}, HSO_4^-, H_2SO_4, NH_3.

Solid Phase - $NaHSO_4$, NaCl, $NaNO_3$, NH_4Cl, NH_4NO_3, $(NH_4)_2SO_4$, NH_4HSO_4, $(NH_4)_3H(SO_4)_2$.

For the above 23 constituents, Kim *et al.* (1993a) combine 13 equilibrium equations with equations for conservation of mass, electroneutrality, and relative humidity to obtain the equilibrium solution. The Kelvin effect is ignored, and there is no size segregation of the aerosol. In later work (Kim and Seinfeld, 1995; Meng, *et. al,* 1995) extended SCAPE to include the carbonates CO_2 (gas and liquid), HCO_3^-, and CO_3^{2-}, and crustal elements Ca^{2+}, K^+, and Mg^{2+}. The AEM uses the most recent SCAPE computer code (dated Sept. 1995) without applying the carbonate and the crustal element portions.

The AEM adds the following features to SCAPE: 1) Henry's law equilibrium between gas and liquid phase for SO_2, H_2O_2, and O_3; 2) liquid phase equilibrium between SO_2, HSO_3^-, and SO_3^{2-}; 3) gas and liquid phase transformation through use of kinetic reactions; and 4) mixing between plumes and ambient background air. AEM model assumptions are:

1. Secondary transformation may be modeled in a LaGrangian framework, i.e., by following a well mixed homogeneous air parcel as it is transported from a source to a receptor.

2. The aerosol may be characterized as a homogeneous well mixed internal mixture of a single size in equilibrium with the gas phase.

3. Mixing between a plume or reaction volume and ambient background air may be simulated by entraining background air into the parcel while maintaining its well mixed nature. The AEM uses Gaussian plume theory for this mixing.

4. The dominate chemical species in the aerosol are those discussed above.

5. Chemical transformation progresses slowly relative to the establishment of equilibrium between gas and liquid phase.

Assumptions 1 through 3 are simplifications of reality that afford a practical model structure for physically reasonable estimates of transformation under varying conditions. Assumption 4 is reasonably complied with for power station plumes. Assumption 5 is reasonable for atmospheric processes except possibly under conditions of very high oxidation rates (Freiberg and Schwartz, 1981) that are not expected in the MZVS.

B.5.1 Overall Integration Scheme

At the beginning of each time step, equilibrium among the 23 constituents is established by SCAPE. The resulting gas and liquid phase concentrations are passed to a subroutine that establishes equilibrium among these gas and liquid phase constituents along with gas and liquid phase SO_2, H_2O_2, and O_3, and liquid phase HSO_3^- and SO_3^{2-}. The constants used by this subroutine are from the earlier equilibrium models of Bassett and Seinfeld (1983) and Pilinis and Seinfeld (1987) and from Seigneur and Saxena (1987).

Since binary activities for the sulfur IV ions are not available, they are set to 1. In a typical simulation after a few tens of seconds the concentration of the sulfur IV species is minor compared to that of the other ionic species present. After the establishment of equilibrium, gas and liquid phase transformation kinetic reaction equations are solved using DGEAR (IMSL, 1987) with the liquid water concentration fixed over the time step. The liquid water concentration changes with the re-establishment of equilibrium at the beginning of the next time step. In order to accommodate high initial concentrations in the plume, the AEM begins with a time step of 0.005 hours, which is doubled for each subsequent time step until a maximum time step is reached.

B.5.2 Model Inputs

Table B.5.1 reproduces part of the AEM chemical reaction input file, and lists the gas and liquid phase reactions (Seigneur, 1987) used by AEM in the simulations described herein. The Seigneur (1987) reaction scheme is a simple one using formaldehyde (HCHO) as the sole hydrocarbon. Though simple, this reaction set serves MZVS purposes. The NO_x/HCHO mechanism exemplifies the major features of photochemical smog chemistry, and the use of a single hydrocarbon gives a convenient parameterization for hydrocarbon input to smog production. As Seigneur (1987) does not give rate constants, gas phase rate constants were taken from Stockwell and Calvert (1983), gas phase activation energies (E/R) terms were from Leone and Seinfeld (1985), and liquid phase constants were from Seigneur and Saxena (1988). The reaction file is known to the program by the name AEROSOL.CCC and has the following features:

- Lines headed by #'s are treated as comments and ignored by the program.

Table B.5.1
AEM Reaction File

```
### 12 ABCDEFGHIJ 12 ABCDEFGHIJ 12 ABCDEFGHIJ 12 ABCDEFGHIJ 12 ABCDEFGHIJ 12 ABCDEFGHIJ 12 123 12 12 +.12345E+00 +.12345E+00
# the following simplified aqueous phase reaction scheme is from Seigneur, 1987
550  0              1       SO2g  1      H2O2g  1      H2SO4g  0              0              0  31  0  0 0.76000E+06 0.44300E+04
551  0              1       SO2g  1       O3g  1      H2SO4g  0              0              0  32  0  0 0.24000E+05 0.00000E+00
552  0                      1       SO2g  1      H2SO4g  0              0              0  33  0  0 0.47000E+01 0.13700E+05
#
# the following simplified gas phase reaction scheme is from Seigneur, 1987
# the following two reactions are Siegneur's #1
# 1a, photolytic - rate constant from Stockwell and    Calvert, 1983
560  0              0              1       NO2g  1         Og  1        NOg  0              2   3  0  0 1.03000E-02
# 1b, O2 pressure dependent + third body (+M) rate constant from Stockwell and    Calvert, 1983.  E/R term from Leone & Seinfeld
561  0              1     FILLERg  1         Og  1        O3g  0              0              2  26  0  0 1.46e-14    -510.
# 2, rate constant from Stockwell and    Calvert, 1983.  E/R term from Leone & Seinfeld
562  0              1        NOg  1        O3g  1       NO2g  0              0              2  27  0  0 1.75000E-14 1500.
# 3, rate constant from Stockwell and    Calvert, 1983.  E/R term from Leone & Seinfeld
563  0              1        NOg  1       HO2g  1       NO2g  1        HOg  0              2  27  0  0 8.11000E-12 -240
# 4, Photolytic and third body( +2O2) rate constant from Stockwell and    Calvert, 1983.
564  0              0              1      HCHOg  2       HO2g  1        COg  0              2   3  0  0 3.00000E-05
# 5, Photolytic rate constant from Stockwell and    Calvert, 1983.
565  0              0              1      HCHOg  1        H2g  1        COg  0              2   3  0  0 3.97000E-05
# 6, Third body (+O2) rate constant from Stockwell and    Calvert, 1983.
566  0              1      HCHOg  1        HOg  1       HO2g  1        COg  0              2  27  0  0 1.42000E-11
# 7, Third body (+O2) rate constant from Stockwell and    Calvert, 1983.  E/R term from RADM
567  0              1      HCHOg  1       NO3g  1      HNO3g  1       HO2g  1        COg  2  27  0  0 1.38000E-15 2058.
# the following three reactions are Siegneur's #8
# 8a, rate constant from Stockwell and    Calvert, 1983.
568  0              1      HCHOg  1       HO2g  1      HMO2g  0              0              2  27  0  0 1.69000E-14
# 8b, rate constant from Stockwell and    Calvert, 1983.
569  0              1      HMO2g  1        NOg  1    OCH2OHg  1       NO2g  0              2  27  0  0 2.81000E-13
# 8c, O2 pressure dependent rate constant from Stockwell and    Calvert, 1983.
570  0              1    FILLERg  1    OCH2OHg  1     HCOOHg  1       HO2g  0              2  26  0  0 1.49000E-14
# 9, Third body (+M) rate constant from Stockwell and    Calvert, 1983.
571  0              1       NO2g  1        HOg  1      HNO3g  0              0              2  23  0  0 1.00000E-11
# 10, rate constant from Stockwell and    Calvert, 1983.  E/R term from Leone & Seinfeld
572  0              1       NO2g  1       O3g  1       NO3g  0              0              2  27  0  0 3.63000E-17 2450.
# 11, Third body (+M) rate constant from Stockwell and    Calvert, 1983.
573  0              1       NO3g  1       NO2g  1      N2O5g  0              0              2  23  0  0 1.83000E-12
```

Table B.5.1 (continued)
AEM Reaction File

```
# 12, H2Og dependent rate constant from Stockwell and    Calvert, 1983
574  0             1    FILLERg  1      N2O5g  2      HNO3g  0             0             2  24  0  0 3.38000E-21
# 13, rate constant from Stockwell and    Calvert, 1983.  E/R term from Leone and Seinfeld, '85
575  0             0             2       HO2g  1      H2O2g  0             0             2  27  0  0 2.57000E-12 -1200.
#  rate constant from Stockwell and    Calvert, 1983.
576  0             1        HOg  1       SO2g  0             1     H2SO4g  1       HO2g  2  23  0  0 1.08000E-12
#  rate constant from Stockwell and    Calvert, 1983.
577  0             1         Og  1       SO2g  0             1     H2SO4g  0             2  27  0  0 5.68000E-14
#
599  0             0             1     DUMMYg  0             0             0             1   0  0  0 0.00000E+00
#
# background air
#
601  1       NH3b  0             0             1       NH3g  0             0             1  22  0  0 0.10000E+01
602  1        O3b  0             0             1        O3g  0             0             1  22  0  0 0.10000E+01
603  1      H2O2b  0             0             1      H2O2g  0             0             1  22  0  0 0.10000E+01
604  1        NOb  0             0             1        NOg  0             0             1  22  0  0 0.10000E+01
605  1       NO2b  0             0             1       NO2g  0             0             1  22  0  0 0.10000E+01
606  1      HCHOb  0             0             1      HCHOg  0             0             1  22  0  0 0.10000E+01
611  1      NACLb  0             0             1      NACLs  0             0             1  22  0  0 0.10000E+01
612  1    FILLERb  0             0             1    FILLERg  0             0             1  22  0  0 0.10000E+01
```

- Data records are read by the program as fixed format records. The record structure is given by the top line in Table B.5.1. The first column numbers the reaction. This is followed by up to three pairs of stoichiometric coefficients and reaction species, followed in turn by up to three stoichiometric coefficient, product pairs. The following codes provide information to the program about units and reaction types. Fields for rate constants and activation energies appear in the last set of records.

The first three reactions in Table B.5.1 are liquid phase reactions and the next block of reactions are gas phase reactions. The specification to the program of this reaction set is designed to be as flexible as possible and can be easily changed as circumstances require. The units code indicates that units of molecules per cc, seconds, and degrees Kelvin. The reaction type code indicates photolytic reactions (3), pressure dependent reactions (23), H_2O dependent reactions (24), O_2 dependent reactions (26), and ordinary gas phase reactions (27). The constituent labeled FILLERg is a dummy constituent introduced for numerical purposes.

In contrast to the gas phase reaction set which is completely specified by the input file, the liquid phase reaction rate expressions (Seigneur and Saxena, 1988) are, in general, functions of pH and concentration, thereby requiring coding specific to each reaction in the program proper. Reaction 1 depends on pH directly through the rate expression, although this dependence is important only for acidic drops. Reaction 2 is a combination of simple binary reactions for the liquid species SO_2, HSO_3^-, and SO_3^{2-}. Since the relative abundance of these species is pH dependent, reaction 2 is pH dependent. Reaction 3 is catalyzed by trace metal ions Mn^{2+} and Fe^{3+} and is a complicated expression of pH and sulfur IV concentration.

The constants involved in these expressions are given in the reaction file to facilitate changing if required. Also, although these are liquid phase reactions, the program treats them as gas phase reactions with multiplicative factors given by gas phase and liquid water concentrations at the beginning of the time step. This is for numerical purposes, since treating these reactions directly as liquid phase reactions requires prohibitively small time steps. The program progresses by establishing equilibrium and then solving the kinetic reaction set for the initial equilibrium conditions for some fixed time step, which can be varied. This perturbs the gas phase concentrations but not the liquid or solid. At the end of this time step equilibrium is reestablished.

The next reaction involves another dummy constituent DUMMYg introduced to allow quantification of the dilution due to mixing. Finally a block of reactions that simulates mixing of background air into the reaction volume is given. Constants used by SCAPE do not appear in AEROSOL.CCC as they are internal to SCAPE. In the future, these constants will be removed to external input files so that they may be more easily examined and updated.

In addition to the reactions shown in Table B.5.1, AEROSOL.CCC also contains additional equilibrium relations from earlier equilibrium models of Basset and Seinfeld (1983) and Pilinus and Seinfeld (1987) and from Seigneur and Saxena (1988).

Table B.5.2 is an example of the other input file read by the AEM. As in AEROSOL.CCC, lines beginning with #'s are treated as comments. The filename is passed to the model, with a default name of AEM2.INP. It begins with a sequence of records defining time profiles for temperature, pressure, and relative humidity. The columns give time (hours), temperature (degrees Celsius), pressure (millibars), and relative humidity (fractional). After the asterisk which terminates the time profiles, the aerosol concentration follows in drops per cc. This number is only used in calculation of a nominal radius for the aerosol particle.

The next two data records give values for variables used in the program. Sunrise is the simulated time (hours) at which sunrise begins and daylight is the length (hours) of the daytime period. The AEM simulates the daytime period by use of a truncated half sine wave. For numerical purposes over each time step the sine function is replaced with a linear approximation. The concentrations for Mn^{2+} and Fe^{3+} are used in Reaction 552 of Table B.5.1 and are in moles per liter. Velocity, mixing flag, stability, and stack diameter are used in simulating mixing between a plume and ambient background air.

To parameterize mixing between plumes and ambient air, the AEM uses concepts from Gaussian plume dispersion theory. An estimate of the spread of the plume as it mixes is given by $\sigma_y * \sigma_z$, where σ_y and σ_z are dispersion parameters for cross wind and vertical directions, respectively. This leads to a change in concentration due to entrainment of ambient air of

$$dC/dt = -C\, v\, S(x) / x, \qquad \text{(B.5.1)}$$

$$S(x) = d\ln(\sigma_y) / d\ln(x) + d\ln(\sigma_z) / d\ln(x), \qquad \text{(B.5.2)}$$

where x denotes down wind distance, v velocity, and C concentration. The dispersion parameters σ_y and σ_z are empirically-derived functions of stability and downwind distance determined by Turner (1994). To avoid singularities for x = 0, the downwind distance is normalized by adding a constant fixed distance to x. This is set to be the distance for which σ_y equals the stack diameter. Setting the mixing flag to 1 or 0 turns this mixing procedure on or off, respectively. This treatment of mixing is simple, but dimensional analysis gives a formula of the form of Equation B.5.1, with S(x) constant. Indeed, S(x) varies slowly with x, and Equation B.5.1 is a physically reasonable expression for parameterizing mixing between plume and ambient air. Though deposition can be added to the model, it is not used in this application; this tends to overestimate conversion rates. The next block of input parameters in AEM2.INP gives the gas phase reactions to be used by the model..

Table B.5.2
AEM Input Specification File

```
    0.0000    15.0000   804.0519     0.9500
    4.5282    15.0000   773.3542     0.9500
    9.0564    15.0000   742.6565     0.9500
   13.5846    15.0000   711.9589     0.9500
   18.1128    15.0000   681.2612     0.9500
* terminating asterick
# drop number density[a]
100
# sunrise,  daylight, velocity, mn++,  fe+++
0 1.00000e+00 1.20000e+01 1.20000e+01 6.66000e-01 1.00000e-05 1.00000e-05
# mixing flag, stability, stack diameter
1 3 8.00000e+00
*
# begin gas phase kinetic reactions
560 561 562 563 564 565 566 567 568 569
570 571 572 573 574 575 576
550 551
599
# background
601 602 603 604 605 606 607 608 609 611 612
* end gas phase kinetic reactions
# Initial Concentrations
# plume
SO2g 1.42434e-04
NO2g 2.95813e-05
```

Table B.5.2 (continued)
AEM Input Specification File

```
NOg 4.08261e-04
NACLs 1.70940e-16
DUMMYg 1
FILLERg 1
# background
NACLb 1.70940e-16
NH3b  7.00000e-10
O3b   3.00000e-08
H2O2b 1.00000e-09
NOb    0.05e-9
NO2b   0.455e-9
HCHOb 2.00000e-10
FILLERb 1
* terminating asterick
# print flags
1 1 0
# tmax (hrs), dt(hours) water, tprint(hrs), hmax(sec)
  18.113 .25 1.00 100
# hstart, tol,    itermax, miter (1=anal, 2=finite diff), inorm
1.00E-8 0.001  100000 1 3
* terminating asterick
```

[a] Comment line begin with a "#".

Initial plume concentrations and background concentrations constitute the next block of data. The AEM recognizes gas phase concentrations by use of a final lower case g in the species name. Similarly, a lower case l, s, or b denotes liquid phase, solid phase, or background concentrations, respectively. Units are atmospheres for gas phase concentrations and moles per drop for solid. The inclusion of a salt, NaCl, in the initial concentrations provides solute for drop formation, and the inclusion of the background salt, NaClb, maintains this solute concentration though out the mixing process.

The next record flags output options and the next gives integration parameters. Tmax is the total simulation time and dt the maximum time step in hours. The AEM starts with a time step of 18 seconds which is doubled for each subsequent time step until dt is reached. As explained above, equilibrium is imposed at the beginning of each of these time steps and the reaction set integrated across them. Tprint gives the time in hours between the ASCII outputs and hmax is the maximum time step in seconds for the differential equations integrator. The final data record gives parameters used by the integrator, DGEAR.

B.5.3 Output Files

The AEM has two output files. One, an ASCII output file is illustrated partially in Table B.5.3. This output is periodically written with a period given by the input parameter Tprint discussed above. The first data row gives time, temperature, pressure and relative humidity at the given time in the simulation. These are followed by pH and ionic strength. The next line indicates how well charge balance is attained. This is followed by a record of the initial sulfur IV and sulfur VI concentrations, sulfur IV and sulfur VI concentrations at the given time, sulfur VI produced by conversion, and the fraction of total sulfur converted. The next record contains initial total sulfur and total sulfur at the given time. These are equal when sulfur concentrations are zero in background air. The final blocks of data give species names and species concentrations. The first block gives concentrations in atmospheres, molals, and moles per drop for gas, liquid, and solid phases respectively. The last block gives concentrations in moles per drop. The last block facilitates checking the AEM for numerical accuracy.

The other output file is a constant record ASCII file that records values of parameters and concentrations at each time step and is designed to be easily converted into xBASE or other standard data formats for data analysis. It is too large to be conveniently illustrated here, but examples are included in the data base.

B.5.4 Variation of Base Case Parameters

The AEM was used to place bounds on particle sulfate formation rates and nitrate equilibrium for different conditions that were or might be encountered in the MZVS. The results of these tests are shown in Tables B.5.4 through B.5.9. Parameters not displayed were set to the base case values with one exception. For these simulations a relative humidity of 75% instead of the base case relative humidity of 51% was used. This is

Table B.5.3
AEM Output File

```
**********
   TIME(HRS)       P(MB)        T(C)     RH =
    10.00000   736.17598    15.00000       .51000
PH =       5.84075
IONIC STRENGTH =     171.93022
Charge+, -, totalion =    .37121E-16   .37121E-16   .21210E-27

siv0, svi0, siv, svi, svi-svi0, conv =  .6024E-08  .0000E+01  .6010E-08  .1414E-10  .1414E-10  .2347E-02
totsulf0, totsulf =    .6024E-08  .6024E-08

     htrial       hminc       hmaxc       nstep        nfcn         nje =
  .1000E+03  .1000E-07  .1000E+03         34.          35.          8.

DROP DIAMETER(MICRONS) =    .14888E+00 WATERRK(CC)     =    .21600E-15 WATERRK(MOLES) =    .12000E-16

DRY MASS DIAMETER(MICRONS) =    .21439E+00 DRY MASS VOLUME(CC)     =    .51592E-14

CHEMICAL SPECIES =
   ALDb          CH4b          FILLERb       H2O2b         HCHOb         NACLb         NH3b          NMHCb         NO2b          NOb
   O3b           ALDg          CH4g          CO2g          COg           DUMMYg        FILLERg       H2O2g         H2SO4g        H2g
   HCHOg         HCLg          HCOOHg        HMO2g         HNO2g         HNO3g         HO2g          HOg           N2O5g         NH3g
   NMHCg         NO2g          NO3g          NOg           O3g           OCH2OHg       Og            SO2g          CL-1          CO21
   CO3=1         H+1           H2O21         H2SO41        HCL1          HCO3-1        HNO21         HNO31         HSO3-1        HSO4-1
   NA+1          NH31          NH4+1         NO2-1         NO3-1         NO31          O31           OH-1          SO21          SO3=1
   SO4=1         (NH4)2SO4s    NA2SO4s       NACLs         NAHSO4s       NANO3s        NH4CLs        NH4HSO4s      NH4NO3s       SOLID1s

molalities, atmospheres, moles =
   .00000E+01    .00000E+01    .10000E+01    .10000E-08    .10000E-09    .17094E-15    .70000E-09    .00000E+01    .45500E-09    .50000E-10
   .30000E-07    .00000E+01    .00000E+01    .00000E+01    .98418E-14    .19231E-04    .10000E+01    .99998E-09    .10371E-15    .00000E+01
   .99987E-10    .38601E-09    .17521E-16    .13440E-14    .00000E+01    .21731E-08    .53593E-14    .29241E-18    .62447E-10    .69995E-09
   .00000E+01    .62475E-08    .42582E-12    .32943E-12    .20753E-07    .54850E-25    .00000E+01    .27328E-08    .52272E+00    .00000E+01
   .00000E+01    .14429E-05    .30751E-04    .16819E-02    .31387E-09    .00000E+01    .00000E+01    .24727E-03    .15331E-04    .12510E+02
   .17178E+03    .32166E-07    .72517E-01    .00000E+01    .15867E+03    .00000E+01    .16865E-09    .64130E-08    .23651E-08    .55356E-06
   .76492E-01    .00000E+01    .00000E+01    .75663E-17    .00000E+01    .12599E-15    .00000E+01    .00000E+01    .00000E+01    .00000E+01

moles =
   .00000E+01    .00000E+01    .42295E-06    .42295E-15    .42295E-16    .72299E-22    .29606E-15    .00000E+01    .19244E-15    .21147E-16
   .12688E-13    .00000E+01    .00000E+01    .00000E+01    .41626E-20    .81338E-11    .42295E-06    .42294E-15    .43862E-22    .00000E+01
   .42289E-16    .16326E-15    .74104E-23    .56844E-21    .00000E+01    .91910E-15    .22667E-20    .12367E-24    .26412E-16    .29604E-15
   .00000E+01    .26424E-14    .18010E-18    .13933E-18    .87775E-14    .23199E-31    .00000E+01    .11558E-14    .11291E-18    .00000E+01
   .00000E+01    .31168E-24    .66424E-23    .36329E-21    .67798E-28    .00000E+01    .00000E+01    .53411E-22    .33116E-23    .27023E-17
   .37105E-16    .69480E-26    .15664E-19    .00000E+01    .34273E-16    .00000E+01    .36430E-28    .13852E-26    .51087E-27    .11957E-24
   .16523E-19    .00000E+01    .00000E+01    .75663E-17    .00000E+01    .12599E-15    .00000E+01    .00000E+01    .00000E+01    .00000E+01
```

Table B.5.4
Conversion of Sulfur Dioxide to Sulfate for Different Levels of Solar Insolation

Photolytic Multiplier[c]	Fraction of SO_2 Converted to SO_4 at Different Aging Periods[a]				Changes in Particle Scattering (Mm^{-1}) for Different Aging Periods[b]			
	1 hr	6-hr	12-hr	18-hr	1-hr	6-hr	12-hr	18-hr
2.00	1.84E-06	1.85E-06	1.87E-06	0.005242	3.10E-02	1.28E-03	3.78E-04	4.75E-01
1.50	1.84E-06	1.85E-06	1.87E-06	0.004086	3.10E-02	1.28E-03	3.78E-04	3.68E-01
1.00	2.39E-12	5.31E-10	4.08E-06	0.002862	1.26E-08	1.94E-07	6.85E-04	1.55E-01
0.75	1.84E-06	1.85E-06	1.87E-06	0.002079	3.10E-02	1.28E-03	3.78E-04	1.85E-01
0.50	1.84E-06	1.85E-06	1.87E-06	0.001359	3.10E-02	1.28E-03	3.78E-04	1.20E-01

[a] Base case with variation of solar insolation. Relative humidity = 75%.
A power station plume was assumed to contain:
Initial SO_2 concentration of 1.29 g/m^3
Initial NO_x concentration of 1.36 g/m^3 (10% NO_2, 90% NO)
Initial solute concentration of 0.001 $\mu g/m^3$ NaCl
Background air mixed into the plume assuming C stability and Gaussian dispersion was assumed to contain:
NH_3 concentration of 0.5 $\mu g/m^3$
O_3 concentration of 30 ppbv
H_2O_2 concentration of 1 ppbv
NO_x concentration of 0.5 ppbv (90% NO_2, 10% NO)
Formaldehyde concentration of 0.2 ppbv
10^{-5} moles/liter of dissolved Fe^{+++} and Mn^{++} in droplets
Transport velocity was assumed to be 0.67 m/s.

[b] Assumes that sulfate light scattering =0.86 +0.73[1/(100-RH)]*[sulfate concentration] as derived in Appendix B.4

[c] Variations in solar insolation are simulated by multiplying photolytic rate constants by values in this column.

Table B.5.5
Conversion of Sulfur Dioxide to Sulfate for Different Values of Relative Humidity and Temperature

Relative Humidity	Temp.	Fraction of SO_2 Converted to SO_4 at Different Aging Periods[a]				Changes in Particle Scattering (Mm^{-1}) for Different Aging Periods[b]			
(%)	(°C)	1 hr	6-hr	12-hr	18-hr	1-hr	6-hr	12-hr	18-hr
75	10	4.78E-07	4.80E-07	5.87E-07	2.75E-03	8.19E-03	3.38E-04	1.14E-04	2.50E-01
75	20	3.82E-06	3.87E-06	3.93E-06	2.84E-03	6.31E-02	2.63E-03	7.81E-04	2.49E-01
75	25	7.28E-06	7.51E-06	7.55E-06	2.91E-03	1.18E-01	5.00E-03	1.47E-03	2.51E-01
95	10	2.04E-07	2.94E-07	1.13E-05	2.80E-03	1.43E-02	8.45E-04	8.21E-03	1.06E+00
95	20	1.37E-06	1.50E-06	1.08E-05	2.96E-03	9.19E-02	4.21E-03	6.28E-03	1.07E+00
95	25	4.83E-06	5.33E-06	5.74E-06	2.96E-03	3.15E-01	1.44E-02	4.53E-03	1.05E+00
100	10	1.49E-03	2.19E-02	7.08E-02	1.74E-01	3.63E+02	2.76E+02	2.60E+02	3.19E+02
100	20	7.35E-03	6.86E-02	1.69E-01	3.39E-01	1.64E+03	8.52E+02	6.16E+02	6.08E+02
100	25	8.79E-02	8.02E-01	9.30E-01	9.92E-01	1.46E+04	1.03E+04	3.48E+03	1.81E+03

[a] Base case with variation of relative humidity and temperature.
A power station plume was assumed to contain:
Initial SO_2 concentration of 1.29 g/m^3
Initial NO_x concentration of 1.36 g/m^3 (10% NO_2, 90% NO)
Initial solute concentration of 0.001 $\mu g/m^3$ NaCl
Background air mixed into the plume assuming C stability and Gaussian dispersion was assumed to contain:
NH_3 concentration of 0.5 $\mu g/m^3$
O_3 concentration of 30 ppbv
H_2O_2 concentration of 1 ppbv
NO_x concentration of 0.5 ppbv (90% NO_2, 10% NO)
Formaldehyde concentration of 0.2 ppbv
10^{-5} moles/liter of dissolved Fe^{+++} and Mn^{++} in droplets
Transport velocity was assumed to be 0.67 m/s.

[b] Assumes that sulfate light scattering =0.86 +0.73[1/(100-RH)]*[sulfate concentration] as derived in Appendix B.4

Table B.5.6
Conversion of Sulfur Dioxide to Sulfate for Different Levels of Background Formaldehyde

Formaldehyde	Fraction of SO_2 Converted to SO_4 at Different Aging Periods[a]				Changes in Particle Scattering (Mm^{-1}) for Different Aging Periods[b]			
(ppbv)	1 hr	6-hr	12-hr	18-hr	1-hr	6-hr	12-hr	18-hr
0.40	1.84E-06	1.85E-06	1.89E-06	5.47E-03	3.10E-02	1.28E-03	3.81E-04	4.89E-01
0.80	1.84E-06	1.85E-06	1.91E-06	1.06E-02	3.10E-02	1.29E-03	3.87E-04	9.53E-01
2.00	1.84E-06	1.86E-06	1.97E-06	2.45E-02	3.11E-02	1.28E-03	3.98E-04	2.21E+00

[a] Base case with variation of background formaledhyde. Relative humidity = 75%.
A power station plume was assumed to contain:
Initial SO_2 concentration of 1.29 g/m^3
Initial NO_x concentration of 1.36 g/m^3 (10% NO_2, 90% NO)
Initial solute concentration of 0.001 $\mu g/m^3$ NaCl
Background air mixed into the plume assuming C stability and Gaussian dispersion was assumed to contain:
NH_3 concentration of 0.5 $\mu g/m^3$
O_3 concentration of 30 ppbv
H_2O_2 concentration of 1 ppbv
NO_x concentration of 0.5 ppbv (90% NO_2, 10% NO)
Formaldehyde concentration of 0.2 ppbv
10^{-5} moles/liter of dissolved Fe^{+++} and Mn^{++} in droplets
Transport velocity was assumed to be 0.67 m/s.
[b] Assumes that sulfate light scattering =0.86 +0.73[1/(100-RH)]*[sulfate concentration] as derived in Appendix B.4

Table B.5.7
Conversion of Sulfur Dioxide to Sulfate for Different Values of Relative Humidity and Hydrogen Peroxide

Relative Humidity	Hydrogen Peroxide	Fraction of SO_2 Converted to SO_4 at Different Aging Periods[a]				Changes in Particle Scattering (Mm^{-1}) for Different Aging Periods[b]			
(%)	(ppbv)	1 hr	6-hr	12-hr	18-hr	1-hr	6-hr	12-hr	18-hr
95	2	6.47E-07	7.76E-07	3.21E-05	2.96E-03	4.44E-02	2.21E-03	2.18E-02	1.10E+00
95	4	1.09E-06	1.29E-06	6.39E-05	3.14E-03	7.39E-02	3.67E-03	4.31E-02	1.16E+00
99	2	1.19E-05	2.75E-05	5.56E-04	4.66E-03	3.59E+00	3.52E-01	1.96E+00	8.33E+00
99	4	1.22E-04	2.66E-04	1.34E-03	6.73E-03	3.50E+01	3.49E+00	4.83E+00	1.21E+01
100	2	4.31E-03	6.69E-02	2.09E-01	4.22E-01	1.03E+03	8.27E+02	7.70E+02	7.68E+02
100	4	8.27E-03	1.36E-01	4.15E-01	7.57E-01	1.97E+03	1.68E+03	1.54E+03	1.39E+03

[a] Base case with variation of relative humidity and Hydrogen Peroxide.
A power station plume was assumed to contain:
Initial SO_2 concentration of 1.29 g/m^3
Initial NO_x concentration of 1.36 g/m^3 (10% NO_2, 90% NO)
Initial solute concentration of 0.001 $\mu g/m^3$ NaCl
Background air mixed into the plume assuming C stability and Gaussian dispersion was assumed to contain:
NH_3 concentration of 0.5 $\mu g/m^3$
O_3 concentration of 30 ppbv
H_2O_2 concentration of 1 ppbv
NO_x concentration of 0.5 ppbv (90% NO_2, 10% NO)
Formaldehyde concentration of 0.2 ppbv
10^{-5} moles/liter of dissolved Fe^{+++} and Mn^{++} in droplets
Transport velocity was assumed to be 0.67 m/s.
[b] Assumes that sulfate light scattering =0.86 +0.73[1/(100-RH)]*[sulfate concentration] as derived in Appendix B.4

Table B.5.8
Conversion of Sulfur Dioxide to Sulfate for Different Values of Relative Humidity and Maximum Ammonia and Ozone Concentrations

Relative Humidity	Fraction of SO_2 Converted to SO_4 at Different Aging Periods[a]				Changes in Particle Scattering (Mm^{-1}) for Different Aging Periods[b]			
(%)	1 hr	6-hr	12-hr	18-hr	1-hr	6-hr	12-hr	18-hr
95	9 .60E-06	3.58E-06	4.22E-04	5.26E-03	4.12E-02	8.05E-03	3.17E-01	1.94E+00
99	9 .33E-05	5.06E-05	2.79E-03	1.15E-02	9.58E-01	5.89E-01	1.00E+01	2.07E+01
100	9 .78E-02	9.82E-02	2.56E-01	4.30E-01	2.02E+03	1.21E+03	9.49E+02	7.84E+02

[a] Base case with variation of relative humidity for background levels of ammonia and ozone of 4 $\mu g/m^3$ and 50 ppbv, respectively.
A power station plume was assumed to contain:
Initial SO_2 concentration of 1.29 g/m^3
Initial NO_x concentration of 1.36 g/m^3 (10% NO_2, 90% NO)
Initial solute concentration of 0.001 $\mu g/m^3$ NaCl
Background air mixed into the plume assuming C stability and Gaussian dispersion was assumed to contain:
NH_3 concentration of 0.5 $\mu g/m^3$
O_3 concentration of 30 ppbv
H_2O_2 concentration of 1 ppbv
NO_x concentration of 0.5 ppbv (90% NO_2, 10% NO)
Formaldehyde concentration of 0.2 ppbv
10^{-5} moles/liter of dissolved Fe^{+++} and Mn^{++} in droplets
Transport velocity was assumed to be 0.67 m/s.
[b] Assumes that sulfate light scattering =0.86 +0.73[1/(100-RH)]*[sulfate concentration] as derived in Appendix B.4

Table B.5.9
Conversion of Sulfur Dioxide to Sulfate for Different Values of Relative Humidity and Stability

Relative Humidity		Fraction of SO_2 Converted to SO_4 at Different Aging Periods[a]				Changes in Particle Scattering (Mm^{-1}) for Different Aging Periods[b]			
(%)	Stability	1 hr	6-hr	12-hr	18-hr	1-hr	6-hr	12-hr	18-hr
75	2	1.92E-06	1.94E-06	2.26E-06	1.70E-02	9.68E-03	2.96E-04	8.93E-05	3.61E-01
75	3	1.84E-06	1.85E-06	1.87E-06	2.78E-03	3.10E-02	1.28E-03	3.78E-04	2.49E-01
75	4	1.87E-06	1.91E-06	1.92E-06	4.68E-04	1.05E-01	7.83E-03	2.92E-03	3.78E-01
95	2	4.02E-07	6.86E-06	7.55E-05	1.72E-02	8.23E-03	2.97E-03	1.20E-02	1.52E+00
95	3	4.87E-07	5.82E-07	1.65E-05	2.88E-03	3.34E-02	1.64E-03	1.13E-02	1.07E+00
95	4	6.09E-07	6.71E-07	7.99E-07	5.12E-04	1.40E-01	1.13E-02	5.10E-03	1.71E+00
100	2	4.82E-03	8.76E-02	3.17E-01	5.12E-01	3.37E+02	2.28E+02	2.29E+02	2.17E+02
100	3	2.36E-03	3.27E-02	1.05E-01	2.30E-01	5.72E+02	4.08E+02	3.87E+02	4.20E+02
100	4	1.18E-03	1.75E-02	3.75E-02	6.75E-02	9.27E+02	1.33E+03	1.08E+03	1.11E+03

[a] Base case with variation of relative humidity and stability.
A power station plume was assumed to contain:
- Initial SO_2 concentration of 1.29 g/m^3
- Initial NO_x concentration of 1.36 g/m^3 (10% NO_2, 90% NO)
- Initial solute concentration of 0.001 $\mu g/m^3$ NaCl

Background air mixed into the plume assuming C stability and Gaussian dispersion was assumed to contain:
- NH_3 concentration of 0.5 $\mu g/m^3$
- O_3 concentration of 30 ppbv
- H_2O_2 concentration of 1 ppbv
- NO_x concentration of 0.5 ppbv (90% NO_2, 10% NO)
- Formaldehyde concentration of 0.2 ppbv
- 10^{-5} moles/liter of dissolved Fe^{+++} and Mn^{++} in droplets

Transport velocity was assumed to be 0.67 m/s.

[b] Assumes that sulfate light scattering =0.86 +0.73[1/(100-RH)]*[sulfate concentration] as derived in Appendix B.4

because SCAPE sometimes failed numerically at the lower relative humidity, resulting in nonconservation of sulfur mass. Since the liquid phase conversion is not important at relative humidities at or below 95%, this does not affect subsequent conclusions.

Table B.5.4 gives the results of varying the solar flux to simulate overcast conditions. This is done by multiplying the photolytic rate constants by the constant factor given in the Photolytic Multiplier column. The entry for Photolytic Multiplier = 1 is the base case simulation. The photolytic rate constants used in these simulations were picked to simulate a clear day in August at 35 °N latitude, near sea level (Stockwell and Calvert, 1983). Since the Yampa Valley is at 2000 m elevation and the study extended over one year, Phot. Frac. values of 1.5 and 2.0 were used to simulate midsummer conditions. The lower values simulate winter and overcast conditions. Even with large amounts of solar radiation, conversion of sulfur dioxide to sulfate is low.

Table B.5.5 shows results of varying temperature and different relative humidity. Gas phase conversion is not sensitive to temperature variations while liquid phase conversion is, with the hour 18 contribution to the scattering coefficient increasing from 420 Mm^{-1} at 15 °C (see Table 7.4.1) to 319 Mm^{-1} at 10 °C and 100% relative humidity. The change, however, is not enough to affect the conclusions of Section 6.4 of the MZVS report.

Table B.5.6 shows results of varying the background formaldehyde level, which drives the gas phase conversion. Increasing the formaldehyde level by a factor of 10 increases the contribution to the scattering coefficient from 0.25 Mm^{-1} to 2.21 Mm^{-1}, bringing the contribution into the minor range. The change, however, is not enough to change the conclusions of Section 7.4 of the MZVS report.

Table B.5.7 shows results of varying background hydrogen peroxide concentrations for different relative humidities. Hydrogen peroxide conversion is the dominant pathway for liquid phase conversion through reaction 575 in Table B.5.1. When the 100% relative humidity base case simulation was repeated using only Reaction 575 for liquid phase transformation a total hour 18 conversion of 20% was obtained in contrast to the base case value of 22%. At 4 ppbv, almost total conversion is obtained after 18 hours. Again, because the change is to increase liquid phase conversion, the conclusions of Section 7.4 are not affected.

In Table B.5.8, the background ozone and ammonia concentrations are increased to near the observed upper limits measured during the MZVS, 4 $\mu g/m^3$ for ammonia, and 50 ppbv for ozone. For the gas phase dominated 95% relative humidity entry, total conversion at hour 18 increases from the base case 0.29% to 0.53%, with the contribution to the scattering coefficient increasing from 1.07 Mm^{-1} to 1.94 Mm^{-1}. This is not enough to affect the conclusions of Section 7.4. For the liquid phase dominated entry for 100% relative humidity, the base case hour 18 conversion of 23.0% increases to 43%. Again, because the change is to increase liquid phase conversion, the conclusions of Section 7.4 are not affected.

In Table B.5.9, stability is varied; this affects the rate of mixing between plume and background air, with lower levels of stability producing more rapid mixing. The base case entries for stability 3 are included in Table B.5.9. For all relative humidity levels, lower values of stability give higher total conversions. This is because the more rapid mixing associated with lower values of stability holds up oxidant levels against the depleting effects of conversion. The contribution to the scattering coefficient, however, is a function not of total conversion solely but also of the sulfate concentration. While higher conversion tends to raise this concentration, mixing tends to lower it through dilution. For the gas phase dominated entries of 75% and 95% relative humidities, the contribution to the scattering coefficient stays roughly level, and the conclusions of Section 7.4 are not affected by these entries. The decrease in contribution to the scattering coefficient from the base case stability 3 to stability 2 for the 100% relative humidity entries is not enough to affect the conclusions of Section 7.4, and going from stability 3 to 4 increases the contribution to the scattering coefficient, and, again, the conclusions of Section 7.4 are not affected.

B.6 THRESHOLD FOR VISUAL PERCEPTION OF CHANGES IN REGIONAL HAZE

The deciview haze index was introduced by Pitchford and Malm (1994) as an aid in presentations of data for the spatial and temporal distributions of values for the light-extinction coefficient (b_{ext}), which is a measure of haze. Pitchford and Malm (1994) also presented a derivation indicating that when a scene contains elements at or near the visual range, the threshold for the visual perception of a change in regional haze is a change of approximately one deciview unit. Because sight paths in the MZWA are typically much shorter than the visual range, this appendix presents a derivation based on information presented by Pitchford and Malm (1994) that is applicable to these cases. The result is that the just noticeable change in b_{ext}, which is defined by Pitchford and Malm (1994), is approximately equal to 0.39/r, where r is the distance to the farthest target in the scene. This result is valid for all values of r up to and including the visual range.

B.6.1 Introduction

Pitchford and Malm (1994) proposed the deciview haze index as an aid in presentations of data for b_{ext} in the Earth's atmosphere. Their objective was to develop an index that is more linearly related to the human visual response to regional haze than is either b_{ext} or the visual range, VR. The deciview haze index, dv, is defined as

$$dv = 10 \ln_e (b_{ext}/10\,Mm^{-1}) \qquad \text{(B.6-1)}$$

Particle-free air at modest elevations has a b_{ext} of approximately 10 Mm^{-1}. The deciview haze index has a value of zero for these conditions, and increases by approximately one unit for each 10 percent increase in b_{ext}. The deciview haze index is ideally suited for the presentation of spatial or temporal trends in haze, and Pitchford and Malm (1994) show an example (Figure 3) of such an application.

Pitchford and Malm (1994) also presented information on the threshold for the visual perception of changes in haze levels, and indicated that a 1 dv change causes a small but perceptible scenic change under many circumstances. They state that the general application of this perception threshold depends on the assumption that sensitive scenic targets are available "at every distance." The 1 dv perception threshold is often endorsed in oral conversations, but no articles or reports other than Pitchford and Malm (1994) have been located that provide additional justification for its use. Some advocates of the 1 dv perception threshold overlook the requirement that the scene contain elements at the most sensitive distance.

B.6.2 Extension of the Derivation to Short Sight Paths

The derivation in this appendix is based on the information presented in Pitchford and Malm (1994) and has the purpose of extending the results presented there to the case of scenes that contain only sight paths that are shorter than the visual range. It is not the

purpose of this appendix to re-examine the assumptions and data used by Pitchford and Malm (1994) in their derivations.

Pitchford and Malm (1994) state:

$$1 - L = e^{\Delta b_{ext} r} \tag{B.6-2}$$

where L is a (spatial) frequency dependent proportionality constant, Δb_{ext} is the change in b_{ext} corresponding to a just noticeable change (JNC) in haze, and r is the distance to an element in a scene. For the derivation below, it is only necessary to know that L does not depend on the haze level or the sight path length. Pitchford and Malm (1994) say, "Equation [B.6-2] indicates that the change in extinction coefficient corresponding to a JNC in a scenic element is inversely proportional to the distance to the element. The most sensitive scenic element is the one at the greatest distance that is still visible at the lower extinction coefficient value, but just disappears at the higher extinction coefficient. In other words, the most sensitive distance for a scenic element is near the visual range, ..." In the following derivation, the Δb_{ext} in Equation B.6-2 is called the liminal Δb_{ext}. The 1 dv perception threshold recommended by Pitchford and Malm (1994) for scenes that include elements at the most sensitive distance corresponds to

$$\frac{\text{liminal } \Delta b_{ext}}{b_{ext}} = 0.1 \tag{B.6-3}$$

It is possible to derive a value for the liminal Δb_{ext} appropriate for scenes that do not include elements at the most sensitive distance by using Equation B.6-2 to modify Equation B.6-3 to obtain

$$\frac{\text{liminal } \Delta b_{ext}}{b_{ext}} = \frac{0.1\ VR}{r} \tag{B.6-4}$$

where r is the distance to the most distant element in the scene. When elements in the scene are available at a distance r approximately equal to VR, the liminal Δb_{ext} is approximately 10 percent of b_{ext}, so the threshold change in dv is one unit. When scenic elements are available only at shorter distances, Equation B.6-4 complies with the Pitchford and Malm (1994) result that "the change in extinction coefficient corresponding to a JNC in a scenic element is inversely proportional to the distance to the element."

Equation B.6-4 can be simplified by making use of the definition of VR

$$VR = \frac{3.9}{b_{ext}} \tag{B.6-5}$$

which assumes that a dark target is used to determine the visual range and that the liminal contrast is 2 percent. Combining Equations B.6-4 and B.6-5 gives

$$\text{liminal } \Delta b_{ext} = \frac{0.39}{r} \qquad \text{(B.6-6)}$$

In words, when a target at a distance close to the visual range is not available, the change in the b_{ext} of a regional haze corresponding to a just noticeable change (as defined in Pitchford and Malm, 1994) is equal to 0.39/r, were r is the distance to the farthest target in the scene. When r is equal to the visual range, the liminal Δb_{ext} derived from Equation B.6-6 is the same as obtained from a change of 1 dv.

B.6.3 Discussion

As an example, if an observer is in a valley in which the longest sight path is 20 km (12 mi), the threshold Δb_{ext} from Equation B.6-6 is 20 Mm^{-1}. The data in Section 3.1 indicate that the 50th percentile value of b_{ext} at Buffalo Pass is 16 or 17 Mm^{-1}. At this level of b_{ext}, a 1 dv change corresponds to a Δb_{ext} of less than 2 Mm^{-1}. When b_{ext} is 17 Mm^{-1}, using a 1 dv change to calculate the threshold for the perception of a change in regional haze in a valley where the longest sight path is 20 km would underestimate the Δb_{ext} required to produce a just noticeable change in haze by about a factor of 10.

The longest sight path identified in the MZWA is between Davis Peak and the Southern Ridge (see Figure 7.8.3) and has a length of 35 km (22 mi). For this value of r, Equation B.6.6 gives a value of 11 Mm^{-1} for Δb_{ext}. Thus, a derivation based on the information and definitions presented in Pitchford and Malm (1994) indicates that a Δb_{ext} of 11 Mm^{-1} or more is necessary to cause a just noticeable change in regional haze in sight paths within the MZWA. This result applies to hazes without apparent edges or boundaries. It is likely that haze layers or puffs that have well-defined edges could be perceived even though the Δb_{ext} values are smaller. It is also true that smaller changes in b_{ext} would cause perceptible changes in haze in longer sight paths outside the MZWA.

There is considerable uncertainty in the Δb_{ext} that could be visually perceived by an observer in the outdoors when the haze appears to be uniform. The perception of changes in an apparently uniform haze requires comparing one view with the memory of a different one, and there are few experimental data for that type of comparison. Comparisons have been made using split-screen images as described by Pitchford and Malm (1994), and the 1 dv threshold is, in part, derived from that type of experiment. In split-screen experiments, a sharp boundary through the middle of the image separates representations of two different haze levels. It is not known how the results from comparisons using split-screen images relate to the perception of changes in an apparently uniform haze in the outdoors.

B.7 CONTRAST CALCULATION MODEL

Contrast is a parameter closely linked to human perception. It is a well established procedure to use contrasts to determine whether or not an object is perceptible. For example, calculation of the standard visual range from b_{ext} is based on the assumption that a distant, dark object is perceptible against the horizon sky if its contrast, measured at the location of the observer, has a magnitude greater than 0.02. In addition, it is possible to use contrast as a measure of visual quality throughout the full range of visibility conditions that can be observed. Contrasts have large magnitudes when the visibility is excellent, and change toward zero with increasing haze. Therefore, it is a useful component of visibility analyses to calculate the contrasts and contrast transmittances for MZWA sight paths to evaluate the effect of various values of light extinction and changes in light extinction on visibility.

Performing quantitative contrast calculations for sight paths requires estimating the illumination of both the sight path and the target and then using this information to determine the brightness of the target and the amount of light scattered into the sight path by the atmosphere. These calculations were performed as described in this appendix. All calculations were performed for a wavelength of 550 nm, which corresponds to green light.

Determine the downward flux of sunlight. The optical depth of a cloud-free haze layer near the surface of the earth is equal to an assumed mixing depth multiplied by the value of b_{ext} in the haze layer. The optical depth of the cloud-free atmosphere above the haze layer is set equal to 0.134 (see, for example, Richards *et al.*, 1986). The total optical depth, τ, of the atmosphere is the sum of these two numbers. The optical depth for the slant path of the solar rays is the total optical depth divided by $\cos\theta$, where θ is the solar zenith angle. The solar flux F_o at the top of the atmosphere through a surface normal to the sun's rays is 1875 W m^{-2} μm^{-1}. The solar flux at the surface of the earth on a surface normal to the sun's rays is $F_o e^{-\tau/\cos\theta}$ when the atmosphere is cloud free. These solar fluxes are measured using a surface normal to the solar rays.

Determine the downward flux of diffuse skylight. Radiative transfer calculations were performed by Richards *et al.* (1986) to determine the downward flux of diffuse skylight as a function of atmospheric haze. The aerosol in the haze layer was composed of fine, coarse, and carbon particles with the same physical and optical properties as the bottom haze layer described by Richards *et al.* (1986). The relative volume concentrations of fine, coarse, and carbon aerosol were 46, 51, and 3%, respectively. The relative contributions to b_{ext} were 75, 12.5, and 12.5%, respectively. These proportions were kept constant as the total aerosol concentration was changed to vary the optical depth of the haze. The results of these calculations are shown in Figure B.7-1. The data in these curves were interpolated to determine the downward flux of diffuse skylight.

Determine the initial radiance of a target. Each target (mountainside) is illuminated by the direct solar rays, diffuse skylight, and light reflected from the surface

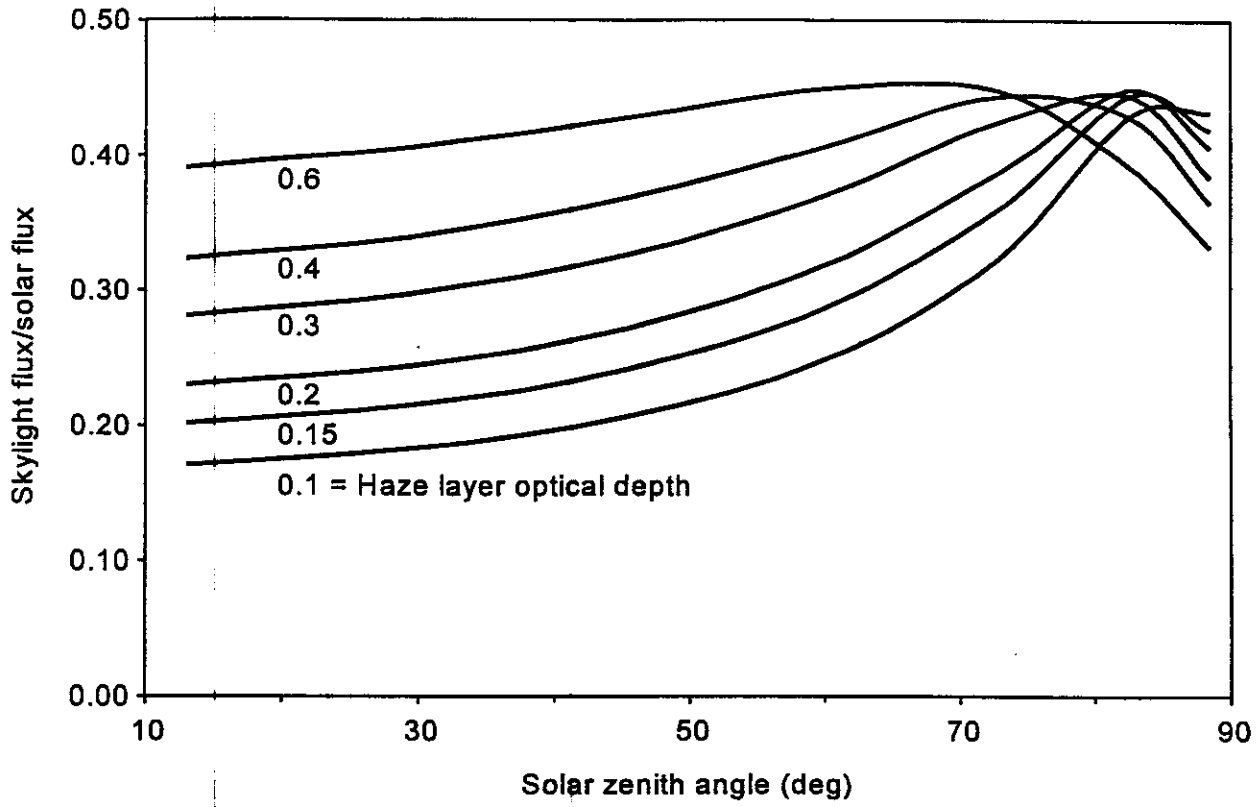


Figure B.7-1 Data for the ratio of the total flux of skylight F incident of the earth's surface to the solar flux $F_0\cos\theta$ on a horizontal surface at the top of the atmosphere. These data are a function of the solar zenith angle and the optical depth of the haze layer.

of the earth. The angle between the sun's rays and the normal to the mountainside was used to determine the illumination by the direct solar rays. It was assumed that the diffuse skylight and the light reflected from the surface of the earth were perfectly diffuse. Therefore, the light falling on the mountainside from each of these hemispherical sources is proportional to the fraction of each of these hemispheres that can illuminate the mountainside.

The radiance of the mountainside is determined from the illumination multiplied by the surface albedo (reflectance) of the mountainside. It is assumed that the reflected light is perfectly diffuse.

Estimate the phase function. When the direction of travel of radiation is changed by light scattering, the redirected radiation is not evenly distributed into all possible angles. The angular distribution of the scattered light is described by the phase function. This function was named by astronomers, and an example of its use is provided by the phases of the moon. The moon scatters light back toward the sun more strongly than in other directions, so the moonlight is strongest when the moon is full. Measuring the light from the moon during the progression from a new moon to a full moon would provide data for the phase function of the moon. An example of a phase function and the contribution of various atmospheric constituents is shown in Figure B.7-2. The phase function used in this work was calculated for the same atmospheric composition as was used for the calculation of the diffuse sky radiance.

Determine the Source Function. The source function I_e is also known as the equilibrium radiance. Except when it is unusually clear, the horizon sky radiance is approximately equal to the source function when the atmosphere and its illumination is reasonably uniform and the view toward the horizon is approximately horizontal. When the sky is free of clouds, the source function can be calculated from the Equation B.7-1 (Richards *et al.*, 1986)

$$I_e = (\omega_o / 4\pi)[2F_+ + 2F_- + F_s P(\Omega,\Omega_s)] \qquad \text{(B.7-1)}$$

where ω_o is the single scattering albedo

$$\omega_o = b_{scat} / b_{ext} \qquad \text{(B.7-2)}$$

F_+ is the flux of diffuse light reflected upward from the Earth's surface, F_- is the flux of diffuse skylight incident on the Earth's surface, F_s is the direct solar flux on the sight path measured normal to the solar rays, $P(\Omega,\Omega_s)$ is the phase function for the scattering of radiation from the direction Ω_s of the solar rays into the direction Ω of the line of sight. Near the surface of the Earth, Equation 1 can be simplified by the relation

$$F_+ = \alpha(F_- + F_s \cos\theta) \qquad \text{(B.7-3)}$$

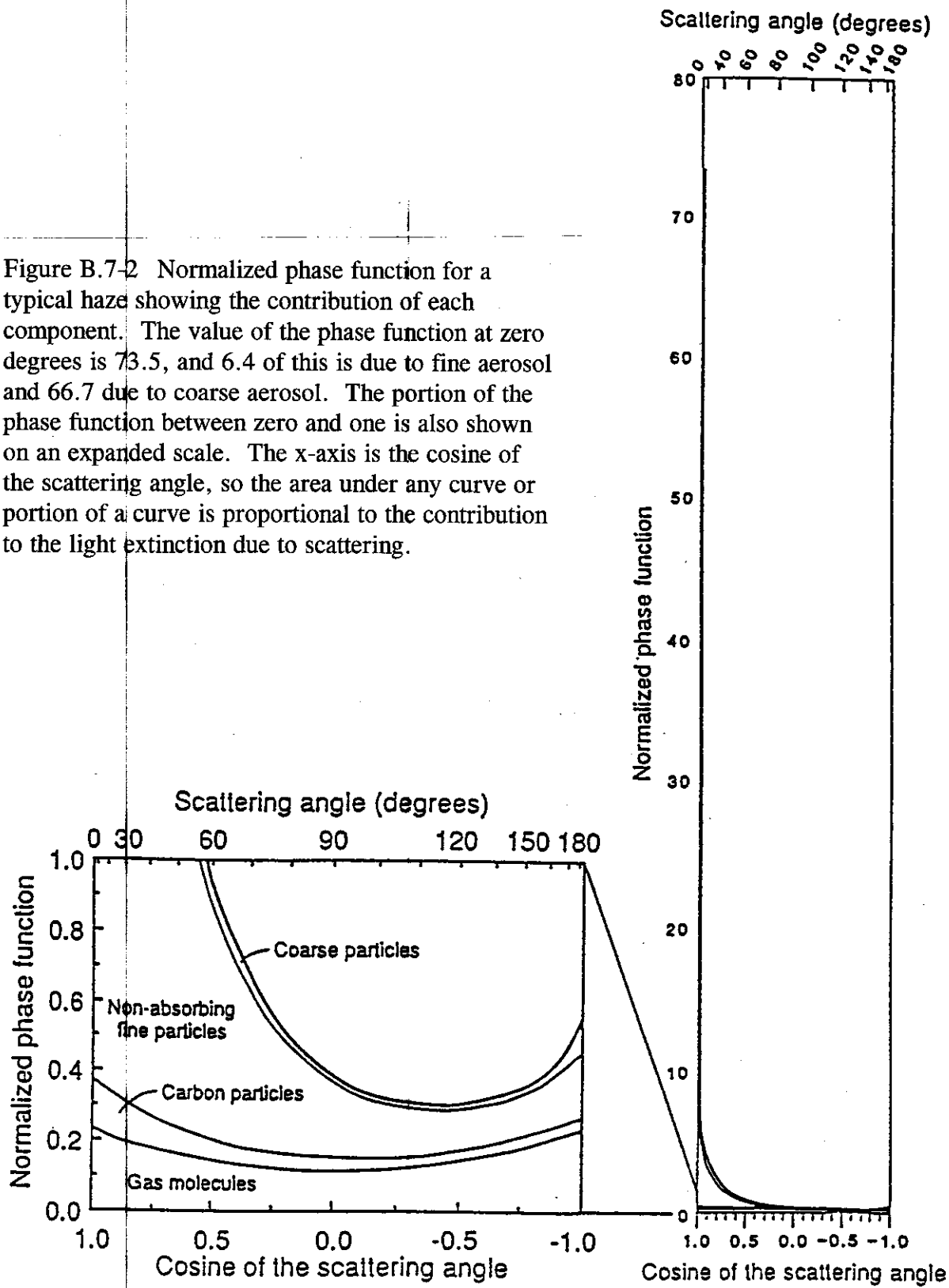


Figure B.7-2 Normalized phase function for a typical haze showing the contribution of each component. The value of the phase function at zero degrees is 73.5, and 6.4 of this is due to fine aerosol and 66.7 due to coarse aerosol. The portion of the phase function between zero and one is also shown on an expanded scale. The x-axis is the cosine of the scattering angle, so the area under any curve or portion of a curve is proportional to the contribution to the light extinction due to scattering.

where α is the diffuse reflectance (albedo) of the Earth's surface and θ is the angle between the sun's rays and the normal to the Earth's surface. It is known that the radiance reflected from the Earth's surface is not perfectly diffuse (Gordon, 1964), the skylight is also not perfectly diffuse, and that these assumptions are worst when the sun is near the horizon.

The source function can also be calculated for cases in which the sky is uniformly overcast, so the direct solar flux on the sight path, F_s, in Equations B.7-1 and B.7-3 is equal to zero. These equations can be combined to obtain

$$I_e = (\omega_o / 2\pi)(1+\alpha)F_- \tag{B.7-4}$$

where F_- is the downward flux of diffuse light from the cloud layer. Equation B.7-4 indicates that when the sky is uniformly overcast, the ratio of the source function to the downward flux of diffuse light depends on the single scattering albedo and the reflectance (albedo) of the surface of the earth.

Determine the transmittance of the sight path. The optical depth, τ, for a sight path is equal to the average value of b_{ext} multiplied by the length of the sight path x

$$\tau = \bar{b}_{ext}\, x \tag{B.7-5}$$

The transmittance T is given by

$$T = e^{-\tau}. \tag{B.7-6}$$

The transmittance of a sight path is the fraction of the light entering one end of the sight path that is transmitted to the other end. It is the transmitted radiance that conveys information to the observer about the properties of the target being viewed.

Determine the path radiance of the sight path. The path radiance of a sight path is calculated from the Equation B.7-7.

$$I_p = I_e(1 - T) \tag{B.7-7}$$

The path radiance is the light scattered into the sight path by the intervening atmosphere. This radiance tends to be relatively featureless, and contributes the appearance of haze to the sight path.

Visibility is determined by the competition between the transmitted radiance and the path radiance. When the transmitted radiance is dominant, visibility is good. When the path radiance is dominant, as in a fog, the visibility is impaired.

Determine the apparent contrast of the target against the sky. The apparent contrast of the target against the background horizon sky was calculated from Equation 7.8-1. The radiance of the background horizon sky was set equal to the source function, calculated by Equation B.7-1 for a cloud-free sky or B.7-4 for a uniformly overcast sky. The apparent radiance of the target I was calculated from

$$I = TC_o + I_p \tag{B.7-8}$$

where the initial radiance of the target C_o was calculated as described above, the transmittance of the sight path T calculated from Equation B.7-6, and the path radiance I_p from Equation B.7-7.

Determine the contrast transmittance for features on the face of the target. The contrast transmittance for features on a target is the fraction of the contrast of these features at the target transmitted through the atmosphere to the observer. It was calculated from

$$C / C_o = I_{bt} / (I_{bt} + I_p) \tag{B.7-9}$$

where C_o is the initial contrast, which is the contrast of features measured at the target, and C is the apparent contrast, which is the contrast at the location of the observer. Equation B.7-9 is completely general and contains no assumptions about the uniformity of the atmosphere or its illumination. It is included in the paper of Duntley *et al.* (1957), which contains an excellent overview of contrast reduction by the atmosphere.

Mt. Zirkel Wilderness Area
Reasonable Attribution Study of Visibility Impairment

Volume II: Results of Data Analysis and Modeling
Final Report

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APPENDIX C

SOURCE PROFILES

Table C.1

Geological Source Profiles[a] (Weight Percent by Mass) Acquired in the Mt. Zirkel Visibility Study

	MZC1PVRD	MZC2PVRD	MZC3PVRD	MZS1PVRD	MZS2PVRD	MZS3PVRD
Cl^-	0.08342 ± 0.05572	0.07317 ± 0.05413	0.07282 ± 0.06347	0.03283 ± 0.03521	0.05788 ± 0.03537	0.05505 ± 0.04797
NO_3^-	0.00000 ± 0.05149	0.00000 ± 0.05081	0.00000 ± 0.06068	0.00000 ± 0.03420	0.09453 ± 0.03406	0.00000 ± 0.04587
$SO_4^=$	0.06797 ± 0.05170	0.08232 ± 0.05111	0.08738 ± 0.06097	0.04720 ± 0.03433	0.04051 ± 0.03226	0.06055 ± 0.04605
K^+	0.07273 ± 0.00710	0.06640 ± 0.00681	0.10573 ± 0.00921	0.05575 ± 0.00493	0.05963 ± 0.00490	0.05994 ± 0.00613
NH_4^+	0.16653 ± 0.05218	0.12866 ± 0.05123	0.12816 ± 0.06104	0.13420 ± 0.03481	0.11035 ± 0.03259	0.13872 ± 0.04639
OC	8.92894 ± 0.60172	5.18293 ± 0.46777	9.08981 ± 0.66381	5.36936 ± 0.36894	11.00965 ± 0.58741	4.77064 ± 0.42085
EC	1.05046 ± 0.28907	1.06707 ± 0.29541	1.25000 ± 0.34098	0.45828 ± 0.13692	0.10932 ± 0.06432	0.74312 ± 0.21139
Na	0.53931 ± 0.10566	0.33331 ± 0.09059	0.41399 ± 0.11463	0.45559 ± 0.07934	0.40221 ± 0.07593	0.30725 ± 0.09173
Mg	0.71834 ± 0.06427	0.59283 ± 0.05752	0.48646 ± 0.06920	0.57855 ± 0.04751	0.63398 ± 0.04555	0.41284 ± 0.05365
Al	5.23221 ± 0.11621	4.31723 ± 0.09722	5.23335 ± 0.13456	4.11858 ± 0.06746	4.14014 ± 0.06433	4.12031 ± 0.08605
Si	23.67044 ± 0.46025	19.44060 ± 0.37399	23.17896 ± 0.53029	17.79423 ± 0.23241	17.51429 ± 0.21548	19.19913 ± 0.33400
P	0.05661 ± 0.01253	0.06688 ± 0.01071	0.08601 ± 0.01278	0.09165 ± 0.00952	0.11353 ± 0.00951	0.05517 ± 0.01051
S	0.22960 ± 0.00844	0.20694 ± 0.00781	0.23226 ± 0.00933	0.18112 ± 0.00571	0.25633 ± 0.00626	0.15255 ± 0.00649
Cl	0.02025 ± 0.04098	0.02295 ± 0.03720	0.00090 ± 0.04284	0.00000 ± 0.03337	0.00000 ± 0.03381	0.00000 ± 0.04078
K	2.84679 ± 0.05914	2.23846 ± 0.04689	2.71189 ± 0.06584	2.17776 ± 0.03260	2.25047 ± 0.03186	2.45141 ± 0.04706
Ca	3.27015 ± 0.06697	2.76460 ± 0.05625	3.04208 ± 0.07287	3.26506 ± 0.04558	3.34802 ± 0.04417	4.26636 ± 0.07667
Ti	0.56968 ± 0.02223	0.48192 ± 0.02113	0.51705 ± 0.02699	0.58782 ± 0.01604	0.57394 ± 0.01534	0.69305 ± 0.02201
V	0.01912 ± 0.03070	0.00732 ± 0.02853	0.00000 ± 0.04623	0.02700 ± 0.00882	0.02609 ± 0.00860	0.03030 ± 0.03257
Cr	0.01395 ± 0.00346	0.01106 ± 0.00309	0.00177 ± 0.01590	0.02142 ± 0.00312	0.01378 ± 0.00307	0.01457 ± 0.00354
Mn	0.10157 ± 0.00438	0.08899 ± 0.00387	0.09481 ± 0.00471	0.10021 ± 0.00373	0.11562 ± 0.00381	0.09248 ± 0.00419
Fe	6.26446 ± 0.12139	5.22944 ± 0.10017	5.96251 ± 0.13604	6.04766 ± 0.07818	6.16825 ± 0.07502	6.50490 ± 0.11237
Co	0.00352 ± 0.09519	0.00000 ± 0.07953	0.00000 ± 0.09072	0.00000 ± 0.09174	0.00000 ± 0.09354	0.00246 ± 0.09877
Ni	0.00043 ± 0.00320	0.00082 ± 0.00303	0.00000 ± 0.00351	0.00759 ± 0.00097	0.00712 ± 0.00094	0.00670 ± 0.00114
Cu	0.00525 ± 0.00083	0.00438 ± 0.00084	0.00495 ± 0.00100	0.00583 ± 0.00064	0.00729 ± 0.00062	0.00615 ± 0.00083
Zn	0.05567 ± 0.00168	0.05679 ± 0.00170	0.05544 ± 0.00195	0.03879 ± 0.00104	0.04403 ± 0.00106	0.04649 ± 0.00143
Ga	0.00315 ± 0.00444	0.00000 ± 0.00432	0.00136 ± 0.00518	0.00026 ± 0.00311	0.00136 ± 0.00297	0.00000 ± 0.00410
As	0.00021 ± 0.00644	0.00169 ± 0.00709	0.00000 ± 0.00801	0.00000 ± 0.00415	0.00057 ± 0.00390	0.00094 ± 0.00504
Se	0.00074 ± 0.00260	0.00000 ± 0.00256	0.00000 ± 0.00302	0.00047 ± 0.00192	0.00000 ± 0.00178	0.00026 ± 0.00248
Br	0.00324 ± 0.00084	0.00240 ± 0.00247	0.00170 ± 0.00284	0.00107 ± 0.00174	0.00156 ± 0.00165	0.00057 ± 0.00227
Rb	0.01739 ± 0.00100	0.01289 ± 0.00093	0.01602 ± 0.00117	0.01285 ± 0.00072	0.01206 ± 0.00068	0.01305 ± 0.00088
Sr	0.04769 ± 0.00155	0.03821 ± 0.00138	0.04084 ± 0.00163	0.06384 ± 0.00134	0.06657 ± 0.00131	0.05546 ± 0.00156
Yt	0.00305 ± 0.00329	0.00353 ± 0.00110	0.00393 ± 0.00129	0.00334 ± 0.00080	0.00448 ± 0.00076	0.00266 ± 0.00310
Zr	0.02240 ± 0.00153	0.01893 ± 0.00146	0.01949 ± 0.00169	0.02169 ± 0.00132	0.02082 ± 0.00130	0.01894 ± 0.00149
Mo	0.00305 ± 0.00639	0.00000 ± 0.00643	0.00159 ± 0.00756	0.00411 ± 0.00467	0.00087 ± 0.00435	0.00450 ± 0.00620
Pd	0.00000 ± 0.02135	0.00000 ± 0.02174	0.00000 ± 0.02542	0.00000 ± 0.01558	0.00027 ± 0.01487	0.00459 ± 0.02019
Ag	0.00464 ± 0.02395	0.00000 ± 0.02413	0.00000 ± 0.02875	0.00000 ± 0.01784	0.00152 ± 0.01684	0.00000 ± 0.02284
Cd	0.00651 ± 0.02400	0.00000 ± 0.02422	0.01641 ± 0.02906	0.00268 ± 0.01803	0.00295 ± 0.01652	0.00000 ± 0.02324
In	0.00365 ± 0.02925	0.00000 ± 0.02897	0.00000 ± 0.03400	0.00000 ± 0.02069	0.00592 ± 0.01964	0.00000 ± 0.02739
Sn	0.00706 ± 0.03611	0.00000 ± 0.03561	0.00956 ± 0.04364	0.02677 ± 0.00871	0.00212 ± 0.02432	0.00000 ± 0.03405
Sb	0.00699 ± 0.04096	0.02789 ± 0.04067	0.00000 ± 0.04847	0.00000 ± 0.02961	0.01656 ± 0.02770	0.00182 ± 0.03879
Ba	0.18765 ± 0.04939	0.18089 ± 0.04941	0.18030 ± 0.05993	0.11984 ± 0.03578	0.14962 ± 0.03332	0.16009 ± 0.04723
La	0.00000 ± 0.18556	0.02989 ± 0.18816	0.13305 ± 0.22565	0.00000 ± 0.13504	0.00000 ± 0.12615	0.00000 ± 0.17893
Au	0.00036 ± 0.00723	0.00000 ± 0.00718	0.00184 ± 0.00852	0.00225 ± 0.00523	0.00186 ± 0.00503	0.00000 ± 0.00665
Hg	0.00000 ± 0.00570	0.00000 ± 0.00578	0.00000 ± 0.00681	0.00000 ± 0.00425	0.00000 ± 0.00398	0.00021 ± 0.00567
Tl	0.00351 ± 0.00590	0.00000 ± 0.00568	0.00000 ± 0.00663	0.00153 ± 0.00416	0.00000 ± 0.00383	0.00000 ± 0.00531
Pb	0.02191 ± 0.00272	0.02774 ± 0.00282	0.03019 ± 0.00330	0.01081 ± 0.00187	0.01024 ± 0.00176	0.00828 ± 0.00243
U	0.00000 ± 0.00606	0.00184 ± 0.00601	0.00403 ± 0.00716	0.00190 ± 0.00452	0.00256 ± 0.00428	0.00116 ± 0.00573
SO_2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
NH_3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

[a] Source profile descriptions are identified in Table 6.3.1.

continued . . .

Table C.1 (cont.)

Geological Source Profiles[a] (Weight Percent by Mass) Acquired in the Mt. Zirkel Visibility Study

	MZBPUPRD	MZHVUPRD	MZBPSOIL	MZJUSOIL	MZBBSOIL	MZHSSOIL
Cl^-	0.06151 ± 0.04916	0.08223 ± 0.05493	0.04453 ± 0.04068	0.04054 ± 0.03703	0.06923 ± 0.06649	0.08146 ± 0.05121
NO_3^-	0.12302 ± 0.04887	0.00000 ± 0.05076	0.09609 ± 0.04071	0.00000 ± 0.03556	0.00000 ± 0.06410	0.07303 ± 0.04763
$SO_4^=$	0.10624 ± 0.04713	0.08528 ± 0.05108	0.06094 ± 0.03927	0.05974 ± 0.03578	0.10000 ± 0.06447	0.30056 ± 0.05086
K^+	0.05567 ± 0.00606	0.15478 ± 0.01067	0.07657 ± 0.00615	0.10844 ± 0.00733	0.12565 ± 0.01037	0.12236 ± 0.00879
NH_4^+	0.09702 ± 0.04685	0.19797 ± 0.05173	0.12867 ± 0.03957	0.08876 ± 0.03582	0.14346 ± 0.06454	0.13904 ± 0.04733
OC	6.16030 ± 0.46907	3.09645 ± 0.41031	7.42188 ± 0.47347	9.00427 ± 0.51893	4.14103 ± 0.53490	3.66105 ± 0.39843
EC	0.48462 ± 0.14935	0.38579 ± 0.13218	0.19531 ± 0.08598	3.14367 ± 0.82609	0.43590 ± 0.15420	0.00000 ± 0.08427
Na	0.07707 ± 0.22667	0.00000 ± 0.26948	0.62107 ± 0.08338	0.02070 ± 0.20831	0.23878 ± 0.29098	0.30994 ± 0.08975
Mg	0.38755 ± 0.04962	0.72126 ± 0.06056	0.83725 ± 0.05195	0.83829 ± 0.04769	0.50214 ± 0.06405	0.74349 ± 0.05861
Al	4.06925 ± 0.08495	4.82429 ± 0.10610	5.50265 ± 0.09379	3.13184 ± 0.05666	4.21467 ± 0.11699	4.67184 ± 0.09635
Si	12.58568 ± 0.22420	16.16305 ± 0.31151	15.48530 ± 0.23100	13.19169 ± 0.18037	20.91259 ± 0.50562	18.22637 ± 0.32376
P	0.08561 ± 0.00805	0.06226 ± 0.00903	0.08958 ± 0.00855	0.07833 ± 0.00769	0.06060 ± 0.01120	0.07437 ± 0.00997
S	0.10679 ± 0.00532	0.08609 ± 0.00546	0.05220 ± 0.00420	0.09236 ± 0.00443	0.09681 ± 0.00630	0.13630 ± 0.00608
Cl	0.00000 ± 0.02556	0.00000 ± 0.03446	0.00000 ± 0.02517	0.00000 ± 0.03744	0.00133 ± 0.03346	0.00000 ± 0.03796
K	1.50572 ± 0.03029	1.71697 ± 0.03736	1.60693 ± 0.02749	1.89283 ± 0.03160	1.86569 ± 0.04898	2.04094 ± 0.04087
Ca	1.55626 ± 0.03073	3.14535 ± 0.06292	1.51670 ± 0.02603	5.12625 ± 0.07128	2.50995 ± 0.06350	4.16766 ± 0.07617
Ti	0.32992 ± 0.01856	0.36108 ± 0.01947	0.66495 ± 0.01770	0.36201 ± 0.01312	0.43790 ± 0.02228	0.39522 ± 0.01896
V	0.00000 ± 0.03371	0.01641 ± 0.02574	0.02953 ± 0.00974	0.01760 ± 0.01928	0.02683 ± 0.02829	0.00634 ± 0.02564
Cr	0.01067 ± 0.01201	0.00249 ± 0.00831	0.00820 ± 0.01127	0.00954 ± 0.00205	0.01305 ± 0.00286	0.01898 ± 0.00295
Mn	0.07754 ± 0.00344	0.08575 ± 0.00361	0.17950 ± 0.00529	0.16935 ± 0.00370	0.07462 ± 0.00358	0.08120 ± 0.00355
Fe	4.31193 ± 0.07598	4.44457 ± 0.08520	7.94259 ± 0.11680	3.30637 ± 0.04488	3.63269 ± 0.08791	4.90110 ± 0.08663
Co	0.00000 ± 0.06563	0.00000 ± 0.06769	0.00000 ± 0.12042	0.00058 ± 0.05032	0.00000 ± 0.05554	0.00000 ± 0.07453
Ni	0.00234 ± 0.00272	0.00000 ± 0.00292	0.00000 ± 0.00320	0.00092 ± 0.00198	0.00413 ± 0.00104	0.00457 ± 0.00099
Cu	0.00486 ± 0.00077	0.00292 ± 0.00085	0.00753 ± 0.00072	0.00275 ± 0.00054	0.00485 ± 0.00093	0.00516 ± 0.00078
Zn	0.01812 ± 0.00098	0.01508 ± 0.00106	0.01880 ± 0.00088	0.01681 ± 0.00075	0.01454 ± 0.00114	0.01841 ± 0.00100
Ga	0.00000 ± 0.00395	0.00000 ± 0.00455	0.00186 ± 0.00347	0.00211 ± 0.00294	0.00128 ± 0.00473	0.00000 ± 0.00403
As	0.00000 ± 0.00477	0.00268 ± 0.00521	0.00084 ± 0.00416	0.00277 ± 0.00351	0.00158 ± 0.00558	0.00214 ± 0.00475
Se	0.00000 ± 0.00236	0.00000 ± 0.00270	0.00038 ± 0.00205	0.00000 ± 0.00171	0.00000 ± 0.00274	0.00000 ± 0.00244
Br	0.00271 ± 0.00077	0.00031 ± 0.00252	0.00148 ± 0.00191	0.00258 ± 0.00056	0.00194 ± 0.00264	0.00243 ± 0.00078
Rb	0.01116 ± 0.00087	0.01117 ± 0.00094	0.01203 ± 0.00077	0.01177 ± 0.00065	0.01137 ± 0.00100	0.01084 ± 0.00085
Sr	0.02209 ± 0.00104	0.02470 ± 0.00120	0.02324 ± 0.00093	0.02219 ± 0.00082	0.02168 ± 0.00125	0.02886 ± 0.00116
Yt	0.00198 ± 0.00295	0.00314 ± 0.00341	0.00166 ± 0.00255	0.00365 ± 0.00074	0.00235 ± 0.00347	0.00465 ± 0.00103
Zr	0.00967 ± 0.00120	0.01099 ± 0.00140	0.01388 ± 0.00109	0.01182 ± 0.00093	0.01829 ± 0.00151	0.01373 ± 0.00131
Mo	0.00000 ± 0.00586	0.00000 ± 0.00679	0.00381 ± 0.00510	0.00248 ± 0.00425	0.00147 ± 0.00697	0.00000 ± 0.00608
Pd	0.00660 ± 0.01848	0.00000 ± 0.02184	0.00000 ± 0.01734	0.00000 ± 0.01465	0.00641 ± 0.02373	0.00000 ± 0.01992
Ag	0.00060 ± 0.02168	0.00000 ± 0.02507	0.00000 ± 0.01981	0.00000 ± 0.01651	0.00468 ± 0.02706	0.00946 ± 0.02243
Cd	0.00000 ± 0.02180	0.00000 ± 0.02512	0.00273 ± 0.01984	0.00000 ± 0.01614	0.00168 ± 0.02746	0.00286 ± 0.02277
In	0.00000 ± 0.02588	0.00000 ± 0.03039	0.00608 ± 0.02350	0.00772 ± 0.02013	0.00000 ± 0.03251	0.00000 ± 0.02689
Sn	0.00000 ± 0.03250	0.00000 ± 0.03731	0.00000 ± 0.02848	0.00000 ± 0.02383	0.00000 ± 0.03997	0.00000 ± 0.03288
Sb	0.00317 ± 0.03727	0.00000 ± 0.04234	0.00663 ± 0.03248	0.02073 ± 0.02778	0.03301 ± 0.04678	0.00927 ± 0.03785
Ba	0.09144 ± 0.13267	0.05549 ± 0.15228	0.02902 ± 0.11583	0.00797 ± 0.09988	0.00719 ± 0.16310	0.17585 ± 0.04586
La	0.07891 ± 0.17224	0.05339 ± 0.19623	0.00488 ± 0.14720	0.00000 ± 0.12821	0.05028 ± 0.21154	0.03005 ± 0.17547
Au	0.00000 ± 0.00624	0.00000 ± 0.00707	0.00080 ± 0.00544	0.00159 ± 0.00462	0.00000 ± 0.00736	0.00000 ± 0.00640
Hg	0.00000 ± 0.00542	0.00000 ± 0.00621	0.00000 ± 0.00453	0.00000 ± 0.00390	0.00164 ± 0.00647	0.00000 ± 0.00552
Tl	0.00336 ± 0.00527	0.00108 ± 0.00597	0.00026 ± 0.00449	0.00000 ± 0.00373	0.00004 ± 0.00613	0.00076 ± 0.00533
Pb	0.00747 ± 0.00232	0.00118 ± 0.00780	0.00716 ± 0.00200	0.00528 ± 0.00167	0.00656 ± 0.00817	0.00321 ± 0.00704
U	0.00266 ± 0.00549	0.00092 ± 0.00620	0.00166 ± 0.00480	0.00023 ± 0.00410	0.00000 ± 0.00629	0.00000 ± 0.00554
SO_2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
NH_3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

[a] Source profile descriptions are identified in Table 6.3.1.

continued . . .

Table C-1 (cont.)

Composite Geological Source Profiles[a] (Weight Percent by Mass) Acquired in the Mt. Zirkel Visibility Study

	MZCPVRDC	MZSPVRDC	MZPVRDC	MZUPRDC	MZSOILC	MZGEOLC
Cl^-	0.07647 ± 0.05792	0.04859 ± 0.03997	0.06253 ± 0.04976	0.07187 ± 0.05212	0.05894 ± 0.05017	0.06289 ± 0.05030
NO_3^-	0.00000 ± 0.05451	0.03151 ± 0.05458	0.01576 ± 0.04717	0.06151 ± 0.08699	0.04228 ± 0.04972	0.03222 ± 0.04878
$SO_4^=$	0.07922 ± 0.05478	0.04942 ± 0.03804	0.06432 ± 0.04716	0.09576 ± 0.04914	0.13031 ± 0.11503	0.09156 ± 0.06886
K^+	0.08162 ± 0.02112	0.05844 ± 0.00535	0.07003 ± 0.01848	0.10522 ± 0.07009	0.10825 ± 0.02240	0.08864 ± 0.03343
NH_4^+	0.14111 ± 0.05499	0.12776 ± 0.03841	0.13444 ± 0.04743	0.14749 ± 0.07138	0.12499 ± 0.04810	0.13346 ± 0.04798
OC	7.73389 ± 2.21066	7.04988 ± 3.44230	7.39189 ± 2.61437	4.62837 ± 2.16647	6.05705 ± 2.57946	6.48636 ± 2.54756
EC	1.12251 ± 0.30935	0.43691 ± 0.31744	0.77971 ± 0.43154	0.43520 ± 0.14103	0.94372 ± 1.47743	0.77696 ± 0.84365
Na	0.42887 ± 0.10410	0.38835 ± 0.08261	0.40861 ± 0.09397	0.03854 ± 0.24900	0.29763 ± 0.24827	0.30994 ± 0.19761
Mg	0.59921 ± 0.11607	0.54179 ± 0.11506	0.57050 ± 0.10805	0.55440 ± 0.23597	0.73029 ± 0.15846	0.62108 ± 0.15413
Al	4.92760 ± 0.52860	4.12634 ± 0.07324	4.52697 ± 0.55175	4.44677 ± 0.53389	4.38025 ± 0.98839	4.46470 ± 0.65991
Si	22.09667 ± 2.31331	18.16922 ± 0.90285	20.13294 ± 2.66347	14.37436 ± 2.52958	16.95399 ± 3.34671	18.11353 ± 3.48085
P	0.06983 ± 0.01492	0.08678 ± 0.02949	0.07831 ± 0.02287	0.07394 ± 0.01651	0.07572 ± 0.01196	0.07672 ± 0.01745
S	0.22293 ± 0.01391	0.19667 ± 0.05361	0.20980 ± 0.03787	0.09644 ± 0.01464	0.09442 ± 0.03438	0.15245 ± 0.06769
Cl	0.01470 ± 0.04041	0.00000 ± 0.03614	0.00735 ± 0.03834	0.00000 ± 0.03034	0.00033 ± 0.03390	0.00379 ± 0.03565
K	2.59905 ± 0.31948	2.29322 ± 0.14174	2.44613 ± 0.27735	1.61135 ± 0.14938	1.85160 ± 0.18038	2.10882 ± 0.42069
Ca	3.02561 ± 0.25318	3.62648 ± 0.55570	3.32605 ± 0.50742	2.35081 ± 1.12365	3.33014 ± 1.62160	3.16487 ± 1.04574
Ti	0.52288 ± 0.04417	0.61827 ± 0.06513	0.57058 ± 0.07216	0.34550 ± 0.02203	0.46502 ± 0.13686	0.49788 ± 0.12254
V	0.00881 ± 0.03602	0.02780 ± 0.02011	0.01831 ± 0.02917	0.00820 ± 0.02999	0.02008 ± 0.02193	0.01721 ± 0.02712
Cr	0.00893 ± 0.00956	0.01659 ± 0.00420	0.01276 ± 0.00714	0.00658 ± 0.01033	0.01244 ± 0.00609	0.01162 ± 0.00746
Mn	0.09512 ± 0.00629	0.10277 ± 0.01178	0.09895 ± 0.00943	0.08164 ± 0.00580	0.12617 ± 0.05594	0.10514 ± 0.03434
Fe	5.81880 ± 0.53226	6.24027 ± 0.23697	6.02954 ± 0.43483	4.37825 ± 0.09379	4.94569 ± 2.11303	5.39304 ± 1.33620
Co	0.00117 ± 0.08872	0.00082 ± 0.09473	0.00100 ± 0.09178	0.00000 ± 0.06667	0.00014 ± 0.08011	0.00055 ± 0.08421
Ni	0.00042 ± 0.00325	0.00713 ± 0.00102	0.00378 ± 0.00370	0.00117 ± 0.00282	0.00241 ± 0.00228	0.00288 ± 0.00299
Cu	0.00486 ± 0.00089	0.00642 ± 0.00076	0.00564 ± 0.00102	0.00389 ± 0.00137	0.00507 ± 0.00196	0.00516 ± 0.00145
Zn	0.05597 ± 0.00178	0.04310 ± 0.00393	0.04953 ± 0.00749	0.01660 ± 0.00215	0.01714 ± 0.00194	0.03325 ± 0.01779
Ga	0.00150 ± 0.00466	0.00054 ± 0.00343	0.00102 ± 0.00409	0.00000 ± 0.00426	0.00131 ± 0.00385	0.00095 ± 0.00404
As	0.00063 ± 0.00721	0.00051 ± 0.00439	0.00057 ± 0.00597	0.00134 ± 0.00499	0.00183 ± 0.00456	0.00112 ± 0.00538
Se	0.00025 ± 0.00273	0.00024 ± 0.00208	0.00025 ± 0.00243	0.00000 ± 0.00253	0.00009 ± 0.00227	0.00015 ± 0.00240
Br	0.00245 ± 0.00223	0.00107 ± 0.00191	0.00176 ± 0.00207	0.00151 ± 0.00186	0.00211 ± 0.00170	0.00183 ± 0.00192
Rb	0.01543 ± 0.00231	0.01265 ± 0.00077	0.01404 ± 0.00214	0.01116 ± 0.00090	0.01150 ± 0.00083	0.01272 ± 0.00202
Sr	0.04225 ± 0.00490	0.06196 ± 0.00579	0.05210 ± 0.01181	0.02339 ± 0.00185	0.02399 ± 0.00331	0.03795 ± 0.01689
Yt	0.00350 ± 0.00213	0.00349 ± 0.00190	0.00350 ± 0.00202	0.00256 ± 0.00319	0.00308 ± 0.00225	0.00320 ± 0.00233
Zr	0.02027 ± 0.00186	0.02049 ± 0.00140	0.02038 ± 0.00148	0.01033 ± 0.00130	0.01443 ± 0.00274	0.01672 ± 0.00444
Mo	0.00155 ± 0.00681	0.00316 ± 0.00514	0.00235 ± 0.00603	0.00000 ± 0.00634	0.00194 ± 0.00569	0.00182 ± 0.00598
Pd	0.00000 ± 0.02291	0.00162 ± 0.01705	0.00081 ± 0.02019	0.00330 ± 0.02023	0.00160 ± 0.01920	0.00149 ± 0.01988
Ag	0.00155 ± 0.02571	0.00051 ± 0.01935	0.00103 ± 0.02275	0.00030 ± 0.02343	0.00353 ± 0.02180	0.00174 ± 0.02255
Cd	0.00764 ± 0.02586	0.00188 ± 0.01948	0.00476 ± 0.02289	0.00000 ± 0.02352	0.00182 ± 0.02195	0.00298 ± 0.02269
In	0.00122 ± 0.03083	0.00197 ± 0.02283	0.00159 ± 0.02713	0.00000 ± 0.02822	0.00345 ± 0.02616	0.00195 ± 0.02700
Sn	0.00554 ± 0.03863	0.00963 ± 0.02468	0.00759 ± 0.03241	0.00000 ± 0.03499	0.00000 ± 0.03185	0.00379 ± 0.03267
Sb	0.01163 ± 0.04352	0.00613 ± 0.03240	0.00888 ± 0.03836	0.00158 ± 0.03988	0.01741 ± 0.03690	0.01051 ± 0.03814
Ba	0.18295 ± 0.05314	0.14318 ± 0.03924	0.16307 ± 0.04671	0.07346 ± 0.14281	0.05501 ± 0.11412	0.11211 ± 0.09398
La	0.05431 ± 0.20063	0.00000 ± 0.14851	0.02716 ± 0.17650	0.06615 ± 0.18462	0.02130 ± 0.16855	0.03170 ± 0.17529
Au	0.00074 ± 0.00767	0.00137 ± 0.00568	0.00105 ± 0.00675	0.00000 ± 0.00667	0.00060 ± 0.00604	0.00073 ± 0.00651
Hg	0.00000 ± 0.00612	0.00007 ± 0.00469	0.00004 ± 0.00545	0.00000 ± 0.00583	0.00041 ± 0.00520	0.00015 ± 0.00544
Tl	0.00117 ± 0.00608	0.00051 ± 0.00448	0.00084 ± 0.00534	0.00222 ± 0.00563	0.00026 ± 0.00500	0.00088 ± 0.00528
Pb	0.02661 ± 0.00426	0.00978 ± 0.00204	0.01820 ± 0.00964	0.00432 ± 0.00575	0.00556 ± 0.00555	0.01167 ± 0.00957
U	0.00196 ± 0.00643	0.00187 ± 0.00489	0.00191 ± 0.00571	0.00179 ± 0.00586	0.00047 ± 0.00525	0.00141 ± 0.00559
SO_2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
NH_3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

[a] Source profile descriptions are identified in Table 6.3.1.

Table C.2

Motor Vehicle Source Profiles[a] (Weight Percent by Sum of Species) Acquired in the Mt. Zirkel Visibility Study

	MZMVCGA	MZMVCGB	MZMVCGC	MZMVCGD	MZMVCGE	MZMVCGF	MZMVCGG	MZMVCGH	MZMVCGI
Cl⁻	2.60010 ± 1.21980	1.07050 ± 1.23000	3.70930 ± 6.63380	1.54680 ± 1.35930	5.44630 ± 6.28290	2.95390 ± 3.06400	1.52960 ± 1.98100	1.56380 ± 1.92570	2.05960 ± 2.75170
NO_3^-	0.00000 ± 1.10990	0.00000 ± 1.21010	0.00000 ± 5.48130	0.00000 ± 1.31570	0.00000 ± 4.47350	0.00000 ± 2.70580	0.00000 ± 1.91810	0.00000 ± 1.86490	0.00000 ± 2.57130
$SO_4^=$	0.00000 ± 1.20370	0.00000 ± 1.31510	0.00000 ± 5.95610	0.00000 ± 1.78480	0.00000 ± 5.87270	5.30440 ± 3.94610	0.15590 ± 2.26720	0.00000 ± 2.26300	0.00000 ± 2.83660
K^+	0.00000 ± 0.72090	0.00000 ± 0.79240	0.00000 ± 3.60690	0.00000 ± 0.85960	0.00000 ± 2.91850	0.00000 ± 1.76870	0.00000 ± 1.25460	0.00000 ± 1.21770	0.00000 ± 1.69290
NH_4^+	0.00000 ± 1.11900	0.00000 ± 1.22650	0.00000 ± 5.56840	0.00000 ± 1.40500	0.00000 ± 4.73140	0.00000 ± 2.73770	0.00000 ± 1.97820	0.00000 ± 1.93330	0.00000 ± 2.62130
OC	73.58640 ± 25.14120	48.62170 ± 24.63930	54.63960 ± 113.77570	66.75900 ± 28.79200	53.29890 ± 91.60400	52.70000 ± 55.42150	62.12390 ± 40.99940	89.10470 ± 45.30030	57.17810 ± 54.06710
EC	25.37370 ± 6.41880	50.04430 ± 13.77270	41.71960 ± 42.60480	32.07940 ± 9.09880	41.88030 ± 34.79400	40.52210 ± 21.04840	35.76880 ± 13.63960	9.60410 ± 4.03350	40.56890 ± 20.16560
Na	0.00000 ± 0.65430	0.00000 ± 0.71060	0.00000 ± 3.13040	0.41190 ± 0.74440	1.68270 ± 3.06540	0.00000 ± 1.75360	0.99080 ± 0.86550	0.66860 ± 1.15070	0.00000 ± 1.68820
Mg	0.00000 ± 0.30140	0.00000 ± 0.32590	0.12660 ± 1.42620	0.00000 ± 0.32570	0.00000 ± 1.24090	0.00000 ± 0.77960	0.32400 ± 0.37310	0.00000 ± 0.50320	0.18260 ± 0.76330
Al	0.02980 ± 0.11770	0.11140 ± 0.12950	0.03630 ± 0.56230	0.00990 ± 0.13350	0.00000 ± 0.47490	0.00000 ± 0.32520	0.00000 ± 0.19480	0.03060 ± 0.20240	0.29330 ± 0.35180
Si	0.00000 ± 0.19070	0.00000 ± 0.16150	0.00320 ± 0.72320	0.00000 ± 0.26390	0.15320 ± 0.76110	0.17100 ± 0.72250	0.08790 ± 0.38640	0.00100 ± 0.37970	0.00000 ± 0.76610
P	0.00000 ± 0.06880	0.01390 ± 0.07530	0.00000 ± 0.32490	0.04040 ± 0.08370	0.14810 ± 0.32470	0.00000 ± 0.20290	0.05680 ± 0.12300	0.05610 ± 0.12500	0.02500 ± 0.19070
S	0.00000 ± 0.17010	0.00000 ± 0.18080	0.00000 ± 0.79730	0.00000 ± 0.40880	0.00000 ± 1.29710	5.55750 ± 2.79430	0.00000 ± 0.41520	0.00000 ± 0.43990	2.56670 ± 1.29080
Cl	0.03400 ± 0.10240	0.00000 ± 0.11480	0.08380 ± 0.50450	0.00000 ± 0.13120	0.00000 ± 0.47750	0.09220 ± 0.32350	0.04560 ± 0.18550	0.00000 ± 0.18680	0.13730 ± 0.29900
K	0.00880 ± 0.06270	0.00780 ± 0.06710	0.19030 ± 0.35390	0.08390 ± 0.07460	0.00000 ± 0.41880	0.14750 ± 0.19070	0.05450 ± 0.10640	0.09190 ± 0.11260	0.00000 ± 0.17630
Ca	0.14360 ± 0.09290	0.20050 ± 0.10000	0.00000 ± 0.39180	0.05260 ± 0.10830	0.08680 ± 0.35940	0.01840 ± 0.27680	0.00000 ± 0.15810	0.00000 ± 0.15920	0.00000 ± 0.28550
Ti	0.00000 ± 0.34850	0.00000 ± 0.40550	0.00000 ± 1.66320	0.00000 ± 0.39740	0.00000 ± 1.42730	0.00000 ± 0.89190	0.00000 ± 0.56220	0.00000 ± 0.58080	0.00000 ± 0.87840
V	0.00000 ± 0.14380	0.00000 ± 0.21720	0.00000 ± 0.68610	0.00000 ± 0.21200	0.00000 ± 0.58730	0.00000 ± 0.36710	0.00000 ± 0.23160	0.00000 ± 0.23990	0.00000 ± 0.36200
Cr	0.00000 ± 0.03420	0.00000 ± 0.06620	0.03790 ± 0.16730	0.00000 ± 0.06410	0.00000 ± 0.14040	0.02850 ± 0.08830	0.00000 ± 0.05570	0.01630 ± 0.05740	0.00940 ± 0.08590
Mn	0.00130 ± 0.02450	0.00000 ± 0.03210	0.00640 ± 0.11630	0.00230 ± 0.03130	0.04340 ± 0.10570	0.00000 ± 0.06370	0.02670 ± 0.03150	0.02350 ± 0.03160	0.00000 ± 0.06090
Fe	0.00170 ± 0.06960	0.04830 ± 0.05800	0.00000 ± 0.25480	0.00000 ± 0.09760	0.00000 ± 0.27320	0.00000 ± 0.26820	0.00000 ± 0.14250	0.00000 ± 0.13980	0.00000 ± 0.28710
Co	0.00000 ± 0.01580	0.00400 ± 0.01750	0.00000 ± 0.07420	0.00000 ± 0.01750	0.00000 ± 0.06380	0.00000 ± 0.04190	0.00000 ± 0.02560	0.00000 ± 0.02650	0.00950 ± 0.05230
Ni	0.00000 ± 0.01590	0.00730 ± 0.01790	0.04760 ± 0.08970	0.00990 ± 0.01770	0.00000 ± 0.06380	0.01010 ± 0.04220	0.00000 ± 0.02560	0.00000 ± 0.02650	0.00160 ± 0.03900
Cu	0.00270 ± 0.01530	0.01480 ± 0.01300	0.07980 ± 0.09780	0.00150 ± 0.01680	0.02040 ± 0.06350	0.01840 ± 0.03960	0.01670 ± 0.02520	0.00000 ± 0.02550	0.00000 ± 0.03740
Zn	0.01030 ± 0.01720	0.00000 ± 0.01910	0.06610 ± 0.09160	0.12590 ± 0.03400	0.02040 ± 0.07340	0.06540 ± 0.04670	0.02120 ± 0.02240	0.02450 ± 0.02300	0.08430 ± 0.05180
Ga	0.00000 ± 0.01440	0.00930 ± 0.01640	0.00000 ± 0.06930	0.00000 ± 0.01600	0.02300 ± 0.06170	0.00000 ± 0.03690	0.00330 ± 0.02340	0.00000 ± 0.02450	0.00000 ± 0.03590
As	0.00280 ± 0.01660	0.00200 ± 0.01860	0.00000 ± 0.08220	0.00310 ± 0.01830	0.00000 ± 0.06890	0.00000 ± 0.04360	0.00890 ± 0.02800	0.00200 ± 0.02760	0.02500 ± 0.04380
Se	0.00600 ± 0.00890	0.00380 ± 0.01010	0.01290 ± 0.04470	0.00920 ± 0.00790	0.00000 ± 0.03830	0.03020 ± 0.02380	0.00330 ± 0.01450	0.00000 ± 0.01530	0.00310 ± 0.02350
Br	0.00330 ± 0.00860	0.00490 ± 0.00970	0.01450 ± 0.04820	0.02360 ± 0.00960	0.07150 ± 0.06480	0.06540 ± 0.03740	0.02780 ± 0.01490	0.02860 ± 0.01490	0.04060 ± 0.02580
Rb	0.00000 ± 0.00780	0.00000 ± 0.00870	0.00320 ± 0.03720	0.00230 ± 0.00840	0.01020 ± 0.03420	0.00340 ± 0.02020	0.00000 ± 0.01220	0.00100 ± 0.01330	0.00000 ± 0.02030
Sr	0.00480 ± 0.00650	0.00870 ± 0.00760	0.01850 ± 0.04520	0.00380 ± 0.00690	0.01020 ± 0.03670	0.00000 ± 0.01680	0.00000 ± 0.01450	0.00000 ± 0.01430	0.00000 ± 0.02180
Yt	0.00000 ± 0.01040	0.00150 ± 0.01170	0.00730 ± 0.04970	0.00000 ± 0.01140	0.00000 ± 0.04340	0.00000 ± 0.02680	0.00560 ± 0.01680	0.00000 ± 0.01740	0.00000 ± 0.02650
Zr	0.00000 ± 0.01210	0.00200 ± 0.01370	0.00480 ± 0.05830	0.00000 ± 0.01300	0.00000 ± 0.05110	0.00340 ± 0.03190	0.00220 ± 0.02010	0.00000 ± 0.02040	0.00000 ± 0.02960
Mo	0.00000 ± 0.02190	0.00910 ± 0.02470	0.02100 ± 0.10610	0.00000 ± 0.02360	0.00000 ± 0.09190	0.00000 ± 0.05530	0.00220 ± 0.03560	0.00000 ± 0.03670	0.00160 ± 0.05620
Pd	0.00480 ± 0.13630	0.03540 ± 0.15170	0.00000 ± 0.65380	0.00000 ± 0.14950	0.19920 ± 0.58240	0.00000 ± 0.35210	0.10800 ± 0.22370	0.00000 ± 0.22970	0.00000 ± 0.34480
Ag	0.02920 ± 0.15880	0.00000 ± 0.17660	0.00000 ± 0.76190	0.00000 ± 0.17390	0.21960 ± 0.67780	0.00000 ± 0.41070	0.00000 ± 0.25830	0.00000 ± 0.26740	0.07650 ± 0.40260
Cd	0.00000 ± 0.16120	0.00000 ± 0.17840	0.03470 ± 0.77390	0.00000 ± 0.17620	0.30390 ± 0.70400	0.00000 ± 0.41740	0.00000 ± 0.26050	0.00000 ± 0.27050	0.21380 ± 0.41820
In	0.00630 ± 0.19400	0.03350 ± 0.21480	0.00000 ± 0.92870	0.00000 ± 0.21130	0.41110 ± 0.86460	0.00000 ± 0.49960	0.00000 ± 0.31280	0.01530 ± 0.32460	0.06550 ± 0.48780
Sn	0.00000 ± 0.23880	0.02500 ± 0.26600	0.00000 ± 1.15290	0.00000 ± 0.26160	0.00000 ± 0.98820	0.02180 ± 0.61870	0.00000 ± 0.38850	0.07760 ± 0.40200	0.00000 ± 0.60380
Sb	0.07760 ± 0.28280	0.05190 ± 0.31420	0.01130 ± 1.35360	0.00000 ± 0.30890	0.00000 ± 1.16180	0.12910 ± 0.72870	0.00000 ± 0.45870	0.10920 ± 0.47710	0.00000 ± 0.71460
Ba	0.37260 ± 1.02470	0.34480 ± 1.13680	1.48660 ± 5.11070	0.00230 ± 1.11590	0.98820 ± 4.27720	0.63870 ± 2.64450	0.00000 ± 1.65650	0.13470 ± 1.71540	0.97520 ± 2.61750
La	0.29980 ± 1.34430	0.36830 ± 1.49290	1.14080 ± 6.53290	0.35930 ± 1.47240	0.30130 ± 5.52840	0.00000 ± 3.45190	0.13030 ± 2.17910	0.00000 ± 2.25280	0.00000 ± 3.38430
Au	0.00000 ± 0.02340	0.01370 ± 0.02630	0.00000 ± 0.11290	0.00000 ± 0.02590	0.00000 ± 0.09700	0.00670 ± 0.06040	0.00330 ± 0.03790	0.00000 ± 0.03980	0.02340 ± 0.06030
Hg	0.00000 ± 0.01960	0.00330 ± 0.02210	0.05720 ± 0.11060	0.00080 ± 0.02140	0.01020 ± 0.08210	0.00000 ± 0.05030	0.00560 ± 0.03230	0.00000 ± 0.03270	0.00000 ± 0.04990
Tl	0.00070 ± 0.01890	0.00000 ± 0.02130	0.00000 ± 0.09110	0.00000 ± 0.02060	0.01790 ± 0.08050	0.00000 ± 0.04860	0.00000 ± 0.03120	0.00000 ± 0.03160	0.00000 ± 0.04840
Pb	0.00000 ± 0.02540	0.00710 ± 0.02830	0.12980 ± 0.16120	0.01910 ± 0.02190	0.04850 ± 0.11190	0.02350 ± 0.06640	0.02230 ± 0.04190	0.00000 ± 0.04290	0.00470 ± 0.06400
U	0.00000 ± 0.01360	0.00180 ± 0.01570	0.02020 ± 0.06530	0.00000 ± 0.06180	0.05110 ± 0.22850	0.00000 ± 0.13240	0.00450 ± 0.09580	0.01020 ± 0.08580	0.00000 ± 0.12330
SO_2	0.09709 ± 0.04319	0.09878 ± 0.04753	0.43172 ± 0.21205	0.94428 ± 0.04839	2.05374 ± 0.17595	1.26690 ± 0.11339	0.61680 ± 0.06950	0.47108 ± 0.07227	0.57387 ± 0.11102
NH_3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

[a] Source profile descriptions are identified in Table 6.3.2.

continued . . .

Table C.2 (cont.)

Motor Vehicle Source Profiles[a] (Weight Percent by Sum of Species) Acquired in the Mt. Zirkel Visibility Study

	MZMVSBA	MZMVSBB	MZMVSBD
Cl^-	0.91740 ± 0.92210	1.76340 ± 1.57300	1.50370 ± 0.76370
NO_3^-	0.00000 ± 0.92150	0.00000 ± 1.51150	0.00000 ± 0.73970
$SO_4^=$	1.52270 ± 0.98910	1.03470 ± 1.69550	2.95570 ± 0.87310
K^+	0.00000 ± 0.59610	0.00000 ± 0.97970	0.00000 ± 0.47780
NH_4^+	0.00000 ± 0.91640	0.00000 ± 1.52740	0.00000 ± 0.73080
OC	40.60570 ± 18.11480	36.08700 ± 28.97620	39.59960 ± 14.59060
EC	57.34110 ± 13.54340	61.22210 ± 19.70110	56.71550 ± 12.20400
Na	0.00000 ± 0.53300	0.00000 ± 0.92740	0.00000 ± 0.43110
Mg	0.00000 ± 0.23530	0.17730 ± 0.41460	0.00000 ± 0.19410
Al	0.00000 ± 0.10250	0.00000 ± 0.22950	0.00000 ± 0.09180
Si	0.19730 ± 0.29090	0.23420 ± 0.32520	0.11110 ± 0.29900
P	0.00100 ± 0.05540	0.01870 ± 0.10000	0.00510 ± 0.04590
S	0.36490 ± 0.11870	0.00000 ± 0.25660	0.63150 ± 0.11210
Cl	0.00970 ± 0.08460	0.05780 ± 0.15210	0.05010 ± 0.04990
K	0.00000 ± 0.05690	0.00000 ± 0.08860	0.01520 ± 0.05180
Ca	0.00000 ± 0.10050	0.00000 ± 0.13250	0.03120 ± 0.09910
Ti	0.00000 ± 0.26960	0.00000 ± 0.50850	0.00000 ± 0.22520
V	0.00000 ± 0.11120	0.00000 ± 0.27240	0.00000 ± 0.09260
Cr	0.01490 ± 0.02680	0.00000 ± 0.08300	0.00000 ± 0.02190
Mn	0.00210 ± 0.01900	0.00000 ± 0.04010	0.00000 ± 0.01600
Fe	0.00000 ± 0.10920	0.00000 ± 0.11760	0.00000 ± 0.11320
Co	0.00000 ± 0.01330	0.00370 ± 0.02150	0.00000 ± 0.01180
Ni	0.00000 ± 0.01230	0.00000 ± 0.02240	0.00000 ± 0.01010
Cu	0.00360 ± 0.01180	0.01210 ± 0.02080	0.00040 ± 0.00970
Zn	0.02510 ± 0.01080	0.02050 ± 0.01870	0.04080 ± 0.01030
Ga	0.00000 ± 0.01130	0.00000 ± 0.02050	0.00000 ± 0.00930
As	0.00210 ± 0.01330	0.00280 ± 0.02330	0.00250 ± 0.01100
Se	0.00150 ± 0.00720	0.00090 ± 0.01210	0.00000 ± 0.00550
Br	0.01130 ± 0.00550	0.01680 ± 0.01050	0.01090 ± 0.00490
Rb	0.00000 ± 0.00620	0.00000 ± 0.01120	0.00000 ± 0.00510
Sr	0.00000 ± 0.00670	0.00000 ± 0.01210	0.00000 ± 0.00550
Yt	0.00000 ± 0.00820	0.00000 ± 0.01490	0.00000 ± 0.00670
Zr	0.00150 ± 0.00970	0.00000 ± 0.01680	0.00000 ± 0.00760
Mo	0.00000 ± 0.01740	0.00000 ± 0.03080	0.00000 ± 0.01390
Pd	0.03490 ± 0.10580	0.05320 ± 0.18910	0.00000 ± 0.08670
Ag	0.03790 ± 0.12320	0.04670 ± 0.22250	0.00000 ± 0.10150
Cd	0.02720 ± 0.12410	0.00000 ± 0.22390	0.00000 ± 0.10230
In	0.00050 ± 0.15020	0.04200 ± 0.26900	0.01680 ± 0.12300
Sn	0.00000 ± 0.18710	0.00000 ± 0.33400	0.00210 ± 0.15200
Sb	0.00000 ± 0.21940	0.00000 ± 0.39370	0.00000 ± 0.17980
Ba	0.15020 ± 0.79440	0.43670 ± 1.42840	0.43070 ± 0.65390
La	0.00000 ± 1.04400	0.51220 ± 1.87370	0.00000 ± 0.85290
Au	0.00000 ± 0.01850	0.00000 ± 0.03270	0.00000 ± 0.01520
Hg	0.00100 ± 0.01540	0.00000 ± 0.02710	0.00000 ± 0.01260
Tl	0.00000 ± 0.01490	0.00000 ± 0.02610	0.00420 ± 0.01220
Pb	0.00870 ± 0.02010	0.02050 ± 0.03590	0.00800 ± 0.01650
U	0.00000 ± 0.04410	0.00000 ± 0.07930	0.00000 ± 0.03490
SO_2	0.12970 ± 0.03325	0.21535 ± 0.05976	0.13138 ± 0.02743
NH_3	0.00000	0.00000	0.00000

[a] Source profile descriptions are identified in Table 6.3.2.

continued . . .

Table C.2 (cont.)

Composite Motor Vehicle Source Profiles[a] (Weight Percent by Sum of Species) Acquired in the Mt. Zirkel Visibility Study

	MZMVCG1C	MZMVCG2C	MZMVCG3C	MZMVCGC	MZMVSBC	MZMVC
Cl^-	2.45997 ± 1.32497	3.31567 ± 1.97476	1.71767 ± 0.29662	2.49777 ± 1.38398	1.39483 ± 0.43338	2.22203 ± 3.12024
NO_3^-	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 2.56994
$SO_4^=$	0.00000 ± 0.00000	1.76813 ± 3.06250	0.05197 ± 0.09001	0.60670 ± 1.76239	1.83770 ± 0.99849	0.91445 ± 3.09330
K^+	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 1.68346
NH_4^+	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 2.64335
OC	58.94923 ± 13.02838	57.58597 ± 7.94972	69.46890 ± 17.18397	62.00137 ± 12.79735	38.76410 ± 2.37238	56.19205 ± 53.62903
EC	39.04587 ± 12.55075	38.16060 ± 5.31008	28.64727 ± 16.66559	35.28458 ± 11.86559	58.42623 ± 2.44141	41.06999 ± 20.63968
Na	0.00000 ± 0.00000	0.69820 ± 0.87712	0.55313 ± 0.50539	0.41711 ± 0.59833	0.00000 ± 0.00000	0.31283 ± 1.58144
Mg	0.04220 ± 0.07309	0.00000 ± 0.00000	0.16887 ± 0.16244	0.07036 ± 0.11715	0.05910 ± 0.10236	0.06754 ± 0.69070
Al	0.05917 ± 0.04535	0.00330 ± 0.00572	0.10797 ± 0.16123	0.05681 ± 0.09528	0.00000 ± 0.00000	0.04261 ± 0.28434
Si	0.00107 ± 0.00185	0.10807 ± 0.09401	0.02963 ± 0.05046	0.04626 ± 0.07176	0.18087 ± 0.06317	0.07991 ± 0.49300
P	0.00463 ± 0.00803	0.06283 ± 0.07656	0.04597 ± 0.01816	0.03781 ± 0.04729	0.00827 ± 0.00927	0.03043 ± 0.17124
S	0.00000 ± 0.00000	1.85250 ± 3.20862	0.85557 ± 1.48188	0.90269 ± 1.94101	0.33213 ± 0.31702	0.76005 ± 1.68074
Cl	0.03927 ± 0.04215	0.03073 ± 0.05323	0.06097 ± 0.06993	0.04366 ± 0.05057	0.03920 ± 0.02584	0.04254 ± 0.26133
K	0.06897 ± 0.10508	0.07713 ± 0.07398	0.04880 ± 0.04621	0.06497 ± 0.06944	0.00507 ± 0.00878	0.04999 ± 0.18705
Ca	0.11470 ± 0.10333	0.05260 ± 0.03420	0.00000 ± 0.00000	0.05577 ± 0.07372	0.01040 ± 0.01801	0.04443 ± 0.21583
Ti	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.80879
V	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00000 ± 0.34164
Cr	0.01263 ± 0.02188	0.00950 ± 0.01645	0.00857 ± 0.00818	0.01023 ± 0.01441	0.00497 ± 0.00860	0.00892 ± 0.08516
Mn	0.00257 ± 0.00338	0.01523 ± 0.02442	0.01673 ± 0.01458	0.01151 ± 0.01583	0.00070 ± 0.00121	0.00881 ± 0.05722
Fe	0.01667 ± 0.02741	0.00000 ± 0.00000	0.00000 ± 0.00000	0.00556 ± 0.01604	0.00000 ± 0.00000	0.00417 ± 0.18029
Co	0.00133 ± 0.00231	0.00000 ± 0.00000	0.03017 ± 0.05225	0.01050 ± 0.03003	0.00123 ± 0.00214	0.00818 ± 0.03771
Ni	0.01830 ± 0.02564	0.00667 ± 0.00577	0.00053 ± 0.00092	0.00850 ± 0.01529	0.00000 ± 0.00000	0.00638 ± 0.03918
Cu	0.03243 ± 0.04146	0.01343 ± 0.01038	0.00557 ± 0.00964	0.01714 ± 0.02496	0.00537 ± 0.00605	0.01420 ± 0.04000
Zn	0.02547 ± 0.03556	0.07057 ± 0.05294	0.04333 ± 0.03552	0.04646 ± 0.04146	0.02880 ± 0.01064	0.04204 ± 0.04288
Ga	0.00310 ± 0.00537	0.00767 ± 0.01328	0.00110 ± 0.00191	0.00396 ± 0.00779	0.00000 ± 0.00000	0.00297 ± 0.03388
As	0.00160 ± 0.00144	0.00103 ± 0.00179	0.01197 ± 0.01180	0.00487 ± 0.00804	0.00247 ± 0.00035	0.00427 ± 0.03944
Se	0.00757 ± 0.00475	0.01313 ± 0.01548	0.00213 ± 0.00185	0.00761 ± 0.00944	0.00080 ± 0.00075	0.00591 ± 0.02141
Br	0.00757 ± 0.00606	0.05350 ± 0.02607	0.03233 ± 0.00717	0.03113 ± 0.02426	0.01300 ± 0.00330	0.02660 ± 0.02807
Rb	0.00107 ± 0.00185	0.00530 ± 0.00428	0.00033 ± 0.00058	0.00223 ± 0.00330	0.00000 ± 0.00000	0.00168 ± 0.01848
Sr	0.01067 ± 0.00706	0.00467 ± 0.00515	0.00000 ± 0.00000	0.00511 ± 0.00637	0.00000 ± 0.00000	0.00383 ± 0.02027
Yt	0.00293 ± 0.00386	0.00000 ± 0.00000	0.00187 ± 0.00323	0.00160 ± 0.00283	0.00000 ± 0.00000	0.00120 ± 0.02427
Zr	0.00227 ± 0.00241	0.00113 ± 0.00196	0.00073 ± 0.00127	0.00138 ± 0.00182	0.00050 ± 0.00087	0.00116 ± 0.02837
Mo	0.01003 ± 0.01053	0.00000 ± 0.00000	0.00127 ± 0.00114	0.00377 ± 0.00710	0.00000 ± 0.00000	0.00283 ± 0.05134
Pd	0.01340 ± 0.01920	0.06640 ± 0.11501	0.03600 ± 0.06235	0.03860 ± 0.07001	0.02937 ± 0.02703	0.03629 ± 0.32025
Ag	0.00973 ± 0.01686	0.07320 ± 0.12679	0.02550 ± 0.04417	0.03614 ± 0.07346	0.02820 ± 0.02482	0.03416 ± 0.37311
Cd	0.01157 ± 0.02003	0.10130 ± 0.17546	0.07127 ± 0.12344	0.06138 ± 0.11476	0.00907 ± 0.01570	0.04830 ± 0.38183
In	0.01327 ± 0.01780	0.13703 ± 0.23735	0.02693 ± 0.03426	0.05908 ± 0.13383	0.01977 ± 0.02091	0.04925 ± 0.46000
Sn	0.00833 ± 0.01443	0.00727 ± 0.01259	0.02587 ± 0.04480	0.01382 ± 0.02599	0.00070 ± 0.00121	0.01054 ± 0.55764
Sb	0.04693 ± 0.03343	0.04303 ± 0.07454	0.03640 ± 0.06305	0.04212 ± 0.05180	0.00000 ± 0.00000	0.03159 ± 0.65646
Ba	0.73467 ± 0.65134	0.54307 ± 0.49986	0.36997 ± 0.52846	0.54923 ± 0.51313	0.33920 ± 0.16371	0.49673 ± 2.42610
La	0.60297 ± 0.46703	0.22020 ± 0.19289	0.04343 ± 0.07523	0.28887 ± 0.35581	0.17073 ± 0.29572	0.25933 ± 3.13537
Au	0.00457 ± 0.00791	0.00223 ± 0.00387	0.00890 ± 0.01267	0.00523 ± 0.00825	0.00000 ± 0.00000	0.00393 ± 0.05478
Hg	0.02017 ± 0.03211	0.00367 ± 0.00567	0.00187 ± 0.00323	0.00857 ± 0.01857	0.00033 ± 0.00058	0.00651 ± 0.04879
Tl	0.00023 ± 0.00040	0.00597 ± 0.01033	0.00000 ± 0.00000	0.00207 ± 0.00594	0.00140 ± 0.00242	0.00190 ± 0.04448
Pb	0.04563 ± 0.07298	0.03037 ± 0.01586	0.00900 ± 0.01176	0.02833 ± 0.04102	0.01240 ± 0.00702	0.02435 ± 0.06739
U	0.00733 ± 0.01118	0.01703 ± 0.02950	0.00490 ± 0.00511	0.00976 ± 0.01692	0.00000 ± 0.00000	0.00732 ± 0.09977
SO_2	0.20920 ± 0.09626	1.42164 ± 0.06378	0.55392 ± 0.02321	0.72825 ± 0.06017	0.13138 ± 0.01723	0.58589 ± 0.58876
NH_3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

[a] Source profile descriptions are identified in Table 6.3.2.

Table C.3A

Residential Wood Combustion Source Profiles[a] (Weight Percent by Mass) Acquired in the Mt. Zirkel Visibility Study

	MZRWC1	MZRWC2	MZRWC3	MZRWCC
Cl^-	0.27254 ± 0.01293	0.13683 ± 0.00806	0.36380 ± 0.01803	0.25772 ± 0.11421
NO_3^-	0.05209 ± 0.00877	0.08751 ± 0.00806	0.08096 ± 0.01799	0.07352 ± 0.01885
$SO_4^=$	1.06226 ± 0.03276	0.48106 ± 0.01483	1.19827 ± 0.03708	0.91387 ± 0.38094
K^+	1.05910 ± 0.00977	0.44583 ± 0.00107	2.68607 ± 0.02141	1.39700 ± 1.15771
NH_4^+	0.14984 ± 0.01124	0.11908 ± 0.00981	0.11238 ± 0.01875	0.12710 ± 0.01998
OC	50.05437 ± 2.40819	63.69541 ± 3.04715	40.36344 ± 2.02448	51.37107 ± 11.72158
EC	8.09716 ± 1.18210	12.58340 ± 1.83570	16.48795 ± 2.40786	12.38950 ± 4.19875
Na	0.01605 ± 0.02011	0.00000 ± 0.02282	0.00000 ± 0.04813	0.00535 ± 0.03287
Mg	0.00614 ± 0.00804	0.00000 ± 0.00947	0.00000 ± 0.02128	0.00205 ± 0.01423
Al	0.00270 ± 0.00469	0.00000 ± 0.00503	0.03454 ± 0.00425	0.01241 ± 0.01921
Si	0.01676 ± 0.00139	0.00778 ± 0.00130	0.04915 ± 0.00351	0.02457 ± 0.02176
P	0.00000 ± 0.00304	0.00065 ± 0.00326	0.00323 ± 0.00773	0.00129 ± 0.00515
S	0.09371 ± 0.00151	0.11348 ± 0.00164	0.33151 ± 0.00406	0.17957 ± 0.13196
Cl	0.05284 ± 0.00201	0.10610 ± 0.00293	0.22629 ± 0.00918	0.12841 ± 0.08885
K	0.14123 ± 0.00200	0.43315 ± 0.00328	2.22805 ± 0.01271	0.93414 ± 1.13002
Ca	0.00678 ± 0.00111	0.01819 ± 0.00225	0.06784 ± 0.01052	0.03094 ± 0.03247
Ti	0.00000 ± 0.00982	0.00000 ± 0.00897	0.00000 ± 0.01916	0.00000 ± 0.01347
V	0.00000 ± 0.00624	0.00000 ± 0.00371	0.00000 ± 0.01213	0.00000 ± 0.00816
Cr	0.00000 ± 0.00205	0.00000 ± 0.00090	0.00000 ± 0.00398	0.00000 ± 0.00264
Mn	0.00000 ± 0.00088	0.00114 ± 0.00025	0.00408 ± 0.00063	0.00174 ± 0.00211
Fe	0.00094 ± 0.00022	0.00263 ± 0.00024	0.04655 ± 0.00088	0.01671 ± 0.02586
Co	0.00000 ± 0.00039	0.00000 ± 0.00043	0.00000 ± 0.00117	0.00000 ± 0.00075
Ni	0.00000 ± 0.00041	0.00000 ± 0.00042	0.00000 ± 0.00078	0.00000 ± 0.00056
Cu	0.00000 ± 0.00039	0.00000 ± 0.00040	0.00127 ± 0.00027	0.00042 ± 0.00074
Zn	0.01172 ± 0.00025	0.03893 ± 0.00038	0.03967 ± 0.00060	0.03010 ± 0.01592
Ga	0.00000 ± 0.00103	0.00000 ± 0.00106	0.00000 ± 0.00207	0.00000 ± 0.00147
As	0.00000 ± 0.00115	0.00000 ± 0.00125	0.00000 ± 0.00208	0.00000 ± 0.00155
Se	0.00000 ± 0.00051	0.00000 ± 0.00052	0.00000 ± 0.00098	0.00000 ± 0.00070
Br	0.00112 ± 0.00017	0.00037 ± 0.00049	0.00060 ± 0.00089	0.00069 ± 0.00059
Rb	0.00035 ± 0.00044	0.00035 ± 0.00045	0.00119 ± 0.00028	0.00063 ± 0.00048
Sr	0.00000 ± 0.00048	0.00000 ± 0.00049	0.00057 ± 0.00092	0.00019 ± 0.00066
Yt	0.00000 ± 0.00059	0.00000 ± 0.00060	0.00000 ± 0.00112	0.00000 ± 0.00081
Zr	0.00000 ± 0.00068	0.00000 ± 0.00069	0.00000 ± 0.00128	0.00000 ± 0.00093
Mo	0.00000 ± 0.00126	0.00000 ± 0.00128	0.00000 ± 0.00240	0.00000 ± 0.00173
Pd	0.00102 ± 0.00310	0.00000 ± 0.00310	0.00000 ± 0.00643	0.00034 ± 0.00449
Ag	0.00200 ± 0.00373	0.00000 ± 0.00374	0.00000 ± 0.00761	0.00067 ± 0.00535
Cd	0.00000 ± 0.00371	0.00134 ± 0.00385	0.00039 ± 0.00768	0.00058 ± 0.00540
In	0.00000 ± 0.00465	0.00000 ± 0.00466	0.00000 ± 0.00934	0.00000 ± 0.00660
Sn	0.00000 ± 0.00592	0.00184 ± 0.00582	0.00211 ± 0.01198	0.00132 ± 0.00841
Sb	0.00000 ± 0.00715	0.00000 ± 0.00701	0.00000 ± 0.01412	0.00000 ± 0.00999
Ba	0.00000 ± 0.02618	0.00712 ± 0.02641	0.01185 ± 0.05097	0.00632 ± 0.03643
La	0.02313 ± 0.03499	0.00000 ± 0.03435	0.04747 ± 0.06764	0.02353 ± 0.04823
Au	0.00000 ± 0.00152	0.00000 ± 0.00202	0.00000 ± 0.00321	0.00000 ± 0.00236
Hg	0.00000 ± 0.00111	0.00000 ± 0.00113	0.00000 ± 0.00209	0.00000 ± 0.00151
Tl	0.00000 ± 0.00108	0.00000 ± 0.00112	0.00015 ± 0.00212	0.00005 ± 0.00152
Pb	0.00000 ± 0.00160	0.00000 ± 0.00161	0.00000 ± 0.00308	0.00000 ± 0.00221
U	0.00000 ± 0.00106	0.00000 ± 0.00109	0.00000 ± 0.00202	0.00000 ± 0.00146
SO_2	0.00000 ± 0.32613	0.00000 ± 0.65408	0.00000 ± 0.59086	0.00000 ± 0.54262
NH_3	0.00000	0.00000	0.00000	0.00000

[a] Source profile descriptions are identified in Table 6.3.3.

Table C.3B

Residential Coal Combustion Source Profiles[a] (Weight Percent by Mass) Acquired in the Mt. Zirkel Visibility Study

	MZRCC1	MZRCC2	MZRCC3	MZRCC4	MZRCCC
Cl^-	0.25214 ± 0.01196	0.27381 ± 0.02207	0.12664 ± 0.04692	0.10762 ± 0.05606	0.19005 ± 0.08502
NO_3^-	0.07891 ± 0.00778	0.76720 ± 0.05651	0.21107 ± 0.04693	0.20179 ± 0.05609	0.31474 ± 0.30759
$SO_4^=$	0.38195 ± 0.01177	7.03042 ± 0.21812	2.19512 ± 0.06981	3.68274 ± 0.11868	3.32256 ± 2.81640
K^+	0.70006 ± 0.00126	1.14860 ± 0.00492	0.04798 ± 0.00517	0.00000 ± 0.00617	0.47416 ± 0.55147
NH_4^+	0.11678 ± 0.00952	3.13452 ± 0.14911	0.92195 ± 0.06421	1.46401 ± 0.08971	1.40932 ± 1.27639
OC	65.43346 ± 3.12765	45.43651 ± 2.29766	75.95685 ± 3.97971	91.13229 ± 4.79043	69.48978 ± 19.19405
EC	6.79533 ± 0.99148	33.20547 ± 4.84726	21.26642 ± 3.10964	43.03812 ± 6.29125	26.07633 ± 15.63563
Na	0.00525 ± 0.01995	0.01280 ± 0.10670	0.01553 ± 0.09540	0.09962 ± 0.10147	0.03330 ± 0.08829
Mg	0.00000 ± 0.00781	0.13906 ± 0.01731	0.02000 ± 0.04187	0.00000 ± 0.04675	0.03977 ± 0.06687
Al	0.01292 ± 0.00141	0.16304 ± 0.01054	0.02907 ± 0.00873	0.05192 ± 0.01044	0.06424 ± 0.06778
Si	0.00561 ± 0.00106	0.21007 ± 0.00892	0.07933 ± 0.00778	0.09340 ± 0.00899	0.09710 ± 0.08458
P	0.00390 ± 0.00089	0.00000 ± 0.02038	0.00000 ± 0.01871	0.00707 ± 0.02041	0.00274 ± 0.01720
S	0.06358 ± 0.00130	3.44986 ± 0.01780	1.24224 ± 0.01478	1.24657 ± 0.01687	1.50056 ± 1.41373
Cl	0.09366 ± 0.00256	0.18089 ± 0.02401	0.05653 ± 0.00981	0.03084 ± 0.00958	0.09048 ± 0.06556
K	0.35868 ± 0.00292	1.69007 ± 0.01249	0.08241 ± 0.00458	0.00000 ± 0.01044	0.53279 ± 0.78662
Ca	0.00844 ± 0.00189	0.82152 ± 0.01054	0.01004 ± 0.01163	0.01744 ± 0.00449	0.21436 ± 0.40479
Ti	0.00019 ± 0.00861	0.01318 ± 0.02224	0.00000 ± 0.04341	0.00613 ± 0.04769	0.00488 ± 0.03438
V	0.00000 ± 0.00355	0.00046 ± 0.00922	0.00000 ± 0.01787	0.00000 ± 0.01962	0.00012 ± 0.01416
Cr	0.00000 ± 0.00086	0.00000 ± 0.00216	0.00000 ± 0.00413	0.00000 ± 0.00455	0.00000 ± 0.00328
Mn	0.00018 ± 0.00066	0.01573 ± 0.00077	0.00017 ± 0.00301	0.00095 ± 0.00340	0.00426 ± 0.00766
Fe	0.00000 ± 0.00058	0.23726 ± 0.00219	0.00662 ± 0.00101	0.02461 ± 0.00143	0.06712 ± 0.11390
Co	0.00000 ± 0.00039	0.00000 ± 0.00390	0.00000 ± 0.00181	0.00000 ± 0.00213	0.00000 ± 0.00241
Ni	0.00000 ± 0.00040	0.00072 ± 0.00098	0.00000 ± 0.00185	0.00000 ± 0.00206	0.00018 ± 0.00148
Cu	0.00000 ± 0.00038	0.00316 ± 0.00034	0.00000 ± 0.00175	0.00158 ± 0.00204	0.00118 ± 0.00151
Zn	0.02213 ± 0.00029	0.03500 ± 0.00064	0.00221 ± 0.00070	0.00288 ± 0.00079	0.01556 ± 0.01592
Ga	0.00000 ± 0.00104	0.00138 ± 0.00260	0.00094 ± 0.00498	0.00000 ± 0.00479	0.00058 ± 0.00373
As	0.00000 ± 0.00112	0.00231 ± 0.00634	0.00000 ± 0.00496	0.00000 ± 0.00540	0.00058 ± 0.00488
Se	0.00000 ± 0.00050	0.01063 ± 0.00054	0.00355 ± 0.00084	0.00229 ± 0.00268	0.00412 ± 0.00459
Br	0.00000 ± 0.00045	0.01274 ± 0.00059	0.00305 ± 0.00073	0.00209 ± 0.00237	0.00447 ± 0.00566
Rb	0.00025 ± 0.00042	0.00115 ± 0.00117	0.00055 ± 0.00193	0.00046 ± 0.00211	0.00060 ± 0.00156
Sr	0.00000 ± 0.00047	0.03140 ± 0.00062	0.00085 ± 0.00216	0.00204 ± 0.00242	0.00857 ± 0.01524
Yt	0.00000 ± 0.00057	0.00000 ± 0.00139	0.00000 ± 0.00262	0.00000 ± 0.00291	0.00000 ± 0.00210
Zr	0.00000 ± 0.00066	0.00090 ± 0.00202	0.00002 ± 0.00305	0.00000 ± 0.00333	0.00023 ± 0.00249
Mo	0.00000 ± 0.00124	0.00000 ± 0.00285	0.00000 ± 0.00568	0.00000 ± 0.00609	0.00000 ± 0.00444
Pd	0.00013 ± 0.00304	0.00202 ± 0.00803	0.00293 ± 0.01575	0.00233 ± 0.01807	0.00185 ± 0.01273
Ag	0.00054 ± 0.00356	0.00047 ± 0.00931	0.00000 ± 0.01893	0.00000 ± 0.02167	0.00025 ± 0.01523
Cd	0.00000 ± 0.00354	0.00356 ± 0.00970	0.00000 ± 0.01911	0.00000 ± 0.02158	0.00089 ± 0.01531
In	0.00000 ± 0.00444	0.00728 ± 0.01161	0.00000 ± 0.02313	0.00000 ± 0.02585	0.00182 ± 0.01843
Sn	0.00000 ± 0.00569	0.00964 ± 0.01419	0.00977 ± 0.02910	0.01795 ± 0.03224	0.00934 ± 0.02302
Sb	0.00000 ± 0.00683	0.00230 ± 0.01730	0.00000 ± 0.03446	0.00730 ± 0.03899	0.00240 ± 0.02763
Ba	0.00000 ± 0.02534	0.04449 ± 0.06378	0.00000 ± 0.12838	0.00000 ± 0.14081	0.01112 ± 0.10126
La	0.00000 ± 0.03336	0.00000 ± 0.08131	0.00752 ± 0.16772	0.00000 ± 0.18325	0.00188 ± 0.13175
Au	0.00000 ± 0.00166	0.00086 ± 0.00373	0.00014 ± 0.00671	0.00000 ± 0.00695	0.00025 ± 0.00524
Hg	0.00000 ± 0.00108	0.00046 ± 0.00264	0.00000 ± 0.00504	0.00065 ± 0.00565	0.00028 ± 0.00404
Tl	0.00000 ± 0.00109	0.00000 ± 0.00284	0.00000 ± 0.00494	0.00000 ± 0.00545	0.00000 ± 0.00398
Pb	0.00000 ± 0.00157	0.03207 ± 0.00163	0.00000 ± 0.00752	0.00000 ± 0.00812	0.00802 ± 0.01604
U	0.00000 ± 0.00103	0.00000 ± 0.00244	0.00000 ± 0.00472	0.00030 ± 0.00527	0.00008 ± 0.00378
SO_2	0.00000 ± 0.71333	0.00000 ± 189.983	112.129 ± 2.50502	531.883 ± 27.2720	161.003 ± 252.841
NH_3	0.00000	0.00000	0.00000	0.00000	0.00000

[a] Source profile descriptions are identified in Table 6.3.3.

Table C.4

Forest Fire Source Profiles[a] (Weight Percent by Mass) Acquired in the Mt. Zirkel Visibility Study

	MZFFIRE1	MZFFIRE2	MZFFIRE3	MZFFIRE4	MZFFIREC
Cl^-	0.06031 ± 0.00792	0.36945 ± 0.02391	0.16435 ± 0.03654	0.23404 ± 0.01110	0.20704 ± 0.12969
NO_3^-	0.00000 ± 0.00792	0.03866 ± 0.02387	0.05917 ± 0.03652	0.01450 ± 0.00833	0.02808 ± 0.02615
$SO_4^=$	0.04844 ± 0.00792	0.20048 ± 0.02388	0.14244 ± 0.03653	0.14152 ± 0.00834	0.13322 ± 0.06289
K^+	0.01468 ± 0.00087	0.22305 ± 0.00278	0.06774 ± 0.00404	0.17592 ± 0.00095	0.12034 ± 0.09586
NH_4^+	0.08225 ± 0.00881	0.22754 ± 0.02616	0.00000 ± 0.00000	0.13222 ± 0.01039	0.11050 ± 0.09518
OC	30.65221 ± 1.49025	66.14320 ± 3.27625	38.37838 ± 2.15285	52.33372 ± 2.51317	46.87688 ± 15.66772
EC	0.82159 ± 0.12032	4.90215 ± 0.71626	2.95106 ± 0.43136	4.23404 ± 0.61847	3.22721 ± 1.79651
Na	0.02015 ± 0.00590	0.00254 ± 0.05677	0.02629 ± 0.06548	0.00000 ± 0.02174	0.01225 ± 0.04477
Mg	0.00673 ± 0.00747	0.03620 ± 0.00905	0.02496 ± 0.02679	0.00389 ± 0.00909	0.01794 ± 0.01534
Al	0.00190 ± 0.00415	0.02180 ± 0.00515	0.03338 ± 0.00524	0.00470 ± 0.00543	0.01545 ± 0.01484
Si	0.01332 ± 0.00122	0.11817 ± 0.00474	0.07354 ± 0.00468	0.04289 ± 0.00169	0.06198 ± 0.04481
P	0.00117 ± 0.00272	0.01815 ± 0.00286	0.00924 ± 0.00283	0.00060 ± 0.00324	0.00729 ± 0.00825
S	0.05125 ± 0.00126	0.09776 ± 0.00324	0.09382 ± 0.00379	0.07403 ± 0.00149	0.07922 ± 0.02134
Cl	0.07650 ± 0.00205	0.29757 ± 0.00758	0.11009 ± 0.00588	0.21027 ± 0.00340	0.17361 ± 0.10029
K	0.03124 ± 0.00125	0.29844 ± 0.00602	0.06259 ± 0.00375	0.18854 ± 0.00227	0.14520 ± 0.12271
Ca	0.03995 ± 0.00109	1.22318 ± 0.00938	0.15359 ± 0.00462	0.06053 ± 0.00158	0.36931 ± 0.57139
Ti	0.00000 ± 0.00873	0.00606 ± 0.02381	0.00000 ± 0.03624	0.00000 ± 0.00862	0.00152 ± 0.02253
V	0.00000 ± 0.00360	0.00036 ± 0.00982	0.00000 ± 0.01494	0.00000 ± 0.00356	0.00009 ± 0.00929
Cr	0.00000 ± 0.00086	0.00021 ± 0.00238	0.00000 ± 0.00349	0.00000 ± 0.00084	0.00005 ± 0.00220
Mn	0.00000 ± 0.00065	0.00178 ± 0.00183	0.00000 ± 0.00253	0.00029 ± 0.00067	0.00052 ± 0.00163
Fe	0.00119 ± 0.00022	0.04568 ± 0.00105	0.00759 ± 0.00090	0.01756 ± 0.00038	0.01801 ± 0.01964
Co	0.00000 ± 0.00040	0.00000 ± 0.00135	0.00000 ± 0.00156	0.00000 ± 0.00051	0.00000 ± 0.00108
Ni	0.00000 ± 0.00040	0.00001 ± 0.00108	0.00000 ± 0.00161	0.00000 ± 0.00039	0.00000 ± 0.00101
Cu	0.00000 ± 0.00040	0.00016 ± 0.00103	0.00065 ± 0.00156	0.00019 ± 0.00040	0.00025 ± 0.00098
Zn	0.00000 ± 0.00044	0.00582 ± 0.00045	0.00000 ± 0.00175	0.00585 ± 0.00020	0.00292 ± 0.00337
Ga	0.00000 ± 0.00097	0.00000 ± 0.00249	0.00000 ± 0.00370	0.00000 ± 0.00095	0.00000 ± 0.00233
As	0.00101 ± 0.00129	0.00000 ± 0.00304	0.00000 ± 0.00444	0.00023 ± 0.00111	0.00031 ± 0.00282
Se	0.00000 ± 0.00051	0.00000 ± 0.00130	0.00000 ± 0.00196	0.00000 ± 0.00049	0.00000 ± 0.00123
Br	0.00007 ± 0.00048	0.00237 ± 0.00043	0.00180 ± 0.00186	0.00061 ± 0.00016	0.00121 ± 0.00105
Rb	0.00000 ± 0.00043	0.00029 ± 0.00113	0.00000 ± 0.00162	0.00001 ± 0.00043	0.00007 ± 0.00103
Sr	0.00019 ± 0.00050	0.00419 ± 0.00045	0.00068 ± 0.00188	0.00017 ± 0.00048	0.00131 ± 0.00194
Yt	0.00000 ± 0.00061	0.00000 ± 0.00152	0.00000 ± 0.00226	0.00000 ± 0.00058	0.00000 ± 0.00143
Zr	0.00000 ± 0.00069	0.00000 ± 0.00178	0.00000 ± 0.00262	0.00000 ± 0.00067	0.00000 ± 0.00166
Mo	0.00000 ± 0.00127	0.00000 ± 0.00324	0.00000 ± 0.00483	0.00000 ± 0.00123	0.00000 ± 0.00304
Pd	0.00000 ± 0.00306	0.00000 ± 0.00861	0.00000 ± 0.01348	0.00000 ± 0.00306	0.00000 ± 0.00828
Ag	0.00000 ± 0.00357	0.00051 ± 0.01070	0.00000 ± 0.01555	0.00000 ± 0.00371	0.00013 ± 0.00978
Cd	0.00041 ± 0.00365	0.00000 ± 0.01042	0.00000 ± 0.01597	0.00000 ± 0.00369	0.00010 ± 0.00988
In	0.00209 ± 0.00450	0.00000 ± 0.01267	0.00568 ± 0.01942	0.00000 ± 0.00450	0.00194 ± 0.01202
Sn	0.00133 ± 0.00558	0.00291 ± 0.01565	0.00000 ± 0.02364	0.00186 ± 0.00569	0.00153 ± 0.01473
Sb	0.00148 ± 0.00686	0.00000 ± 0.01846	0.00000 ± 0.02824	0.00047 ± 0.00683	0.00049 ± 0.01755
Ba	0.00433 ± 0.02573	0.00000 ± 0.06975	0.00000 ± 0.10412	0.00000 ± 0.02522	0.00108 ± 0.06520
La	0.00000 ± 0.03396	0.00000 ± 0.09046	0.00000 ± 0.13672	0.00000 ± 0.03359	0.00000 ± 0.08538
Au	0.00000 ± 0.00139	0.00000 ± 0.00361	0.00000 ± 0.00530	0.00000 ± 0.00141	0.00000 ± 0.00335
Hg	0.00000 ± 0.00111	0.00000 ± 0.00288	0.00000 ± 0.00431	0.00000 ± 0.00110	0.00000 ± 0.00271
Tl	0.00000 ± 0.00114	0.00000 ± 0.00284	0.00000 ± 0.00427	0.00000 ± 0.00108	0.00000 ± 0.00268
Pb	0.00268 ± 0.00060	0.00000 ± 0.00408	0.00000 ± 0.00611	0.00000 ± 0.00165	0.00067 ± 0.00378
U	0.00000 ± 0.00108	0.00000 ± 0.00274	0.00000 ± 0.00407	0.00000 ± 0.00104	0.00000 ± 0.00256
SO_2	0.16600 ± 0.05200	0.44400 ± 0.15000	0.38000 ± 0.23900	0.19200 ± 0.05500	0.29500 ± 0.13700
NH_3	0.00000	0.00000	0.00000	0.00000	0.00000

[a] Source profile descriptions are identified in Table 6.3.4.

Table C.5

Geothermal Springs Source Profiles[a] (Weight Percent by Sum of Species) Acquired in the Mt. Zirkel Visibility Study

	MZGS1	MZGS2	MZGS3	MZGSC	MZGS2C
Cl^-	7.224 ± 7.021	26.536 ± 26.152	18.916 ± 22.149	17.559 ± 20.197	22.726 ± 24.233
NO_3^-	6.192 ± 6.413	17.690 ± 21.284	13.757 ± 17.392	12.547 ± 16.295	15.724 ± 19.436
$SO_4^=$	5.934 ± 6.267	34.398 ± 31.092	30.381 ± 33.485	23.571 ± 26.629	32.390 ± 32.311
K^+	0.000 ± 0.473	5.081 ± 4.299	0.000 ± 1.051	1.694 ± 2.934	2.541 ± 3.593
NH_4^+	3.561 ± 5.099	16.413 ± 20.687	24.247 ± 27.361	14.740 ± 20.021	20.330 ± 24.255
OC	69.662 ± 122.752	0.000 ± 420.801	0.000 ± 245.433	23.221 ± 290.045	0.000 ± 344.464
EC	7.740 ± 9.761	0.000 ± 29.484	0.000 ± 17.197	2.580 ± 20.497	0.000 ± 24.135
Na	0.000 ± 2.660	0.000 ± 10.329	12.928 ± 13.798	4.309 ± 10.069	6.464 ± 12.188
Mg	0.618 ± 1.205	0.000 ± 4.442	1.550 ± 2.867	0.723 ± 3.131	0.775 ± 3.738
Al	0.351 ± 0.649	3.070 ± 2.481	0.795 ± 1.570	1.405 ± 1.736	1.933 ± 2.076
Si	1.346 ± 1.042	3.492 ± 2.733	5.879 ± 6.219	3.572 ± 3.968	4.686 ± 4.803
P	0.375 ± 0.300	0.000 ± 0.993	0.438 ± 0.730	0.271 ± 0.732	0.219 ± 0.871
S	1.103 ± 0.852	8.970 ± 6.900	10.471 ± 11.063	6.848 ± 7.544	9.721 ± 9.220
Cl	0.000 ± 0.396	0.000 ± 1.507	0.000 ± 0.835	0.000 ± 1.021	0.000 ± 1.218
K	0.366 ± 0.300	1.910 ± 1.521	1.622 ± 1.742	1.299 ± 1.346	1.766 ± 1.635
Ca	0.623 ± 0.494	2.857 ± 2.246	2.780 ± 2.948	2.086 ± 2.159	2.819 ± 2.621
Ti	0.000 ± 1.372	0.000 ± 5.324	0.134 ± 2.759	0.045 ± 3.551	0.067 ± 4.240
V	0.000 ± 0.567	0.000 ± 2.198	0.113 ± 1.145	0.038 ± 1.468	0.057 ± 1.752
Cr	0.000 ± 0.135	0.000 ± 0.524	0.145 ± 0.313	0.048 ± 0.361	0.073 ± 0.432
Mn	0.000 ± 0.095	0.000 ± 0.370	0.065 ± 0.207	0.022 ± 0.251	0.033 ± 0.300
Fe	0.541 ± 0.417	1.733 ± 1.337	2.274 ± 2.403	1.516 ± 1.606	2.004 ± 1.944
Co	0.000 ± 0.061	0.000 ± 0.233	0.021 ± 0.130	0.007 ± 0.158	0.011 ± 0.189
Ni	0.000 ± 0.063	0.000 ± 0.242	0.059 ± 0.142	0.020 ± 0.166	0.030 ± 0.198
Cu	0.030 ± 0.064	0.000 ± 0.229	0.021 ± 0.124	0.017 ± 0.155	0.011 ± 0.184
Zn	0.000 ± 0.068	0.000 ± 0.265	0.086 ± 0.163	0.029 ± 0.184	0.043 ± 0.220
Ga	0.000 ± 0.058	0.000 ± 0.219	0.000 ± 0.115	0.000 ± 0.147	0.000 ± 0.175
As	0.000 ± 0.067	0.000 ± 0.262	0.054 ± 0.145	0.018 ± 0.177	0.027 ± 0.212
Se	0.000 ± 0.034	0.000 ± 0.134	0.019 ± 0.072	0.006 ± 0.090	0.010 ± 0.108
Br	0.000 ± 0.032	0.000 ± 0.124	0.084 ± 0.091	0.028 ± 0.091	0.042 ± 0.109
Rb	0.000 ± 0.030	0.000 ± 0.118	0.019 ± 0.063	0.006 ± 0.079	0.010 ± 0.095
Sr	0.000 ± 0.034	0.000 ± 0.131	0.082 ± 0.089	0.027 ± 0.094	0.041 ± 0.112
Yt	0.000 ± 0.041	0.000 ± 0.161	0.000 ± 0.080	0.000 ± 0.106	0.000 ± 0.127
Zr	0.000 ± 0.048	0.000 ± 0.187	0.017 ± 0.093	0.006 ± 0.124	0.009 ± 0.148
Mo	0.000 ± 0.087	0.000 ± 0.337	0.130 ± 0.217	0.043 ± 0.237	0.065 ± 0.283
Pd	0.228 ± 0.560	0.537 ± 2.092	0.019 ± 1.099	0.261 ± 1.402	0.278 ± 1.671
Ag	0.178 ± 0.640	0.000 ± 2.421	0.256 ± 1.312	0.145 ± 1.632	0.128 ± 1.947
Cd	0.000 ± 0.625	0.000 ± 2.454	0.048 ± 1.302	0.016 ± 1.644	0.024 ± 1.964
In	0.000 ± 0.758	0.000 ± 2.903	0.631 ± 1.676	0.210 ± 1.984	0.316 ± 2.370
Sn	0.000 ± 0.941	0.000 ± 3.633	0.315 ± 1.932	0.105 ± 2.437	0.158 ± 2.910
Sb	0.182 ± 1.117	0.000 ± 4.262	0.000 ± 2.237	0.061 ± 2.853	0.000 ± 3.404
Ba	2.072 ± 4.312	12.023 ± 17.888	0.000 ± 8.144	4.698 ± 11.617	6.012 ± 13.898
La	0.000 ± 5.267	5.877 ± 20.615	0.659 ± 10.755	2.179 ± 13.765	3.268 ± 16.442
Au	0.000 ± 0.092	0.000 ± 0.354	0.132 ± 0.230	0.044 ± 0.249	0.066 ± 0.299
Hg	0.000 ± 0.077	0.000 ± 0.298	0.000 ± 0.151	0.000 ± 0.198	0.000 ± 0.236
Tl	0.000 ± 0.076	0.000 ± 0.292	0.013 ± 0.150	0.004 ± 0.195	0.007 ± 0.232
Pb	0.000 ± 0.100	0.000 ± 0.387	0.212 ± 0.233	0.071 ± 0.267	0.106 ± 0.319
U	0.000 ± 0.075	0.000 ± 0.292	0.015 ± 0.146	0.005 ± 0.193	0.008 ± 0.231
SO_2	655.817 ± 506.591	3377.98 ± 2603.04	2752.61 ± 2910.17	2262.14 ± 2273.14	3065.29 ± 2760.87
NH_3	0.000	0.000	0.000	0.000	0.000

[a] Source profile descriptions are identified in Table 6.3.5.

Table C.6

Coal-Fired Boiler Source Profiles[a] (Weight Percent by Mass) Acquired in the Mt. Zirkel Visibility Study

	MZCG2PP1	MZCG2PP2	MZCG2PP3	MZCG2PP4	MZCG3PP1	MZCG3PP2	MZCG3PP3
Cl^-	0.57061 ± 0.14476	0.18326 ± 0.05659	0.41842 ± 0.13191	0.24309 ± 0.04770	1.65000 ± 0.11284	1.49118 ± 0.07583	0.84240 ± 0.05605
NO_3^-	0.15562 ± 0.14414	0.15611 ± 0.05658	0.20526 ± 0.13166	0.12869 ± 0.04768	0.40435 ± 0.10895	0.33529 ± 0.07365	1.62153 ± 0.12026
$SO_4^{=}$	14.33429 ± 0.56285	27.28507 ± 0.87994	27.91579 ± 1.06053	21.44900 ± 0.68285	15.39783 ± 0.55222	9.31765 ± 0.30947	13.30189 ± 0.42828
K^+	0.25012 ± 0.01698	0.32029 ± 0.00693	0.29092 ± 0.01585	0.16201 ± 0.00540	0.07246 ± 0.01203	0.02281 ± 0.00809	0.02381 ± 0.00611
NH_4^+	0.68271 ± 0.15145	1.97036 ± 0.10997	3.85105 ± 0.23930	4.59409 ± 0.22375	0.17283 ± 0.10905	0.12838 ± 0.07380	0.05927 ± 0.05556
OC	4.12104 ± 3.70308	3.21267 ± 1.45337	0.47366 ± 3.38027	1.17255 ± 1.22453	1.91304 ± 2.79260	2.83824 ± 1.88929	3.14095 ± 1.42594
EC	8.24207 ± 1.22691	2.23982 ± 0.32875	9.26316 ± 1.35782	12.56435 ± 1.83311	2.54348 ± 0.37251	0.66176 ± 0.13261	0.31077 ± 0.09993
Na	1.69205 ± 0.22759	2.12045 ± 0.14678	1.65616 ± 0.22711	0.89972 ± 0.11281	0.27820 ± 0.33421	0.00000 ± 0.38131	0.00000 ± 0.26307
Mg	2.09873 ± 0.13953	2.43257 ± 0.08594	2.33068 ± 0.13802	1.33612 ± 0.06523	0.25724 ± 0.05234	0.25000 ± 0.06142	0.15075 ± 0.04279
Al	4.31749 ± 0.13927	4.24742 ± 0.07095	4.32861 ± 0.13150	3.74545 ± 0.05775	1.31920 ± 0.04944	2.32841 ± 0.05726	1.76717 ± 0.04025
Si	8.20925 ± 0.21475	7.75529 ± 0.08856	8.70066 ± 0.20848	7.23487 ± 0.07220	2.29761 ± 0.05638	3.98065 ± 0.06526	3.07881 ± 0.04291
P	0.19066 ± 0.03016	0.10967 ± 0.01926	0.16758 ± 0.03128	0.12430 ± 0.01684	0.06620 ± 0.01715	0.02285 ± 0.06372	0.04436 ± 0.04455
S	7.38179 ± 0.18511	9.26684 ± 0.09372	10.63734 ± 0.24173	7.90393 ± 0.06877	3.37304 ± 0.06818	8.08756 ± 0.10656	5.46505 ± 0.05709
Cl	0.00000 ± 0.13908	0.00000 ± 0.17207	0.00000 ± 0.19395	0.00000 ± 0.14797	0.52028 ± 0.03769	0.99082 ± 0.07323	0.59457 ± 0.04420
K	0.81337 ± 0.03064	0.83357 ± 0.01775	0.83184 ± 0.02878	0.70414 ± 0.01441	0.13322 ± 0.02711	0.22756 ± 0.05522	0.17546 ± 0.02880
Ca	3.55873 ± 0.09307	3.79698 ± 0.04216	3.41426 ± 0.08227	3.11744 ± 0.03083	9.99080 ± 0.18935	22.52349 ± 0.28565	11.49990 ± 0.11352
Ti	0.21965 ± 0.05622	0.21683 ± 0.03906	0.16500 ± 0.17667	0.18083 ± 0.04006	0.00843 ± 0.10193	0.14551 ± 0.02512	0.11276 ± 0.01737
V	0.01150 ± 0.06994	0.00960 ± 0.04865	0.00000 ± 0.07311	0.00000 ± 0.04958	0.00000 ± 0.04204	0.01571 ± 0.03159	0.01563 ± 0.02195
Cr	0.01657 ± 0.00549	0.00863 ± 0.00989	0.00953 ± 0.01569	0.00929 ± 0.00940	0.00352 ± 0.00987	0.00734 ± 0.00794	0.00974 ± 0.00192
Mn	0.10401 ± 0.00590	0.12071 ± 0.00358	0.10924 ± 0.00563	0.08038 ± 0.00289	0.00926 ± 0.00253	0.02428 ± 0.00230	0.01342 ± 0.00155
Fe	3.10017 ± 0.07768	3.26905 ± 0.03337	3.06861 ± 0.07041	2.84477 ± 0.02500	0.72107 ± 0.01536	1.33506 ± 0.01892	0.91370 ± 0.01055
Co	0.00242 ± 0.04856	0.00483 ± 0.05000	0.00000 ± 0.04782	0.00009 ± 0.04349	0.00000 ± 0.01252	0.00162 ± 0.02138	0.00000 ± 0.01445
Ni	0.00983 ± 0.00217	0.00807 ± 0.00100	0.00650 ± 0.00190	0.00521 ± 0.00085	0.00248 ± 0.00422	0.00341 ± 0.00109	0.00395 ± 0.00078
Cu	0.01643 ± 0.00211	0.01042 ± 0.00088	0.01139 ± 0.00181	0.00763 ± 0.00075	0.00707 ± 0.00140	0.00572 ± 0.00105	0.00264 ± 0.00070
Zn	0.04787 ± 0.00287	0.03100 ± 0.00118	0.03061 ± 0.00229	0.02598 ± 0.00101	0.01737 ± 0.00170	0.01376 ± 0.00126	0.01062 ± 0.00088
Ga	0.00000 ± 0.01380	0.00000 ± 0.00572	0.00000 ± 0.01216	0.00000 ± 0.00492	0.00000 ± 0.00950	0.00000 ± 0.00704	0.00000 ± 0.00489
As	0.00000 ± 0.02957	0.00000 ± 0.02373	0.00000 ± 0.01937	0.00000 ± 0.01285	0.00000 ± 0.01063	0.00000 ± 0.00787	0.00000 ± 0.00535
Se	0.26689 ± 0.00824	0.43107 ± 0.00552	0.39145 ± 0.01033	0.28061 ± 0.00356	0.00000 ± 0.00500	0.00000 ± 0.00371	0.00000 ± 0.00255
Br	0.01971 ± 0.00252	0.00438 ± 0.00108	0.02266 ± 0.00234	0.02878 ± 0.00149	0.01989 ± 0.00184	0.06296 ± 0.00200	0.01592 ± 0.00100
Rb	0.00222 ± 0.00617	0.00490 ± 0.00086	0.00176 ± 0.00542	0.00389 ± 0.00086	0.00122 ± 0.00433	0.00160 ± 0.00403	0.00079 ± 0.00226
Sr	0.18499 ± 0.00588	0.17507 ± 0.00265	0.17424 ± 0.00519	0.15297 ± 0.00216	0.04196 ± 0.00214	0.08118 ± 0.00210	0.05788 ± 0.00143
Yt	0.00000 ± 0.00827	0.00000 ± 0.00356	0.00000 ± 0.00713	0.00000 ± 0.00296	0.00000 ± 0.00567	0.00000 ± 0.00425	0.00208 ± 0.00297
Zr	0.00830 ± 0.01234	0.01035 ± 0.00265	0.00287 ± 0.01100	0.00794 ± 0.00231	0.00000 ± 0.00687	0.00416 ± 0.00600	0.00309 ± 0.00418
Mo	0.00000 ± 0.01732	0.00000 ± 0.00680	0.00000 ± 0.01495	0.00000 ± 0.00603	0.00000 ± 0.01215	0.00000 ± 0.00894	0.00000 ± 0.00607
Pd	0.00539 ± 0.05372	0.00000 ± 0.02258	0.02137 ± 0.04698	0.00297 ± 0.01989	0.00678 ± 0.03785	0.00888 ± 0.03047	0.00185 ± 0.02100
Ag	0.01919 ± 0.06306	0.00049 ± 0.02600	0.01584 ± 0.05500	0.00000 ± 0.02204	0.00000 ± 0.04433	0.00474 ± 0.03522	0.00262 ± 0.02435
Cd	0.01069 ± 0.06317	0.00000 ± 0.02648	0.00000 ± 0.05568	0.00000 ± 0.02235	0.00000 ± 0.04563	0.00000 ± 0.03515	0.00000 ± 0.02406
In	0.00000 ± 0.07383	0.00587 ± 0.03122	0.01005 ± 0.06790	0.00000 ± 0.02771	0.00000 ± 0.05489	0.00104 ± 0.04290	0.00000 ± 0.02916
Sn	0.07470 ± 0.09483	0.02932 ± 0.03817	0.00000 ± 0.08171	0.01429 ± 0.03366	0.00000 ± 0.06574	0.01682 ± 0.05065	0.00000 ± 0.03552
Sb	0.00000 ± 0.10683	0.00000 ± 0.04468	0.00000 ± 0.09868	0.00000 ± 0.03808	0.00000 ± 0.07772	0.00000 ± 0.05975	0.00000 ± 0.04153
Ba	0.85427 ± 0.13980	0.97587 ± 0.05941	1.18766 ± 0.12650	1.05486 ± 0.05219	0.30926 ± 0.09493	0.19272 ± 0.21004	0.10578 ± 0.14695
La	0.00000 ± 0.50764	0.00000 ± 0.20248	0.00000 ± 0.44879	0.00000 ± 0.17445	0.00000 ± 0.36226	0.06422 ± 0.26678	0.00000 ± 0.18649
Au	0.00000 ± 0.01960	0.00000 ± 0.00800	0.00000 ± 0.01716	0.00000 ± 0.00714	0.00000 ± 0.01385	0.00000 ± 0.01016	0.00000 ± 0.00694
Hg	0.00000 ± 0.01559	0.00000 ± 0.00715	0.00000 ± 0.01432	0.01432 ± 0.00222	0.00000 ± 0.01089	0.00000 ± 0.00809	0.00000 ± 0.00548
Tl	0.00000 ± 0.01605	0.00000 ± 0.00750	0.00371 ± 0.01421	0.00000 ± 0.00597	0.00000 ± 0.01078	0.00000 ± 0.00776	0.00135 ± 0.00553
Pb	0.07614 ± 0.01210	0.02493 ± 0.03830	0.00000 ± 0.04013	0.00000 ± 0.02556	0.00000 ± 0.01583	0.00000 ± 0.01153	0.00000 ± 0.00804
U	0.00000 ± 0.01478	0.00000 ± 0.00604	0.00000 ± 0.01305	0.00000 ± 0.00540	0.00063 ± 0.01046	0.00000 ± 0.00771	0.00000 ± 0.00518
SO_2	27557.9 ± 755.684	11882.4 ± 201.017	35904.5 ± 923.656	9823.61 ± 162.734	2688.46 ± 65.1181	6269.39 ± 163.301	9343.11 ± 161.156
NH_3	4.17118 ± 0.19614	3.62513 ± 0.14989	10.24316 ± 0.47081	20.9438 ± 0.85919	6.28261 ± 0.27783	13.4588 ± 0.56663	2.24617 ± 0.09278

[a] Source profile descriptions are identified in Table 6.3.6.

continued . . .

Table C.6 (cont.)

Coal-Fired Boiler Source Profiles[a] (Weight Percent by Mass) Acquired in the Mt. Zirkel Visibility Study

	MZHD1PP1			MZHD2PP1			MZHD2PP2		
Cl^-	1.1192	±	0.3729	1.7935	±	0.0856	1.9673	±	0.0971
NO_3^-	0.3264	±	0.3669	0.0613	±	0.0127	0.2367	±	0.0345
$SO_4^=$	2.9689	±	0.4099	6.5484	±	0.2024	13.4584	±	0.4226
K^+	0.1111	±	0.0409	0.0848	±	0.0014	0.0915	±	0.0038
NH_4^+	1.5000	±	0.3846	7.4548	±	0.3614	10.8894	±	0.5699
OC	34.0933	±	3.5842	0.4534	±	0.0963	0.5356	±	0.2618
EC	4.3005	±	0.8216	0.2384	±	0.0377	0.5504	±	0.0895
Na	0.3861	±	0.8742	0.0000	±	0.0819	0.0000	±	0.1811
Mg	1.1545	±	0.2214	0.0643	±	0.0171	0.1554	±	0.0379
Al	10.3104	±	0.6661	1.8112	±	0.0182	4.1722	±	0.0447
Si	16.0225	±	1.0015	3.3763	±	0.0145	7.4709	±	0.0525
P	0.5721	±	0.0635	0.0765	±	0.0049	0.1375	±	0.0107
S	1.7107	±	0.1177	1.9534	±	0.0082	3.3302	±	0.0242
Cl	0.0000	±	0.1011	1.9574	±	0.0195	1.9814	±	0.0326
K	0.5813	±	0.0688	0.2439	±	0.0042	0.4309	±	0.0092
Ca	4.1202	±	0.2673	1.0859	±	0.0056	1.8021	±	0.0155
Ti	0.7703	±	0.2592	0.1820	±	0.0130	0.3018	±	0.0283
V	0.0675	±	0.1421	0.0100	±	0.0140	0.0158	±	0.0247
Cr	0.0052	±	0.0331	0.0046	±	0.0012	0.0059	±	0.0026
Mn	0.0243	±	0.0181	0.0088	±	0.0009	0.0117	±	0.0020
Fe	2.9309	±	0.1836	1.1181	±	0.0038	1.6642	±	0.0112
Co	0.0000	±	0.0485	0.0011	±	0.0170	0.0001	±	0.0254
Ni	0.0035	±	0.0146	0.0020	±	0.0004	0.0025	±	0.0011
Cu	0.0647	±	0.0114	0.0049	±	0.0004	0.0072	±	0.0010
Zn	0.0683	±	0.0126	0.0184	±	0.0005	0.0309	±	0.0012
Ga	0.0000	±	0.0348	0.0039	±	0.0010	0.0050	±	0.0026
As	0.0000	±	0.0379	0.0000	±	0.0152	0.0000	±	0.0204
Se	0.2201	±	0.0198	0.3391	±	0.0015	0.4293	±	0.0036
Br	0.0173	±	0.0120	0.1096	±	0.0009	0.0675	±	0.0016
Rb	0.0040	±	0.0147	0.0014	±	0.0039	0.0027	±	0.0029
Sr	0.1791	±	0.0172	0.0614	±	0.0006	0.0974	±	0.0016
Yt	0.0000	±	0.0204	0.0000	±	0.0013	0.0000	±	0.0023
Zr	0.0309	±	0.0182	0.0095	±	0.0010	0.0171	±	0.0021
Mo	0.0000	±	0.0433	0.0000	±	0.0018	0.0000	±	0.0043
Pd	0.0000	±	0.1292	0.0000	±	0.0055	0.0018	±	0.0136
Ag	0.0256	±	0.1508	0.0003	±	0.0063	0.0034	±	0.0155
Cd	0.0158	±	0.1508	0.0014	±	0.0064	0.0000	±	0.0159
In	0.0245	±	0.1836	0.0000	±	0.0076	0.0000	±	0.0189
Sn	0.0290	±	0.2263	0.0056	±	0.0093	0.0116	±	0.0230
Sb	0.0293	±	0.2734	0.0002	±	0.0110	0.0000	±	0.0271
Ba	0.0000	±	0.9902	0.2668	±	0.0273	0.4042	±	0.0722
La	0.0000	±	1.2817	0.0059	±	0.0503	0.0000	±	0.1251
Au	0.0000	±	0.0491	0.0000	±	0.0023	0.0000	±	0.0051
Hg	0.0032	±	0.0391	0.0006	±	0.0033	0.0005	±	0.0053
Tl	0.0000	±	0.0375	0.0012	±	0.0036	0.0035	±	0.0057
Pb	0.0000	±	0.0597	0.0031	±	0.0285	0.0090	±	0.0366
U	0.0000	±	0.0364	0.0000	±	0.0024	0.0004	±	0.0039
SO_2	5721.4	±	347.79	2215.8	±	39.410	1933.8	±	50.370
NH_3	3365.597	±	264.610	219.267	±	8.8401	762.968	±	31.030

[a] Source profile descriptions are identified in Table 6.3.6.

continued . . .

Table C.6 (cont.)

Coal-Fired Boiler Source Profiles[a] (Weight Percent by Mass) Acquired in the Mt. Zirkel Visibility Study

	MZCG2PPC	MZCG3PPC	MZHD2PPC	MZHDPPC	MZPPC
Cl^-	0.35384 ± 0.17562	1.32786 ± 0.42786	1.88040 ± 0.12290	1.62667 ± 0.44799	1.02789 ± 0.66857
NO_3^-	0.16142 ± 0.10439	0.78706 ± 0.72350	0.14900 ± 0.12403	0.20813 ± 0.21289	0.36313 ± 0.45464
$SO_4^{=}$	22.74604 ± 6.31846	12.67245 ± 3.08857	10.00340 ± 4.88611	7.65857 ± 5.33214	15.19772 ± 8.25474
K^+	0.25584 ± 0.06885	0.03969 ± 0.02838	0.08815 ± 0.00474	0.09580 ± 0.02373	0.14298 ± 0.10844
NH_4^+	2.82455 ± 1.70151	0.12016 ± 0.08251	9.17210 ± 2.42863	6.61473 ± 4.75074	3.15029 ± 3.61797
OC	2.24498 ± 2.68099	2.63074 ± 2.11356	0.49460 ± 0.19725	11.69417 ± 19.39826	5.19547 ± 10.23826
EC	8.07735 ± 4.30671	1.17200 ± 1.20063	0.39440 ± 0.22062	1.69643 ± 2.26058	4.09147 ± 4.41052
Na	1.59210 ± 0.50749	0.09273 ± 0.32980	0.00000 ± 0.14054	0.12870 ± 0.51760	0.70327 ± 0.82948
Mg	2.04953 ± 0.49569	0.21933 ± 0.05950	0.10985 ± 0.06442	0.45807 ± 0.60485	1.02303 ± 0.97673
Al	4.15974 ± 0.27852	1.80493 ± 0.50567	2.99170 ± 1.66948	5.43127 ± 4.38726	3.83475 ± 2.57487
Si	7.97502 ± 0.62650	3.11902 ± 0.84224	5.42360 ± 2.89532	8.95657 ± 6.45267	6.81268 ± 4.02758
P	0.14805 ± 0.03757	0.04447 ± 0.04597	0.10700 ± 0.04313	0.26203 ± 0.27025	0.15117 ± 0.15717
S	8.79748 ± 1.46151	5.64188 ± 2.36223	2.64180 ± 0.97354	2.33143 ± 0.87343	5.91099 ± 3.18116
Cl	0.00000 ± 0.16467	0.70189 ± 0.25296	1.96940 ± 0.02686	1.31293 ± 1.13710	0.60445 ± 0.79650
K	0.79573 ± 0.06174	0.17875 ± 0.04726	0.33740 ± 0.13223	0.41870 ± 0.16903	0.49753 ± 0.28911
Ca	3.47185 ± 0.28413	14.67140 ± 6.84184	1.44400 ± 0.50643	2.33607 ± 1.58606	6.49098 ± 6.56508
Ti	0.19558 ± 0.09683	0.08890 ± 0.07159	0.24190 ± 0.08471	0.41803 ± 0.31090	0.23031 ± 0.20447
V	0.00528 ± 0.06136	0.01044 ± 0.03290	0.01290 ± 0.02008	0.03110 ± 0.08366	0.01457 ± 0.06270
Cr	0.01100 ± 0.01075	0.00687 ± 0.00740	0.00525 ± 0.00202	0.00523 ± 0.01918	0.00803 ± 0.01315
Mn	0.10358 ± 0.01697	0.01565 ± 0.00775	0.01025 ± 0.00205	0.01493 ± 0.01053	0.05061 ± 0.04694
Fe	3.07065 ± 0.17441	0.99661 ± 0.32503	1.39115 ± 0.38615	1.90440 ± 0.92996	2.09856 ± 1.03107
Co	0.00183 ± 0.04753	0.00054 ± 0.01656	0.00060 ± 0.02161	0.00040 ± 0.03310	0.00102 ± 0.03626
Ni	0.00740 ± 0.00199	0.00328 ± 0.00255	0.00225 ± 0.00083	0.00267 ± 0.00846	0.00474 ± 0.00494
Cu	0.01147 ± 0.00367	0.00514 ± 0.00227	0.00605 ± 0.00163	0.02560 ± 0.03388	0.01381 ± 0.01829
Zn	0.03386 ± 0.00961	0.01392 ± 0.00338	0.02465 ± 0.00884	0.03920 ± 0.02596	0.02948 ± 0.01743
Ga	0.00000 ± 0.00994	0.00000 ± 0.00739	0.00445 ± 0.00197	0.00297 ± 0.02016	0.00089 ± 0.01333
As	0.00000 ± 0.02224	0.00000 ± 0.00824	0.00000 ± 0.01799	0.00000 ± 0.02635	0.00000 ± 0.02065
Se	0.34250 ± 0.08122	0.00000 ± 0.00388	0.38420 ± 0.06378	0.32950 ± 0.10493	0.23585 ± 0.17654
Br	0.01888 ± 0.01038	0.03292 ± 0.02609	0.08855 ± 0.02977	0.06480 ± 0.04621	0.03687 ± 0.03272
Rb	0.00319 ± 0.00415	0.00120 ± 0.00366	0.00205 ± 0.00344	0.00270 ± 0.00894	0.00245 ± 0.00591
Sr	0.17182 ± 0.01348	0.06034 ± 0.01973	0.07940 ± 0.02546	0.11263 ± 0.06031	0.12062 ± 0.05790
Yt	0.00000 ± 0.00593	0.00069 ± 0.00444	0.00000 ± 0.00187	0.00000 ± 0.01188	0.00021 ± 0.00789
Zr	0.00736 ± 0.00845	0.00242 ± 0.00579	0.01330 ± 0.00537	0.01917 ± 0.01085	0.00942 ± 0.00897
Mo	0.00000 ± 0.01231	0.00000 ± 0.00939	0.00000 ± 0.00330	0.00000 ± 0.02514	0.00000 ± 0.01663
Pd	0.00743 ± 0.03872	0.00584 ± 0.03056	0.00090 ± 0.01037	0.00060 ± 0.07507	0.00491 ± 0.05070
Ag	0.00888 ± 0.04517	0.00245 ± 0.03558	0.00185 ± 0.01183	0.00977 ± 0.08760	0.00722 ± 0.05915
Cd	0.00267 ± 0.04553	0.00000 ± 0.03604	0.00070 ± 0.01212	0.00573 ± 0.08762	0.00279 ± 0.05935
In	0.00398 ± 0.05432	0.00035 ± 0.04360	0.00000 ± 0.01440	0.00817 ± 0.10665	0.00415 ± 0.07185
Sn	0.02958 ± 0.06756	0.00561 ± 0.05212	0.00860 ± 0.01754	0.01540 ± 0.13144	0.01813 ± 0.08845
Sb	0.00000 ± 0.07842	0.00000 ± 0.06147	0.00010 ± 0.02068	0.00983 ± 0.15875	0.00295 ± 0.10561
Ba	1.01816 ± 0.13991	0.20259 ± 0.15782	0.33550 ± 0.09716	0.22367 ± 0.57343	0.53514 ± 0.43718
La	0.00000 ± 0.36419	0.02141 ± 0.28118	0.00295 ± 0.09534	0.00197 ± 0.74407	0.00701 ± 0.49281
Au	0.00000 ± 0.01408	0.00000 ± 0.01069	0.00000 ± 0.00396	0.00000 ± 0.02853	0.00000 ± 0.01892
Hg	0.00358 ± 0.01123	0.00000 ± 0.00845	0.00055 ± 0.00441	0.00143 ± 0.02286	0.00186 ± 0.01512
Tl	0.00093 ± 0.01174	0.00045 ± 0.00831	0.00235 ± 0.00477	0.00157 ± 0.02200	0.00098 ± 0.01487
Pb	0.02527 ± 0.03589	0.00000 ± 0.01222	0.00605 ± 0.03280	0.00403 ± 0.04365	0.01132 ± 0.03169
U	0.00000 ± 0.01066	0.00021 ± 0.00807	0.00020 ± 0.00324	0.00013 ± 0.02118	0.00010 ± 0.01413
SO_2	21297.1 ± 12557.9	6100.32 ± 3330.54	2074.78 ± 199.369	3290.33 ± 2110.11	11336.0 ± 11438.3
NH_3	9.74580 ± 8.04530	7.32920 ± 5.67912	491.118 ± 384.454	1449.28 ± 1681.699	440.880 ± 1054.86

[a] Source profile descriptions are identified in Table 6.3.6.

Table C.7

Regional Background Source Profiles[a] (Weight Percent by Sum of Species) Acquired in the Mt. Zirkel Visibility Study

	MZBBRC	MZJURC	MZRC
Cl^-	0.2464 ± 1.0190	0.0000 ± 0.8003	0.1344 ± 0.9260
NO_3^-	1.8201 ± 0.9304	1.6210 ± 0.7117	1.7296 ± 0.8381
$SO_4^=$	27.3481 ± 10.1518	30.4337 ± 4.8768	28.7506 ± 8.3298
K^+	0.3303 ± 0.5126	0.4712 ± 0.3825	0.3943 ± 0.4634
NH_4^+	10.2225 ± 2.6856	11.9393 ± 1.5579	10.5086 ± 2.5338
OC	44.9861 ± 19.2063	41.0873 ± 8.6825	43.2139 ± 15.3452
EC	10.7763 ± 7.7703	14.0512 ± 4.5054	12.2649 ± 6.0820
Na	0.9816 ± 1.0014	0.3129 ± 0.5235	0.6777 ± 0.8195
Mg	0.2570 ± 0.5261	0.3060 ± 0.2350	0.2793 ± 0.4196
Al	0.8026 ± 0.6596	2.1568 ± 1.8142	1.4182 ± 1.4188
Si	2.1395 ± 2.0735	3.4732 ± 1.7080	2.7457 ± 1.8733
P	0.0311 ± 0.1766	0.0000 ± 0.0809	0.0170 ± 0.1414
S	10.1691 ± 4.2933	11.6515 ± 2.1442	10.8429 ± 3.5621
Cl	0.0110 ± 0.5216	0.0506 ± 0.3481	0.0290 ± 0.4511
K	0.5292 ± 0.5073	0.8645 ± 0.4904	0.6816 ± 0.5268
Ca	0.4798 ± 0.5679	1.0774 ± 0.6705	0.7514 ± 0.6847
Ti	0.0283 ± 0.5534	0.0241 ± 0.2383	0.0264 ± 0.4392
V	0.0027 ± 0.2268	0.0000 ± 0.1300	0.0015 ± 0.1891
Cr	0.0042 ± 0.0545	0.0046 ± 0.0399	0.0044 ± 0.0484
Mn	0.0095 ± 0.0386	0.0148 ± 0.0185	0.0119 ± 0.0311
Fe	0.4575 ± 0.6291	1.0100 ± 0.5555	0.7086 ± 0.5507
Co	0.0000 ± 0.0262	0.0010 ± 0.0209	0.0004 ± 0.0240
Ni	0.0016 ± 0.0247	0.0103 ± 0.0179	0.0056 ± 0.0196
Cu	0.0045 ± 0.0773	0.0855 ± 0.0916	0.0413 ± 0.0738
Zn	0.0558 ± 0.3458	0.4370 ± 0.2638	0.2291 ± 0.2629
Ga	0.0010 ± 0.0468	0.0012 ± 0.0094	0.0011 ± 0.0351
As	0.0078 ± 0.0540	0.0036 ± 0.0105	0.0059 ± 0.0405
Se	0.0055 ± 0.0283	0.0050 ± 0.0038	0.0053 ± 0.0211
Br	0.0190 ± 0.0257	0.0459 ± 0.0199	0.0312 ± 0.0216
Rb	0.0043 ± 0.0243	0.0026 ± 0.0047	0.0035 ± 0.0182
Sr	0.0074 ± 0.0271	0.0180 ± 0.0197	0.0122 ± 0.0204
Yt	0.0000 ± 0.0328	0.0030 ± 0.0063	0.0014 ± 0.0246
Zr	0.0062 ± 0.0390	0.0055 ± 0.0064	0.0059 ± 0.0291
Mo	0.0065 ± 0.0706	0.0032 ± 0.0137	0.0050 ± 0.0530
Pd	0.0238 ± 0.2191	0.0114 ± 0.0868	0.0182 ± 0.1720
Ag	0.0565 ± 0.2517	0.0056 ± 0.1009	0.0334 ± 0.1980
Cd	0.0260 ± 0.2538	0.0161 ± 0.1017	0.0215 ± 0.1996
In	0.0343 ± 0.3050	0.0049 ± 0.1674	0.0209 ± 0.2519
Sn	0.0495 ± 0.3787	0.0337 ± 0.1519	0.0424 ± 0.2978
Sb	0.1117 ± 0.4487	0.0211 ± 0.1810	0.0705 ± 0.3532
Ba	0.2559 ± 1.6297	0.1719 ± 0.6510	0.2177 ± 1.2811
La	0.1146 ± 2.1240	0.2153 ± 0.8578	0.1604 ± 1.6719
Au	0.0060 ± 0.0756	0.0020 ± 0.0234	0.0042 ± 0.0580
Hg	0.0055 ± 0.0625	0.0012 ± 0.0134	0.0035 ± 0.0470
Tl	0.0050 ± 0.0610	0.0011 ± 0.0126	0.0033 ± 0.0458
Pb	0.0008 ± 0.0819	0.0153 ± 0.0131	0.0074 ± 0.0611
U	0.0074 ± 0.0602	0.0024 ± 0.0126	0.0051 ± 0.0453
SO_2	9.2958 ± 3.8196	6.5594 ± 7.1134	8.0520 ± 5.7284
NH_3	7.3078 ± 8.2668 [b]	7.3078 ± 8.2668	7.3078 ± 8.2668

[a] Source profile descriptions are identified in Table 6.3.7.

[b] No ammonia was measured. Assume the same chemical abundance found at the Juniper Mountain site.

Mt. Zirkel Wilderness Area
Reasonable Attribution Study of Visibility Impairment

Volume II: Results of Data Analysis and Modeling
Final Report

July 1, 1996

APPENDIX D

MODEL RESULTS

Table D.1

Individual Source Contribution to $PM_{2.5}$ Mass at the Six Sites between 02/16/95 and 10/29/95 during the Mt. Zirkel Visibility Study

Site	Date	Start Hour[a]	Primary Geological SCE ± σ (µg/m³)	Primary Motor Vehicle SCE ± σ (µg/m³)	Coal-Fired Generating Station SCE ± σ (µg/m³)	Vegetative Burning SCE ± σ (µg/m³)	Secondary Ammonium Sulfate SCE ± σ (µg/m³)	Secondary Ammonium Nitrate SCE ± σ (µg/m³)	Measured Mass ± σ (µg/m³)	Calculated[b] Mass ± σ (µg/m³)	Unexplained[c] Mass ± σ (µg/m³)
Baggs/Baker	2/23/95	6	0.4155 ± 0.2431	1.2234 ± 0.8263	0.8720 ± 0.0954	0.0000 ± 0.0000	0.4295 ± 0.1646	0.3969 ± 0.1010	2.2931 ± 0.0358	3.3373 ± 0.8878	-1.0442 ± 1.3330
Baggs/Baker	2/23/95	12	0.4071 ± 0.2413	0.8230 ± 0.6098	1.1396 ± 0.1230	0.0000 ± 0.0000	0.8894 ± 0.1875	0.4556 ± 0.0847	3.2612 ± 0.0430	3.7149 ± 0.6982	-0.4537 ± 1.1825
~~Baggs/Baker~~	~~8/7/95~~	~~6~~	~~2.0906 ± 0.2764~~	~~1.4262 ± 0.9809~~	~~0.2165 ± 0.0276~~	~~2.4008 ± 0.6690~~	~~1.5801 ± 0.2205~~	~~0.1966 ± 0.1112~~	~~6.4920 ± 0.5515~~	~~7.9130 ± 1.2441~~	~~-1.4210 ± 1.6710~~
Baggs/Baker	8/7/95	12	1.2666 ± 0.2555	1.3225 ± 0.9070	0.0329 ± 0.0066	1.5719 ± 0.6168	1.4545 ± 0.1995	0.1403 ± 0.1024	3.8528 ± 0.4643	5.7887 ± 1.1483	-1.9359 ± 1.5850
Baggs/Baker	8/8/95	6	3.5072 ± 0.2490	2.1082 ± 1.2884	0.1133 ± 0.0154	3.6429 ± 0.7710	1.9372 ± 0.2819	0.3119 ± 0.1578	7.8697 ± 0.5785	11.6207 ± 1.5560	-3.7510 ± 1.8565
Baggs/Baker	8/8/95	12	3.0536 ± 0.2596	2.1784 ± 1.3820	0.0838 ± 0.0121	3.3234 ± 0.7984	1.1315 ± 0.2257	0.3496 ± 0.1674	6.4782 ± 0.5622	10.1203 ± 1.6413	-3.6421 ± 1.8970
Baggs/Baker	8/9/95	6	3.2051 ± 0.2208	0.0000 ± 0.0000	0.5140 ± 0.0627	0.9556 ± 0.2829	0.5200 ± 0.1129	0.1459 ± 0.0438	7.9140 ± 0.5943	5.3406 ± 0.3839	2.5734 ± 1.0588
Baggs/Baker	8/9/95	12	2.7598 ± 0.2398	1.4011 ± 0.9544	0.2812 ± 0.0352	1.1745 ± 0.6792	0.8458 ± 0.1626	0.2312 ± 0.1107	6.6937 ± 0.5678	6.6936 ± 1.2123	0.0001 ± 1.6574
Baggs/Baker	8/14/95	6	0.7561 ± 0.2313	1.7551 ± 1.1474	0.0866 ± 0.0114	0.0580 ± 0.7003	0.3736 ± 0.1452	0.2010 ± 0.1288	2.4444 ± 0.0381	3.2304 ± 1.3778	-0.7860 ± 1.6604
Baggs/Baker	8/22/95	6	0.4426 ± 0.2271	0.8068 ± 0.6671	0.5140 ± 0.0636	0.4747 ± 0.6004	1.8535 ± 0.2412	0.1139 ± 0.0732	4.1553 ± 0.5246	4.2055 ± 0.9616	-0.0502 ± 1.4827
Baggs/Baker	8/22/95	12	0.3073 ± 0.2377	1.5929 ± 1.0843	0.0687 ± 0.0100	0.2223 ± 0.7068	2.2042 ± 0.2822	0.1210 ± 0.1206	4.5973 ± 0.5402	4.5164 ± 1.3513	0.0809 ± 1.7304
Baggs/Baker	8/23/95	6	0.3936 ± 0.2327	1.0165 ± 0.7801	0.5794 ± 0.0717	0.3070 ± 0.6411	1.2724 ± 0.1991	0.0845 ± 0.0844	5.0247 ± 0.5503	3.6534 ± 1.0610	1.3713 ± 1.5572
Baggs/Baker	8/23/95	12	0.3917 ± 0.2293	0.9292 ± 0.7180	0.0559 ± 0.0171	0.2371 ± 0.6247	2.2421 ± 0.2658	0.1004 ± 0.0792	4.0854 ± 0.5277	3.9564 ± 1.0176	0.1290 ± 1.5211
Baggs/Baker	8/23/95	12	0.3806 ± 0.2291	0.9323 ± 0.7192	0.0559 ± 0.0171	0.2442 ± 0.6256	2.2419 ± 0.2658	0.1002 ± 0.0794	4.0854 ± 0.5277	3.9551 ± 1.0190	0.1303 ± 1.5220
Baggs/Baker	8/24/95	6	0.4426 ± 0.2302	1.5098 ± 1.0086	0.3401 ± 0.0423	0.0134 ± 0.6796	1.9874 ± 0.2641	0.1315 ± 0.1161	5.2768 ± 0.5418	4.4048 ± 1.2717	0.8720 ± 1.6843
Baggs/Baker	8/24/95	12	0.5739 ± 0.2327	1.4523 ± 0.9763	0.0123 ± 0.0062	0.2268 ± 0.6809	1.1633 ± 0.1811	0.1461 ± 0.1128	4.2839 ± 0.5268	3.5747 ± 1.2315	0.7092 ± 1.6555
Baggs/Baker	8/25/95	6	0.3873 ± 0.2228	1.4753 ± 0.9756	0.1731 ± 0.0221	0.0507 ± 0.6572	1.0773 ± 0.1783	0.1124 ± 0.1131	4.9335 ± 0.5217	3.2761 ± 1.2159	1.6574 ± 1.6444
Baggs/Baker	8/25/95	12	0.4540 ± 0.2288	1.6100 ± 1.0502	0.0711 ± 0.0103	0.1692 ± 0.6822	1.7312 ± 0.2384	0.0772 ± 0.1221	5.0556 ± 0.5337	4.1127 ± 1.3010	0.9429 ± 1.6991
Baggs/Baker	8/26/95	6	0.4007 ± 0.2338	2.0518 ± 1.2943	0.1173 ± 0.0146	0.2215 ± 0.7251	1.8972 ± 0.2756	0.1845 ± 0.1528	4.2072 ± 0.0431	4.8730 ± 1.5347	-0.6658 ± 1.7525
Baggs/Baker	8/26/95	12	0.4672 ± 0.2307	1.8006 ± 1.1700	0.1016 ± 0.0129	0.0853 ± 0.7012	1.6009 ± 0.2371	0.1922 ± 0.1362	3.3268 ± 0.0419	4.2478 ± 1.4102	-0.9210 ± 1.6799
Baggs/Baker	8/27/95	6	0.5996 ± 0.2267	1.4162 ± 0.9636	0.2657 ± 0.0322	0.3446 ± 0.6634	1.2388 ± 0.1703	0.1269 ± 0.1071	5.2672 ± 0.0404	3.9918 ± 1.2089	1.2754 ± 1.5555
Baggs/Baker	8/27/95	12	0.3958 ± 0.2297	1.4394 ± 0.9963	0.0584 ± 0.0085	0.4277 ± 0.6770	1.6294 ± 0.2219	0.1727 ± 0.1121	3.1794 ± 0.0409	4.1234 ± 1.2512	-0.9440 ± 1.5824
Baggs/Baker	9/2/95	6	0.5419 ± 0.2286	1.7632 ± 1.1599	0.3189 ± 0.0381	1.5008 ± 0.7014	2.3262 ± 0.2606	0.1694 ± 0.1309	5.4830 ± 0.0487	6.6204 ± 1.4057	-1.1374 ± 1.6774
Baggs/Baker	9/2/95	12	0.5507 ± 0.2203	1.0360 ± 0.7553	0.0420 ± 0.0071	0.6084 ± 0.6158	1.3528 ± 0.1529	0.1357 ± 0.0841	3.9831 ± 0.0412	3.7256 ± 1.0143	0.2575 ± 1.4249
Baggs/Baker	9/17/95	6	0.8724 ± 0.2306	1.4034 ± 0.9763	0.2179 ± 0.0260	0.9035 ± 0.6735	0.8136 ± 0.1433	0.1853 ± 0.1071	3.5537 ± 0.0410	4.3961 ± 1.2217	-0.8424 ± 1.5637
Baggs/Baker	9/17/95	12	2.0399 ± 0.2540	1.9803 ± 1.2467	0.0897 ± 0.0118	0.9960 ± 0.7671	1.3298 ± 0.2037	0.1356 ± 0.1440	6.1956 ± 0.0433	6.5713 ± 1.5065	-0.3757 ± 1.7363
Baggs/Baker	9/18/95	6	0.4253 ± 0.2334	1.7930 ± 1.1486	0.1123 ± 0.0140	0.4430 ± 0.7073	1.5792 ± 0.2093	0.0534 ± 0.1308	4.3227 ± 0.0401	4.4062 ± 1.3911	-0.0835 ± 1.6685
Baggs/Baker	9/18/95	12	0.6022 ± 0.2337	1.6386 ± 1.0897	0.0842 ± 0.0196	0.7660 ± 0.7000	1.4659 ± 0.1922	0.0655 ± 0.1206	3.7360 ± 0.0410	4.6224 ± 1.3356	-0.8864 ± 1.6349
Baggs/Baker	9/19/95	6	0.2647 ± 0.2286	1.4611 ± 0.9851	0.4220 ± 0.0495	0.2238 ± 0.6711	1.2487 ± 0.1802	0.1988 ± 0.1110	3.7451 ± 0.0401	3.8191 ± 1.2330	-0.0740 ± 1.5709
Baggs/Baker	9/19/95	12	0.8448 ± 0.2414	1.8805 ± 1.2248	0.1620 ± 0.0256	1.1058 ± 0.7383	0.7167 ± 0.1679	0.1136 ± 0.1361	4.3651 ± 0.0391	4.8234 ± 1.4666	-0.4583 ± 1.7131
Baggs/Baker	9/20/95	6	0.2979 ± 0.2248	1.0800 ± 0.8140	0.0575 ± 0.0083	0.2147 ± 0.6299	1.4218 ± 0.1599	0.1170 ± 0.0868	2.0150 ± 0.0420	3.1889 ± 1.0691	-1.1739 ± 1.4629
Baggs/Baker	9/20/95	12	0.2404 ± 0.2218	0.7374 ± 0.6220	0.0507 ± 0.0078	0.2216 ± 0.5814	1.2696 ± 0.1341	0.0738 ± 0.0674	1.3516 ± 0.0421	2.5935 ± 0.8926	-1.2419 ± 1.3368
Baggs/Baker	9/21/95	6	0.1037 ± 0.2268	0.7851 ± 0.6522	0.0098 ± 0.0050	0.1526 ± 0.5909	0.7304 ± 0.0998	0.0486 ± 0.0692	0.3384 ± 0.0399	1.8302 ± 0.9169	-1.4918 ± 1.3548
Baggs/Baker	9/21/95	12	0.5143 ± 0.2251	0.0000 ± 0.0000	0.0285 ± 0.0061	0.1353 ± 0.2868	0.4586 ± 0.0580	0.0930 ± 0.0436	1.2707 ± 0.0390	1.2297 ± 0.3718	0.0410 ± 0.8632
Baggs/Baker	9/24/95	6	0.5867 ± 0.1357	0.9279 ± 0.6190	0.7019 ± 0.4156	0.6372 ± 0.3712	1.5648 ± 0.2499	0.0991 ± 0.0694	4.5978 ± 0.0402	4.5176 ± 0.8828	0.0802 ± 1.3294
Baggs/Baker	9/24/95	12	0.4477 ± 0.2171	0.0326 ± 0.2217	0.0589 ± 0.0084	0.0968 ± 0.4285	1.5415 ± 0.1349	0.0609 ± 0.0432	3.6961 ± 0.0424	2.2384 ± 0.5478	1.4577 ± 1.0476
Baggs/Baker	9/30/95	6	0.2449 ± 0.2142	0.6284 ± 0.5358	0.0264 ± 0.0057	0.0000 ± 0.0000	0.2808 ± 0.0665	0.0598 ± 0.0598	0.5614 ± 0.0372	1.2403 ± 0.5839	-0.6789 ± 1.0813
Baggs/Baker	9/30/95	12	0.3633 ± 0.2120	0.0781 ± 0.1586	0.0395 ± 0.0057	0.0000 ± 0.0000	1.0790 ± 0.1010	0.0560 ± 0.0418	3.2156 ± 0.0383	1.6159 ± 0.2865	1.5997 ± 0.7579
Baggs/Baker	10/1/95	6	0.4592 ± 0.2175	1.0002 ± 0.7366	0.2134 ± 0.0251	0.0000 ± 0.0000	0.8642 ± 0.1231	0.0844 ± 0.0808	3.4232 ± 0.0386	2.6214 ± 0.7824	0.8018 ± 1.2515
Baggs/Baker	10/1/95	12	0.4730 ± 0.2187	0.9342 ± 0.6866	0.0186 ± 0.0054	0.0000 ± 0.0000	0.4436 ± 0.0904	0.0000 ± 0.0000	1.9910 ± 0.0371	1.8694 ± 0.7263	0.1216 ± 1.2058
Baggs/Baker	10/2/95	6	0.5246 ± 0.2229	1.5860 ± 1.0275	0.0784 ± 0.0106	0.0000 ± 0.0000	0.6142 ± 0.1412	0.2609 ± 0.1195	2.3584 ± 0.0396	3.0641 ± 1.0676	-0.7057 ± 1.4618
Baggs/Baker	10/2/95	12	0.3872 ± 0.2179	0.9701 ± 0.7039	0.0967 ± 0.0123	0.0000 ± 0.0000	0.4690 ± 0.0963	0.2330 ± 0.0824	1.0387 ± 0.0396	2.1560 ± 0.7478	-1.1173 ± 1.2236
Baggs/Baker	10/7/95	6	1.3626 ± 0.2249	0.9927 ± 0.7025	0.3404 ± 0.0398	0.0000 ± 0.0000	0.6053 ± 0.1148	0.0784 ± 0.0803	4.2415 ± 0.0384	3.3794 ± 0.7519	0.8621 ± 1.2269
Baggs/Baker	10/7/95	12	1.0872 ± 0.2194	0.9139 ± 0.6795	0.1453 ± 0.0173	0.0000 ± 0.0000	0.7595 ± 0.1099	0.0647 ± 0.0758	2.6025 ± 0.0388	2.9706 ± 0.7266	-0.3681 ± 1.2061
Baggs/Baker	10/8/95	6	0.7053 ± 0.2221	0.8383 ± 0.7740	0.1497 ± 0.0180	3.7245 ± 0.6291	0.9261 ± 0.1183	0.3619 ± 0.0816	5.8515 ± 0.0444	6.7058 ± 1.0321	-0.8543 ± 1.4374
Baggs/Baker	10/8/95	12	0.5802 ± 0.2175	0.3112 ± 0.3887	0.0272 ± 0.0059	1.0888 ± 0.4801	0.6658 ± 0.0764	0.0560 ± 0.0473	2.7454 ± 0.0382	2.7292 ± 0.6611	0.0162 ± 1.1505
Baggs/Baker	10/9/95	6	0.7954 ± 0.2175	0.5101 ± 0.4837	0.1998 ± 0.0236	0.6802 ± 0.5310	0.6100 ± 0.0853	0.0956 ± 0.0559	3.3118 ± 0.0390	2.8911 ± 0.7578	0.4207 ± 1.2317
Baggs/Baker	10/9/95	12	1.3282 ± 0.2304	0.7737 ± 0.6481	0.0301 ± 0.0061	0.7439 ± 0.6046	0.5260 ± 0.0885	0.1121 ± 0.0705	4.2323 ± 0.0412	3.5140 ± 0.9228	0.7183 ± 1.3592
Baggs/Baker	10/10/95	6	1.0130 ± 0.2259	1.1370 ± 0.8177	0.1573 ± 0.0190	1.1938 ± 0.6454	0.5948 ± 0.1145	0.1608 ± 0.0902	3.1167 ± 0.0390	4.2567 ± 1.0760	-1.1400 ± 1.4675
Baggs/Baker	10/10/95	12	0.8540 ± 0.2264	1.0390 ± 0.7730	0.0248 ± 0.0058	0.8378 ± 0.6337	0.5400 ± 0.1034	0.2303 ± 0.0864	2.6898 ± 0.0401	3.5259 ± 1.0337	-0.8361 ± 1.4384
Baggs/Baker	10/11/95	6	0.9329 ± 0.2219	0.9668 ± 0.7271	0.2606 ± 0.0303	0.3636 ± 0.6160	0.4011 ± 0.1002	0.0518 ± 0.0784	2.9441 ± 0.0378	2.9768 ± 0.9872	-0.0327 ± 1.4056
Baggs/Baker	10/11/95	12	1.7363 ± 0.2377	1.4096 ± 0.9586	0.0872 ± 0.0113	0.2193 ± 0.6877	0.6975 ± 0.1345	0.0918 ± 0.1064	4.6884 ± 0.0399	4.2417 ± 1.2157	0.4467 ± 1.5598
Baggs/Baker	10/12/95	6	1.1161 ± 0.2364	1.9112 ± 1.1786	0.1681 ± 0.0199	0.5048 ± 0.7214	1.6897 ± 0.2216	0.0833 ± 0.1386	5.9547 ± 0.0446	5.4732 ± 1.4262	0.4815 ± 1.6895
Baggs/Baker	10/12/95	12	2.0970 ± 0.2120	0.0000 ± 0.0000	0.0506 ± 0.0076	0.5161 ± 0.2900	1.0820 ± 0.1025	0.1256 ± 0.0453	5.5467 ± 0.0408	3.8713 ± 0.3764	1.6754 ± 0.8686
Baggs/Baker	10/13/95	6	0.6020 ± 0.2115	0.5403 ± 0.4768	0.1360 ± 0.0163	0.0000 ± 0.0000	0.2346 ± 0.0633	0.0931 ± 0.0560	2.3158 ± 0.0373	1.6060 ± 0.5287	0.7098 ± 1.0290
Baggs/Baker	10/13/95	12	0.8290 ± 0.2364	0.0000 ± 0.0000	0.0587 ± 0.0084	0.2715 ± 0.2996	0.2903 ± 0.0479	0.0544 ± 0.0423	3.5869 ± 0.0380	1.5039 ± 0.3870	2.0830 ± 0.8806
Baggs/Baker	10/14/95	6	0.6493 ± 0.2163	0.0699 ± 0.2553	0.5000 ± 0.0574	0.4225 ± 0.4275	0.1213 ± 0.0798	0.0743 ± 0.0429	2.8670 ± 0.0375	1.8373 ± 0.5534	1.0297 ± 1.0527
Baggs/Baker	10/14/95	12	0.5355 ± 0.2202	0.6598 ± 0.5901	0.2079 ± 0.0245	0.2602 ± 0.5657	0.3016 ± 0.0767	0.0591 ± 0.0619	2.7454 ± 0.0380	2.0241 ± 0.8527	0.7213 ± 1.3065

Table D.1 (cont.)

Individual Source Contribution to $PM_{2.5}$ Mass at the Six Sites between 02/16/95 and 10/29/95 during the Mt. Zirkel Visibility Study

Site	Date	Start Hour[a]	Primary Geological SCE ± σ (μg/m³)	Primary Motor Vehicle SCE ± σ (μg/m³)	Coal-Fired Generating Station SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Ammonium Sulfate SCE ± σ (μg/m³)	Secondary Ammonium Nitrate SCE ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Calculated[b] Mass ± σ (μg/m³)	Unexplained[c] Mass ± σ (μg/m³)
Buffalo Pass	2/23/95	6	0.0871 ± 0.0198	0.5667 ± 0.3799	0.4119 ± 0.0446	0.2942 ± 0.1045	0.2702 ± 0.0871	0.3002 ± 0.0622	1.9907 ± 0.0350	1.9303 ± 0.4112	0.0604 ± 0.9075
~~Buffalo Pass~~	~~2/23/95~~	~~12~~	~~0.0854 ± 0.0190~~	~~0.0226 ± 0.4052~~	~~0.1972 ± 0.0222~~	~~0.2097 ± 0.1102~~	~~0.5376 ± 0.0836~~	~~0.1506 ± 0.0590~~	~~1.1446 ± 0.0349~~	~~1.8027 ± 0.4332~~	~~-0.6579 ± 0.9315~~
Buffalo Pass	3/26/95	6	0.2355 ± 0.0196	0.2282 ± 0.1660	0.2560 ± 0.0288	0.0735 ± 0.0485	0.8929 ± 0.1134	0.0972 ± 0.0272	1.8779 ± 0.2299	1.7833 ± 0.2115	0.0946 ± 0.6898
Buffalo Pass	3/27/95	6	0.1976 ± 0.0498	1.1728 ± 0.7221	0.4993 ± 0.0562	0.0085 ± 0.2040	1.8707 ± 0.2488	0.1778 ± 0.0872	3.1349 ± 0.2597	3.9267 ± 0.7989	-0.7918 ± 1.2904
Buffalo Pass	3/28/95	6	0.1857 ± 0.0345	0.8306 ± 0.5135	0.0464 ± 0.0079	0.0546 ± 0.1470	1.9608 ± 0.2307	0.3038 ± 0.0706	3.2814 ± 0.2707	3.3819 ± 0.5872	-0.1005 ± 1.1170
Buffalo Pass	3/29/95	6	0.1897 ± 0.0204	0.3305 ± 0.2214	0.2182 ± 0.0249	0.3803 ± 0.0678	1.9842 ± 0.2289	0.8923 ± 0.1083	-99.0000 ± -99.0000	3.9952 ± 0.3446	-99.0000 ± -99.0000
Buffalo Pass	3/30/95	6	0.1918 ± 0.0315	0.5247 ± 0.3313	0.5481 ± 0.0437	0.1646 ± 0.0966	2.8156 ± 0.3233	0.1366 ± 0.0444	3.7060 ± 0.2772	4.3814 ± 0.4780	-0.6754 ± 1.0163
Buffalo Pass	3/31/95	6	0.8286 ± 0.0545	0.7561 ± 0.4666	0.1534 ± 0.0131	0.5799 ± 0.1597	2.1750 ± 0.2522	0.2836 ± 0.0647	4.2680 ± 0.3007	4.7766 ± 0.5605	-0.4886 ± 1.1006
Buffalo Pass	5/6/95	6	3.0756 ± 0.1429	0.6091 ± 0.3873	0.0226 ± 0.0029	1.1477 ± 0.2909	0.9456 ± 0.1186	0.1655 ± 0.0505	4.3418 ± 0.3012	5.9661 ± 0.5212	-1.6243 ± 1.0645
Buffalo Pass	5/7/95	6	2.5522 ± 0.1502	0.5091 ± 0.3459	0.2443 ± 0.2628	1.2166 ± 0.2571	1.2126 ± 0.1464	0.2481 ± 0.0492	3.9553 ± 0.2913	5.9829 ± 0.5488	-2.0276 ± 1.0874
Buffalo Pass	6/14/95	6	1.1897 ± 0.0690	0.8168 ± 0.5150	0.0344 ± 0.0038	3.8259 ± 0.2930	1.2559 ± 0.1581	0.2347 ± 0.0666	5.3450 ± 0.3384	7.3574 ± 0.6207	-2.0124 ± 1.1644
Buffalo Pass	6/15/95	6	0.6580 ± 0.0454	0.6544 ± 0.4126	0.0073 ± 0.0022	2.1190 ± 0.1855	2.5435 ± 0.2946	0.1081 ± 0.0514	5.3341 ± 0.3385	6.0903 ± 0.5442	-0.7562 ± 1.0968
Buffalo Pass	6/16/95	6	0.9205 ± 0.1596	1.0648 ± 0.6676	0.0278 ± 0.0067	1.5911 ± 0.2647	1.5551 ± 0.1962	0.2004 ± 0.0808	5.7732 ± 0.3721	5.3597 ± 0.7657	0.4135 ± 1.2922
Buffalo Pass	6/29/95	6	0.0924 ± 0.0182	0.2989 ± 0.1991	0.0096 ± 0.0058	0.0249 ± 0.0566	0.5120 ± 0.0647	0.0691 ± 0.0296	1.3189 ± 0.2146	1.0069 ± 0.2197	0.3120 ± 0.6967
Buffalo Pass	6/30/95	6	0.3408 ± 0.0260	0.4874 ± 0.3181	0.2509 ± 0.0284	0.7167 ± 0.1008	0.9926 ± 0.1283	0.1027 ± 0.0411	3.9003 ± 0.2855	2.8911 ± 0.3619	1.0092 ± 0.8974
Buffalo Pass	7/1/95	6	0.2788 ± 0.0428	1.0517 ± 0.6399	0.0106 ± 0.0035	0.5423 ± 0.1854	0.7758 ± 0.1105	0.1236 ± 0.0758	3.1646 ± 0.0211	2.7828 ± 0.6809	0.3818 ± 1.1672
Buffalo Pass	7/29/95	6	1.0366 ± 0.1523	1.1915 ± 0.7274	0.0432 ± 0.0060	0.7168 ± 0.2640	0.9973 ± 0.1325	0.1156 ± 0.0851	5.2274 ± 0.0230	4.1010 ± 0.8043	1.1264 ± 1.2685
Buffalo Pass	7/30/95	6	1.0877 ± 0.1588	1.1928 ± 0.7274	0.0495 ± 0.0066	0.7976 ± 0.2709	1.3456 ± 0.1553	0.1041 ± 0.0853	5.5742 ± 0.0262	4.5773 ± 0.8119	0.9969 ± 1.2746
Buffalo Pass	8/7/95	6	1.5776 ± 0.2176	1.0609 ± 0.6947	0.0529 ± 0.0095	3.1167 ± 0.3604	1.6677 ± 0.1738	0.1901 ± 0.0860	7.2623 ± 0.0477	7.6659 ± 0.8352	-0.4036 ± 1.2933
Buffalo Pass	8/7/95	12	1.6091 ± 0.2205	1.0329 ± 0.6791	0.0493 ± 0.0088	1.8528 ± 0.3258	1.5879 ± 0.1659	0.1221 ± 0.0821	5.5509 ± 0.0430	6.2541 ± 0.8064	-0.7032 ± 1.2707
Buffalo Pass	8/8/95	6	2.4423 ± 0.2980	0.6890 ± 0.4553	0.0615 ± 0.0099	1.5993 ± 0.3639	1.9950 ± 0.1814	0.0700 ± 0.0620	6.6964 ± 0.0458	6.8571 ± 0.6822	-0.1607 ± 1.1690
Buffalo Pass	8/8/95	12	2.8884 ± 0.3923	1.7879 ± 1.1114	0.2755 ± 0.0346	2.2661 ± 0.5485	2.1525 ± 0.2472	0.2740 ± 0.1327	8.3699 ± 0.0628	9.6444 ± 1.3304	-1.2745 ± 1.6324
Buffalo Pass	8/9/95	6	5.7632 ± 0.5508	0.7389 ± 0.4961	0.0491 ± 0.0087	1.4566 ± 0.5785	0.5347 ± 0.0937	0.2687 ± 0.0712	8.1633 ± 0.0307	8.8112 ± 0.9477	-0.6479 ± 1.3771
Buffalo Pass	8/9/95	12	4.3656 ± 0.5072	1.0538 ± 0.6705	0.2125 ± 0.0271	1.2641 ± 0.5796	1.0616 ± 0.1578	0.2573 ± 0.0900	7.0778 ± 0.5730	8.2149 ± 1.0375	-1.1371 ± 1.5503
Buffalo Pass	8/14/95	6	1.2910 ± 0.1823	1.0400 ± 0.6492	0.3161 ± 0.0377	0.3540 ± 0.2653	0.5556 ± 0.1245	0.1698 ± 0.0850	2.8155 ± 0.0347	3.7265 ± 0.7411	-0.9110 ± 1.2180
Buffalo Pass	8/14/95	12	0.5266 ± 0.0815	0.7735 ± 0.5082	0.0447 ± 0.0082	0.2319 ± 0.1611	0.4998 ± 0.0920	0.1329 ± 0.0686	1.5914 ± 0.0344	2.2094 ± 0.5515	-0.6180 ± 1.0508
Buffalo Pass	8/21/95	6	1.0321 ± 0.0379	0.6455 ± 0.4212	0.0287 ± 0.0082	0.4376 ± 0.1345	2.0933 ± 0.2432	0.1594 ± 0.0641	6.1411 ± 0.0434	4.3966 ± 0.5102	1.7445 ± 1.0111
Buffalo Pass	8/21/95	12	1.3373 ± 0.0451	0.5159 ± 0.3597	0.0783 ± 0.0116	0.4807 ± 0.1250	2.5060 ± 0.2865	0.1320 ± 0.0549	7.4997 ± 0.0499	5.0502 ± 0.4819	2.4495 ± 0.9830
Buffalo Pass	8/21/95	12	1.3373 ± 0.0451	0.5159 ± 0.3597	0.0783 ± 0.0116	0.4807 ± 0.1250	2.5060 ± 0.2865	0.1320 ± 0.0549	7.4997 ± 0.0499	5.0502 ± 0.4819	2.4495 ± 0.9830
Buffalo Pass	8/22/95	6	0.1800 ± 0.0352	0.5847 ± 0.4052	0.0000 ± 0.0000	0.2163 ± 0.1128	1.1361 ± 0.1370	0.1629 ± 0.0592	3.7686 ± 0.0281	2.2800 ± 0.4477	1.4886 ± 0.9467
Buffalo Pass	8/22/95	12	0.3996 ± 0.0771	1.0586 ± 0.6619	0.0000 ± 0.0000	0.3348 ± 0.1985	1.3837 ± 0.1808	0.1099 ± 0.0852	3.6440 ± 0.0279	3.2866 ± 0.7235	0.3574 ± 1.2032
Buffalo Pass	8/23/95	6	0.7118 ± 0.0989	0.4414 ± 0.3397	0.0149 ± 0.0065	0.4173 ± 0.1374	1.1014 ± 0.1309	0.1090 ± 0.0509	4.2492 ± 0.0277	2.7958 ± 0.4048	1.4534 ± 0.9002
Buffalo Pass	8/23/95	12	3.6975 ± 0.4584	1.2015 ± 0.7509	0.6299 ± 0.0799	0.5830 ± 0.5339	1.5800 ± 0.2130	0.1435 ± 0.0947	9.1140 ± 0.0420	7.8354 ± 1.0582	1.2786 ± 1.4554
Buffalo Pass	8/24/95	6	8.5259 ± 0.9182	2.3577 ± 1.5620	0.1279 ± 0.0177	9.2111 ± 5.5111	1.7754 ± 0.2522	0.2805 ± 0.1679	20.4550 ± 0.0384	22.2785 ± 5.8092	-1.8235 ± 3.4088
Buffalo Pass	8/24/95	12	0.9357 ± 0.1404	1.1778 ± 0.7405	0.1233 ± 0.0167	0.4989 ± 0.2532	2.7671 ± 0.2585	0.0967 ± 0.0911	7.2323 ± 0.0551	5.5995 ± 0.8412	1.6328 ± 1.2982
Buffalo Pass	8/25/95	6	0.5747 ± 0.1025	0.8101 ± 0.5431	0.0063 ± 0.0067	0.4239 ± 0.1792	0.8968 ± 0.1079	0.1889 ± 0.0702	4.0783 ± 0.0322	2.9007 ± 0.5951	1.1776 ± 1.0914
Buffalo Pass	8/25/95	12	1.1169 ± 0.1862	0.7956 ± 0.5296	0.0000 ± 0.0000	0.9246 ± 0.2452	1.0583 ± 0.1350	0.3157 ± 0.0765	5.7132 ± 0.0358	4.2113 ± 0.6319	1.5019 ± 1.1248
Buffalo Pass	8/26/95	6	1.4891 ± 0.2475	1.1231 ± 0.7105	0.0302 ± 0.0073	0.6067 ± 0.3186	1.3555 ± 0.1559	0.2300 ± 0.0895	4.2791 ± 0.0393	4.8346 ± 0.8366	-0.5555 ± 1.2941
Buffalo Pass	8/26/95	12	4.8648 ± 0.6084	0.9728 ± 0.6245	0.0141 ± 0.0067	0.7957 ± 0.6284	1.1116 ± 0.1325	0.1892 ± 0.0801	7.7190 ± 0.0388	7.9482 ± 1.0858	-0.2292 ± 1.4741
Buffalo Pass	8/27/95	6	3.1165 ± 0.4356	0.8729 ± 0.5586	0.0374 ± 0.0078	1.3191 ± 0.4731	1.3156 ± 0.1421	0.3235 ± 0.0792	7.5094 ± 0.0406	6.9850 ± 0.8673	0.5244 ± 1.3177
Buffalo Pass	8/27/95	12	2.4570 ± 0.3671	0.8919 ± 0.5722	0.0305 ± 0.0077	1.0807 ± 0.4088	1.0811 ± 0.1272	0.2417 ± 0.0775	6.0122 ± 0.0392	5.7829 ± 0.8072	0.2293 ± 1.2712
Buffalo Pass	9/2/95	6	1.5321 ± 0.2025	1.2901 ± 0.7815	0.0000 ± 0.0000	0.0000 ± 0.0000	2.0865 ± 0.2135	0.1289 ± 0.0980	4.9899 ± 0.0429	5.0376 ± 0.8408	-0.0477 ± 1.2975
Buffalo Pass	9/2/95	12	2.6649 ± 0.3175	1.6372 ± 0.9871	0.0000 ± 0.0000	0.0000 ± 0.0000	2.4906 ± 0.2582	0.1251 ± 0.1211	6.4566 ± 0.0491	6.9178 ± 1.0754	-0.4612 ± 1.4674
Buffalo Pass	9/17/95	6	0.8277 ± 0.1416	0.8038 ± 0.5313	0.0566 ± 0.0093	0.5118 ± 0.2037	1.0009 ± 0.1198	0.1405 ± 0.0732	3.9214 ± 0.0424	3.3413 ± 0.6030	0.5801 ± 1.0990
Buffalo Pass	9/17/95	12	0.5352 ± 0.0940	0.5533 ± 0.3867	0.1383 ± 0.0172	0.3323 ± 0.1420	1.3009 ± 0.1287	0.1267 ± 0.0549	3.6188 ± 0.0374	2.9867 ± 0.4454	0.6321 ± 0.9446
Buffalo Pass	9/18/95	6	0.1517 ± 0.0302	0.4821 ± 0.3508	0.0133 ± 0.0065	0.2854 ± 0.0987	0.7694 ± 0.0865	0.0892 ± 0.0509	1.7151 ± 0.0349	1.7911 ± 0.3792	-0.0760 ± 0.8716
Buffalo Pass	9/18/95	12	0.1412 ± 0.0318	0.4777 ± 0.3434	1.0053 ± 0.1158	0.8318 ± 0.1054	0.9134 ± 0.1930	0.1979 ± 0.0551	2.8088 ± 0.0387	3.5673 ± 0.4286	-0.7585 ± 0.9267
Buffalo Pass	9/19/95	6	0.1672 ± 0.0337	0.4022 ± 0.3113	0.0059 ± 0.0066	0.1133 ± 0.0891	0.4148 ± 0.0607	0.0918 ± 0.0482	0.9810 ± 0.0349	1.1952 ± 0.3347	-0.2142 ± 0.8189
Buffalo Pass	9/19/95	12	0.2423 ± 0.0490	0.7835 ± 0.5135	1.0706 ± 0.1238	0.9989 ± 0.1582	0.5963 ± 0.1981	0.1430 ± 0.0684	3.9877 ± 0.0378	3.8346 ± 0.5919	0.1531 ± 1.0887
Buffalo Pass	9/20/95	6	0.0896 ± 0.0447	1.3021 ± 0.8050	0.0048 ± 0.0064	0.6429 ± 0.2298	0.3481 ± 0.1099	0.1767 ± 0.0977	1.5359 ± 0.0326	2.5642 ± 0.8512	-1.0283 ± 1.3052
Buffalo Pass	9/20/95	12	0.0852 ± 0.0262	0.6205 ± 0.4041	0.0632 ± 0.0098	0.2888 ± 0.1139	0.8593 ± 0.0990	0.1603 ± 0.0592	1.7729 ± 0.0361	2.0773 ± 0.4363	-0.3044 ± 0.9348
Buffalo Pass	9/21/95	6	0.1169 ± 0.0250	0.2118 ± 0.2163	0.1776 ± 0.0214	0.0720 ± 0.0611	1.2961 ± 0.1201	0.0502 ± 0.0401	2.7243 ± 0.0369	1.9246 ± 0.2601	0.7997 ± 0.7222
Buffalo Pass	9/21/95	12	0.1469 ± 0.0264	0.1686 ± 0.1391	0.0000 ± 0.0000	0.0790 ± 0.0426	0.8761 ± 0.0761	0.0638 ± 0.0231	1.7017 ± 0.0207	1.3324 ± 0.1679	0.3693 ± 0.5799
Buffalo Pass	9/24/95	6	0.1709 ± 0.0327	0.4908 ± 0.3597	0.0073 ± 0.0063	0.3501 ± 0.1028	1.1080 ± 0.1100	0.0609 ± 0.0511	2.9318 ± 0.0363	2.1880 ± 0.3947	0.7438 ± 0.8892
Buffalo Pass	9/24/95	12	0.2391 ± 0.0429	0.5609 ± 0.4047	0.1386 ± 0.0170	0.6579 ± 0.1199	0.9703 ± 0.1064	0.0926 ± 0.0556	2.7536 ± 0.0368	2.6594 ± 0.4412	0.0942 ± 0.9401
Buffalo Pass	9/27/95	6	0.6451 ± 0.1022	1.0887 ± 0.6803	0.1227 ± 0.0158	0.7023 ± 0.2221	1.1775 ± 0.1441	0.1391 ± 0.0859	3.4636 ± 0.0386	3.8754 ± 0.7423	-0.4118 ± 1.2191
Buffalo Pass	9/27/95	12	0.5307 ± 0.0841	0.8406 ± 0.5292	0.6273 ± 0.0756	1.3807 ± 0.1932	1.1510 ± 0.1660	0.0000 ± 0.0000	3.4936 ± 0.0399	4.5303 ± 0.5981	-1.0367 ± 1.0944

Table D.1 (cont.)

Individual Source Contribution to $PM_{2.5}$ Mass at the Six Sites between 02/16/95 and 10/29/95 during the Mt. Zirkel Visibility Study

Site	Date	Start Hour[a]	Primary Geological SCE ± σ (μg/m³)	Primary Motor Vehicle SCE ± σ (μg/m³)	Coal-Fired Generating Station SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Ammonium Sulfate SCE ± σ (μg/m³)	Secondary Ammonium Nitrate SCE ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Calculated[b] Mass ± σ (μg/m³)	Unexplained[c] Mass ± σ (μg/m³)
Buffalo Pass	9/30/95	6	0.3544 ± 0.0515	0.1967 ± 0.2359	0.0560 ± 0.0092	0.0250 ± 0.0712	0.1375 ± 0.0413	0.1185 ± 0.0432	1.7547 ± 0.0353	0.8881 ± 0.2589	0.8666 ± 0.7204
Buffalo Pass	9/30/95	12	0.3720 ± 0.0660	1.0375 ± 0.6396	0.3265 ± 0.0387	0.0000 ± 0.0000	1.3502 ± 0.1640	0.2078 ± 0.0855	3.3335 ± 0.0371	3.2940 ± 0.6702	0.0395 ± 1.1584
~~Buffalo Pass~~	~~10/1/95~~	~~6~~	~~1.0259 ± 0.1510~~	~~0.9753 ± 0.6235~~	~~0.4482 ± 0.0519~~	~~0.0430 ± 0.2292~~	~~0.8476 ± 0.1359~~	~~0.2211 ± 0.0828~~	~~4.5135 ± 0.0384~~	~~3.5611 ± 0.7015~~	~~0.9524 ± 1.1851~~
Buffalo Pass	10/1/95	12	1.1739 ± 0.1662	0.9486 ± 0.5977	0.2578 ± 0.0304	0.3507 ± 0.2427	0.6257 ± 0.1098	0.3972 ± 0.0865	5.4989 ± 0.0346	3.7539 ± 0.6813	1.7450 ± 1.1678
Buffalo Pass	10/2/95	6	0.7472 ± 0.1181	1.1963 ± 0.7393	0.3270 ± 0.0383	0.3686 ± 0.2401	0.7428 ± 0.1333	0.8081 ± 0.1235	3.8070 ± 0.0403	4.1900 ± 0.8079	-0.3830 ± 1.2718
Buffalo Pass	10/2/95	12	1.0460 ± 0.1547	1.2340 ± 0.7628	0.0578 ± 0.0095	0.3805 ± 0.2682	0.5634 ± 0.1152	0.2404 ± 0.0962	4.2277 ± 0.0358	3.5221 ± 0.8369	0.7056 ± 1.2942
Buffalo Pass	10/7/95	6	3.0578 ± 0.2817	0.9993 ± 0.6436	0.0657 ± 0.0099	0.0000 ± 0.0000	0.6166 ± 0.1037	0.0926 ± 0.0790	8.4843 ± 0.0344	4.8320 ± 0.7146	3.6523 ± 1.1960
Buffalo Pass	10/7/95	12	1.1296 ± 0.1084	0.3242 ± 0.2618	0.1765 ± 0.0211	0.0000 ± 0.0000	0.6187 ± 0.0757	0.0601 ± 0.0430	4.1258 ± 0.0330	2.3091 ± 0.2972	1.8167 ± 0.7717
Buffalo Pass	10/8/95	6	0.4960 ± 0.0831	1.0526 ± 0.6659	0.0513 ± 0.0091	2.7918 ± 0.2610	0.8367 ± 0.1193	0.3732 ± 0.0910	-99.0000 ± 0.0412	5.6016 ± 0.7356	-99.0000 ± -99.0000
Buffalo Pass	10/8/95	12	0.5737 ± 0.0797	0.1586 ± 0.1961	0.2614 ± 0.0291	1.0818 ± 0.1201	0.6239 ± 0.0788	0.0849 ± 0.0408	-99.0000 ± 0.0349	2.7843 ± 0.2607	-99.0000 ± -99.0000
Buffalo Pass	10/9/95	6	0.6291 ± 0.0940	0.7311 ± 0.4761	0.1386 ± 0.0171	0.7810 ± 0.1717	0.4696 ± 0.0823	0.0742 ± 0.0624	-99.0000 ± 0.0330	2.8236 ± 0.5253	-99.0000 ± -99.0000
Buffalo Pass	10/10/95	6	0.7522 ± 0.1104	0.6957 ± 0.4612	0.3485 ± 0.0406	1.1909 ± 0.1900	0.4421 ± 0.0935	0.1839 ± 0.0637	-99.0000 ± 0.0347	3.6133 ± 0.5248	-99.0000 ± -99.0000
Buffalo Pass	10/10/95	12	0.6361 ± 0.0983	0.8806 ± 0.5573	0.2816 ± 0.0333	0.7794 ± 0.1942	0.5527 ± 0.1024	0.1536 ± 0.0725	-99.0000 ± 0.0341	3.2840 ± 0.6122	-99.0000 ± -99.0000
Buffalo Pass	10/11/95	6	0.5950 ± 0.0914	0.8528 ± 0.5539	0.0605 ± 0.0095	0.3584 ± 0.1793	0.2831 ± 0.0783	0.0596 ± 0.0685	-99.0000 ± 0.0318	2.2094 ± 0.5985	-99.0000 ± -99.0000
Buffalo Pass	10/11/95	12	2.9264 ± 0.3752	1.2000 ± 0.7563	0.1412 ± 0.0175	0.5205 ± 0.4499	0.4041 ± 0.1076	0.1079 ± 0.0898	-99.0000 ± 0.0311	5.3001 ± 0.9670	-99.0000 ± -99.0000
Buffalo Pass	10/12/95	6	4.1455 ± 0.5601	2.5330 ± 1.5701	0.1532 ± 0.0189	2.1824 ± 0.7570	2.1574 ± 0.2862	0.2270 ± 0.1803	-99.0000 ± 0.0541	11.3985 ± 1.8619	-99.0000 ± -99.0000
Buffalo Pass	10/12/95	12	0.2944 ± 0.0777	1.8702 ± 1.1735	0.0681 ± 0.0102	0.5300 ± 0.3287	1.5295 ± 0.2060	0.0765 ± 0.1326	-99.0000 ± 0.0386	4.3687 ± 1.2455	-99.0000 ± -99.0000
Buffalo Pass	10/13/95	6	0.6203 ± 0.0905	0.3907 ± 0.3450	0.3701 ± 0.0425	0.0991 ± 0.1264	0.1723 ± 0.0754	0.1378 ± 0.0517	-99.0000 ± 0.0370	1.7903 ± 0.3916	-99.0000 ± -99.0000
Buffalo Pass	10/13/95	12	0.3600 ± 0.0579	0.3796 ± 0.3015	0.4512 ± 0.0473	0.4541 ± 0.0997	0.0000 ± 0.0000	0.0000 ± 0.0000	-99.0000 ± 0.0298	1.6449 ± 0.3262	-99.0000 ± -99.0000
Buffalo Pass	10/14/95	6	1.4271 ± 0.1817	0.4586 ± 0.3583	0.2091 ± 0.0249	0.3501 ± 0.2134	0.1815 ± 0.0607	0.0946 ± 0.0494	-99.0000 ± 0.0331	2.7210 ± 0.4623	-99.0000 ± -99.0000
Buffalo Pass	10/14/95	12	0.8225 ± 0.1127	0.4082 ± 0.3293	0.3497 ± 0.0401	0.2688 ± 0.1476	0.1455 ± 0.0715	0.0457 ± 0.0474	-99.0000 ± 0.0336	2.0404 ± 0.3897	-99.0000 ± -99.0000
Buffalo Pass	10/15/95	6	1.4340 ± 0.1757	0.0222 ± 0.4190	0.0484 ± 0.0085	0.3653 ± 0.1891	0.2192 ± 0.0413	0.1962 ± 0.0428	-99.0000 ± 0.0350	2.2853 ± 0.4958	-99.0000 ± -99.0000
Buffalo Pass	10/15/95	12	1.4906 ± 0.2042	0.7662 ± 0.6291	0.1464 ± 0.0174	0.1583 ± 0.2628	0.1694 ± 0.0728	0.1752 ± 0.0662	-99.0000 ± 0.0332	2.9061 ± 0.7187	-99.0000 ± -99.0000
Buffalo Pass	10/16/95	6	1.5836 ± 0.1901	0.4213 ± 0.2803	0.1725 ± 0.0205	0.2541 ± 0.2171	0.7187 ± 0.0796	0.1295 ± 0.0377	-99.0000 ± 0.0209	3.2797 ± 0.4123	-99.0000 ± -99.0000
Buffalo Pass	10/17/95	6	1.0552 ± 0.1525	1.0421 ± 0.6394	0.2306 ± 0.0271	1.0149 ± 0.2525	0.6990 ± 0.1122	0.1075 ± 0.0751	-99.0000 ± 0.0207	4.1493 ± 0.7175	-99.0000 ± -99.0000
Buffalo Pass	10/18/95	6	0.7046 ± 0.1032	0.7639 ± 0.4828	0.0765 ± 0.0095	0.4938 ± 0.1777	0.7604 ± 0.0960	0.1017 ± 0.0584	-99.0000 ± 0.0204	2.9209 ± 0.5367	-99.0000 ± -99.0000
Buffalo Pass	10/19/95	6	0.4940 ± 0.0635	0.1085 ± 0.1012	0.1174 ± 0.0140	0.7276 ± 0.0859	0.2160 ± 0.0338	0.1000 ± 0.0231	-99.0000 ± 0.0176	1.7635 ± 0.1534	-99.0000 ± -99.0000
Buffalo Pass	10/20/95	6	1.3637 ± 0.1785	0.5411 ± 0.4243	0.1609 ± 0.0180	0.4720 ± 0.2189	0.2532 ± 0.0571	0.1050 ± 0.0430	-99.0000 ± 0.0175	2.8959 ± 0.5150	-99.0000 ± -99.0000
Buffalo Pass	10/21/95	6	1.3829 ± 0.1794	0.5416 ± 0.4184	0.1575 ± 0.0176	1.1328 ± 0.2347	0.4727 ± 0.0686	0.1281 ± 0.0438	-99.0000 ± 0.0185	3.8156 ± 0.5189	-99.0000 ± -99.0000
Buffalo Pass	10/22/95	6	0.1863 ± 0.0280	0.0996 ± 0.1113	0.1494 ± 0.0174	0.1731 ± 0.0429	0.5081 ± 0.0540	0.0664 ± 0.0220	-99.0000 ± 0.0190	1.1829 ± 0.1368	-99.0000 ± -99.0000
Buffalo Pass	10/23/95	6	0.0268 ± 0.0181	0.0080 ± 0.0821	0.6113 ± 0.0628	0.3003 ± 0.0306	1.1241 ± 0.1326	0.0553 ± 0.0203	-99.0000 ± 0.0252	2.1258 ± 0.1730	-99.0000 ± -99.0000
Buffalo Pass	10/24/95	6	0.2902 ± 0.0456	0.3613 ± 0.3899	0.0828 ± 0.0096	0.1777 ± 0.0898	0.4854 ± 0.0572	0.0744 ± 0.0325	-99.0000 ± 0.0187	1.4718 ± 0.4081	-99.0000 ± -99.0000
Buffalo Pass	10/25/95	6	0.2520 ± 0.0465	0.6394 ± 0.5380	0.2682 ± 0.0298	0.2514 ± 0.1269	0.4357 ± 0.0785	0.1105 ± 0.0494	-99.0000 ± 0.0188	1.9572 ± 0.5632	-99.0000 ± -99.0000
Buffalo Pass	10/26/95	6	0.6646 ± 0.1062	1.1041 ± 0.8797	0.2990 ± 0.0333	0.1886 ± 0.2244	0.2892 ± 0.1024	0.1019 ± 0.0795	-99.0000 ± 0.0204	2.6474 ± 0.9238	-99.0000 ± -99.0000
Buffalo Pass	10/27/95	6	0.9477 ± 0.1311	0.5619 ± 0.4592	0.0412 ± 0.0057	0.0316 ± 0.1730	0.3072 ± 0.0558	0.1211 ± 0.0447	-99.0000 ± 0.0175	2.0107 ± 0.5130	-99.0000 ± -99.0000
Buffalo Pass	10/28/95	6	1.3738 ± 0.1668	0.3421 ± 0.2780	0.3530 ± 0.0372	0.2359 ± 0.1900	0.0513 ± 0.0613	0.1231 ± 0.0332	-99.0000 ± 0.0173	2.4792 ± 0.3840	-99.0000 ± -99.0000
Buffalo Pass	10/29/95	6	0.9541 ± 0.1375	0.8746 ± 0.6144	0.3003 ± 0.0332	0.2540 ± 0.2150	0.1580 ± 0.0844	0.1254 ± 0.0642	-99.0000 ± 0.0172	2.6664 ± 0.6745	-99.0000 ± -99.0000
Gilpin Creek	3/26/95	6	0.1843 ± 0.0374	0.0000 ± 0.0000	0.0015 ± 0.0230	0.1017 ± 0.3940	0.7943 ± 0.1540	0.2043 ± 0.1197	1.2846 ± 1.5523	1.2861 ± 0.4418	-0.0015 ± 1.8147
Gilpin Creek	3/27/95	6	0.5575 ± 0.0937	0.9112 ± 0.7933	0.0112 ± 0.0235	0.2187 ± 0.2175	0.6680 ± 0.1663	0.1365 ± 0.1372	2.4390 ± 1.5902	2.5031 ± 0.8558	-0.0641 ± 2.0592
Gilpin Creek	3/28/95	6	0.3573 ± 0.0610	0.2186 ± 0.5634	0.0217 ± 0.0236	0.3559 ± 0.1384	1.5849 ± 0.2198	0.5617 ± 0.1364	0.7341 ± 1.5514	3.1001 ± 0.6386	-2.3660 ± 1.9194
Gilpin Creek	3/30/95	6	1.2577 ± 0.1778	0.0000 ± 0.0000	0.1405 ± 0.0276	0.6833 ± 0.2236	2.5154 ± 0.3104	0.3882 ± 0.1259	2.9363 ± 1.5578	4.9851 ± 0.4411	-2.0488 ± 1.8190
Gilpin Creek	3/31/95	6	1.1296 ± 0.1615	0.0000 ± 0.0000	0.2661 ± 0.0371	0.7005 ± 0.2036	2.4292 ± 0.3061	0.5505 ± 0.1358	2.7938 ± 1.5802	5.0759 ± 0.4255	-2.2821 ± 1.8298
Gilpin Creek	5/6/95	6	4.3900 ± 0.6291	4.0764 ± 2.1104	0.1058 ± 0.0255	0.8602 ± 0.9714	1.7657 ± 0.4085	0.3651 ± 0.3134	7.0963 ± 1.6593	11.5632 ± 2.4615	-4.4669 ± 2.7706
Gilpin Creek	5/7/95	6	4.3359 ± 0.5701	1.9143 ± 1.1250	0.0179 ± 0.0225	1.1881 ± 0.7161	1.2672 ± 0.2448	0.3391 ± 0.1812	5.5207 ± 1.6324	9.0625 ± 1.4821	-3.5418 ± 2.3725
Gilpin Creek	6/14/95	6	0.7674 ± 0.1292	1.4808 ± 1.0046	0.1198 ± 0.0272	4.1190 ± 0.3935	1.5940 ± 0.2540	0.5398 ± 0.1711	5.6717 ± 1.5245	8.6208 ± 1.1293	-2.9491 ± 2.1407
Gilpin Creek	6/15/95	6	0.9476 ± 0.1542	1.6078 ± 1.0269	0.0154 ± 0.0234	2.9428 ± 0.3833	2.5270 ± 0.3375	0.4226 ± 0.1708	2.3529 ± 1.5341	8.4632 ± 1.1700	-6.1103 ± 2.1664
Gilpin Creek	6/16/95	6	0.8104 ± 0.1328	1.3091 ± 0.9714	0.0353 ± 0.0237	2.2307 ± 0.3243	1.6054 ± 0.2457	0.3550 ± 0.1562	3.7516 ± 1.5964	6.3459 ± 1.0732	-2.5943 ± 2.1668
Gilpin Creek	6/29/95	6	0.2310 ± 0.0663	1.4567 ± 1.0140	0.0627 ± 0.0235	0.4667 ± 0.2791	0.9496 ± 0.2022	0.2547 ± 0.1570	0.0000 ± 1.5405	3.4214 ± 1.0847	-3.4214 ± 2.1313
Gilpin Creek	6/30/95	6	0.3622 ± 0.0744	1.1960 ± 0.8848	0.1157 ± 0.0266	0.6974 ± 0.2509	1.2174 ± 0.2128	0.4749 ± 0.1562	1.6882 ± 1.5875	4.0636 ± 0.9601	-2.3754 ± 2.1072
Gilpin Creek	7/1/95	6	0.3920 ± 0.0765	0.8147 ± 0.7804	0.0730 ± 0.0253	1.2549 ± 0.2113	1.0142 ± 0.1832	0.2524 ± 0.1341	2.9795 ± 1.5808	3.8012 ± 0.8436	-0.8217 ± 2.0460
Gilpin Creek	7/29/95	6	0.4541 ± 0.1125	2.4059 ± 1.4673	0.1370 ± 0.0288	0.5120 ± 0.4327	1.0924 ± 0.2467	0.3183 ± 0.2034	0.0000 ± 1.5627	4.9197 ± 1.5671	-4.9197 ± 2.3614
Gilpin Creek	7/30/95	6	0.7203 ± 0.1251	1.5930 ± 1.1730	0.0546 ± 0.0239	1.0062 ± 0.3459	1.4838 ± 0.2239	0.2453 ± 0.1588	14.8420 ± 1.6998	5.1032 ± 1.2598	9.7388 ± 2.3257
Gilpin Creek	7/31/95	6	0.5992 ± 0.1018	1.0424 ± 0.9578	0.2282 ± 0.0358	1.0801 ± 0.2522	0.7198 ± 0.1645	0.2236 ± 0.1353	2.4565 ± 1.6017	3.8933 ± 1.0188	-1.4368 ± 2.1455
Gilpin Creek	8/7/95	6	0.5215 ± 0.1178	2.4163 ± 1.4790	0.0556 ± 0.0239	2.1403 ± 0.4609	1.7044 ± 0.3030	0.3713 ± 0.2115	3.9392 ± 1.5975	7.2094 ± 1.5971	-3.2702 ± 2.3971
Gilpin Creek	8/14/95	6	0.3632 ± 0.0791	1.2919 ± 0.9638	0.0514 ± 0.0221	0.6782 ± 0.2650	0.5817 ± 0.1577	0.2517 ± 0.1384	0.9379 ± 1.5860	3.1981 ± 1.0246	-2.2602 ± 2.1365
Gilpin Creek	8/21/95	6	0.2711 ± 0.0717	1.4250 ± 0.9501	0.0687 ± 0.0234	0.0000 ± 0.0000	2.0224 ± 0.2825	0.1767 ± 0.1530	5.1020 ± 1.6172	3.9639 ± 1.0058	1.1381 ± 2.1510
Gilpin Creek	8/22/95	6	0.3876 ± 0.0688	0.5296 ± 0.5793	0.0403 ± 0.0225	0.0000 ± 0.0000	1.5355 ± 0.2144	0.1621 ± 0.1202	2.2489 ± 1.5878	2.6551 ± 0.6334	-0.4062 ± 1.9463

Table D.1 (cont.)
Individual Source Contribution to $PM_{2.5}$ Mass at the Six Sites between 02/16/95 and 10/29/95 during the Mt. Zirkel Visibility Study

Site	Date	Start Hour[a]	Primary Geological SCE ± σ (μg/m³)	Primary Motor Vehicle SCE ± σ (μg/m³)	Coal-Fired Generating Station SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Ammonium Sulfate SCE ± σ (μg/m³)	Secondary Ammonium Nitrate SCE ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Calculated[b] Mass ± σ (μg/m³)	Unexplained[c] Mass ± σ (μg/m³)
Gilpin Creek	8/24/95	6	0.3285 ± 0.0657	0.9640 ± 0.7789	0.0696 ± 0.0237	0.2890 ± 0.2340	0.4857 ± 0.1564	0.1442 ± 0.1346	5.5112 ± 1.6295	2.2810 ± 0.8420	3.2302 ± 2.0831
Gilpin Creek	8/25/95	6	0.1978 ± 0.0553	1.1659 ± 0.8664	0.0349 ± 0.0230	0.0000 ± 0.0000	1.0211 ± 0.1941	0.2021 ± 0.1443	4.7988 ± 1.5782	2.6218 ± 0.9015	2.1770 ± 2.0721
~~Gilpin Creek~~	~~8/26/95~~	~~6~~	~~0.2443 ± 0.0653~~	~~1.3401 ± 0.9714~~	~~0.1348 ± 0.0282~~	~~0.3042 ± 0.2583~~	~~1.2850 ± 0.2024~~	~~0.2053 ± 0.1476~~	~~2.8949 ± 1.5359~~	~~3.5737 ± 1.0383~~	~~-0.6788 ± 2.1061~~
Gilpin Creek	8/27/95	6	0.2335 ± 0.0609	1.1544 ± 0.8343	0.2056 ± 0.0335	0.8506 ± 0.2386	1.4016 ± 0.2039	0.1996 ± 0.1376	5.7082 ± 1.5342	4.0453 ± 0.9046	1.6629 ± 2.0403
Gilpin Creek	9/2/95	6	0.3624 ± 0.0938	1.9868 ± 1.3207	0.2412 ± 0.0371	0.8502 ± 0.3844	2.2225 ± 0.2915	0.1679 ± 0.1791	4.0389 ± 1.5646	5.8310 ± 1.4210	-1.7921 ± 2.3000
Gilpin Creek	9/17/95	6	0.5319 ± 0.0947	1.1828 ± 0.8602	0.0781 ± 0.0246	0.6525 ± 0.2521	1.4357 ± 0.2051	0.3493 ± 0.1424	4.9926 ± 1.5824	4.2303 ± 0.9356	0.7623 ± 2.0917
Gilpin Creek	9/18/95	6	0.2226 ± 0.0778	1.9743 ± 1.1529	0.0163 ± 0.0745	0.5430 ± 0.3582	1.2469 ± 0.2475	0.2103 ± 0.1815	2.6455 ± 1.6024	4.2134 ± 1.2503	-1.5679 ± 2.2513
Gilpin Creek	9/19/95	6	0.2283 ± 0.0730	1.7119 ± 1.0010	0.0403 ± 0.0748	0.6162 ± 0.3164	0.7216 ± 0.2044	0.2919 ± 0.1693	1.7007 ± 1.5992	3.6102 ± 1.0879	-1.9095 ± 2.1756
Gilpin Creek	9/20/95	6	0.2534 ± 0.0628	1.1673 ± 0.8366	0.0195 ± 0.0245	0.9352 ± 0.2422	0.7615 ± 0.1721	0.1949 ± 0.1449	1.2581 ± 1.5202	3.3318 ± 0.9021	-2.0737 ± 2.0286
Gilpin Creek	9/21/95	6	0.1084 ± 0.0392	0.7855 ± 0.7289	0.0228 ± 0.0233	0.0352 ± 0.3147	0.7244 ± 0.1521	0.1674 ± 0.1266	1.9910 ± 1.5328	1.8437 ± 0.8195	0.1473 ± 1.9971
Gilpin Creek	9/27/95	6	0.5023 ± 0.1056	1.9594 ± 1.1830	0.3175 ± 0.0893	1.4557 ± 0.3785	1.4696 ± 0.2525	0.4522 ± 0.1861	7.1090 ± 1.5809	6.1567 ± 1.2885	0.9523 ± 2.2531
Gilpin Creek	9/30/95	6	0.1391 ± 0.0447	0.9460 ± 0.7106	0.0119 ± 0.0235	0.0365 ± 0.3384	0.3739 ± 0.1457	0.0000 ± 0.0000	7.1281 ± 1.6250	1.5074 ± 0.8020	5.6207 ± 2.0602
Gilpin Creek	10/1/95	6	0.2557 ± 0.0771	1.8392 ± 1.1290	0.0941 ± 0.0255	0.0132 ± 0.3330	0.8919 ± 0.2045	0.2449 ± 0.1703	5.2523 ± 1.6069	3.3390 ± 1.2095	1.9133 ± 2.2363
Gilpin Creek	10/2/95	6	0.2963 ± 0.0737	1.4487 ± 1.0302	0.0280 ± 0.0237	0.4704 ± 0.2836	0.8259 ± 0.1841	0.4397 ± 0.1592	4.5351 ± 1.6130	3.5090 ± 1.0986	1.0261 ± 2.1907
Gilpin Creek	10/8/95	6	0.8528 ± 0.1465	1.8757 ± 1.0437	0.1595 ± 0.0301	2.8372 ± 0.4101	0.9299 ± 0.2110	0.2930 ± 0.1745	5.8579 ± 1.6237	6.9481 ± 1.1640	-1.0902 ± 2.2281
Gilpin Creek	10/9/95	6	0.7951 ± 0.1341	1.5873 ± 0.9495	0.0841 ± 0.0254	0.6078 ± 0.3231	0.7158 ± 0.1859	0.1873 ± 0.1586	6.0469 ± 1.6254	3.9774 ± 1.0413	2.0695 ± 2.1736
Gilpin Creek	10/10/95	6	1.0341 ± 0.1902	2.9884 ± 1.6421	0.1567 ± 0.0301	0.9441 ± 0.5595	0.5863 ± 0.2658	0.2494 ± 0.2351	7.5033 ± 1.6292	5.9590 ± 1.7812	1.5443 ± 2.4933
Gilpin Creek	10/11/95	6	0.4071 ± 0.0848	1.5092 ± 1.0016	0.0836 ± 0.0260	0.3089 ± 0.2900	0.4243 ± 0.1748	0.1511 ± 0.1569	5.1039 ± 1.5614	2.8842 ± 1.0725	2.2197 ± 2.1408
Gilpin Creek	10/12/95	6	0.8992 ± 0.1509	1.7802 ± 1.0160	0.0668 ± 0.0244	1.1947 ± 0.3793	0.1759 ± 0.1807	0.0000 ± 0.0000	9.4787 ± 1.6116	4.1168 ± 1.1100	5.3619 ± 2.1948
Gilpin Creek	10/13/95	6	0.9465 ± 0.2002	3.9854 ± 2.0642	0.0474 ± 0.0247	0.3143 ± 0.7056	0.2774 ± 0.3302	0.1771 ± 0.2972	5.7728 ± 1.5999	5.7481 ± 2.2354	0.0247 ± 2.6515
Gilpin Creek	10/14/95	6	0.5837 ± 0.1040	1.3504 ± 0.8758	0.2306 ± 0.0361	0.0240 ± 0.2918	0.5298 ± 0.1730	0.2458 ± 0.1509	5.5866 ± 1.5982	2.9643 ± 0.9576	2.6223 ± 2.1141
Hayden Waste Water	2/16/95	12	1.1617 ± 0.1089	3.1453 ± 1.7783	0.8349 ± 0.0946	0.0000 ± 0.0000	1.0571 ± 0.3553	2.4853 ± 0.3701	13.9330 ± 0.9937	8.6843 ± 1.8564	5.2487 ± 2.1680
Hayden Waste Water	2/17/95	6	0.4709 ± 0.1157	2.2341 ± 1.2261	0.6812 ± 0.0772	0.2443 ± 0.3696	0.4947 ± 0.2425	1.8712 ± 0.2763	5.1910 ± 0.5180	5.9964 ± 1.3452	-0.8054 ± 1.7201
Hayden Waste Water	2/17/95	12	0.8929 ± 0.1504	1.3073 ± 0.7639	1.4562 ± 0.1587	0.0000 ± 0.0000	0.6412 ± 0.2938	2.3294 ± 0.2897	4.6601 ± 0.4760	6.6270 ± 0.8953	-1.9669 ± 1.4203
Hayden Waste Water	2/19/95	6	0.1339 ± 0.0546	0.8976 ± 0.5271	1.0897 ± 0.1177	0.0736 ± 0.1632	0.9117 ± 0.2438	1.1122 ± 0.1497	3.6200 ± 0.4657	4.2187 ± 0.6349	-0.5987 ± 1.2193
Hayden Waste Water	2/19/95	12	0.5048 ± 0.0919	0.5487 ± 0.4492	0.3215 ± 0.0371	0.4495 ± 0.1530	0.7106 ± 0.1416	1.0218 ± 0.1255	3.6390 ± 0.4598	3.5569 ± 0.5204	0.0821 ± 1.1190
Hayden Waste Water	2/23/95	6	1.9466 ± 0.3492	1.5900 ± 0.9451	2.7156 ± 0.2765	0.3488 ± 0.4451	1.1082 ± 0.5040	2.7343 ± 0.3176	8.7750 ± 0.0778	10.4435 ± 1.2824	-1.6685 ± 1.6034
Hayden Waste Water	2/24/95	6	0.8739 ± 0.1812	2.0754 ± 1.1522	1.6209 ± 0.1799	0.3476 ± 0.3919	0.9065 ± 0.3521	1.5999 ± 0.2428	6.3634 ± 0.5227	7.4242 ± 1.3150	-1.0608 ± 1.7039
Hayden Waste Water	2/24/95	12	4.2540 ± 0.7718	7.4421 ± 4.0482	0.4726 ± 0.0543	0.0729 ± 1.4507	1.3401 ± 0.6411	1.5437 ± 0.5551	15.9390 ± 0.8910	15.1254 ± 4.4509	0.8136 ± 3.1138
Hayden Waste Water	2/26/95	6	1.5091 ± 0.2983	4.1478 ± 2.2578	0.8402 ± 0.0951	0.3286 ± 0.7506	1.7023 ± 0.4280	3.5851 ± 0.5125	14.2710 ± 0.8194	12.1131 ± 2.4910	2.1579 ± 2.3777
Hayden Waste Water	2/26/95	12	0.5875 ± 0.1354	1.8653 ± 1.1209	1.4081 ± 0.1558	0.5588 ± 0.3507	1.8748 ± 0.3692	1.4503 ± 0.2076	6.2393 ± 0.5098	7.7448 ± 1.2655	-1.5055 ± 1.6706
Hayden Waste Water	8/7/95	6	1.3933 ± 0.2892	0.9489 ± 0.5913	1.5664 ± 0.1706	1.9272 ± 0.3639	1.6186 ± 0.2417	0.1536 ± 0.0765	6.7885 ± 0.4976	7.6080 ± 0.8118	-0.8195 ± 1.3679
Hayden Waste Water	8/7/95	12	1.1551 ± 0.2049	1.5082 ± 0.9287	0.0442 ± 0.0080	1.9753 ± 0.3627	2.2171 ± 0.2895	0.2100 ± 0.1144	6.5174 ± 0.5157	7.1099 ± 1.0644	-0.5925 ± 1.5475
Hayden Waste Water	8/8/95	6	1.7340 ± 0.2944	1.2859 ± 0.8259	0.5360 ± 0.0661	2.4334 ± 0.4113	2.0771 ± 0.2857	0.1537 ± 0.0982	6.6891 ± 0.5136	8.2201 ± 1.0167	-1.5310 ± 1.5156
Hayden Waste Water	8/8/95	12	3.0532 ± 0.4702	1.0348 ± 0.7068	0.0855 ± 0.0124	3.3516 ± 0.5561	1.4565 ± 0.2015	0.2287 ± 0.0841	7.0567 ± 0.5230	9.2103 ± 1.0381	-2.1536 ± 1.5329
Hayden Waste Water	8/9/95	6	3.0623 ± 0.4927	1.5201 ± 0.9152	1.8940 ± 0.2214	1.8212 ± 0.5822	0.5732 ± 0.3614	0.2754 ± 0.1171	8.0499 ± 0.5601	9.1462 ± 1.2699	-1.0963 ± 1.6892
Hayden Waste Water	8/9/95	12	2.6097 ± 0.4317	1.8353 ± 1.0632	0.3195 ± 0.0399	1.2746 ± 0.5441	0.8807 ± 0.2068	0.2190 ± 0.1367	5.5552 ± 0.4899	7.1388 ± 1.2945	-1.5836 ± 1.6820
Hayden Waste Water	8/14/95	6	1.1803 ± 0.2072	1.1405 ± 0.7105	2.5176 ± 0.2542	0.1041 ± 0.2918	0.0000 ± 0.0000	0.1419 ± 0.0689	3.3524 ± 0.0336	5.0844 ± 0.8399	-1.7320 ± 1.2965
Hayden Waste Water	8/14/95	12	0.5685 ± 0.1031	1.3768 ± 0.8216	0.4630 ± 0.0542	0.1367 ± 0.2597	0.4166 ± 0.1515	0.1504 ± 0.1028	1.8831 ± 0.0345	3.1120 ± 0.8886	-1.2289 ± 1.3336
Hayden Waste Water	8/21/95	6	0.6708 ± 0.2047	1.6802 ± 1.0907	5.6536 ± 0.6601	0.0000 ± 0.0000	0.4206 ± 0.9853	0.2205 ± 0.1474	7.7518 ± 1.0016	8.6457 ± 1.6309	-0.8939 ± 2.0652
Hayden Waste Water	8/21/95	12	1.0012 ± 0.3124	8.5431 ± 4.4191	0.1152 ± 0.0159	0.0000 ± 0.0000	2.5597 ± 0.7686	0.1878 ± 0.6073	9.4934 ± 0.7628	12.4070 ± 4.5372	-2.9136 ± 3.1075
Hayden Waste Water	8/23/95	6	0.8344 ± 0.1625	2.3619 ± 1.2591	1.5135 ± 0.5854	0.0000 ± 0.0000	1.2357 ± 0.3922	0.1404 ± 0.1715	5.6442 ± 0.4707	6.0859 ± 1.4621	-0.4417 ± 1.7736
Hayden Waste Water	8/23/95	12	0.8943 ± 0.2075	4.8160 ± 2.3493	0.2011 ± 0.1196	0.0000 ± 0.0000	1.8816 ± 0.4702	0.4928 ± 0.3465	5.3685 ± 0.4597	8.2858 ± 2.4326	-2.9173 ± 2.2531
Hayden Waste Water	8/24/95	6	0.3293 ± 0.0971	1.7585 ± 0.9683	0.8687 ± 0.1061	0.0000 ± 0.0000	1.3310 ± 0.2702	0.2581 ± 0.1322	4.5151 ± 0.4452	4.5456 ± 1.0241	-0.0305 ± 1.4988
Hayden Waste Water	8/24/95	12	0.4729 ± 0.1445	3.1245 ± 1.6491	0.4755 ± 0.0591	0.0000 ± 0.0000	1.6790 ± 0.3395	0.1189 ± 0.2241	4.5481 ± 0.4508	5.8708 ± 1.7057	-1.3227 ± 1.9012
Hayden Waste Water	8/25/95	6	0.4388 ± 0.2037	0.9422 ± 0.5912	6.7941 ± 0.7069	0.0000 ± 0.0000	0.0000 ± 0.0000	0.1307 ± 0.0776	4.9308 ± 0.4545	8.3058 ± 0.9470	-3.3750 ± 1.4493
Hayden Waste Water	8/25/95	12	0.5504 ± 0.1185	1.8343 ± 1.0377	0.7241 ± 0.0893	0.0000 ± 0.0000	1.8254 ± 0.2998	0.1885 ± 0.1371	5.0485 ± 0.4968	5.1227 ± 1.0989	-0.0742 ± 1.5635
Hayden Waste Water	8/26/95	6	0.0000 ± 0.0000	0.9731 ± 0.6303	2.4737 ± 0.1333	0.6865 ± 0.1855	1.3629 ± 0.1647	0.1765 ± 0.0790	5.5555 ± 0.0411	5.6727 ± 0.6949	-0.1172 ± 1.1796
Hayden Waste Water	8/26/95	12	0.5268 ± 0.1040	1.3432 ± 0.8166	0.0939 ± 0.0122	0.1998 ± 0.2559	1.5480 ± 0.1886	0.1646 ± 0.1014	3.2781 ± 0.0408	3.8761 ± 0.8883	-0.5980 ± 1.3335
Hayden Waste Water	8/27/95	6	0.6265 ± 0.1444	1.7166 ± 1.0258	1.5060 ± 0.1317	0.8811 ± 0.3349	2.2164 ± 0.2524	0.1813 ± 0.1262	7.1511 ± 0.0495	7.1279 ± 1.1324	0.0232 ± 1.5057
Hayden Waste Water	8/27/95	12	1.1854 ± 0.2078	2.2065 ± 1.2911	0.0579 ± 0.0056	1.0411 ± 0.4394	1.5275 ± 0.2340	0.1888 ± 0.1573	5.3305 ± 0.0401	6.2072 ± 1.4081	-0.8767 ± 1.6786
Hayden Waste Water	9/17/95	6	1.1722 ± 0.1931	1.2759 ± 0.8228	0.6291 ± 0.0567	0.6791 ± 0.3085	1.1251 ± 0.1634	0.1655 ± 0.0981	4.6732 ± 0.0409	5.0469 ± 0.9214	-0.3737 ± 1.3581
Hayden Waste Water	9/17/95	12	0.7293 ± 0.1389	1.5966 ± 1.0303	0.1225 ± 0.0114	1.0332 ± 0.3289	1.3178 ± 0.2007	0.2806 ± 0.1251	4.1342 ± 0.0512	5.0800 ± 1.1158	-0.9458 ± 1.4947
Hayden Waste Water	9/18/95	6	0.9871 ± 0.1896	1.4054 ± 0.8342	0.9061 ± 0.1034	0.0000 ± 0.0000	2.0436 ± 0.2572	0.6863 ± 0.1298	6.7275 ± 0.0601	6.0285 ± 0.9086	0.6990 ± 1.3494
Hayden Waste Water	9/18/95	12	0.2523 ± 0.0782	1.5735 ± 0.9907	0.5987 ± 0.0543	0.3753 ± 0.2828	1.6249 ± 0.2246	0.2672 ± 0.1275	3.7049 ± 0.0595	4.6919 ± 1.0664	-0.9870 ± 1.4616
Hayden Waste Water	9/19/95	6	0.4021 ± 0.1199	1.5952 ± 0.9175	2.6937 ± 0.2931	0.0000 ± 0.0000	4.4398 ± 0.5271	0.3763 ± 0.1252	9.8453 ± 0.0795	9.5071 ± 1.1116	0.3382 ± 1.4932
Hayden Waste Water	9/19/95	12	0.9573 ± 0.1580	1.7448 ± 1.0524	1.1281 ± 0.1338	1.3287 ± 0.3583	0.8661 ± 0.2486	0.2145 ± 0.1282	7.5111 ± 0.0384	6.2395 ± 1.1645	1.2716 ± 1.5266

Table D.1 (cont.)

Individual Source Contribution to $PM_{2.5}$ Mass at the Six Sites between 02/16/95 and 10/29/95 during the Mt. Zirkel Visibility Study

Site	Date	Start Hour[a]	Primary Geological SCE ± σ (μg/m³)	Primary Motor Vehicle SCE ± σ (μg/m³)	Coal-Fired Generating Station SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Ammonium Sulfate SCE ± σ (μg/m³)	Secondary Ammonium Nitrate SCE ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Calculated[b] Mass ± σ (μg/m³)	Unexplained[c] Mass ± σ (μg/m³)
Hayden Waste Water	9/20/95	6	0.3282 ± 0.0778	1.4545 ± 0.8923	0.1760 ± 0.0211	0.6931 ± 0.2694	1.6303 ± 0.2038	0.2389 ± 0.1113	4.4012 ± 0.0431	4.5210 ± 0.9639	-0.1198 ± 1.3891
Hayden Waste Water	9/20/95	12	0.2553 ± 0.0612	1.1375 ± 0.7128	0.0693 ± 0.0098	0.3662 ± 0.2114	1.5644 ± 0.1788	0.1489 ± 0.0879	3.4732 ± 0.0374	3.5416 ± 0.7722	-0.0684 ± 1.2433
~~Hayden Waste Water~~	~~9/21/95~~	~~6~~	~~0.1113 ± 0.0471~~	~~1.1878 ± 0.6997~~	~~0.4277 ± 0.0569~~	~~0.0000 ± 0.0000~~	~~1.2265 ± 0.1767~~	~~0.0000 ± 0.0000~~	~~3.1718 ± 0.0347~~	~~3.0013 ± 0.7289~~	~~0.1705 ± 1.2079~~
Hayden Waste Water	9/21/95	12	0.3928 ± 0.0835	1.2101 ± 0.7626	0.4018 ± 0.0475	0.2296 ± 0.2305	1.0076 ± 0.1604	0.0745 ± 0.0912	3.5422 ± 0.0352	3.3164 ± 0.8234	0.2258 ± 1.2838
Hayden Waste Water	9/24/95	6	0.5652 ± 0.1046	1.5841 ± 0.9571	0.1266 ± 0.0155	0.4439 ± 0.3023	1.0468 ± 0.1748	0.1304 ± 0.1158	3.9771 ± 0.0355	3.8970 ± 1.0308	0.0801 ± 1.4363
Hayden Waste Water	9/24/95	12	0.2879 ± 0.0673	1.4811 ± 0.8696	0.0348 ± 0.0067	0.0000 ± 0.0000	1.1231 ± 0.1716	0.0864 ± 0.1091	4.5293 ± 0.0372	3.0133 ± 0.8956	1.5160 ± 1.3389
Hayden Waste Water	9/27/95	6	0.9468 ± 0.1588	1.5403 ± 0.9434	0.4318 ± 0.2074	0.5176 ± 0.3157	1.5191 ± 0.2170	0.1886 ± 0.1145	3.1648 ± 0.0406	5.1442 ± 1.0574	-1.9794 ± 1.4548
Hayden Waste Water	9/27/95	12	1.0787 ± 0.1830	1.0407 ± 0.7355	0.3754 ± 0.0484	3.4111 ± 0.3461	1.5412 ± 0.1850	0.2624 ± 0.0866	4.9296 ± 0.0421	7.7095 ± 0.8592	-2.7799 ± 1.3116
Hayden Waste Water	9/30/95	6	0.0551 ± 0.0239	0.5438 ± 0.4402	0.0603 ± 0.0088	0.0000 ± 0.0000	0.1307 ± 0.0835	0.0524 ± 0.0526	0.0000 ± 0.0325	0.8423 ± 0.4518	-0.8423 ± 0.9511
Hayden Waste Water	9/30/95	12	0.2970 ± 0.0699	1.2914 ± 0.7572	0.4695 ± 0.0544	0.0000 ± 0.0000	1.8420 ± 0.2171	0.0729 ± 0.0978	6.2300 ± 0.0394	3.9728 ± 0.7987	2.2572 ± 1.2645
Hayden Waste Water	10/1/95	6	0.3633 ± 0.0882	1.6929 ± 1.0034	0.3381 ± 0.0396	0.2276 ± 0.3029	1.6240 ± 0.2188	0.1832 ± 0.1245	5.3018 ± 0.0389	4.4291 ± 1.0823	0.8727 ± 1.4718
Hayden Waste Water	10/1/95	12	0.6938 ± 0.1378	2.4324 ± 1.3958	0.3914 ± 0.0456	0.1064 ± 0.4339	0.5393 ± 0.2172	0.1154 ± 0.1713	3.5778 ± 0.0350	4.2787 ± 1.4947	-0.7009 ± 1.7293
Hayden Waste Water	10/2/95	6	0.4099 ± 0.0951	1.7688 ± 1.0368	0.2350 ± 0.0280	0.2595 ± 0.3174	1.0675 ± 0.1894	0.2484 ± 0.1297	4.7130 ± 0.0362	3.9891 ± 1.1128	0.7239 ± 1.4923
Hayden Waste Water	10/2/95	12	0.2263 ± 0.0507	0.8665 ± 0.5961	0.0763 ± 0.0105	0.2183 ± 0.1679	0.4435 ± 0.1095	0.3544 ± 0.0793	2.0624 ± 0.0361	2.1853 ± 0.6360	-0.1229 ± 1.1284
Hayden Waste Water	10/7/95	6	1.1508 ± 0.1815	1.2806 ± 0.7567	2.1824 ± 0.2208	0.0000 ± 0.0000	0.0000 ± 0.0000	0.1707 ± 0.0976	4.7574 ± 0.0335	4.7845 ± 0.8147	-0.0271 ± 1.2769
Hayden Waste Water	10/7/95	12	1.0453 ± 0.1861	1.3307 ± 0.8028	0.4232 ± 0.0491	0.1962 ± 0.3018	0.9105 ± 0.1638	0.1373 ± 0.0997	4.9060 ± 0.0351	4.0432 ± 0.8997	0.8628 ± 1.3419
Hayden Waste Water	10/8/95	6	0.9364 ± 0.1470	1.2584 ± 0.8161	0.1281 ± 0.0159	3.0489 ± 0.3383	1.3120 ± 0.1724	0.4793 ± 0.1081	7.2761 ± 0.0451	7.1631 ± 0.9186	0.1130 ± 1.3562
Hayden Waste Water	10/8/95	12	0.6246 ± 0.0931	0.2056 ± 0.3148	0.2589 ± 0.0301	1.5703 ± 0.1604	0.4826 ± 0.0842	0.1630 ± 0.0420	3.1602 ± 0.0323	3.3050 ± 0.3785	-0.1448 ± 0.8707
Hayden Waste Water	10/9/95	6	0.6752 ± 0.1235	1.5670 ± 0.9529	0.8152 ± 0.0938	1.0560 ± 0.3108	0.7246 ± 0.1933	0.0000 ± 0.0000	4.7198 ± 0.0338	4.8380 ± 1.0325	-0.1182 ± 1.4374
Hayden Waste Water	10/9/95	12	2.2988 ± 0.3396	2.4842 ± 1.4103	0.1127 ± 0.0141	0.3559 ± 0.5546	0.7804 ± 0.2191	0.0971 ± 0.1742	6.0401 ± 0.0344	6.1291 ± 1.5781	-0.0890 ± 1.7769
Hayden Waste Water	10/10/95	6	1.2284 ± 0.1885	1.5074 ± 0.9014	0.5282 ± 0.0616	1.1861 ± 0.3433	0.5192 ± 0.1661	0.1933 ± 0.1119	5.3783 ± 0.0347	5.1626 ± 1.0049	0.2157 ± 1.4181
Hayden Waste Water	10/10/95	12	1.1335 ± 0.1759	1.3041 ± 0.7887	0.8164 ± 0.0946	0.7497 ± 0.3028	0.3586 ± 0.1738	0.2628 ± 0.1017	4.7598 ± 0.0371	4.6251 ± 0.8912	0.1347 ± 1.3356
Hayden Waste Water	10/11/95	6	1.1139 ± 0.1757	0.8229 ± 0.5781	1.4920 ± 0.1536	0.5700 ± 0.2476	0.0000 ± 0.0000	0.2882 ± 0.0919	4.6535 ± 0.0598	4.2870 ± 0.6771	0.3665 ± 1.1652
Hayden Waste Water	10/11/95	12	1.6157 ± 0.2281	0.9683 ± 0.6354	0.1404 ± 0.0170	0.1126 ± 0.3032	0.6556 ± 0.1217	0.1232 ± 0.0769	4.9523 ± 0.0332	3.6158 ± 0.7541	1.3365 ± 1.2285
Hayden Waste Water	10/12/95	6	1.2802 ± 0.1990	1.8301 ± 1.0740	0.2303 ± 0.0271	0.8103 ± 0.3831	1.6543 ± 0.2238	0.1274 ± 0.1322	6.6782 ± 0.0445	5.9326 ± 1.1867	0.7456 ± 1.5412
Hayden Waste Water	10/12/95	12	1.1630 ± 0.1746	1.2139 ± 0.7539	0.0431 ± 0.0074	0.9622 ± 0.2943	1.7945 ± 0.1981	0.1206 ± 0.0927	5.6716 ± 0.0437	5.2973 ± 0.8564	0.3743 ± 1.3095
Hayden Waste Water	10/13/95	6	0.5516 ± 0.1071	1.3248 ± 0.8253	0.1345 ± 0.0164	0.6882 ± 0.2606	1.0023 ± 0.1595	0.1230 ± 0.0990	5.0321 ± 0.0327	3.8244 ± 0.8922	1.2077 ± 1.3362
Hayden Waste Water	10/13/95	12	0.7144 ± 0.1307	1.0812 ± 0.6916	0.4791 ± 0.0551	0.3893 ± 0.2429	0.2189 ± 0.1348	0.0787 ± 0.0846	5.6042 ± 0.0351	2.9616 ± 0.7634	2.6426 ± 1.2361
Hayden Waste Water	10/14/95	6	0.4629 ± 0.1032	1.3223 ± 0.8230	1.0929 ± 0.2880	0.4606 ± 0.2585	0.0000 ± 0.0000	0.1531 ± 0.0986	4.1906 ± 0.0325	3.4918 ± 0.9206	0.6988 ± 1.3573
Hayden Waste Water	10/14/95	12	0.3735 ± 0.0805	0.3904 ± 0.4201	1.0459 ± 0.1126	0.2058 ± 0.1347	0.0000 ± 0.0000	0.0548 ± 0.0481	1.8805 ± 0.0345	2.0704 ± 0.4649	-0.1899 ± 0.9649
Hayden VOR	2/17/95	12	0.2389 ± 0.0785	1.1881 ± 0.7258	1.3204 ± 0.1578	0.1523 ± 0.2173	0.0000 ± 0.0000	0.3889 ± 0.1152	0.9535 ± 0.7350	3.2886 ± 0.7863	-2.3351 ± 1.4536
Hayden VOR	2/23/95	6	0.5241 ± 0.1136	1.1117 ± 0.6329	1.3228 ± 0.1389	0.2987 ± 0.2240	0.7277 ± 0.2117	0.6546 ± 0.1075	4.4474 ± 0.0416	4.6396 ± 0.7344	-0.1922 ± 1.2127
Hayden VOR	2/24/95	6	0.6196 ± 0.1551	2.7722 ± 1.4638	0.6474 ± 0.3571	0.0000 ± 0.0000	1.6265 ± 0.4012	0.9276 ± 0.2228	4.7739 ± 0.1191	6.5933 ± 1.5827	-1.8194 ± 1.7831
Hayden VOR	2/26/95	6	0.8015 ± 0.2818	4.9662 ± 2.6166	2.5460 ± 1.5528	0.0000 ± 0.0000	2.0320 ± 0.8090	1.4760 ± 0.3774	7.5706 ± 0.1054	11.8217 ± 3.1834	-4.2511 ± 2.5255
Hayden VOR	2/26/95	12	0.6176 ± 0.1316	2.0512 ± 1.2118	0.5779 ± 0.0713	0.4363 ± 0.3770	1.5059 ± 0.2356	0.7461 ± 0.1654	5.4747 ± 0.0579	5.9350 ± 1.3099	-0.4603 ± 1.6196
Hayden VOR	8/7/95	6	1.1196 ± 0.1866	2.0607 ± 1.1702	0.9151 ± 0.1118	1.6901 ± 0.4212	1.2188 ± 0.2428	0.2384 ± 0.1498	6.0934 ± 0.0582	7.2427 ± 1.2944	-1.1493 ± 1.6100
Hayden VOR	8/7/95	12	0.9974 ± 0.1895	2.2699 ± 1.2706	0.0364 ± 0.0063	1.6688 ± 0.4474	2.3374 ± 0.2814	0.2518 ± 0.1636	6.4145 ± 0.0695	7.5617 ± 1.3987	-1.1472 ± 1.6740
Hayden VOR	8/8/95	6	1.9024 ± 0.3074	3.3679 ± 1.8607	0.8796 ± 0.1082	1.9312 ± 0.6717	2.0949 ± 0.3557	0.2268 ± 0.2361	6.7106 ± 0.0633	10.4028 ± 2.0498	-3.6922 ± 2.0257
Hayden VOR	8/8/95	12	2.6605 ± 0.3623	1.5267 ± 0.9344	0.1120 ± 0.0149	3.5836 ± 0.5377	1.8678 ± 0.2134	0.3004 ± 0.1161	6.5053 ± 0.0481	10.0510 ± 1.1631	-3.5457 ± 1.5259
Hayden VOR	8/9/95	6	4.0555 ± 0.5904	2.4660 ± 1.4251	3.8509 ± 0.7293	0.5560 ± 0.7381	0.0000 ± 0.0000	0.2999 ± 0.1801	8.0515 ± 0.1017	11.2283 ± 1.8678	-3.1768 ± 1.9354
Hayden VOR	8/9/95	12	2.5619 ± 0.4260	5.4487 ± 2.9651	0.4431 ± 0.0552	0.6846 ± 1.0109	1.0248 ± 0.4370	0.3765 ± 0.3766	5.0364 ± 0.0521	10.5396 ± 3.2142	-5.5032 ± 2.5360
Hayden VOR	8/14/95	6	0.8975 ± 0.1627	2.5068 ± 1.4221	0.1085 ± 0.0642	0.1027 ± 0.4536	0.5818 ± 0.2127	0.1852 ± 0.1764	2.8902 ± 0.0350	4.3825 ± 1.5281	-1.4923 ± 1.7485
Hayden VOR	8/14/95	12	0.5508 ± 0.0922	1.0733 ± 0.7218	0.0341 ± 0.0202	0.1914 ± 0.2155	0.5609 ± 0.1111	0.1652 ± 0.0839	1.9359 ± 0.0345	2.5757 ± 0.7718	-0.6398 ± 1.2429
Hayden VOR	8/21/95	6	3.0857 ± 0.3294	1.3700 ± 0.8395	4.0441 ± 0.4397	0.0000 ± 0.0000	1.5477 ± 0.5343	0.3962 ± 0.1124	8.4113 ± 0.0753	10.4437 ± 1.1422	-2.0324 ± 1.5133
Hayden VOR	8/21/95	12	1.9264 ± 0.3330	4.7316 ± 2.5978	0.1727 ± 0.0221	0.1527 ± 0.8609	2.9398 ± 0.4620	0.3473 ± 0.3295	7.8107 ± 0.0689	10.2705 ± 2.8148	-2.4598 ± 2.3737
Hayden VOR	8/22/95	6	0.3773 ± 0.1059	1.7357 ± 1.0331	1.6466 ± 0.1946	0.4374 ± 0.3183	1.2069 ± 0.2892	0.2570 ± 0.1292	4.5138 ± 0.0508	5.6609 ± 1.1481	-1.1471 ± 1.5162
Hayden VOR	8/22/95	12	0.6098 ± 0.1198	2.0730 ± 1.1981	0.3319 ± 0.0412	0.3945 ± 0.3743	1.8935 ± 0.2476	0.2138 ± 0.1500	5.0401 ± 0.0575	5.5165 ± 1.2944	-0.4764 ± 1.6100
Hayden VOR	8/23/95	6	1.0193 ± 0.2070	3.3988 ± 1.7996	1.1357 ± 0.1395	0.0000 ± 0.0000	1.9393 ± 0.3648	0.2671 ± 0.2387	9.1975 ± 0.0601	7.7602 ± 1.8684	1.4373 ± 1.9340
Hayden VOR	8/23/95	12	0.7325 ± 0.1506	2.0933 ± 1.2106	5.2857 ± 0.5871	0.0528 ± 0.3864	0.0000 ± 0.0000	0.1641 ± 0.1525	5.1510 ± 0.0517	8.3284 ± 1.4161	-3.1774 ± 1.6837
Hayden VOR	8/24/95	6	1.0650 ± 0.1782	1.1409 ± 0.7388	1.6609 ± 0.1944	0.3116 ± 0.2766	1.3122 ± 0.2669	0.2043 ± 0.0907	6.0879 ± 0.0446	5.6949 ± 0.8783	0.3930 ± 1.3261
Hayden VOR	8/24/95	12	2.6337 ± 0.3528	3.4492 ± 1.8450	0.5837 ± 0.0723	0.0000 ± 0.0000	1.5105 ± 0.3186	0.2320 ± 0.2408	5.1270 ± 0.0458	8.4091 ± 1.9218	-3.2821 ± 1.9610
Hayden VOR	8/25/95	6	1.3681 ± 0.2290	1.4996 ± 0.9160	2.1834 ± 0.2545	0.5741 ± 0.3576	1.5394 ± 0.3426	0.2116 ± 0.1140	6.7737 ± 0.0462	7.3762 ± 1.1021	-0.6025 ± 1.4854
Hayden VOR	8/25/95	12	0.9216 ± 0.1565	1.9249 ± 1.1453	0.5362 ± 0.0663	0.2956 ± 0.3682	1.8925 ± 0.2489	0.2969 ± 0.1431	5.0340 ± 0.0507	5.8677 ± 1.2484	-0.8337 ± 1.5809
Hayden VOR	8/26/95	6	2.6621 ± 0.3904	0.9958 ± 0.6493	3.9713 ± 0.3736	0.8324 ± 0.4499	0.0000 ± 0.0000	0.3338 ± 0.0873	7.9206 ± 0.0460	8.7954 ± 0.9610	-0.8748 ± 1.3871
Hayden VOR	8/26/95	12	1.4067 ± 0.2044	1.3275 ± 0.8116	0.1152 ± 0.0140	0.5899 ± 0.3240	1.6633 ± 0.1906	0.3915 ± 0.1071	4.6502 ± 0.0428	5.4941 ± 0.9238	-0.8439 ± 1.3599
Hayden VOR	8/27/95	6	1.1238 ± 0.2299	1.5952 ± 0.9635	3.5629 ± 0.3989	1.2181 ± 0.3757	0.6401 ± 0.4797	1.5853 ± 0.2197	8.1911 ± 0.1147	9.7254 ± 1.2489	-1.5343 ± 1.5846
Hayden VOR	8/27/95	12	3.5277 ± 0.4915	2.6172 ± 1.4708	0.1996 ± 0.0238	0.3687 ± 0.6832	1.5062 ± 0.2549	0.2887 ± 0.1860	11.7100 ± 0.0414	8.5081 ± 1.7239	3.2019 ± 1.8573

Table D.1 (cont.)
Individual Source Contribution to $PM_{2.5}$ Mass at the Six Sites between 02/16/95 and 10/29/95 during the Mt. Zirkel Visibility Study

Site	Date	Start Hour[a]	Primary Geological SCE ± σ (μg/m³)	Primary Motor Vehicle SCE ± σ (μg/m³)	Coal-Fired Generating Station SCE ± σ (μg/m³)	Vegetative Burning SCE ± σ (μg/m³)	Secondary Ammonium Sulfate SCE ± σ (μg/m³)	Secondery Ammonium Nitrate SCE ± σ (μg/m³)	Measured Mass ± σ (μg/m³)	Calculated[b] Mass ± σ (μg/m³)	Unexplained[c] Mass ± σ (μg/m³)
Hayden VOR	9/17/95	6	1.3905 ± 0.2776	1.9332 ± 1.0873	3.0366 ± 0.3201	0.5819 ± 0.4330	0.0000 ± 0.0000	0.1061 ± 0.1400	5.6420 ± 0.0375	7.0483 ± 1.2525	-1.4063 ± 1.5832
Hayden VOR	9/17/95	12	1.9475 ± 0.2948	2.5317 ± 1.4348	0.4167 ± 0.0490	0.4439 ± 0.5303	1.2074 ± 0.2412	0.1485 ± 0.1785	7.4930 ± 0.0387	6.6957 ± 1.5872	0.7973 ± 1.7821
Hayden VOR	9/18/95	6	0.3863 ± 0.0951	1.4670 ± 0.8926	0.9635 ± 0.1126	0.4481 ± 0.2746	2.3160 ± 0.2794	0.5225 ± 0.1248	6.9787 ± 0.0549	6.1240 ± 0.9937	0.8547 ± 1.4108
Hayden VOR	9/18/95	12	0.4283 ± 0.1139	2.5024 ± 1.4248	0.7480 ± 0.0887	0.7425 ± 0.4411	1.3055 ± 0.2687	0.1136 ± 0.1769	3.4567 ± 0.0398	5.8403 ± 1.5323	-2.3836 ± 1.7511
Hayden VOR	9/19/95	6	0.0000 ± 0.0000	0.9749 ± 0.6390	1.9993 ± 0.1903	0.1804 ± 0.1810	4.2994 ± 0.5564	0.3761 ± 0.0896	7.9333 ± 0.0845	7.8301 ± 0.8916	0.1032 ± 1.3380
Hayden VOR	9/19/95	12	1.2658 ± 0.2359	2.5184 ± 1.4408	1.4452 ± 0.1696	1.5432 ± 0.5043	0.4988 ± 0.3085	0.2521 ± 0.1799	5.9441 ± 0.0391	7.5235 ± 1.5944	-1.5794 ± 1.7861
Hayden VOR	9/20/95	6	1.1167 ± 0.1996	1.6073 ± 0.9539	0.1357 ± 0.0163	0.8984 ± 0.3512	1.1876 ± 0.1756	0.1698 ± 0.1178	4.3235 ± 0.0376	5.1155 ± 1.0574	-0.7920 ± 1.4547
Hayden VOR	9/20/95	12	0.9827 ± 0.1734	1.2206 ± 0.7498	0.0056 ± 0.0033	0.6583 ± 0.2816	1.3071 ± 0.1609	0.1638 ± 0.0939	5.1837 ± 0.0380	4.3381 ± 0.8404	0.8456 ± 1.2970
Hayden VOR	9/21/95	6	0.0933 ± 0.0364	0.5145 ± 0.3753	0.6544 ± 0.0769	0.1081 ± 0.1094	0.4924 ± 0.1165	0.1449 ± 0.0530	2.0642 ± 0.0341	2.0076 ± 0.4200	0.0566 ± 0.9171
Hayden VOR	9/21/95	12	0.5250 ± 0.1229	2.3501 ± 1.3546	0.2992 ± 0.0351	0.0970 ± 0.4154	1.5565 ± 0.2454	0.0400 ± 0.1659	5.0184 ± 0.0362	4.8678 ± 1.4531	0.1506 ± 1.7051
Hayden VOR	9/24/95	6	0.7862 ± 0.1398	0.9741 ± 0.6328	0.1122 ± 0.0135	0.7231 ± 0.2345	0.9740 ± 0.1285	0.1993 ± 0.0792	4.1633 ± 0.0356	3.7689 ± 0.7056	0.3944 ± 1.1885
Hayden VOR	9/24/95	12	0.6390 ± 0.1122	0.5886 ± 0.4637	0.0377 ± 0.0059	0.6623 ± 0.1723	1.2263 ± 0.1244	0.1129 ± 0.0552	3.7771 ± 0.0360	3.2668 ± 0.5252	0.5103 ± 1.0255
Hayden VOR	9/27/95	6	1.3904 ± 0.2567	2.1091 ± 1.1984	1.4210 ± 0.1645	0.8480 ± 0.4477	1.0010 ± 0.2602	0.2333 ± 0.1521	5.1184 ± 0.0387	7.0028 ± 1.3532	-1.8844 ± 1.6456
Hayden VOR	9/27/95	12	1.6854 ± 0.2972	2.2721 ± 1.3088	0.2159 ± 0.0311	3.8490 ± 0.5540	1.6233 ± 0.2422	0.3653 ± 0.1649	7.3720 ± 0.0413	10.0110 ± 1.4816	-2.6390 ± 1.7219
Hayden VOR	9/30/95	6	0.0256 ± 0.0219	0.5206 ± 0.4112	0.0186 ± 0.0046	0.0000 ± 0.0000	0.0884 ± 0.0852	0.0986 ± 0.0532	1.7169 ± 0.0348	0.7518 ± 0.4203	0.9651 ± 0.9175
Hayden VOR	9/30/95	12	0.4599 ± 0.0900	0.8642 ± 0.6192	0.5395 ± 0.0619	0.5048 ± 0.1887	1.2574 ± 0.1593	0.1609 ± 0.0736	4.7130 ± 0.0405	3.7867 ± 0.6795	0.9263 ± 1.1665
Hayden VOR	10/1/95	6	2.0228 ± 0.2578	1.2968 ± 0.7994	1.3368 ± 0.5742	0.0000 ± 0.0000	3.0373 ± 0.3775	0.2251 ± 0.1021	9.4353 ± 0.0780	7.9188 ± 1.0900	1.5165 ± 1.4785
Hayden VOR	10/1/95	12	1.0967 ± 0.1504	0.4722 ± 0.4052	0.2614 ± 0.0303	0.4597 ± 0.1986	0.4264 ± 0.0847	0.1473 ± 0.0543	3.7142 ± 0.0377	2.8637 ± 0.4871	0.8505 ± 0.9877
Hayden VOR	10/2/95	6	1.3248 ± 0.2345	1.7167 ± 1.0317	0.4222 ± 0.0494	0.6920 ± 0.3840	0.5632 ± 0.1648	0.4697 ± 0.1330	5.8310 ± 0.0409	5.1886 ± 1.1464	0.6424 ± 1.5148
Hayden VOR	10/2/95	12	1.0453 ± 0.1643	1.5451 ± 0.9078	0.0627 ± 0.0084	0.0000 ± 0.0000	0.4582 ± 0.1372	0.2372 ± 0.1152	2.5878 ± 0.0357	3.3485 ± 0.9398	-0.7607 ± 1.3714
Hayden VOR	10/7/95	6	3.4716 ± 0.3439	0.9948 ± 0.6296	0.7824 ± 0.0900	0.0000 ± 0.0000	0.4587 ± 0.1488	0.1158 ± 0.0790	6.6217 ± 0.0343	5.8233 ± 0.7424	0.7984 ± 1.2190
Hayden VOR	10/7/95	12	2.1315 ± 0.3468	1.1489 ± 0.7272	0.3166 ± 0.0372	0.5453 ± 0.4096	0.8714 ± 0.1391	0.1418 ± 0.0888	6.9232 ± 0.0358	5.1555 ± 0.9195	1.7677 ± 1.3566
Hayden VOR	10/8/95	6	3.6102 ± 0.5176	0.6543 ± 0.4990	0.1290 ± 0.0156	3.4109 ± 0.5447	1.0023 ± 0.1198	0.6148 ± 0.0889	-99.0000 ± 0.0495	9.4215 ± 0.9144	-99.0000 ± -99.0000
Hayden VOR	10/8/95	12	1.8279 ± 0.2828	0.4929 ± 0.3840	0.3128 ± 0.0366	1.9153 ± 0.3241	0.7147 ± 0.1011	0.1881 ± 0.0554	5.5513 ± 0.0370	5.4517 ± 0.5892	0.0996 ± 1.0862
Hayden VOR	10/9/95	6	2.6861 ± 0.4302	0.9705 ± 0.6539	2.2386 ± 0.2293	1.1897 ± 0.4752	0.0000 ± 0.0000	0.1598 ± 0.0806	7.5323 ± 0.0372	7.2447 ± 0.9474	0.2876 ± 1.3770
Hayden VOR	10/9/95	12	3.4233 ± 0.5796	2.9772 ± 1.7063	0.0861 ± 0.0109	1.3874 ± 0.7770	0.6133 ± 0.2429	0.3053 ± 0.2101	7.5911 ± 0.0388	8.7926 ± 1.9886	-1.2015 ± 1.9947
Hayden VOR	10/10/95	6	2.6132 ± 0.3478	1.0414 ± 0.6793	0.4435 ± 0.0519	1.3047 ± 0.4333	0.4402 ± 0.1235	0.3889 ± 0.0910	5.4731 ± 0.0395	6.2319 ± 0.8924	-0.7588 ± 1.3365
Hayden VOR	10/10/95	12	2.8591 ± 0.3818	1.1393 ± 0.7368	0.9054 ± 0.1045	0.9914 ± 0.4657	0.1799 ± 0.1639	0.2322 ± 0.0916	5.7720 ± 0.0371	6.3073 ± 0.9755	-0.5353 ± 1.3973
Hayden VOR	10/11/95	6	2.3909 ± 0.3263	1.3442 ± 0.8421	0.2297 ± 0.0268	0.8671 ± 0.4310	0.3189 ± 0.1244	0.1097 ± 0.1003	5.5702 ± 0.0351	5.2605 ± 1.0137	0.3097 ± 1.4243
Hayden VOR	10/11/95	12	2.2760 ± 0.3205	1.7174 ± 1.0347	0.1442 ± 0.0170	0.4478 ± 0.4550	0.5472 ± 0.1535	0.3244 ± 0.1289	5.5266 ± 0.0407	5.4570 ± 1.1920	0.0696 ± 1.5446
Hayden VOR	10/12/95	6	2.9907 ± 0.4175	2.1177 ± 1.2560	0.2614 ± 0.0304	0.8098 ± 0.5799	2.1780 ± 0.3096	0.2275 ± 0.1569	9.7365 ± 0.6477	8.5851 ± 1.4864	1.1514 ± 1.8418
Hayden VOR	10/12/95	12	4.0098 ± 0.5294	1.7465 ± 1.0687	0.0790 ± 0.0101	1.4892 ± 0.6576	1.8255 ± 0.2242	0.1842 ± 0.1288	9.8500 ± 0.0416	9.3342 ± 1.3863	0.5158 ± 1.6656
Hayden VOR	10/13/95	6	1.4538 ± 0.1985	0.6798 ± 0.4844	0.1193 ± 0.0142	0.4193 ± 0.2538	0.3223 ± 0.0809	0.1323 ± 0.0612	4.9398 ± 0.0339	3.1268 ± 0.5907	1.8130 ± 1.0875
Hayden VOR	10/13/95	12	1.6938 ± 0.2398	1.2037 ± 0.7772	0.2669 ± 0.0310	0.0317 ± 0.3307	0.2844 ± 0.1164	0.1587 ± 0.0923	4.5078 ± 0.0349	3.6392 ± 0.8910	0.8686 ± 1.3354
Hayden VOR	10/14/95	6	1.4554 ± 0.2099	0.7529 ± 0.5292	1.4255 ± 0.1459	1.1115 ± 0.2803	0.0000 ± 0.0000	0.0935 ± 0.0646	7.7854 ± 0.0328	4.8388 ± 0.6543	2.9466 ± 1.1444
Hayden VOR	10/14/95	12	0.8788 ± 0.1335	0.4513 ± 0.3901	1.0777 ± 0.1161	0.1225 ± 0.1705	0.0000 ± 0.0000	0.0993 ± 0.0482	3.6960 ± 0.0316	2.6296 ± 0.4635	1.0664 ± 0.9633
Juniper Mountain	2/23/95	12	0.7497 ± 0.1609	1.1002 ± 0.6056	0.1761 ± 0.0205	0.0000 ± 0.0000	0.6500 ± 0.1142	0.4162 ± 0.0945	1.9033 ± 0.0397	3.0922 ± 0.6442	-1.1889 ± 1.1358
Juniper Mountain	3/27/95	6	0.2874 ± 0.0717	0.5413 ± 0.2961	0.0546 ± 0.0087	0.0000 ± 0.0000	1.8408 ± 0.2118	0.0452 ± 0.0432	3.3837 ± 0.2730	2.7693 ± 0.3737	0.6144 ± 0.9066
Juniper Mountain	3/28/95	6	0.3011 ± 0.0626	0.4364 ± 0.2480	0.0300 ± 0.0069	0.1206 ± 0.1425	1.7927 ± 0.2047	0.1098 ± 0.0384	2.7240 ± 0.2337	2.7906 ± 0.3594	-0.0666 ± 0.8794
Juniper Mountain	3/29/95	6	0.6555 ± 0.0955	0.2885 ± 0.1718	0.0459 ± 0.0080	0.3613 ± 0.1530	1.5308 ± 0.1743	0.1204 ± 0.0310	5.5455 ± 0.3367	3.0024 ± 0.3057	2.5431 ± 0.8513
Juniper Mountain	5/7/95	6	4.9501 ± 0.5927	1.3837 ± 0.7645	0.1031 ± 0.0138	1.1927 ± 0.6839	1.4837 ± 0.2038	0.2356 ± 0.1025	5.6782 ± 0.3575	9.3489 ± 1.2065	-3.6707 ± 1.5940
Juniper Mountain	6/14/95	6	1.0955 ± 0.1468	0.3883 ± 0.2392	0.0801 ± 0.0111	2.3671 ± 0.2437	2.2735 ± 0.2633	0.0770 ± 0.0347	5.4576 ± 0.3442	6.2815 ± 0.4570	-0.8239 ± 1.0161
Juniper Mountain	6/15/95	6	1.9251 ± 0.3341	1.9995 ± 1.0928	0.0364 ± 0.0076	2.0591 ± 0.5080	1.8326 ± 0.2640	0.1965 ± 0.1442	6.5915 ± 0.3855	8.0492 ± 1.2863	-1.4577 ± 1.6496
Juniper Mountain	6/16/95	6	0.0732 ± 0.0557	0.5185 ± 0.2897	0.0471 ± 0.0081	0.0507 ± 0.1537	0.1654 ± 0.0503	0.0191 ± 0.0415	0.3687 ± 0.2089	0.8740 ± 0.3391	-0.5053 ± 0.8496
Juniper Mountain	6/29/95	6	1.4071 ± 0.2570	1.7201 ± 0.9409	0.0206 ± 0.0065	0.2398 ± 0.4132	0.5558 ± 0.1562	0.0886 ± 0.1250	4.7398 ± 0.3701	4.0320 ± 1.0780	0.7078 ± 1.5143
Juniper Mountain	8/7/95	6	0.9727 ± 0.2074	1.3205 ± 0.7408	0.1058 ± 0.0154	2.8866 ± 0.4224	1.5100 ± 0.2061	0.1535 ± 0.1027	6.8061 ± 0.5491	6.9491 ± 0.9075	-0.1430 ± 1.4548
Juniper Mountain	8/7/95	12	0.5899 ± 0.1557	1.1165 ± 0.6410	0.0426 ± 0.0090	1.7117 ± 0.3487	1.3229 ± 0.1784	0.1459 ± 0.0893	4.7624 ± 0.4828	4.9295 ± 0.7724	-0.1671 ± 1.3334
Juniper Mountain	8/8/95	6	1.6200 ± 0.3040	1.9008 ± 1.0501	0.0874 ± 0.0132	1.9181 ± 0.5140	2.1001 ± 0.2856	0.1789 ± 0.1413	6.2506 ± 0.5265	7.8053 ± 1.2494	-1.5547 ± 1.6661
Juniper Mountain	8/8/95	12	1.9166 ± 0.3540	2.3961 ± 1.3174	0.0492 ± 0.0097	1.8652 ± 0.5980	1.4784 ± 0.2600	0.2097 ± 0.1753	6.0942 ± 0.5221	7.9152 ± 1.5221	-1.8210 ± 1.8212
Juniper Mountain	8/9/95	6	1.2175 ± 0.2337	1.0068 ± 0.5855	0.4437 ± 0.0550	0.7126 ± 0.3671	0.3057 ± 0.1231	0.2077 ± 0.0847	4.1558 ± 0.0354	3.8940 ± 0.7467	0.2618 ± 1.2226
Juniper Mountain	8/9/95	12	1.5058 ± 0.2824	1.5268 ± 0.8524	0.0465 ± 0.0095	1.3808 ± 0.4568	0.8819 ± 0.1641	0.2070 ± 0.1172	4.7097 ± 0.0422	5.5488 ± 1.0275	-0.8391 ± 1.4341
Juniper Mountain	8/21/95	6	0.4288 ± 0.1629	1.3478 ± 0.7700	0.0092 ± 0.0072	0.1397 ± 0.4015	1.5896 ± 0.2143	0.1277 ± 0.1090	5.5670 ± 0.6019	3.6428 ± 0.9157	1.9242 ± 1.4811
Juniper Mountain	8/21/95	12	1.1137 ± 0.2161	1.9658 ± 1.0718	0.0232 ± 0.0079	0.4527 ± 0.4216	1.7787 ± 0.2573	0.1438 ± 0.1422	7.7912 ± 0.4757	5.4779 ± 1.2082	2.3133 ± 1.6258
Juniper Mountain	8/22/95	6	0.1981 ± 0.1115	0.6897 ± 0.4268	0.0000 ± 0.0000	0.3086 ± 0.2749	1.5144 ± 0.1819	0.1221 ± 0.0635	3.9391 ± 0.4612	2.8329 ± 0.5543	1.1062 ± 1.1495
Juniper Mountain	8/23/95	6	0.6286 ± 0.1714	2.0272 ± 1.1116	0.0178 ± 0.0077	0.1911 ± 0.4428	1.6482 ± 0.2509	0.1142 ± 0.1492	7.5872 ± 0.0447	4.6269 ± 1.2435	2.9603 ± 1.5777
Juniper Mountain	8/24/95	6	0.2154 ± 0.1134	0.7454 ± 0.4391	0.0215 ± 0.0086	0.0356 ± 0.2802	1.4359 ± 0.1754	0.0440 ± 0.0654	3.3658 ± 0.0421	2.4978 ± 0.5651	0.8680 ± 1.0639
Juniper Mountain	8/24/95	12	0.1880 ± 0.1119	0.7447 ± 0.4501	0.0081 ± 0.0083	0.2223 ± 0.2800	1.0055 ± 0.1330	0.0475 ± 0.0663	3.0421 ± 0.0372	2.2161 ± 0.5618	0.8260 ± 1.0607

Table D.1 (cont.)
Individual Source Contribution to $PM_{2.5}$ Mass at the Six Sites between 02/16/95 and 10/29/95 during the Mt. Zirkel Visibility Study

Site	Date	Start Hour[a]	Primary Geological SCE ± σ (µg/m³)	Primary Motor Vehicle SCE ± σ (µg/m³)	Coal-Fired Generating Station SCE ± σ (µg/m³)	Vegetative Burning SCE ± σ (µg/m³)	Secondary Ammonium Sulfate SCE ± σ (µg/m³)	Secondary Ammonium Nitrate SCE ± σ (µg/m³)	Measured Mass ± σ (µg/m³)	Calculated[b] Mass ± σ (µg/m³)	Unexplained[c] Mass ± σ (µg/m³)
Juniper Mountain	8/25/95	6	0.3810 ± 0.1132	1.5611 ± 0.8660	0.0147 ± 0.0076	0.1919 ± 0.3233	1.0617 ± 0.1761	0.0838 ± 0.1136	4.2680 ± 0.0272	3.2942 ± 0.9546	0.9738 ± 1.3820
Juniper Mountain	8/26/95	6	0.2731 ± 0.1049	0.8145 ± 0.4793	0.0219 ± 0.0077	0.4235 ± 0.2918	1.3228 ± 0.1667	0.1289 ± 0.0709	2.4848 ± 0.0395	2.9847 ± 0.5990	-0.4999 ± 1.0952
~~Juniper Mountain~~	~~9/2/95~~	~~6~~	~~0.9218 ± 0.2433~~	~~3.3492 ± 1.7840~~	~~0.0269 ± 1.0749~~	~~0.0000 ± 0.0000~~	~~2.4066 ± 0.5274~~	~~0.2452 ± 0.2414~~	~~9.0200 ± 0.0475~~	~~6.9437 ± 2.1737~~	~~2.0763 ± 2.0865~~
Juniper Mountain	9/2/95	12	0.4347 ± 0.1371	1.3007 ± 0.7363	0.2073 ± 0.4345	0.6414 ± 0.3451	2.0154 ± 0.2948	0.1622 ± 0.1014	3.6419 ± 0.0464	4.7617 ± 0.9829	-1.1198 ± 1.4028
Juniper Mountain	9/24/95	6	0.2573 ± 0.1022	0.8323 ± 0.4824	0.0264 ± 0.0080	0.5253 ± 0.2891	1.3480 ± 0.1695	0.1434 ± 0.0722	4.0167 ± 0.0391	3.1327 ± 0.6006	0.8840 ± 1.0967
Juniper Mountain	9/24/95	12	0.1714 ± 0.0991	0.6786 ± 0.4323	0.0268 ± 0.0079	0.5772 ± 0.2744	1.2815 ± 0.1580	0.0992 ± 0.0627	3.2730 ± 0.0386	2.8347 ± 0.5486	0.4383 ± 1.0482
Juniper Mountain	9/27/95	6	0.8334 ± 0.1870	2.7281 ± 1.4869	0.0882 ± 0.0127	0.7245 ± 0.5486	1.3894 ± 0.2515	0.1210 ± 0.1913	4.9527 ± 0.0398	5.8846 ± 1.6269	-0.9319 ± 1.8043
Juniper Mountain	9/27/95	12	1.2614 ± 0.2785	3.6905 ± 2.0060	0.1161 ± 0.0285	0.8606 ± 0.7169	1.4616 ± 0.3200	0.2227 ± 0.2568	11.2180 ± 0.0394	7.6129 ± 2.1874	3.6051 ± 2.0920
Juniper Mountain	10/7/95	6	1.1080 ± 0.1868	1.1560 ± 0.6494	0.1376 ± 0.0174	0.1909 ± 0.3593	0.6394 ± 0.1156	0.0713 ± 0.0882	5.4640 ± 0.0359	3.3032 ± 0.7792	2.1608 ± 1.2489
Juniper Mountain	10/8/95	6	0.3629 ± 0.1108	0.8582 ± 0.4924	0.0490 ± 0.0095	3.0326 ± 0.3361	0.7238 ± 0.1024	0.2276 ± 0.0743	4.2995 ± 0.0381	5.2541 ± 0.6206	-0.9546 ± 1.1147
Juniper Mountain	10/8/95	12	0.4262 ± 0.1236	1.1923 ± 0.6658	0.0327 ± 0.0082	0.8792 ± 0.3433	0.5898 ± 0.1133	0.0857 ± 0.0903	2.8718 ± 0.0352	3.2059 ± 0.7730	-0.3341 ± 1.2439
Juniper Mountain	10/9/95	6	0.8556 ± 0.1896	1.1201 ± 0.6219	0.0618 ± 0.0101	0.8114 ± 0.3565	0.4725 ± 0.1035	0.1227 ± 0.0859	3.9210 ± 0.0344	3.4441 ± 0.7546	0.4769 ± 1.2290
Juniper Mountain	10/9/95	12	0.8379 ± 0.1607	1.2718 ± 0.7014	0.0340 ± 0.0084	0.8280 ± 0.3648	0.5772 ± 0.1177	0.1444 ± 0.0960	3.1510 ± 0.0357	3.6933 ± 0.8210	-0.5423 ± 1.2819
Juniper Mountain	10/10/95	6	0.8565 ± 0.1684	1.6420 ± 0.9007	0.0472 ± 0.0094	1.0347 ± 0.4075	0.5579 ± 0.1415	0.1500 ± 0.1195	2.9457 ± 0.0357	4.2883 ± 1.0198	-1.3426 ± 1.4286
Juniper Mountain	10/11/95	12	0.6555 ± 0.1786	2.1556 ± 1.1794	0.0711 ± 0.0110	0.4598 ± 0.4663	1.9260 ± 0.2485	0.1189 ± 0.1543	6.5736 ± 0.0477	5.3869 ± 1.3138	1.1867 ± 1.6217
Juniper Mountain	10/12/95	6	1.5124 ± 0.3318	4.8427 ± 2.6276	0.2074 ± 0.0252	0.7160 ± 0.9030	1.0803 ± 0.3886	0.1564 ± 0.3338	12.8620 ± 0.0374	8.5152 ± 2.8448	4.3468 ± 2.3856
Juniper Mountain	10/12/95	12	0.5937 ± 0.2013	0.7499 ± 0.5210	0.0406 ± 0.0087	1.0872 ± 0.4304	0.2398 ± 0.0836	0.2025 ± 0.0829	3.1852 ± 0.0577	2.9137 ± 0.7149	0.2715 ± 1.1971
Juniper Mountain	10/14/95	6	0.4172 ± 0.1296	0.4936 ± 0.3118	0.0634 ± 0.0102	0.4050 ± 0.2642	0.2496 ± 0.0574	0.0974 ± 0.0515	1.6558 ± 0.0350	1.7262 ± 0.4357	-0.0704 ± 0.9341
Juniper Mountain	10/14/95	12	0.2935 ± 0.1124	0.1562 ± 0.1639	0.0344 ± 0.0082	0.0785 ± 0.2120	0.1547 ± 0.0391	0.0725 ± 0.0396	0.7490 ± 0.0349	0.7898 ± 0.2960	-0.0408 ± 0.7702
Juniper Mountain	10/16/95	6	0.6863 ± 0.2236	2.1627 ± 1.1975	0.1048 ± 0.0156	0.5780 ± 0.5576	1.1751 ± 0.2097	0.1898 ± 0.1610	7.9546 ± 0.0558	4.8967 ± 1.3657	3.0579 ± 1.6536
Juniper Mountain	10/17/95	6	0.7483 ± 0.1330	0.4464 ± 0.2607	0.0937 ± 0.0116	0.9646 ± 0.1977	0.7706 ± 0.0810	0.1148 ± 0.0385	2.8395 ± 0.0207	3.1384 ± 0.3646	-0.2989 ± 0.8542
Juniper Mountain	10/18/95	6	0.6825 ± 0.1285	0.6081 ± 0.3440	0.0386 ± 0.0060	0.5829 ± 0.2045	0.7467 ± 0.0861	0.1577 ± 0.0493	2.8039 ± 0.0202	2.8145 ± 0.4319	-0.0106 ± 0.9296
Juniper Mountain	10/22/95	6	0.4137 ± 0.1016	1.2341 ± 0.6734	0.0088 ± 0.0038	0.4152 ± 0.2587	0.0645 ± 0.0960	0.0598 ± 0.0865	1.4481 ± 0.0169	2.1961 ± 0.7399	-0.7480 ± 1.2166
Juniper Mountain	10/23/95	6	0.1906 ± 0.0527	0.1999 ± 0.1429	0.0252 ± 0.0046	0.4811 ± 0.1260	1.0763 ± 0.0927	0.0965 ± 0.0260	2.6139 ± 0.0233	2.0696 ± 0.2199	0.5443 ± 0.6636

[a] Sampling start time was either 0600 or 1200 MST.
[b] Calculated mass is the sum of the source contribution estimates.
[c] Unexplained mass = Measured mass - Calculated mass.

Table D.2

Individual Source Contribution to Light Extinction at the Six Sites between 02/16/95 and 10/29/95 during the Mt. Zirkel Visibility Study

Site	Date	Start Hour[a]	Primary Geological SCE ± σ (Mm^{-1})	Primary Motor Vehicle SCE ± σ (Mm^{-1})	Coal-Fired Generating Station SCE ± σ (Mm^{-1})	Vegetative Burning SCE ± σ (Mm^{-1})	Secondary Ammonium Sulfate SCE ± σ (Mm^{-1})	Secondary Ammonium Nitrate SCE ± σ (Mm^{-1})	Measured Extinction ± σ (Mm^{-1})	Calculated[b] Extinction ± σ (Mm^{-1})	Rayleigh Coefficient	Unexplained[c] Extinction ± σ (Mm^{-1})
Baggs/Baker	2/23/95	6	0.7223 ± 0.4226	7.6062 ± 7.7887	0.8341 ± 0.3981	0.0000 ± 0.0000	1.2025 ± 0.4608	1.1112 ± 0.2828	19.4407 ± 2.2276	11.4763 ± 7.8290	9.5220	-1.5576 ± 8.1397
Baggs/Baker	2/23/95	12	0.6547 ± 0.3881	4.9143 ± 4.9098	0.8876 ± 0.4222	0.0000 ± 0.0000	2.0208 ± 0.4260	1.0356 ± 0.1924	19.1168 ± 2.2327	9.5130 ± 4.9652	9.5220	0.0818 ± 5.4441
Baggs/Baker	8/7/95	6	3.1253 ± 0.4132	8.2094 ± 8.0325	0.1355 ± 0.0641	7.1537 ± 0.5541	2.8644 ± 0.3997	0.3604 ± 0.2016	38.7604 ± 1.5755	21.8487 ± 8.0749	9.5220	7.3897 ± 8.2272
Baggs/Baker	8/7/95	12	1.8583 ± 0.3749	7.5434 ± 7.3443	0.0191 ± 0.0091	4.6203 ± 0.3623	2.4729 ± 0.3392	0.2385 ± 0.1741	36.4679 ± 1.4917	16.7525 ± 7.3727	9.5220	10.1934 ± 7.5221
Baggs/Baker	8/8/95	6	5.3504 ± 0.3799	12.2569 ± 12.0609	0.0761 ± 0.0357	11.0196 ± 0.8432	3.7522 ± 0.5460	0.6041 ± 0.3056	46.9199 ± 1.5693	33.0593 ± 12.1125	9.5220	4.3386 ± 12.2137
Baggs/Baker	8/8/95	12	4.5711 ± 0.3886	12.5474 ± 12.2823	0.0521 ± 0.0248	9.9137 ± 0.7671	2.0605 ± 0.4110	0.6366 ± 0.3048	35.8861 ± 1.5930	29.7814 ± 12.3230	9.5220	-3.4173 ± 12.4255
Baggs/Baker	8/9/95	6	4.8601 ± 0.3348	0.0000 ± 0.0000	0.3365 ± 0.1594	2.8774 ± 0.2209	0.9879 ± 0.2145	0.2772 ± 0.0832	23.3314 ± 1.4587	9.3391 ± 0.4891	9.5220	4.4703 ± 1.5385
Baggs/Baker	8/9/95	12	4.0552 ± 0.3524	7.9978 ± 7.7893	0.1661 ± 0.0783	3.4557 ± 0.2707	1.4456 ± 0.2779	0.3952 ± 0.1892	22.1260 ± 1.5147	17.5156 ± 7.8096	9.5220	-4.9116 ± 7.9551
Baggs/Baker	8/14/95	6	1.2228 ± 0.3741	10.5091 ± 10.5182	0.0680 ± 0.0327	0.1834 ± 0.0136	0.8626 ± 0.3353	0.4641 ± 0.2974	16.0000 ± 1.5364	13.3100 ± 10.5344	9.5220	-6.8320 ± 10.6458
Baggs/Baker	8/22/95	6	0.7371 ± 0.3782	4.9046 ± 4.9539	0.4409 ± 0.2101	1.5340 ± 0.1112	4.6421 ± 0.6041	0.2853 ± 0.1833	29.7716 ± 1.6004	12.5440 ± 5.0139	9.5220	7.7056 ± 5.2631
Baggs/Baker	8/22/95	12	0.4749 ± 0.3674	9.3212 ± 9.2055	0.0476 ± 0.0225	0.6795 ± 0.0520	4.4478 ± 0.5694	0.2442 ± 0.2434	27.5291 ± 1.6271	15.2152 ± 9.2338	9.5220	2.7919 ± 9.3761
Baggs/Baker	8/23/95	6	0.6663 ± 0.3939	6.2321 ± 6.3272	0.5186 ± 0.2471	1.0038 ± 0.0724	3.3275 ± 0.5207	0.2210 ± 0.2207	28.0194 ± 1.6140	11.9693 ± 6.3698	9.5220	6.5281 ± 6.5711
Baggs/Baker	8/23/95	12	0.5950 ± 0.3582	5.4878 ± 5.4373	0.0434 ± 0.0213	0.7523 ± 0.0569	4.6869 ± 0.5557	0.2095 ± 0.1660	27.4947 ± 1.6170	11.7749 ± 5.4802	9.5220	6.1978 ± 5.7138
Baggs/Baker	8/23/95	12	0.3806 ± 0.2291	0.9323 ± 0.7192	0.0559 ± 0.0171	0.2442 ± 0.6256	2.2419 ± 0.2658	0.1002 ± 0.0794	27.4947 ± 1.6170	3.9551 ± 1.0190	9.5220	14.0176 ± 1.9113
Baggs/Baker	8/24/95	6	0.7576 ± 0.3940	9.3105 ± 9.4865	0.3136 ± 0.1492	0.0442 ± 0.0030	5.2963 ± 0.7110	0.3540 ± 0.3125	30.3504 ± 1.5745	16.0762 ± 9.5276	9.5220	4.7522 ± 9.6568
Baggs/Baker	8/24/95	12	0.9555 ± 0.3874	8.8272 ± 8.9145	0.0103 ± 0.0052	0.7328 ± 0.0536	2.9108 ± 0.4532	0.3656 ± 0.2823	25.7922 ± 1.5875	13.8022 ± 8.9390	9.5220	2.4680 ± 9.0789
Baggs/Baker	8/25/95	6	0.6798 ± 0.3911	9.2193 ± 9.4708	0.1692 ± 0.0809	0.1704 ± 0.0118	3.0900 ± 0.5114	0.3224 ± 0.3244	34.1893 ± 1.5271	13.6511 ± 9.4986	9.5220	11.0162 ± 9.6206
Baggs/Baker	8/25/95	12	0.6922 ± 0.3488	9.3581 ± 9.2070	0.0473 ± 0.0223	0.5115 ± 0.0394	3.3470 ± 0.4609	0.1493 ± 0.2361	31.2969 ± 1.5588	14.1054 ± 9.2283	9.5220	7.6695 ± 9.3590
Baggs/Baker	8/26/95	6	0.6417 ± 0.3744	12.2243 ± 12.1995	0.0909 ± 0.0429	0.6947 ± 0.0514	4.2588 ± 0.6187	0.4142 ± 0.3430	22.7618 ± 1.5353	18.3246 ± 12.2259	9.5220	-5.0848 ± 12.3219
Baggs/Baker	8/26/95	12	0.6993 ± 0.3453	10.3706 ± 10.1509	0.0637 ± 0.0303	0.2547 ± 0.0201	2.9141 ± 0.4316	0.3499 ± 0.2479	19.0960 ± 1.5361	14.6523 ± 10.1690	9.5220	-5.0783 ± 10.2844
Baggs/Baker	8/27/95	6	0.9378 ± 0.3546	8.3367 ± 8.2622	0.1911 ± 0.0907	1.0617 ± 0.0801	2.5926 ± 0.3564	0.2656 ± 0.2241	25.4273 ± 1.5342	13.3855 ± 8.2814	9.5220	2.5198 ± 8.4223
Baggs/Baker	8/27/95	12	0.5919 ± 0.3435	8.2867 ± 8.1097	0.0367 ± 0.0172	1.2744 ± 0.0988	2.9572 ± 0.4027	0.3134 ± 0.2034	22.4120 ± 1.5670	13.4603 ± 8.1301	9.5220	-0.5703 ± 8.2797
Baggs/Baker	9/2/95	6	0.8523 ± 0.3595	10.4091 ± 10.3322	0.2327 ± 0.1106	4.6437 ± 0.3488	4.9513 ± 0.5547	0.3606 ± 0.2786	32.3119 ± 1.5232	21.4497 ± 10.3635	9.5220	1.3402 ± 10.4748
Baggs/Baker	9/2/95	12	0.8418 ± 0.3367	6.0294 ± 5.9361	0.0286 ± 0.0134	1.8432 ± 0.1405	2.6370 ± 0.2980	0.2645 ± 0.1639	25.4118 ± 1.5207	11.6445 ± 5.9570	9.5220	4.2453 ± 6.1480
Baggs/Baker	9/17/95	6	1.3447 ± 0.3554	8.2016 ± 8.0936	0.1501 ± 0.0710	2.7543 ± 0.2099	1.6281 ± 0.2868	0.3708 ± 0.2143	23.7340 ± 1.5620	14.4496 ± 8.1123	9.5220	-0.2376 ± 8.2613
Baggs/Baker	9/17/95	12	3.0797 ± 0.3835	11.4544 ± 11.2382	0.0578 ± 0.0273	2.9893 ± 0.2304	2.4904 ± 0.3815	0.2539 ± 0.2697	23.9141 ± 1.6408	20.3255 ± 11.2568	9.5220	-5.9334 ± 11.3758
Baggs/Baker	9/18/95	6	1.2207 ± 0.6699	14.9915 ± 18.4628	0.2819 ± 0.1352	2.2158 ± 0.1230	11.6711 ± 1.5468	0.3947 ± 0.9667	54.0191 ± 1.5751	30.7757 ± 18.5657	9.5220	13.7214 ± 18.6324
Baggs/Baker	9/18/95	12	1.3569 ± 0.5266	11.7851 ± 13.2433	0.1532 ± 0.0746	3.1368 ± 0.1932	7.1653 ± 0.9395	0.3202 ± 0.5895	34.9314 ± 1.5755	23.9175 ± 13.3017	9.5220	1.4919 ± 13.3947
Baggs/Baker	9/19/95	6	0.6512 ± 0.5624	11.0812 ± 12.8735	0.8189 ± 0.3937	0.9845 ± 0.0582	7.1509 ± 1.0319	1.1385 ± 0.6357	486.9402 ± 1.5455	21.8252 ± 12.9488	9.5220	455.5930 ± 13.0407
Baggs/Baker	9/19/95	12	1.3983 ± 0.3995	11.3946 ± 11.4869	0.1500 ± 0.0728	3.5555 ± 0.2592	1.7648 ± 0.4134	0.2797 ± 0.3351	26.1647 ± 1.6047	18.5429 ± 11.5093	9.5220	-1.9002 ± 11.6206
Baggs/Baker	9/20/95	6	0.6182 ± 0.4565	7.4036 ± 8.0677	0.0817 ± 0.0389	0.8229 ± 0.0531	5.9227 ± 0.6661	0.4874 ± 0.3616	37.4417 ± 1.5468	15.3365 ± 8.1169	9.5220	12.5832 ± 8.2630
Baggs/Baker	9/20/95	12	0.4101 ± 0.3783	4.5395 ± 4.6199	0.0465 ± 0.0220	0.7288 ± 0.0520	3.3871 ± 0.3578	0.1969 ± 0.1798	24.6231 ± 1.5597	9.3089 ± 4.6530	9.5220	5.7922 ± 4.9075
Baggs/Baker	9/21/95	6	0.1791 ± 0.3916	4.8637 ± 4.9700	0.0091 ± 0.0045	0.5070 ± 0.0363	2.0109 ± 0.2748	0.1338 ± 0.1905	15.1667 ± 1.5594	7.7036 ± 4.9967	9.5220	-2.0589 ± 5.2344
Baggs/Baker	9/21/95	12	0.7917 ± 0.3465	0.0000 ± 0.0000	0.0189 ± 0.0093	0.4118 ± 0.0317	0.9138 ± 0.1156	0.1853 ± 0.0869	13.8333 ± 1.6288	2.3215 ± 0.3769	9.5220	1.9898 ± 1.6718
Baggs/Baker	9/24/95	6	0.9337 ± 0.2160	5.5106 ± 5.4889	0.5306 ± 0.2522	1.9895 ± 0.1481	3.4493 ± 0.5509	0.2184 ± 0.1530	24.9030 ± 0.8052	12.6321 ± 5.5306	9.5220	2.7489 ± 5.5889
Baggs/Baker	9/24/95	12	0.6804 ± 0.3300	0.1891 ± 0.1861	0.0389 ± 0.0184	0.2926 ± 0.0222	2.9502 ± 0.2582	0.1166 ± 0.0827	20.1314 ± 1.5669	4.2678 ± 0.4668	9.5220	6.3416 ± 1.6350
Baggs/Baker	9/30/95	6	0.7062 ± 0.6177	5.2710 ± 6.5022	0.0655 ± 0.0317	0.0000 ± 0.0000	2.0907 ± 0.4951	0.4452 ± 0.4452	13.3333 ± 1.5522	8.5786 ± 6.5654	9.5220	-4.7673 ± 6.7464
Baggs/Baker	9/30/95	12	0.6707 ± 0.3914	0.5018 ± 0.5240	0.0441 ± 0.0209	0.0000 ± 0.0000	3.4925 ± 0.3269	0.1813 ± 0.1353	26.2929 ± 1.5624	4.8904 ± 0.7439	9.5220	11.8805 ± 1.7305
Baggs/Baker	10/1/95	6	0.8023 ± 0.3800	6.2352 ± 6.3955	0.2069 ± 0.0987	0.0000 ± 0.0000	2.4505 ± 0.3491	0.2393 ± 0.2291	23.8333 ± 1.5969	9.9342 ± 6.4211	9.5220	4.3771 ± 6.6167
Baggs/Baker	10/1/95	12	0.7319 ± 0.3384	5.4695 ± 5.4040	0.0125 ± 0.0061	0.0000 ± 0.0000	0.8984 ± 0.1831	0.0000 ± 0.0000	15.8508 ± 1.6129	7.1123 ± 5.4177	9.5220	-0.7835 ± 5.6527
Baggs/Baker	10/2/95	6	0.9032 ± 0.3838	9.8107 ± 10.0148	0.0727 ± 0.0350	0.0000 ± 0.0000	1.6782 ± 0.3858	0.7129 ± 0.3265	18.3333 ± 1.5939	13.1777 ± 10.0349	9.5220	-4.3664 ± 10.1607
Baggs/Baker	10/2/95	12	0.5861 ± 0.3298	5.6182 ± 5.5165	0.0627 ± 0.0299	0.0000 ± 0.0000	0.8860 ± 0.1819	0.4402 ± 0.1557	14.5000 ± 1.6024	7.5932 ± 5.5316	9.5220	-2.6152 ± 5.7590
Baggs/Baker	10/7/95	6	2.1638 ± 0.3571	5.8895 ± 5.8620	0.2566 ± 0.1217	0.0000 ± 0.0000	1.3257 ± 0.2514	0.1717 ± 0.1759	16.0000 ± 1.6309	9.8073 ± 5.8821	9.5220	-3.3293 ± 6.1040
Baggs/Baker	10/7/95	12	1.6382 ± 0.3306	5.2815 ± 5.1790	0.0931 ± 0.0440	0.0000 ± 0.0000	1.4134 ± 0.2045	0.1204 ± 0.1411	18.6741 ± 1.6041	8.5466 ± 5.1957	9.5220	0.6055 ± 5.4377
Baggs/Baker	10/8/95	6	1.2584 ± 0.3963	5.2841 ± 5.4592	0.1526 ± 0.0731	12.6826 ± 0.8866	2.7652 ± 0.3532	1.0806 ± 0.2436	40.1182 ± 1.6043	23.2235 ± 5.5620	9.5220	7.3727 ± 5.7887
Baggs/Baker	10/8/95	12	0.8748 ± 0.3279	1.7984 ± 1.7645	0.0169 ± 0.0082	3.2649 ± 0.2514	1.2416 ± 0.1425	0.1044 ± 0.0882	19.3230 ± 1.5886	7.3010 ± 1.8200	9.5220	2.5000 ± 2.4158
Baggs/Baker	10/9/95	6	1.2536 ± 0.3428	3.0145 ± 2.9939	0.1470 ± 0.0698	2.1082 ± 0.1585	1.3066 ± 0.1827	0.2048 ± 0.1197	21.6093 ± 1.5804	8.0347 ± 3.0263	9.5220	4.0526 ± 3.4141
Baggs/Baker	10/9/95	12	1.9983 ± 0.3466	4.4679 ± 4.3790	0.0189 ± 0.0092	2.2269 ± 0.1718	0.9740 ± 0.1639	0.2076 ± 0.1305	17.1667 ± 1.6273	9.8936 ± 4.4011	9.5220	-2.2489 ± 4.6923
Baggs/Baker	10/10/95	6	1.5813 ± 0.3526	6.6863 ± 6.6229	0.1125 ± 0.0535	3.6730 ± 0.2770	1.2376 ± 0.2382	0.3346 ± 0.1877	24.6343 ± 1.5913	13.6253 ± 6.6452	9.5220	1.4870 ± 6.8331
Baggs/Baker	10/10/95	12	1.2804 ± 0.3394	5.9895 ± 5.8653	0.0151 ± 0.0073	2.5018 ± 0.1938	0.9885 ± 0.1893	0.4216 ± 0.1582	20.9980 ± 1.6046	11.1969 ± 5.8835	9.5220	0.2791 ± 6.0984
Baggs/Baker	10/11/95	6	1.4372 ± 0.3419	5.6480 ± 5.5735	0.1784 ± 0.0849	1.1074 ± 0.0847	0.8014 ± 0.2002	0.1035 ± 0.1566	20.9481 ± 1.5828	9.2759 ± 5.5910	9.5220	2.1502 ± 5.8107
Baggs/Baker	10/11/95	12	2.5721 ± 0.3521	8.0778 ± 7.8850	0.0525 ± 0.0249	0.6494 ± 0.0507	1.2261 ± 0.2364	0.1614 ± 0.1870	22.5540 ± 1.6292	12.7393 ± 7.8988	9.5220	0.2927 ± 8.0651
Baggs/Baker	10/12/95	6	1.7224 ± 0.3648	11.1757 ± 11.0332	0.1159 ± 0.0550	1.5399 ± 0.1174	3.3942 ± 0.4451	0.1673 ± 0.2784	32.9354 ± 1.6222	18.1154 ± 11.0525	9.5220	5.2980 ± 11.1709
Baggs/Baker	10/12/95	12	3.2727 ± 0.3309	0.0000 ± 0.0000	0.0365 ± 0.0172	1.5878 ± 0.1196	2.2499 ± 0.2131	0.2612 ± 0.0942	28.6647 ± 1.6046	7.4081 ± 0.4224	9.5220	11.7346 ± 1.6593
Baggs/Baker	10/13/95	6	1.0040 ± 0.3527	3.2867 ± 3.3212	0.1171 ± 0.0557	0.0000 ± 0.0000	0.5897 ± 0.1591	0.2340 ± 0.1408	15.1450 ± 1.5788	5.2315 ± 3.3471	9.5220	0.3915 ± 3.7008
Baggs/Baker	10/13/95	12	1.2428 ± 0.3544	0.0000 ± 0.0000	0.0373 ± 0.0176	0.8112 ± 0.0624	0.5313 ± 0.0877	0.0996 ± 0.0774	12.0000 ± 1.7506	2.7222 ± 0.3788	9.5220	-0.2442 ± 1.7911
Baggs/Baker	10/14/95	6	1.0030 ± 0.3341	0.4093 ± 0.4039	0.3466 ± 0.1643	1.2906 ± 0.0983	0.2444 ± 0.1608	0.1497 ± 0.0864	15.4839 ± 1.5835	3.4436 ± 0.5871	9.5220	2.5183 ± 1.6888

Table D.2 (cont.)

Individual Source Contribution to Light Extinction at the Six Sites between 02/16/95 and 10/29/95 during the Mt. Zirkel Visibility Study

Site	Date	Start Hour[a]	Primary Geological SCE ± σ (Mm^{-1})	Primary Motor Vehicle SCE ± σ (Mm^{-1})	Coal-Fired Generating Station SCE ± σ (Mm^{-1})	Vegetative Burning SCE ± σ (Mm^{-1})	Secondary Ammonium Sulfate SCE ± σ (Mm^{-1})	Secondary Ammonium Nitrate SCE ± σ (Mm^{-1})	Measured Extinction ± σ (Mm^{-1})	Calculated[b] Extinction ± σ (Mm^{-1})	Rayleigh Coefficient	Unexplained[c] Extinction ± σ (Mm^{-1})
Baggs/Baker	10/14/95	12	0.8080 ± 0.3323	3.8147 ± 3.7428	0.1339 ± 0.0635	0.7805 ± 0.0605	0.5638 ± 0.1434	0.1105 ± 0.1157	13.9897 ± 1.5886	6.2114 ± 3.7631	9.5220	-1.7437 ± 4.0847
Buffalo Pass	2/23/95	6	0.1604 ± 0.0365	3.6341 ± 3.7953	0.4525 ± 0.2161	1.0262 ± 0.0707	0.8701 ± 0.2805	0.9667 ± 0.2003	13.0986 ± 1.7484	7.1100 ± 3.8179	8.4220	-2.4334 ± 4.1992
Buffalo Pass	2/23/95	12	0.1465 ± 0.0326	3.8451 ± 3.9209	0.1828 ± 0.0871	0.6931 ± 0.0490	1.4560 ± 0.2264	0.4062 ± 0.1598	14.0544 ± 1.6121	6.7297 ± 3.9321	8.4220	-1.0973 ± 4.2497
Buffalo Pass	3/26/95	6	0.6282 ± 0.0523	1.8205 ± 2.1805	0.5675 ± 0.2746	0.3456 ± 0.0200	5.8649 ± 0.7449	0.6384 ± 0.1787	72.6232 ± 11.8598	9.8651 ± 2.3281	8.4220	54.3361 ± 12.0861
Buffalo Pass	3/27/95	6	0.4953 ± 0.1248	8.9987 ± 10.5297	1.0004 ± 0.4816	0.0377 ± 0.0023	11.0681 ± 1.4720	1.0520 ± 0.5159	46.2475 ± 4.8217	22.6522 ± 10.6562	8.4220	15.1733 ± 11.6963
Buffalo Pass	3/28/95	6	0.4746 ± 0.0882	6.4498 ± 7.6032	0.0967 ± 0.0462	0.2476 ± 0.0143	11.9914 ± 1.4109	1.8579 ± 0.4318	27.7586 ± 2.8594	21.1180 ± 7.7457	8.4220	-1.7814 ± 8.2566
Buffalo Pass	3/29/95	6	0.5353 ± 0.0576	2.7333 ± 3.3441	0.5312 ± 0.2562	1.8755 ± 0.1048	14.2736 ± 1.6466	6.4189 ± 0.7791	-99.0000 ± -99.0000	26.3678 ± 3.8185	8.4220	-99.0000 ± -99.0000
Buffalo Pass	3/30/95	6	0.4652 ± 0.0764	3.9450 ± 4.5587	0.8125 ± 0.0639	0.7150 ± 0.0428	15.7285 ± 1.8060	0.7631 ± 0.2480	46.1461 ± 4.5122	22.4293 ± 4.9109	8.4220	15.2948 ± 6.6691
Buffalo Pass	3/31/95	6	1.8960 ± 0.1247	5.4877 ± 6.2027	0.2103 ± 0.0164	2.4044 ± 0.1474	10.9399 ± 1.2685	1.4265 ± 0.3254	33.1164 ± 2.9110	22.3648 ± 6.3424	8.4220	2.3296 ± 6.9785
Buffalo Pass	5/6/95	6	5.8809 ± 0.2732	3.9872 ± 4.2185	0.0235 ± 0.0020	4.1241 ± 0.2770	3.3140 ± 0.4157	0.5800 ± 0.1770	41.7875 ± 10.4373	17.9097 ± 4.2604	8.4220	15.4558 ± 11.2733
Buffalo Pass	5/7/95	6	6.3284 ± 0.3724	3.8802 ± 4.5209	0.3737 ± 0.0292	5.3874 ± 0.3174	7.0404 ± 0.8500	1.4405 ± 0.2857	209.3681 ± 75.0336	24.4506 ± 4.6350	8.4220	176.4955 ± 75.1766
Buffalo Pass	6/14/95	6	1.7974 ± 0.1042	4.7264 ± 4.6378	0.0256 ± 0.0019	11.4900 ± 0.8844	2.3574 ± 0.2968	0.4405 ± 0.1250	36.1255 ± 5.3333	20.8373 ± 4.7335	8.4220	6.8662 ± 7.1309
Buffalo Pass	6/15/95	6	1.0892 ± 0.0752	3.9656 ± 3.9978	0.0059 ± 0.0005	6.8143 ± 0.4970	6.2651 ± 0.7256	0.2663 ± 0.1266	31.2033 ± 4.5519	18.4064 ± 4.0960	8.4220	4.3749 ± 6.1235
Buffalo Pass	6/16/95	6	1.4277 ± 0.2475	6.2420 ± 6.1706	0.0191 ± 0.0093	4.8724 ± 0.3692	3.1730 ± 0.4003	0.4089 ± 0.1649	27.7228 ± 3.8749	16.1431 ± 6.2017	8.4220	3.1577 ± 7.3127
Buffalo Pass	6/29/95	6	1.7796 ± 0.3505	11.7774 ± 22.3173	0.2336 ± 0.1117	0.7260 ± 0.0330	37.8163 ± 4.7787	5.1037 ± 2.1863	1239.2617 ± 363.9665	57.4366 ± 22.9306	8.4220	1173.4031 ± 364.6881
Buffalo Pass	6/30/95	6	0.6787 ± 0.0518	3.2645 ± 3.5044	0.3258 ± 0.1568	2.6596 ± 0.1752	3.7985 ± 0.4910	0.3930 ± 0.1573	29.2614 ± 4.5636	11.1201 ± 3.5503	8.4220	9.7193 ± 5.7820
Buffalo Pass	7/1/95	6	0.5607 ± 0.0861	7.0828 ± 7.6301	0.0140 ± 0.0070	2.0274 ± 0.1331	3.0307 ± 0.4317	0.4828 ± 0.2961	26.2740 ± 4.4708	13.1984 ± 7.6497	8.4220	4.6536 ± 8.8604
Buffalo Pass	7/29/95	6	1.5502 ± 0.2278	6.8600 ± 6.7135	0.0275 ± 0.0127	2.1368 ± 0.1658	1.8102 ± 0.2405	0.2098 ± 0.1545	22.9546 ± 4.0396	12.5945 ± 6.7255	8.4220	1.9381 ± 7.8454
Buffalo Pass	7/30/95	6	1.6844 ± 0.2459	6.9870 ± 6.9046	0.0348 ± 0.0165	2.4395 ± 0.1850	2.7320 ± 0.3153	0.2114 ± 0.1732	25.9890 ± 4.2598	14.0891 ± 6.9208	8.4220	3.4779 ± 8.1267
Buffalo Pass	8/7/95	6	2.4295 ± 0.3351	6.1972 ± 6.1143	0.0367 ± 0.0173	9.4940 ± 0.7222	3.3278 ± 0.3468	0.3793 ± 0.1716	51.6377 ± 9.1211	21.8645 ± 6.1781	8.4220	21.3512 ± 11.0165
Buffalo Pass	8/7/95	12	2.4733 ± 0.3389	6.0278 ± 5.9442	0.0340 ± 0.0158	5.6364 ± 0.4293	3.1499 ± 0.3291	0.2422 ± 0.1629	29.5627 ± 5.0764	17.5636 ± 5.9806	8.4220	3.5771 ± 7.8446
Buffalo Pass	8/8/95	6	3.9221 ± 0.4786	4.1114 ± 4.1060	0.0477 ± 0.0227	5.0268 ± 0.3732	4.5142 ± 0.4105	0.1584 ± 0.1403	32.1058 ± 4.8628	17.7806 ± 4.1733	8.4220	5.9032 ± 6.4081
Buffalo Pass	8/8/95	12	4.5953 ± 0.6241	10.6165 ± 10.5738	0.2085 ± 0.0990	7.0727 ± 0.5284	4.7403 ± 0.5444	0.6034 ± 0.2922	36.4853 ± 5.9345	27.8367 ± 10.6238	8.4220	0.2266 ± 12.1690
Buffalo Pass	8/9/95	6	8.7669 ± 0.8379	4.2901 ± 4.2178	0.0327 ± 0.0153	4.3972 ± 0.3373	1.0262 ± 0.1798	0.5157 ± 0.1366	20.6361 ± 3.6358	19.0288 ± 4.3194	8.4220	-6.8147 ± 5.6459
Buffalo Pass	8/9/95	12	6.5921 ± 0.7659	6.0955 ± 5.9815	0.1374 ± 0.0650	3.7945 ± 0.2919	1.9894 ± 0.2957	0.4822 ± 0.1687	21.4379 ± 3.4044	19.0911 ± 6.0473	8.4220	-6.0752 ± 6.9397
Buffalo Pass	8/14/95	6	2.1516 ± 0.3038	6.3249 ± 6.3895	0.2710 ± 0.1294	1.1445 ± 0.0830	1.3940 ± 0.3124	0.4260 ± 0.2133	17.2335 ± 3.3463	11.7120 ± 6.4097	8.4220	-2.9005 ± 7.2306
Buffalo Pass	8/14/95	12	0.9141 ± 0.1415	4.8052 ± 4.9182	0.0432 ± 0.0203	0.7730 ± 0.0550	1.3944 ± 0.2567	0.3708 ± 0.1914	12.3333 ± 2.5928	8.3007 ± 4.9310	8.4220	-4.3894 ± 5.5711
Buffalo Pass	8/21/95	6	2.5648 ± 0.0942	4.9262 ± 5.7454	0.0561 ± 0.0272	1.9413 ± 0.1142	12.2003 ± 1.4174	0.9290 ± 0.3736	27.9463 ± 5.1886	22.6177 ± 5.9313	8.4220	-3.0934 ± 7.8805
Buffalo Pass	8/21/95	12	0.1802 ± 0.0114	1.1961 ± 2.5116	0.1709 ± 0.0591	0.8788 ± 0.0412	0.0000 ± 0.0000	0.0000 ± 0.0000	29.3432 ± 5.4206	2.4260 ± 2.5127	8.4220	18.4952 ± 5.9747
Buffalo Pass	8/21/95	12	1.3373 ± 0.0451	0.5159 ± 0.3597	0.0783 ± 0.0116	0.4807 ± 0.1250	2.5060 ± 0.2865	0.1320 ± 0.0549	29.3432 ± 5.4206	5.0502 ± 0.4819	8.4220	15.8710 ± 5.4420
Buffalo Pass	8/22/95	6	0.4551 ± 0.0890	4.5100 ± 5.2941	0.0000 ± 0.0000	0.9738 ± 0.0569	6.8210 ± 0.8225	0.9780 ± 0.3554	21.0461 ± 4.0757	13.7379 ± 5.3704	8.4220	-1.1138 ± 6.7418
Buffalo Pass	8/22/95	12	0.7494 ± 0.1446	6.8559 ± 7.2046	0.0000 ± 0.0000	1.1849 ± 0.0809	4.6437 ± 0.6068	0.3688 ± 0.2859	22.4694 ± 4.0003	13.8027 ± 7.2377	8.4220	0.2447 ± 8.2696
Buffalo Pass	8/23/95	6	1.6458 ± 0.2287	3.2246 ± 3.6585	0.0254 ± 0.0127	1.7450 ± 0.1058	5.6468 ± 0.6711	0.5588 ± 0.2610	19.6901 ± 3.7725	12.8464 ± 3.7372	8.4220	-1.5783 ± 5.3102
Buffalo Pass	8/23/95	12	9.4740 ± 1.1745	9.3454 ± 11.0259	1.4480 ± 0.7043	2.6522 ± 0.1537	9.7035 ± 1.3081	0.8813 ± 0.5816	36.7086 ± 7.4735	33.5044 ± 11.2035	8.4220	-5.2178 ± 13.4674
Buffalo Pass	8/24/95	6	36.9538 ± 3.9798	26.2507 ± 37.3220	0.5744 ± 0.2786	60.9636 ± 19.4403	23.6625 ± 3.3613	3.7385 ± 2.2378	32.8213 ± 5.5865	152.1435 ± 42.4627	8.4220	-127.7442 ± 42.8286
Buffalo Pass	8/24/95	12	1.8856 ± 0.2829	7.9402 ± 8.5602	0.1647 ± 0.0788	1.8690 ± 0.1220	10.8546 ± 1.0140	0.3793 ± 0.3574	28.3933 ± 5.2085	23.0934 ± 8.6333	8.4220	-3.1221 ± 10.0828
Buffalo Pass	8/25/95	6	1.0903 ± 0.1945	5.2809 ± 5.5715	0.0071 ± 0.0033	1.5139 ± 0.1022	3.0889 ± 0.3716	0.6506 ± 0.2418	14.8333 ± 3.3111	11.6317 ± 5.5934	8.4220	-5.2204 ± 6.5000
Buffalo Pass	8/25/95	12	1.8112 ± 0.3019	4.7715 ± 4.7795	0.0000 ± 0.0000	2.9270 ± 0.2164	2.4621 ± 0.3141	0.7345 ± 0.1780	16.6967 ± 3.2829	12.7063 ± 4.8075	8.4220	-4.4316 ± 5.8215
Buffalo Pass	8/26/95	6	2.3765 ± 0.3950	6.6788 ± 6.6589	0.0227 ± 0.0110	1.8979 ± 0.1414	3.0124 ± 0.3465	0.5111 ± 0.1989	15.7335 ± 3.0328	14.4994 ± 6.6841	8.4220	-7.1879 ± 7.3400
Buffalo Pass	8/26/95	12	7.5296 ± 0.9417	5.6976 ± 5.6291	0.0095 ± 0.0047	2.4325 ± 0.1850	2.2533 ± 0.2686	0.3835 ± 0.1624	18.1599 ± 3.3037	18.3060 ± 5.7189	8.4220	-8.5681 ± 6.6046
Buffalo Pass	8/27/95	6	5.1648 ± 0.7219	5.2920 ± 5.3376	0.0313 ± 0.0149	4.2457 ± 0.3099	3.2509 ± 0.3511	0.7994 ± 0.1957	22.5108 ± 3.7940	18.7841 ± 5.4101	8.4220	-4.6953 ± 6.6078
Buffalo Pass	8/27/95	12	4.0712 ± 0.6083	5.4075 ± 5.4533	0.0255 ± 0.0122	3.4783 ± 0.2534	2.6703 ± 0.3142	0.5970 ± 0.1914	19.4609 ± 3.6531	16.2498 ± 5.5053	8.4220	-5.2109 ± 6.6071
Buffalo Pass	9/2/95	6	2.5180 ± 0.3328	7.7887 ± 7.8342	0.0000 ± 0.0000	0.0000 ± 0.0000	5.0393 ± 0.5156	0.3113 ± 0.2367	25.2995 ± 4.2287	15.6573 ± 7.8618	8.4220	1.2202 ± 8.9269
Buffalo Pass	9/2/95	12	4.2051 ± 0.5010	9.6808 ± 9.6188	0.0000 ± 0.0000	0.0000 ± 0.0000	5.3534 ± 0.5550	0.2689 ± 0.2603	26.9115 ± 4.7454	19.5082 ± 9.6513	8.4220	-1.0187 ± 10.7548
Buffalo Pass	9/17/95	6	1.2913 ± 0.2209	4.7266 ± 4.6806	0.0404 ± 0.0191	1.5743 ± 0.1187	2.0791 ± 0.2489	0.2919 ± 0.1521	16.2767 ± 3.3119	10.0036 ± 4.6964	8.4220	-2.1489 ± 5.7467
Buffalo Pass	9/17/95	12	0.8363 ± 0.1469	3.2554 ± 3.2254	0.0993 ± 0.0471	1.0234 ± 0.0772	2.7154 ± 0.2686	0.2645 ± 0.1146	15.6667 ± 3.4749	8.1943 ± 3.2432	8.4220	-0.9496 ± 4.7532
Buffalo Pass	9/18/95	6	2.9217 ± 0.5817	18.9963 ± 36.0026	0.3250 ± 0.1625	8.3008 ± 0.3834	56.8279 ± 6.3889	6.5883 ± 3.7595	797.5000 ± 277.8748	93.9600 ± 36.7648	8.4220	695.1180 ± 280.2964
Buffalo Pass	9/18/95	12	0.7701 ± 0.1734	6.3320 ± 9.6343	6.7149 ± 3.2704	7.3212 ± 0.3432	16.3221 ± 3.4488	3.5364 ± 0.9846	861.2545 ± 281.1638	40.9967 ± 10.7948	8.4220	811.8358 ± 281.3709
Buffalo Pass	9/19/95	6	0.6071 ± 0.1224	3.9429 ± 5.2860	0.0202 ± 0.0101	0.6940 ± 0.0353	4.3453 ± 0.6359	0.9617 ± 0.5049	106.6000 ± 38.4399	10.5712 ± 5.3495	8.4220	87.6068 ± 38.8103
Buffalo Pass	9/19/95	12	0.4801 ± 0.0971	5.2322 ± 5.6062	1.5191 ± 0.7382	3.6915 ± 0.2438	2.2576 ± 0.7500	0.5414 ± 0.2590	22.4197 ± 4.4435	13.7219 ± 5.7160	8.4220	0.2758 ± 7.2400
Buffalo Pass	9/20/95	6	3.4043 ± 1.6984	97.5097 ± 193.9787	0.2472 ± 0.1236	36.4137 ± 1.6980	52.1592 ± 16.4674	26.4767 ± 14.6393	1969.1667 ± 469.2107	216.2108 ± 195.2409	8.4220	1744.5339 ± 508.2103
Buffalo Pass	9/20/95	12	2.2472 ± 0.6910	32.8200 ± 63.8455	2.1708 ± 1.0593	11.4291 ± 0.5253	88.2636 ± 10.1689	16.4653 ± 6.0808	751.8266 ± 217.7600	153.3960 ± 64.9500	8.4220	590.0086 ± 227.2398
Buffalo Pass	9/21/95	6	0.3589 ± 0.0768	1.8514 ± 2.3378	0.4917 ± 0.2380	0.3828 ± 0.0206	10.6317 ± 0.9852	0.4118 ± 0.3289	40.0000 ± 8.7202	14.1283 ± 2.5704	8.4220	17.4497 ± 9.0911
Buffalo Pass	9/21/95	12	0.3322 ± 0.0597	1.2005 ± 1.3509	0.0000 ± 0.0000	0.3242 ± 0.0200	4.3105 ± 0.3744	0.3139 ± 0.1137	16.0833 ± 3.2138	6.4813 ± 1.4078	8.4220	1.1800 ± 3.5086
Buffalo Pass	9/24/95	6	0.7181 ± 0.1374	5.3425 ± 7.5211	0.0317 ± 0.0158	2.4368 ± 0.1197	14.1729 ± 1.4071	0.7790 ± 0.6536	679.9398 ± 157.5239	23.4810 ± 7.6816	8.4220	648.0368 ± 157.7111
Buffalo Pass	9/24/95	12	0.4012 ± 0.0720	3.4233 ± 3.4658	0.1211 ± 0.0576	2.1381 ± 0.1544	2.4797 ± 0.2719	0.2367 ± 0.1421	15.6667 ± 3.4804	8.8001 ± 3.4840	8.4220	-1.5554 ± 4.9246

Table D.2 (cont.)

Individual Source Contribution to Light Extinction at the Six Sites between 02/16/95 and 10/29/95 during the Mt. Zirkel Visibility Study

Site	Date	Start Hour[a]	Primary Geological SCE ± σ (Mm^{-1})	Primary Motor Vehicle SCE ± σ (Mm^{-1})	Coal-Fired Generating Station SCE ± σ (Mm^{-1})	Vegetative Burning SCE ± σ (Mm^{-1})	Secondary Ammonium Sulfate SCE ± σ (Mm^{-1})	Secondary Ammonium Nitrate SCE ± σ (Mm^{-1})	Measured Extinction ± σ (Mm^{-1})	Calculated[b] Extinction ± σ (Mm^{-1})	Rayleigh Coefficient	Unexplained[c] Extinction ± σ (Mm^{-1})
Buffalo Pass	9/27/95	6	1.1191 ± 0.1773	6.7613 ± 6.9190	0.1172 ± 0.0559	2.3402 ± 0.1661	3.2797 ± 0.4014	0.3874 ± 0.2393	20.1194 ± 3.4981	14.0049 ± 6.9392	8.4220	-2.3075 ± 7.7710
Buffalo Pass	9/27/95	12	0.8337 ± 0.1321	4.9596 ± 4.9216	0.5002 ± 0.2423	4.2681 ± 0.3208	2.4412 ± 0.3521	0.0000 ± 0.0000	20.4056 ± 3.4897	13.0028 ± 4.9523	8.4220	-1.0192 ± 6.0583
Buffalo Pass	9/30/95	6	1.8440 ± 0.2680	2.5136 ± 3.7750	0.3177 ± 0.1529	0.2103 ± 0.0099	2.3170 ± 0.6960	1.9969 ± 0.7280	820.6667 ± 178.1013	9.1995 ± 3.9192	8.4220	803.0452 ± 178.1444
Buffalo Pass	9/30/95	12	1.9825 ± 0.3517	13.5082 ± 20.4202	1.9099 ± 0.9240	0.0000 ± 0.0000	23.4442 ± 2.8476	3.6081 ± 1.4846	1618.8722 ± 331.1364	44.4529 ± 20.6948	8.4220	1565.9973 ± 331.7824
Buffalo Pass	10/1/95	6	5.1937 ± 0.7649	12.2102 ± 18.1954	2.4600 ± 1.1919	0.3577 ± 0.0170	13.8103 ± 2.2143	3.6025 ± 1.3458	770.2486 ± 211.7449	37.6344 ± 18.4335	8.4220	724.1922 ± 212.5458
Buffalo Pass	10/1/95	12	3.1293 ± 0.4430	7.5633 ± 9.0586	0.5714 ± 0.2761	1.6483 ± 0.0938	4.1052 ± 0.7204	2.6060 ± 0.5675	16.9149 ± 3.2249	19.6235 ± 9.1203	8.4220	-11.1306 ± 9.6737
Buffalo Pass	10/2/95	6	2.3690 ± 0.3744	10.6824 ± 13.6492	0.9504 ± 0.4592	2.0067 ± 0.1074	6.3941 ± 1.1475	6.9562 ± 1.0631	59.2413 ± 12.8472	29.3588 ± 13.7517	8.4220	21.4605 ± 18.8191
Buffalo Pass	10/2/95	12	1.8526 ± 0.2740	7.7482 ± 7.9841	0.0578 ± 0.0278	1.2883 ± 0.0907	1.6524 ± 0.3379	0.7051 ± 0.2821	11.1667 ± 2.5928	13.3044 ± 8.0015	8.4220	-10.5597 ± 8.4111
Buffalo Pass	10/7/95	6	4.7995 ± 0.4422	5.8933 ± 5.8468	0.0475 ± 0.0227	0.0000 ± 0.0000	1.3045 ± 0.2194	0.1959 ± 0.1671	13.1707 ± 2.4738	12.2407 ± 5.8700	8.4220	-7.4920 ± 6.3700
Buffalo Pass	10/7/95	12	1.7789 ± 0.1707	1.9145 ± 1.9014	0.1290 ± 0.0614	0.0000 ± 0.0000	1.3220 ± 0.1617	0.1284 ± 0.0919	13.9046 ± 2.4238	5.2728 ± 1.9191	8.4220	0.2098 ± 3.0916
Buffalo Pass	10/8/95	6	1.3443 ± 0.2252	8.4813 ± 10.2230	0.1176 ± 0.0565	13.3091 ± 0.7538	5.6407 ± 0.8043	2.5159 ± 0.6135	51.3333 ± 10.7870	31.4089 ± 10.3032	8.4220	11.5024 ± 14.9169
Buffalo Pass	10/8/95	12	0.8917 ± 0.1239	0.9309 ± 0.9208	0.1839 ± 0.0876	3.3186 ± 0.2508	1.2814 ± 0.1618	0.1744 ± 0.0838	13.3333 ± 2.7488	6.7809 ± 0.9834	8.4220	-1.8696 ± 2.9194
Buffalo Pass	10/9/95	6	1.0208 ± 0.1525	4.3852 ± 4.3937	0.1110 ± 0.0526	2.4742 ± 0.1825	1.0946 ± 0.1918	0.1730 ± 0.1455	13.1667 ± 2.8942	9.2588 ± 4.4070	8.4220	-4.5141 ± 5.2724
Buffalo Pass	10/10/95	6	1.2175 ± 0.1787	4.1678 ± 4.1721	0.2768 ± 0.1314	3.7650 ± 0.2785	1.0231 ± 0.2164	0.4256 ± 0.1474	18.1065 ± 3.4823	10.8758 ± 4.1954	8.4220	-1.1913 ± 5.4523
Buffalo Pass	10/10/95	12	0.9939 ± 0.1536	5.1814 ± 5.1335	0.2021 ± 0.0959	2.3998 ± 0.1814	1.1533 ± 0.2137	0.3205 ± 0.1513	14.6117 ± 2.7639	10.2510 ± 5.1466	8.4220	-4.0613 ± 5.8418
Buffalo Pass	10/11/95	6	0.9145 ± 0.1405	4.9770 ± 4.9072	0.0414 ± 0.0196	1.0904 ± 0.0829	0.5615 ± 0.1553	0.1182 ± 0.1359	11.1667 ± 2.4317	7.7030 ± 4.9143	8.4220	-4.9583 ± 5.4830
Buffalo Pass	10/11/95	12	4.4362 ± 0.5688	6.9548 ± 6.8319	0.0923 ± 0.0436	1.5668 ± 0.1201	0.7670 ± 0.2042	0.2048 ± 0.1704	14.8734 ± 2.5304	14.0219 ± 6.8619	8.4220	-7.5705 ± 7.3136
Buffalo Pass	10/12/95	6	6.9643 ± 0.9409	15.4673 ± 15.6661	0.1345 ± 0.0642	7.0972 ± 0.5130	5.5297 ± 0.7336	0.5818 ± 0.4621	-99.0000 ± -99.0000	35.7748 ± 15.7268	8.4220	-99.0000 ± -99.0000
Buffalo Pass	10/12/95	12	1.0527 ± 0.2778	18.1358 ± 24.1864	0.2346 ± 0.1142	3.2009 ± 0.1641	15.6791 ± 2.1117	0.7842 ± 1.3593	271.8238 ± 93.2316	39.0873 ± 24.3188	8.4220	224.3145 ± 96.3511
Buffalo Pass	10/13/95	6	1.2709 ± 0.1854	2.6590 ± 2.8845	0.5107 ± 0.2450	0.3758 ± 0.0245	0.6994 ± 0.3061	0.5594 ± 0.2099	10.6667 ± 2.4692	6.0752 ± 2.9246	8.4220	-3.8305 ± 3.8276
Buffalo Pass	10/13/95	12	0.5767 ± 0.0927	2.2622 ± 2.2573	0.3478 ± 0.1653	1.4249 ± 0.1057	0.0000 ± 0.0000	0.0000 ± 0.0000	8.8333 ± 2.4151	4.6116 ± 2.2677	8.4220	-4.2003 ± 3.3129
Buffalo Pass	10/14/95	6	2.2100 ± 0.2814	2.6858 ± 2.6545	0.1464 ± 0.0693	1.0707 ± 0.0810	0.3685 ± 0.1233	0.1921 ± 0.1003	13.3916 ± 2.4069	6.6735 ± 2.6762	8.4220	-1.7039 ± 3.5993
Buffalo Pass	10/14/95	12	1.2899 ± 0.1767	2.4065 ± 2.3866	0.2538 ± 0.1204	0.8297 ± 0.0627	0.3070 ± 0.1509	0.0964 ± 0.1000	8.3333 ± 2.3874	5.1833 ± 2.4038	8.4220	-5.2720 ± 3.3879
Buffalo Pass	10/15/95	6	2.2238 ± 0.2725	0.1304 ± 0.1290	0.0341 ± 0.0160	1.1182 ± 0.0848	0.4470 ± 0.0842	0.4001 ± 0.0873	16.1645 ± 2.4003	4.3536 ± 0.3362	8.4220	3.3889 ± 2.4237
Buffalo Pass	10/15/95	12	2.2751 ± 0.3117	4.4564 ± 4.3849	0.0978 ± 0.0464	0.4790 ± 0.0365	0.3286 ± 0.1412	0.3399 ± 0.1284	8.2000 ± 2.2533	7.9768 ± 4.4005	8.4220	-8.1988 ± 4.9439
Buffalo Pass	10/16/95	6	2.4131 ± 0.2897	2.4484 ± 2.4080	0.1144 ± 0.0544	0.7680 ± 0.0586	1.3869 ± 0.1536	0.2499 ± 0.0728	13.8417 ± 2.3927	7.3807 ± 2.4326	8.4220	-1.9610 ± 3.4121
Buffalo Pass	10/17/95	6	1.6796 ± 0.2427	6.1900 ± 6.1656	0.1744 ± 0.0828	3.1688 ± 0.2362	1.5417 ± 0.2475	0.2371 ± 0.1656	18.5294 ± 3.1095	12.9916 ± 6.1826	8.4220	-2.8842 ± 6.9205
Buffalo Pass	10/18/95	6	1.1020 ± 0.1614	4.6144 ± 4.5732	0.0548 ± 0.0262	1.5214 ± 0.1149	1.5916 ± 0.2009	0.2129 ± 0.1222	15.6757 ± 2.9955	9.0971 ± 4.5836	8.4220	-1.8434 ± 5.4756
Buffalo Pass	10/19/95	6	0.7781 ± 0.1000	0.6414 ± 0.6366	0.0867 ± 0.0409	2.2544 ± 0.1691	0.4618 ± 0.0723	0.2138 ± 0.0494	14.1757 ± 2.6564	4.4362 ± 0.6732	8.4220	1.3175 ± 2.7404
Buffalo Pass	10/20/95	6	2.0338 ± 0.2662	3.1116 ± 3.0427	0.0998 ± 0.0472	1.4040 ± 0.1093	0.4553 ± 0.1027	0.1888 ± 0.0773	14.8765 ± 2.8829	7.2933 ± 3.0593	8.4220	-0.8388 ± 4.2036
Buffalo Pass	10/21/95	6	2.1257 ± 0.2758	3.1611 ± 3.1171	0.1074 ± 0.0510	3.4461 ± 0.2627	0.9379 ± 0.1361	0.2542 ± 0.0869	17.7308 ± 3.0628	10.0324 ± 3.1448	8.4220	-0.7236 ± 4.3898
Buffalo Pass	10/22/95	6	0.5334 ± 0.0802	0.8308 ± 1.0227	0.3727 ± 0.1792	0.8638 ± 0.0481	3.7403 ± 0.3975	0.4888 ± 0.1620	62.7603 ± 16.2385	6.8298 ± 1.1274	8.4220	47.5085 ± 16.2776
Buffalo Pass	10/23/95	6	0.0672 ± 0.0454	0.0613 ± 0.0718	1.2247 ± 0.5902	1.3415 ± 0.0785	6.6547 ± 0.7850	0.3274 ± 0.1202	230.8762 ± 85.0860	9.6768 ± 0.9962	8.4220	212.7774 ± 85.0918
Buffalo Pass	10/24/95	6	0.4995 ± 0.0785	2.2341 ± 2.2812	0.0768 ± 0.0368	0.5882 ± 0.0422	1.3251 ± 0.1562	0.2031 ± 0.0887	12.0424 ± 2.1158	4.9268 ± 2.2903	8.4220	-1.3064 ± 3.1180
Buffalo Pass	10/25/95	6	0.4203 ± 0.0776	3.8906 ± 3.9310	0.2312 ± 0.1100	0.8136 ± 0.0595	1.0957 ± 0.1974	0.2779 ± 0.1242	13.6818 ± 2.1160	6.7293 ± 3.9407	8.4220	-1.4695 ± 4.4729
Buffalo Pass	10/26/95	6	1.1843 ± 0.1892	6.9555 ± 7.1820	0.3039 ± 0.1453	0.6419 ± 0.0445	0.8609 ± 0.3048	0.3034 ± 0.2367	21.8969 ± 4.2321	10.2499 ± 7.1965	8.4220	3.2250 ± 8.3487
Buffalo Pass	10/27/95	6	1.7014 ± 0.2354	3.5537 ± 3.6793	0.0430 ± 0.0204	0.1082 ± 0.0078	0.9311 ± 0.1691	0.3670 ± 0.1355	39.3333 ± 13.6499	6.7044 ± 3.6932	8.4220	24.2069 ± 14.1407
Buffalo Pass	10/28/95	6	2.2405 ± 0.2720	2.0570 ± 2.0640	0.2862 ± 0.1362	0.7500 ± 0.0554	0.1213 ± 0.1449	0.2910 ± 0.0785	10.6046 ± 2.1099	5.7460 ± 2.0935	8.4220	-3.5634 ± 2.9723
Buffalo Pass	10/29/95	6	1.6458 ± 0.2372	5.4156 ± 5.5316	0.2818 ± 0.1344	0.8427 ± 0.0598	0.4338 ± 0.2317	0.3443 ± 0.1763	9.1667 ± 2.1117	8.9640 ± 5.5463	8.4220	-8.2193 ± 5.9347
Gilpin Creek	3/26/95	6	0.3295 ± 0.0669	0.0000 ± 0.0000	0.0017 ± 0.0008	0.3469 ± 0.0239	2.3829 ± 0.4620	0.6129 ± 0.3591	24.4159 ± 5.1801	3.6739 ± 0.5894	8.7650	11.9770 ± 5.2135
Gilpin Creek	3/27/95	6	1.0089 ± 0.1696	5.7879 ± 6.0077	0.0115 ± 0.0055	0.7534 ± 0.0524	2.0637 ± 0.5138	0.4217 ± 0.4239	28.0464 ± 5.3154	10.0471 ± 6.0471	8.7650	9.2343 ± 8.0511
Gilpin Creek	3/28/95	6	0.5941 ± 0.1014	1.3277 ± 1.3403	0.0182 ± 0.0089	1.1486 ± 0.0838	3.9525 ± 0.5481	1.4008 ± 0.3402	25.0826 ± 5.1801	8.4419 ± 1.4933	8.7650	7.8757 ± 5.3910
Gilpin Creek	3/30/95	6	2.4158 ± 0.3415	0.0000 ± 0.0000	0.1693 ± 0.0813	2.4647 ± 0.1656	8.9044 ± 1.0988	1.3742 ± 0.4457	48.9152 ± 5.3625	15.3284 ± 1.2477	8.7650	24.8218 ± 5.5057
Gilpin Creek	3/31/95	6	2.0354 ± 0.2910	0.0000 ± 0.0000	0.2775 ± 0.1329	2.4036 ± 0.1674	7.4277 ± 0.9360	1.6833 ± 0.4152	37.7547 ± 5.2790	13.8275 ± 1.0858	8.7650	15.1622 ± 5.3895
Gilpin Creek	5/6/95	6	7.5053 ± 1.0755	25.1222 ± 25.5867	0.0970 ± 0.0461	2.8346 ± 0.2029	4.7383 ± 1.0962	0.9798 ± 0.8410	48.2030 ± 5.5340	41.2772 ± 25.6474	8.7650	-1.8392 ± 26.2377
Gilpin Creek	5/7/95	6	8.1145 ± 1.0669	12.3840 ± 13.0038	0.0202 ± 0.0096	4.1980 ± 0.2857	4.2322 ± 0.8176	1.1325 ± 0.6052	106.4008 ± 10.2322	30.0814 ± 13.0902	8.7650	67.5544 ± 16.6148
Gilpin Creek	6/14/95	6	1.1530 ± 0.1941	8.5450 ± 8.3727	0.0766 ± 0.0360	12.3200 ± 0.9517	2.9385 ± 0.4682	0.9951 ± 0.3154	52.0778 ± 5.1271	26.0282 ± 8.4478	8.7650	17.2846 ± 9.8819
Gilpin Creek	6/15/95	6	1.4816 ± 0.2411	9.4638 ± 9.3774	0.0106 ± 0.0052	9.0661 ± 0.6843	5.2836 ± 0.7057	0.8836 ± 0.3571	49.6750 ± 5.2313	26.1893 ± 9.4386	8.7650	14.7207 ± 10.7914
Gilpin Creek	6/16/95	6	1.2184 ± 0.1997	7.5571 ± 7.4054	0.0222 ± 0.0107	6.6755 ± 0.5153	2.9661 ± 0.4540	0.6559 ± 0.2886	46.3479 ± 5.4153	19.0952 ± 7.4455	8.7650	18.4877 ± 9.2066
Gilpin Creek	6/29/95	6	0.4179 ± 0.1200	9.2531 ± 9.6029	0.0659 ± 0.0314	1.6071 ± 0.1110	2.9319 ± 0.6243	0.7864 ± 0.4847	36.3786 ± 5.2110	15.0623 ± 9.6368	8.7650	12.5513 ± 10.9555
Gilpin Creek	6/30/95	6	0.5977 ± 0.1228	7.2364 ± 7.2872	0.0974 ± 0.0460	2.2378 ± 0.1636	2.9734 ± 0.5198	1.1599 ± 0.3815	40.5526 ± 5.3576	14.3026 ± 7.3187	8.7650	17.4850 ± 9.0701
Gilpin Creek	7/1/95	6	0.6419 ± 0.1253	4.9093 ± 4.9325	0.0595 ± 0.0286	4.0022 ± 0.2937	2.4248 ± 0.4380	0.6035 ± 0.3206	43.9230 ± 5.3201	12.6412 ± 4.9726	8.7650	22.5168 ± 7.2822
Gilpin Creek	7/29/95	6	0.6809 ± 0.1687	13.8687 ± 13.5817	0.0866 ± 0.0410	1.5289 ± 0.1180	2.0000 ± 0.4517	0.5827 ± 0.3724	20.7500 ± 5.2092	18.7478 ± 13.5959	8.7650	-6.7628 ± 14.5597
Gilpin Creek	7/30/95	6	1.1024 ± 0.1915	9.2769 ± 9.1365	0.0371 ± 0.0175	3.0510 ± 0.2329	2.9039 ± 0.4382	0.4801 ± 0.3108	24.9167 ± 5.1032	16.8514 ± 9.1573	8.7650	-0.6997 ± 10.4833
Gilpin Creek	7/31/95	6	0.9270 ± 0.1575	6.1035 ± 6.0293	0.1587 ± 0.0755	3.3018 ± 0.2506	1.4572 ± 0.3330	0.4527 ± 0.2739	18.4167 ± 5.3198	12.4009 ± 6.0524	8.7650	-2.7492 ± 8.0580
Gilpin Creek	8/7/95	6	0.7902 ± 0.1785	14.0011 ± 13.7507	0.0364 ± 0.0172	6.4415 ± 0.4947	3.2295 ± 0.5741	0.7035 ± 0.4008	23.5833 ± 5.2824	25.2022 ± 13.7786	8.7650	-10.3839 ± 14.7565

Table D.2 (cont.)

Individual Source Contribution to Light Extinction at the Six Sites between 02/16/95 and 10/29/95 during the Mt. Zirkel Visibility Study

Site	Date	Start Hour[a]	Primary Geological SCE ± σ (Mm^{-1})	Primary Motor Vehicle SCE ± σ (Mm^{-1})	Coal-Fired Generating Station SCE ± σ (Mm^{-1})	Vegetative Burning SCE ± σ (Mm^{-1})	Secondary Ammonium Sulfate SCE ± σ (Mm^{-1})	Secondary Ammonium Nitrate SCE ± σ (Mm^{-1})	Measured Extinction ± σ (Mm^{-1})	Calculated[b] Extinction ± σ (Mm^{-1})	Rayleigh Coefficient	Unexplained[c] Extinction ± σ (Mm^{-1})
Gilpin Creek	8/14/95	6	0.5859 ± 0.1276	7.7262 ± 7.7271	0.0407 ± 0.0192	2.1384 ± 0.1581	1.2878 ± 0.3616	0.5771 ± 0.3173	15.0000 ± 5.2824	12.3561 ± 7.7448	8.7650	-6.1211 ± 9.3747
Gilpin Creek	8/21/95	6	0.4482 ± 0.1186	8.6301 ± 8.6970	0.0577 ± 0.0277	0.0000 ± 0.0000	4.9661 ± 0.6937	0.4339 ± 0.3757	22.6667 ± 5.3198	14.5360 ± 8.7336	8.7650	-0.6343 ± 10.2262
Gilpin Creek	8/22/95	6	0.6505 ± 0.1155	3.2320 ± 3.2723	0.0358 ± 0.0169	0.0000 ± 0.0000	3.9251 ± 0.5481	0.4144 ± 0.3073	21.1667 ± 5.2774	8.2578 ± 3.3341	8.7650	4.1439 ± 6.2424
Gilpin Creek	8/24/95	6	0.6312 ± 0.1262	6.3284 ± 6.7068	0.0837 ± 0.0404	1.0423 ± 0.0704	1.7208 ± 0.5541	0.5109 ± 0.4769	22.3333 ± 5.3493	10.3173 ± 6.7482	8.7650	3.2510 ± 8.6112
Gilpin Creek	8/25/95	6	0.3311 ± 0.0926	7.1058 ± 7.1885	0.0301 ± 0.0143	0.0000 ± 0.0000	2.5917 ± 0.4927	0.5130 ± 0.3663	18.4167 ± 5.2008	10.5717 ± 7.2153	8.7650	-0.9200 ± 8.8943
Gilpin Creek	8/26/95	6	0.3797 ± 0.1015	7.8640 ± 7.7785	0.0952 ± 0.0452	0.9332 ± 0.0705	2.6378 ± 0.4155	0.5446 ± 0.3030	17.0000 ± 5.1012	12.4545 ± 7.7966	8.7650	-4.2195 ± 9.3171
Gilpin Creek	8/27/95	6	0.3764 ± 0.0982	6.9011 ± 6.9003	0.1612 ± 0.0768	2.6817 ± 0.1988	3.2067 ± 0.4665	0.4567 ± 0.3148	21.1667 ± 5.0327	13.7838 ± 6.9272	8.7650	-1.3821 ± 8.5624
Gilpin Creek	9/2/95	6	0.5708 ± 0.1477	11.7363 ± 11.6567	0.1769 ± 0.0841	2.6342 ± 0.1980	4.7520 ± 0.6233	0.3590 ± 0.3829	24.0000 ± 5.1734	20.2312 ± 11.6825	8.7650	-4.9962 ± 12.7767
Gilpin Creek	9/17/95	6	0.8179 ± 0.1456	6.9044 ± 6.8082	0.0532 ± 0.0254	1.9855 ± 0.1511	2.8513 ± 0.4073	0.6937 ± 0.2828	17.0833 ± 5.2092	13.3060 ± 6.8295	8.7650	-4.9877 ± 8.5894
Gilpin Creek	9/18/95	6	0.6798 ± 0.2376	17.1934 ± 21.6677	0.0492 ± 0.0246	2.8621 ± 0.1549	10.1430 ± 2.0133	1.7107 ± 1.4764	123.3333 ± 13.3154	32.6382 ± 21.8129	8.7650	81.9301 ± 25.5559
Gilpin Creek	9/19/95	6	0.4351 ± 0.1391	11.1859 ± 11.8199	0.0521 ± 0.0254	2.2084 ± 0.1485	2.5102 ± 0.7110	1.0154 ± 0.5889	19.6667 ± 5.3198	17.4071 ± 11.8577	8.7650	-6.5054 ± 12.9964
Gilpin Creek	9/20/95	6	0.6882 ± 0.1705	9.4183 ± 11.3599	0.0437 ± 0.0214	4.4660 ± 0.2525	5.1506 ± 1.1640	1.3183 ± 0.9801	152.0833 ± 13.4979	21.0851 ± 11.4654	8.7650	122.2332 ± 17.7101
Gilpin Creek	9/21/95	6	0.1977 ± 0.0715	5.0110 ± 5.2154	0.0238 ± 0.0117	0.1216 ± 0.0080	2.2800 ± 0.4787	0.5269 ± 0.3985	15.0833 ± 5.0869	8.1610 ± 5.2530	8.7650	-1.8427 ± 7.3124
Gilpin Creek	9/27/95	6	0.7921 ± 0.1665	11.5835 ± 11.5068	0.2557 ± 0.1239	4.5135 ± 0.3392	3.1532 ± 0.5418	0.9702 ± 0.3993	19.2500 ± 5.1381	21.2682 ± 11.5333	8.7650	-10.7832 ± 12.6260
Gilpin Creek	9/30/95	6	0.8432 ± 0.2710	13.6297 ± 21.3231	0.0811 ± 0.0391	0.3513 ± 0.0159	7.6034 ± 2.9629	0.0000 ± 0.0000	1646.5000 ± 89.1384	22.5087 ± 21.5297	8.7650	1615.2263 ± 91.7016
Gilpin Creek	10/1/95	6	0.4585 ± 0.1382	11.6250 ± 12.0284	0.0966 ± 0.0465	0.0453 ± 0.0031	2.6952 ± 0.6180	0.7400 ± 0.5146	21.4167 ± 5.2824	15.6606 ± 12.0561	8.7650	-3.0089 ± 13.1626
Gilpin Creek	10/2/95	6	0.4978 ± 0.1238	8.8472 ± 8.9605	0.0240 ± 0.0116	1.5303 ± 0.1104	2.1173 ± 0.4720	1.1273 ± 0.4081	18.0833 ± 5.3120	14.1439 ± 8.9837	8.7650	-4.8256 ± 10.4367
Gilpin Creek	10/8/95	6	1.3905 ± 0.2389	11.2783 ± 11.3167	0.1291 ± 0.0614	9.0205 ± 0.6637	2.1971 ± 0.4985	0.6923 ± 0.4123	26.7500 ± 5.3899	24.7078 ± 11.3573	8.7650	-6.7228 ± 12.5714
Gilpin Creek	10/9/95	6	0.0005 ± 0.0006	18.8090 ± 10.2690	0.8432 ± 0.2342	6.5474 ± 2.9407	0.0000 ± 0.0000	0.2979 ± 0.0297	15.4167 ± 5.3198	26.4980 ± 10.6844	8.7650	-19.8463 ± 11.9355
Gilpin Creek	10/10/95	6	1.5992 ± 0.2941	17.4925 ± 17.2791	0.1089 ± 0.0517	2.8854 ± 0.2187	1.1853 ± 0.5374	0.5042 ± 0.4753	17.2500 ± 5.2824	23.7755 ± 17.2979	8.7650	-15.2905 ± 18.0865
Gilpin Creek	10/11/95	6	0.6184 ± 0.1288	8.7556 ± 8.6055	0.0546 ± 0.0260	0.9314 ± 0.0712	0.8106 ± 0.3340	0.2887 ± 0.2998	13.1667 ± 5.1218	11.4593 ± 8.6185	8.7650	-7.0576 ± 10.0255
Gilpin Creek	10/12/95	6	1.5571 ± 0.2613	11.0452 ± 11.2960	0.0631 ± 0.0301	3.9760 ± 0.2830	0.4877 ± 0.5010	0.0000 ± 0.0000	35.8762 ± 5.1945	17.1291 ± 11.3137	8.7650	9.9821 ± 12.4492
Gilpin Creek	10/13/95	6	1.5303 ± 0.3237	23.8605 ± 23.8803	0.0378 ± 0.0178	0.9931 ± 0.0738	0.6400 ± 0.7618	0.4086 ± 0.6857	11.2500 ± 5.1493	27.4703 ± 23.9046	8.7650	-24.9853 ± 24.4529
Gilpin Creek	10/14/95	6	0.8937 ± 0.1592	7.8654 ± 7.7470	0.1554 ± 0.0736	0.0732 ± 0.0058	1.0381 ± 0.3390	0.4816 ± 0.2957	12.0000 ± 5.1655	10.5074 ± 7.7620	8.7650	-7.2724 ± 9.3237
Hayden Waste Water	2/16/95	12	1.9486 ± 0.1827	19.1914 ± 19.4280	0.7288 ± 0.3475	0.0000 ± 0.0000	2.6983 ± 0.9069	6.3439 ± 0.9447	37.4074 ± 6.7213	30.9110 ± 19.4760	9.5960	-3.0996 ± 20.6032
Hayden Waste Water	2/17/95	6	0.8377 ± 0.2058	14.0613 ± 14.5109	0.6887 ± 0.3294	0.8301 ± 0.0582	1.4667 ± 0.7190	5.5478 ± 0.8192	42.3383 ± 7.9919	23.4323 ± 14.5571	9.5960	9.3100 ± 16.6066
Hayden Waste Water	2/17/95	12	1.4831 ± 0.2498	7.9362 ± 8.0093	1.2382 ± 0.5905	0.0000 ± 0.0000	1.5942 ± 0.7305	5.7916 ± 0.7203	39.0785 ± 7.0705	18.0433 ± 8.1002	9.5960	11.4392 ± 10.7520
Hayden Waste Water	2/19/95	6	0.2999 ± 0.1223	6.4339 ± 7.2135	1.7875 ± 0.8588	0.3000 ± 0.0188	4.4074 ± 1.1786	5.3766 ± 0.7237	46.8595 ± 10.2898	18.6053 ± 7.3960	9.5960	18.6582 ± 12.6720
Hayden Waste Water	2/19/95	12	0.8797 ± 0.1601	3.4156 ± 3.5010	0.3092 ± 0.1476	1.5031 ± 0.1063	2.0019 ± 0.3989	2.8786 ± 0.3536	30.9205 ± 6.1822	10.9881 ± 3.5496	9.5960	10.3364 ± 7.1288
Hayden Waste Water	2/23/95	6	3.9819 ± 0.7143	10.8104 ± 11.7191	3.7335 ± 1.7920	1.3220 ± 0.0858	4.4837 ± 2.0391	11.0628 ± 1.2850	73.1777 ± 16.4177	35.3943 ± 12.1192	9.5960	28.1874 ± 20.4063
Hayden Waste Water	2/24/95	6	1.6394 ± 0.3399	13.4436 ± 14.1283	1.8543 ± 0.8875	1.2307 ± 0.0838	3.0440 ± 1.1824	5.3725 ± 0.8153	42.0607 ± 7.9922	26.5845 ± 14.2331	9.5960	5.8802 ± 16.3235
Hayden Waste Water	2/24/95	12	7.1542 ± 1.2980	45.4708 ± 46.0691	0.4150 ± 0.1980	0.2372 ± 0.0176	3.4447 ± 1.6479	3.9680 ± 1.4269	37.1357 ± 6.8745	60.6899 ± 46.1393	9.5960	-33.1502 ± 46.6486
Hayden Waste Water	2/26/95	6	3.1510 ± 0.6229	28.5357 ± 31.1671	1.2034 ± 0.5777	1.2657 ± 0.0812	7.1805 ± 1.8054	15.1224 ± 2.1618	90.9741 ± 18.7350	56.4587 ± 31.3057	9.5960	24.9194 ± 36.4835
Hayden Waste Water	2/26/95	12	1.0552 ± 0.2432	11.8009 ± 12.2173	1.4576 ± 0.6968	1.9127 ± 0.1335	5.6882 ± 1.1202	4.4002 ± 0.6299	44.1461 ± 9.1062	26.3148 ± 12.3076	9.5960	8.2353 ± 15.3101
Hayden Waste Water	8/7/95	6	2.1559 ± 0.4475	5.5564 ± 5.4892	0.5287 ± 0.2155	5.8911 ± 0.4471	3.2780 ± 0.4895	0.3111 ± 0.1549	43.4499 ± 6.9819	17.7212 ± 5.5535	9.5960	16.1327 ± 8.9212
Hayden Waste Water	8/7/95	12	1.7090 ± 0.3032	8.6374 ± 8.4286	0.0270 ± 0.0125	5.8418 ± 0.4556	3.8808 ± 0.5067	0.3676 ± 0.2002	38.9450 ± 6.0223	20.4636 ± 8.4639	9.5960	6.8854 ± 10.3878
Hayden Waste Water	8/8/95	6	2.6989 ± 0.4582	7.5518 ± 7.4736	0.3796 ± 0.1804	7.4716 ± 0.5652	4.2836 ± 0.5892	0.3170 ± 0.2025	47.4049 ± 7.8435	22.7025 ± 7.5369	9.5960	15.1064 ± 10.8777
Hayden Waste Water	8/8/95	12	4.5934 ± 0.7074	5.9749 ± 5.8571	0.0540 ± 0.0257	10.0345 ± 0.7744	2.6966 ± 0.3731	0.4234 ± 0.1557	42.8213 ± 6.8349	23.7768 ± 5.9640	9.5960	9.4485 ± 9.0711
Hayden Waste Water	8/9/95	6	4.9388 ± 0.7946	9.0894 ± 9.0895	1.4870 ± 0.7076	5.7429 ± 0.4258	1.3130 ± 0.8279	0.6309 ± 0.2682	38.4324 ± 6.8710	23.2020 ± 9.2027	9.5960	5.6344 ± 11.4848
Hayden Waste Water	8/9/95	12	3.8469 ± 0.6364	10.4919 ± 10.2275	0.1903 ± 0.0901	3.7597 ± 0.2937	1.5221 ± 0.3574	0.3785 ± 0.2363	20.6667 ± 5.0253	20.1894 ± 10.2608	9.5960	-9.1187 ± 11.4253
Hayden Waste Water	8/14/95	6	1.9720 ± 0.3462	6.9448 ± 7.0215	2.1760 ± 1.0373	0.3373 ± 0.0244	0.0000 ± 0.0000	0.3584 ± 0.2246	23.6575 ± 5.0710	11.7885 ± 7.1097	9.5960	2.2730 ± 8.7329
Hayden Waste Water	8/14/95	12	0.8785 ± 0.1593	8.0563 ± 7.9561	0.3207 ± 0.1523	0.4171 ± 0.0318	0.8402 ± 0.3055	0.3033 ± 0.2073	15.0000 ± 3.4375	10.8161 ± 7.9678	9.5960	-5.4121 ± 8.6777
Hayden Waste Water	8/21/95	6	1.3519 ± 0.4125	11.3276 ± 12.2124	7.5409 ± 3.6173	0.0000 ± 0.0000	1.6502 ± 3.8657	0.8651 ± 0.5783	41.6198 ± 8.8846	22.7357 ± 13.3295	9.5960	9.2881 ± 16.0191
Hayden Waste Water	8/21/95	12	1.5421 ± 0.4812	49.9073 ± 49.2414	0.0797 ± 0.0376	0.0000 ± 0.0000	5.1103 ± 1.5345	0.3749 ± 1.2124	39.2557 ± 7.9027	57.0143 ± 49.2826	9.5960	-27.3546 ± 49.9122
Hayden Waste Water	8/23/95	6	1.4838 ± 0.2890	14.8633 ± 15.3362	2.0284 ± 0.4662	0.0000 ± 0.0000	3.6603 ± 1.1617	0.4159 ± 0.5080	37.7034 ± 7.3566	22.4517 ± 15.3983	9.5960	5.6557 ± 17.0654
Hayden Waste Water	8/23/95	12	1.5189 ± 0.3524	29.5775 ± 30.0612	0.4674 ± 0.1251	0.0000 ± 0.0000	4.9639 ± 1.2404	1.3001 ± 0.9141	32.9367 ± 6.3370	37.8278 ± 30.1030	9.5960	-14.4871 ± 30.7628
Hayden Waste Water	8/24/95	6	0.6044 ± 0.1782	11.2558 ± 11.7399	0.9460 ± 0.4524	0.0000 ± 0.0000	4.2509 ± 0.8630	0.8243 ± 0.4222	36.3465 ± 7.5411	17.8814 ± 11.7892	9.5960	8.8691 ± 13.9948
Hayden Waste Water	8/24/95	12	0.7622 ± 0.2329	18.6766 ± 18.6748	0.3722 ± 0.1774	0.0000 ± 0.0000	3.8398 ± 0.7764	0.2719 ± 0.5125	26.4067 ± 5.3711	23.9227 ± 18.7002	9.5960	-7.1120 ± 19.4563
Hayden Waste Water	8/25/95	6	0.7970 ± 0.3700	5.9969 ± 6.2315	7.2180 ± 3.4521	0.0000 ± 0.0000	0.0000 ± 0.0000	0.4072 ± 0.2418	32.2700 ± 6.1637	14.4191 ± 7.1375	9.5960	8.2549 ± 9.4305
Hayden Waste Water	8/25/95	12	0.8384 ± 0.1805	10.6562 ± 10.4820	0.4806 ± 0.2277	0.0000 ± 0.0000	3.5191 ± 0.5780	0.3634 ± 0.2643	24.2560 ± 4.8417	15.8577 ± 10.5053	9.5960	-1.1977 ± 11.5673
Hayden Waste Water	8/26/95	6	0.0000 ± 0.0000	5.8961 ± 5.9432	2.1260 ± 0.1628	2.2072 ± 0.1608	3.3539 ± 0.4053	0.4343 ± 0.1944	30.2395 ± 6.5429	14.0175 ± 5.9646	9.5960	6.6260 ± 8.8536
Hayden Waste Water	8/26/95	12	0.7907 ± 0.1561	7.7469 ± 7.5885	0.0592 ± 0.0281	0.5963 ± 0.0460	2.8436 ± 0.3464	0.3024 ± 0.1863	20.3706 ± 4.2184	12.3391 ± 7.6005	9.5960	-1.5645 ± 8.6927
Hayden Waste Water	8/27/95	6	1.0248 ± 0.2362	10.3383 ± 10.3841	1.2718 ± 0.0974	2.8083 ± 0.2061	5.2843 ± 0.6018	0.4322 ± 0.3009	33.5728 ± 7.2211	21.1597 ± 10.4111	9.5960	2.8171 ± 12.6703
Hayden Waste Water	8/27/95	12	1.8102 ± 0.3173	12.8347 ± 12.6332	0.0436 ± 0.0036	3.1519 ± 0.2414	2.9682 ± 0.4547	0.3669 ± 0.3057	23.9366 ± 5.1813	21.1755 ± 12.6514	9.5960	-6.8349 ± 13.6713
Hayden Waste Water	9/17/95	6	1.8875 ± 0.3076	7.5813 ± 7.5540	0.5095 ± 0.0394	2.1220 ± 0.1586	2.4876 ± 0.3613	0.3659 ± 0.2169	28.0087 ± 5.5801	14.9338 ± 7.5738	9.5960	3.4789 ± 9.4074
Hayden Waste Water	9/17/95	12	1.0896 ± 0.2075	9.1876 ± 8.9885	0.0894 ± 0.0067	3.0778 ± 0.2386	2.3841 ± 0.3631	0.5076 ± 0.2263	-99.0000 ± -99.0000	16.3361 ± 9.0042	9.5960	-99.0000 ± -99.0000

Table D.2 (cont.)
Individual Source Contribution to Light Extinction at the Six Sites between 02/16/95 and 10/29/95 during the Mt. Zirkel Visibility Study

Site	Date	Start Hour[a]	Primary Geological SCE ± σ (Mm^{-1})	Primary Motor Vehicle SCE ± σ (Mm^{-1})	Coal-Fired Generating Station SCE ± σ (Mm^{-1})	Vegetative Burning SCE ± σ (Mm^{-1})	Secondary Ammonium Sulfate SCE ± σ (Mm^{-1})	Secondary Ammonium Nitrate SCE ± σ (Mm^{-1})	Measured Extinction ± σ (Mm^{-1})	Calculated[b] Extinction ± σ (Mm^{-1})	Rayleigh Coefficient	Unexplained[c] Extinction ± σ (Mm^{-1})
Hayden Waste Water	9/18/95	6	2.1909 ± 0.4208	10.0182 ± 11.1944	1.4605 ± 0.7023	0.0000 ± 0.0000	9.7097 ± 1.2220	3.2608 ± 0.6167	67.5379 ± 16.4348	26.6401 ± 11.3075	9.5960	31.3018 ± 19.9490
Hayden Waste Water	9/18/95	12	0.4876 ± 0.1511	10.3609 ± 11.0039	0.3720 ± 0.0352	1.3602 ± 0.0906	5.8298 ± 0.8058	0.9587 ± 0.4574	32.8388 ± 6.9927	19.3692 ± 11.0443	9.5960	3.8736 ± 13.0719
Hayden Waste Water	9/19/95	6	0.9213 ± 0.2747	11.5883 ± 13.1045	4.6053 ± 2.2154	0.0000 ± 0.0000	22.3881 ± 2.6579	1.8975 ± 0.6313	111.1518 ± 32.0241	41.4005 ± 13.5711	9.5960	60.1553 ± 34.7810
Hayden Waste Water	9/19/95	12	1.5383 ± 0.2539	10.4128 ± 10.4024	0.9607 ± 0.4657	4.1784 ± 0.3102	1.9633 ± 0.5590	0.4862 ± 0.2906	27.5819 ± 5.4270	19.5397 ± 10.4396	9.5960	-1.5538 ± 11.7659
Hayden Waste Water	9/20/95	6	0.7160 ± 0.1697	10.2635 ± 11.3947	0.2741 ± 0.1321	2.7657 ± 0.1734	7.4948 ± 0.9369	1.0983 ± 0.5117	38.6031 ± 7.9877	22.6124 ± 11.4479	9.5960	6.3947 ± 13.9591
Hayden Waste Water	9/20/95	12	0.4435 ± 0.1063	7.0697 ± 7.2377	0.0659 ± 0.0315	1.2219 ± 0.0865	4.3726 ± 0.4998	0.4162 ± 0.2457	29.3127 ± 6.4341	13.5898 ± 7.2605	9.5960	6.1269 ± 9.7012
Hayden Waste Water	9/21/95	6	0.2191 ± 0.0927	7.7699 ± 8.3063	0.5431 ± 0.2603	0.0000 ± 0.0000	4.5798 ± 0.6374	0.2539 ± 0.3301	19.4083 ± 4.3070	13.3658 ± 8.3418	9.5960	-3.5535 ± 9.3881
Hayden Waste Water	9/21/95	12	0.6210 ± 0.1320	7.1624 ± 7.1204	0.2977 ± 0.1415	0.7130 ± 0.0531	2.1783 ± 0.3468	0.1611 ± 0.1972	16.9189 ± 3.6390	11.1335 ± 7.1344	9.5960	-3.8106 ± 8.0089
Hayden Waste Water	9/24/95	6	0.9997 ± 0.1850	9.9401 ± 10.2380	0.1265 ± 0.0603	1.5019 ± 0.1056	3.0604 ± 0.5110	0.3812 ± 0.3386	26.0604 ± 5.9665	16.0098 ± 10.2587	9.5960	0.4546 ± 11.8676
Hayden Waste Water	9/24/95	12	0.4362 ± 0.1020	8.5818 ± 8.4278	0.0225 ± 0.0107	0.0000 ± 0.0000	2.1275 ± 0.3251	0.1637 ± 0.2067	-99.0000 ± -99.0000	11.3317 ± 8.4372	9.5960	-99.0000 ± -99.0000
Hayden Waste Water	9/27/95	6	1.5412 ± 0.2585	9.2535 ± 9.2807	0.4646 ± 0.1062	1.6430 ± 0.1214	3.5721 ± 0.5103	0.4435 ± 0.2692	29.2833 ± 6.0455	16.9179 ± 9.3036	9.5960	2.7694 ± 11.0953
Hayden Waste Water	9/27/95	12	1.6235 ± 0.2754	6.0105 ± 5.8920	0.2623 ± 0.1267	10.2157 ± 0.7879	2.8574 ± 0.3430	0.4865 ± 0.1606	29.7106 ± 6.0790	21.4559 ± 5.9642	9.5960	-1.3413 ± 8.5162
Hayden Waste Water	9/30/95	6	0.1420 ± 0.0616	4.2444 ± 5.0183	0.1261 ± 0.0605	0.0000 ± 0.0000	0.8103 ± 0.5177	0.3249 ± 0.3261	13.6667 ± 3.4634	5.6477 ± 5.0562	9.5960	-1.5770 ± 6.1286
Hayden Waste Water	9/30/95	12	0.5253 ± 0.1236	8.1022 ± 8.3451	0.4680 ± 0.2239	0.0000 ± 0.0000	5.3837 ± 0.6345	0.2131 ± 0.2858	29.5843 ± 6.1771	14.6923 ± 8.3780	9.5960	5.2960 ± 10.4090
Hayden Waste Water	10/1/95	6	0.6707 ± 0.1628	10.8711 ± 11.3609	0.3738 ± 0.1785	0.7956 ± 0.0547	5.2572 ± 0.7083	0.5931 ± 0.4030	38.3194 ± 9.0225	18.5615 ± 11.3928	9.5960	10.1619 ± 14.5328
Hayden Waste Water	10/1/95	12	1.0738 ± 0.2133	14.2442 ± 14.0731	0.2725 ± 0.1293	0.3252 ± 0.0251	1.0930 ± 0.4402	0.2339 ± 0.3472	14.8333 ± 3.4794	17.2426 ± 14.0865	9.5960	-12.0053 ± 14.5098
Hayden Waste Water	10/2/95	6	0.7420 ± 0.1721	11.2374 ± 11.6652	0.2473 ± 0.1186	0.8939 ± 0.0616	3.2999 ± 0.5855	0.7679 ± 0.4009	28.9930 ± 6.6016	17.1884 ± 11.6888	9.5960	2.2086 ± 13.4242
Hayden Waste Water	10/2/95	12	0.3457 ± 0.0775	5.0418 ± 4.9632	0.0508 ± 0.0244	0.6611 ± 0.0509	0.8631 ± 0.2131	0.6897 ± 0.1543	15.4182 ± 3.3026	7.6522 ± 4.9711	9.5960	-1.8300 ± 5.9682
Hayden Waste Water	10/7/95	6	1.9169 ± 0.3023	7.7859 ± 7.8642	1.8712 ± 0.8917	0.0000 ± 0.0000	0.0000 ± 0.0000	0.4277 ± 0.2445	25.8532 ± 5.5751	12.0017 ± 7.9241	9.5960	4.2555 ± 9.6888
Hayden Waste Water	10/7/95	12	1.5647 ± 0.2786	7.6649 ± 7.5022	0.2656 ± 0.1257	0.5850 ± 0.0451	1.6577 ± 0.2982	0.2500 ± 0.1815	19.8755 ± 4.0753	11.9879 ± 7.5167	9.5960	-1.7084 ± 8.5504
Hayden Waste Water	10/8/95	6	1.6220 ± 0.2546	7.8090 ± 7.9880	0.1217 ± 0.0580	10.1489 ± 0.7212	3.6407 ± 0.4784	1.3300 ± 0.3000	41.1205 ± 8.2178	24.6723 ± 8.0446	9.5960	6.8522 ± 11.4999
Hayden Waste Water	10/8/95	12	0.9401 ± 0.1401	1.1879 ± 1.1643	0.1648 ± 0.0783	4.7029 ± 0.3628	0.8949 ± 0.1561	0.3023 ± 0.0779	22.7525 ± 4.5635	8.1929 ± 1.2423	9.5960	4.9636 ± 4.7296
Hayden Waste Water	10/9/95	6	1.1131 ± 0.2036	9.4764 ± 9.5407	0.6800 ± 0.3240	3.3855 ± 0.2474	1.7652 ± 0.4709	0.0000 ± 0.0000	24.9316 ± 5.3859	16.4202 ± 9.5632	9.5960	-1.0846 ± 10.9756
Hayden Waste Water	10/9/95	12	3.4418 ± 0.5085	14.3103 ± 14.0084	0.0714 ± 0.0336	1.0619 ± 0.0824	1.4220 ± 0.3992	0.1769 ± 0.3174	21.1897 ± 4.2368	20.4843 ± 14.0272	9.5960	-8.8906 ± 14.6531
Hayden Waste Water	10/10/95	6	2.0020 ± 0.3072	9.0618 ± 9.0910	0.4269 ± 0.2031	3.7703 ± 0.2779	1.2251 ± 0.3919	0.4561 ± 0.2640	31.7429 ± 6.2487	16.9422 ± 9.1150	9.5960	5.2047 ± 11.0512
Hayden Waste Water	10/10/95	12	1.7007 ± 0.2639	7.5202 ± 7.3657	0.5162 ± 0.2443	2.2401 ± 0.1736	0.6581 ± 0.3189	0.4823 ± 0.1866	22.5427 ± 4.7408	13.1176 ± 7.3858	9.5960	-0.1709 ± 8.7764
Hayden Waste Water	10/11/95	6	1.7658 ± 0.2785	4.8772 ± 4.8525	1.1159 ± 0.5301	1.7746 ± 0.1325	0.0000 ± 0.0000	0.6280 ± 0.2003	22.2604 ± 4.4578	10.1615 ± 4.8952	9.5960	2.5029 ± 6.6208
Hayden Waste Water	10/11/95	12	2.3984 ± 0.3386	5.5547 ± 5.4251	0.0858 ± 0.0407	0.3338 ± 0.0259	1.1605 ± 0.2154	0.2181 ± 0.1361	16.7523 ± 3.6390	9.7513 ± 5.4418	9.5960	-2.5950 ± 6.5464
Hayden Waste Water	10/12/95	6	2.0560 ± 0.3196	10.9194 ± 10.9065	0.1786 ± 0.0850	2.5473 ± 0.1890	3.7443 ± 0.5065	0.2884 ± 0.2992	37.7086 ± 7.3543	19.7340 ± 10.9290	9.5960	8.3786 ± 13.1730
Hayden Waste Water	10/12/95	12	1.9315 ± 0.2900	7.3685 ± 7.4365	0.0372 ± 0.0174	3.1016 ± 0.2262	4.4602 ± 0.4924	0.2997 ± 0.2304	33.7153 ± 6.9228	17.1987 ± 7.4654	9.5960	6.9206 ± 10.1812
Hayden Waste Water	10/13/95	6	0.9388 ± 0.1823	8.1453 ± 8.2837	0.1223 ± 0.0580	2.2606 ± 0.1625	2.6584 ± 0.4230	0.3262 ± 0.2626	22.9022 ± 4.9637	14.4516 ± 8.3024	9.5960	-1.1454 ± 9.6731
Hayden Waste Water	10/13/95	12	1.0764 ± 0.1969	6.2480 ± 6.1269	0.3064 ± 0.1454	1.1669 ± 0.0902	0.4073 ± 0.2508	0.1464 ± 0.1574	13.5000 ± 3.2955	9.3514 ± 6.1396	9.5960	-5.4474 ± 6.9681
Hayden Waste Water	10/14/95	6	0.7403 ± 0.1651	7.8723 ± 7.8536	1.1206 ± 0.2555	1.4438 ± 0.1075	0.0000 ± 0.0000	0.3424 ± 0.2205	19.5509 ± 4.1172	11.5194 ± 7.8633	9.5960	-1.5645 ± 8.8760
Hayden Waste Water	10/14/95	12	0.5632 ± 0.1214	2.2570 ± 2.2134	0.6719 ± 0.3182	0.6172 ± 0.0480	0.0000 ± 0.0000	0.1022 ± 0.0897	11.6667 ± 3.2974	4.2115 ± 2.2418	9.5960	-2.1408 ± 3.9873
Hayden VOR	2/17/95	12	0.3667 ± 0.1205	6.9292 ± 6.8295	0.8971 ± 0.4254	0.4627 ± 0.0356	0.0000 ± 0.0000	0.7681 ± 0.2275	25.2548 ± 4.6651	9.4238 ± 6.8477	9.4120	6.4190 ± 8.2858
Hayden VOR	2/23/95	6	0.8683 ± 0.1882	6.7398 ± 6.7960	1.1184 ± 0.5328	0.9617 ± 0.0701	1.7968 ± 0.5227	1.6163 ± 0.2654	-99.0000 ± -99.0000	13.1013 ± 6.8450	9.4120	-99.0000 ± -99.0000
Hayden VOR	2/24/95	6	1.1142 ± 0.2789	17.5501 ± 18.1765	1.6808 ± 0.4247	0.0000 ± 0.0000	4.9492 ± 1.2208	2.8225 ± 0.6779	29.3515 ± 5.2607	28.1168 ± 18.2371	9.4120	-8.1773 ± 18.9807
Hayden VOR	2/26/95	6	1.4836 ± 0.5216	31.9359 ± 33.4063	2.8255 ± 1.3521	0.0000 ± 0.0000	6.6182 ± 2.6349	4.8073 ± 1.2292	35.9186 ± 5.2062	47.6705 ± 33.5639	9.4120	-21.1639 ± 33.9653
Hayden VOR	2/26/95	12	1.0567 ± 0.2252	12.6470 ± 12.8839	0.5315 ± 0.2533	1.4385 ± 0.1029	4.0494 ± 0.6335	2.0063 ± 0.4448	22.9297 ± 4.0034	21.7294 ± 12.9120	9.4120	-8.2117 ± 13.5184
Hayden VOR	8/7/95	6	1.7024 ± 0.2837	11.9616 ± 11.7595	0.6034 ± 0.2860	5.1007 ± 0.3911	2.3360 ± 0.4654	0.4569 ± 0.2871	38.1161 ± 9.4633	22.1610 ± 11.7856	9.4120	6.5431 ± 15.1147
Hayden VOR	8/7/95	12	1.4734 ± 0.2799	12.9901 ± 12.6704	0.0214 ± 0.0103	4.9303 ± 0.3847	4.0699 ± 0.4900	0.4384 ± 0.2849	33.9680 ± 8.6522	23.9235 ± 12.6920	9.4120	0.6325 ± 15.3606
Hayden VOR	8/8/95	6	2.8946 ± 0.4677	19.5559 ± 19.2282	0.5814 ± 0.2755	5.8303 ± 0.4469	4.0236 ± 0.6832	0.4356 ± 0.4535	40.8210 ± 10.5016	33.3214 ± 19.2585	9.4120	-1.9124 ± 21.9357
Hayden VOR	8/8/95	12	4.0123 ± 0.5464	8.8256 ± 8.6571	0.0717 ± 0.0341	10.7474 ± 0.8283	3.4856 ± 0.3982	0.5606 ± 0.2167	40.1569 ± 10.3019	27.7032 ± 8.7256	9.4120	3.0417 ± 13.5006
Hayden VOR	8/9/95	6	6.3440 ± 0.9236	14.5184 ± 14.3883	7.2008 ± 1.7781	1.7140 ± 0.1294	0.0000 ± 0.0000	0.6280 ± 0.3771	34.7946 ± 10.8232	30.4052 ± 14.5326	9.4120	-5.0226 ± 18.1201
Hayden VOR	8/9/95	12	3.7763 ± 0.6279	31.1477 ± 30.3631	0.2641 ± 0.1248	2.0192 ± 0.1579	1.7708 ± 0.7551	0.6506 ± 0.6507	20.9183 ± 6.8333	39.6287 ± 30.3866	9.4120	-28.1224 ± 31.1455
Hayden VOR	8/14/95	6	1.4653 ± 0.2656	15.0829 ± 15.1403	0.2262 ± 0.0561	0.3263 ± 0.0243	1.3796 ± 0.5043	0.4391 ± 0.4183	17.5506 ± 6.2042	18.9194 ± 15.1569	9.4120	-10.7808 ± 16.3775
Hayden VOR	8/14/95	12	0.8550 ± 0.1431	6.2948 ± 6.2246	0.0622 ± 0.0153	0.5868 ± 0.0444	1.1474 ± 0.2273	0.3379 ± 0.1716	12.8333 ± 4.8943	9.2841 ± 6.2329	9.4120	-5.8628 ± 7.9248
Hayden VOR	8/21/95	6	5.3548 ± 0.5716	8.5103 ± 8.7099	3.8507 ± 1.8386	0.0000 ± 0.0000	4.3147 ± 1.4895	1.1045 ± 0.3134	31.7463 ± 10.0059	23.1350 ± 9.0491	9.4120	-0.8007 ± 13.4909
Hayden VOR	8/21/95	12	3.0338 ± 0.5244	27.9517 ± 27.7561	0.1264 ± 0.0602	0.4729 ± 0.0357	6.2820 ± 0.9872	0.7421 ± 0.7041	30.5375 ± 9.7937	38.6089 ± 27.7876	9.4120	-17.4834 ± 29.4630
Hayden VOR	8/22/95	6	0.7127 ± 0.2000	11.2862 ± 11.8897	1.9126 ± 0.9160	1.5565 ± 0.1052	4.1165 ± 0.9864	0.8766 ± 0.4407	31.4738 ± 10.9495	20.4611 ± 11.9759	9.4120	1.6007 ± 16.2269
Hayden VOR	8/22/95	12	0.9765 ± 0.1918	12.3496 ± 12.3239	0.2553 ± 0.1216	1.2366 ± 0.0921	4.2491 ± 0.5556	0.4798 ± 0.3366	23.2689 ± 7.9655	19.5469 ± 12.3434	9.4120	-5.6900 ± 14.6904
Hayden VOR	8/23/95	6	1.8194 ± 0.3695	21.4305 ± 22.1405	1.1579 ± 0.5537	0.0000 ± 0.0000	5.7966 ± 1.0904	0.7984 ± 0.7135	26.8097 ± 9.6097	31.0028 ± 22.1888	9.4120	-13.6051 ± 24.1803
Hayden VOR	8/23/95	12	1.2583 ± 0.2587	12.9331 ± 13.1935	5.3880 ± 2.6146	0.1743 ± 0.0128	0.0000 ± 0.0000	0.4458 ± 0.4143	22.3333 ± 8.6396	20.1995 ± 13.4589	9.4120	-7.2782 ± 15.9933
Hayden VOR	8/24/95	6	1.9604 ± 0.3280	7.3146 ± 7.6365	1.8194 ± 0.8710	1.0874 ± 0.0746	4.2188 ± 0.8581	0.6568 ± 0.2916	28.8309 ± 9.8532	17.0574 ± 7.7466	9.4120	2.3615 ± 12.5338
Hayden VOR	8/24/95	12	4.2805 ± 0.5734	20.7056 ± 20.7555	0.4685 ± 0.2228	0.0000 ± 0.0000	3.5368 ± 0.7460	0.5432 ± 0.5638	19.8930 ± 6.9772	29.5346 ± 20.7857	9.4120	-19.0536 ± 21.9255
Hayden VOR	8/25/95	6	2.6039 ± 0.4359	9.7916 ± 10.3427	2.5785 ± 1.2350	2.0560 ± 0.1383	5.3399 ± 1.1884	0.7340 ± 0.3954	26.3986 ± 8.8205	23.1039 ± 10.5012	9.4120	-6.1173 ± 13.7141

Table D.2 (cont.)

Individual Source Contribution to Light Extinction at the Six Sites between 02/16/95 and 10/29/95 during the Mt. Zirkel Visibility Study

Site	Date	Start Hour[a]	Primary Geological SCE ± σ (Mm^{-1})	Primary Motor Vehicle SCE ± σ (Mm^{-1})	Coal-Fired Generating Station SCE ± σ (Mm^{-1})	Vegetative Burning SCE ± σ (Mm^{-1})	Secondary Ammonium Sulfate SCE ± σ (Mm^{-1})	Secondary Ammonium Nitrate SCE ± σ (Mm^{-1})	Measured Extinction ± σ (Mm^{-1})	Calculated[b] Extinction ± σ (Mm^{-1})	Rayleigh Coefficient	Unexplained[c] Extinction ± σ (Mm^{-1})
Hayden VOR	8/25/95	12	1.4065 ± 0.2388	11.1942 ± 11.0157	0.3577 ± 0.1696	0.8938 ± 0.0683	3.6703 ± 0.4827	0.5758 ± 0.2775	21.2702 ± 6.7904	18.0983 ± 11.0339	9.4120	-6.2401 ± 12.9559
Hayden VOR	8/26/95	6	4.3947 ± 0.6445	6.0256 ± 6.0700	3.3243 ± 1.5837	2.6721 ± 0.1949	0.0000 ± 0.0000	0.8162 ± 0.2135	26.0995 ± 8.8980	17.2329 ± 6.3128	9.4120	-0.5454 ± 10.9099
Hayden VOR	8/26/95	12	2.1033 ± 0.3056	7.6415 ± 7.4779	0.0726 ± 0.0342	1.7586 ± 0.1361	3.0170 ± 0.3457	0.7101 ± 0.1943	16.1667 ± 6.1504	15.3031 ± 7.4960	9.4120	-8.5484 ± 9.6963
Hayden VOR	8/27/95	6	1.7902 ± 0.3662	9.4783 ± 9.4439	2.7018 ± 1.2844	3.8062 ± 0.2837	1.4149 ± 1.0603	3.5042 ± 0.4856	26.3727 ± 9.4145	22.6956 ± 9.6131	9.4120	-5.7349 ± 13.4553
Hayden VOR	8/27/95	12	5.3400 ± 0.7440	15.1581 ± 14.8826	0.1301 ± 0.0616	1.1089 ± 0.0855	2.8452 ± 0.4815	0.5454 ± 0.3514	21.5915 ± 6.3346	25.1277 ± 14.9135	9.4120	-12.9482 ± 16.2031
Hayden VOR	9/17/95	6	2.1352 ± 0.4263	11.2762 ± 11.1160	2.0653 ± 0.9794	1.7686 ± 0.1348	0.0000 ± 0.0000	0.2098 ± 0.2769	21.0840 ± 7.0704	17.4551 ± 11.1714	9.4120	-5.7831 ± 13.2208
Hayden VOR	9/17/95	12	2.9021 ± 0.4393	14.5496 ± 14.2245	0.2580 ± 0.1219	1.3199 ± 0.1025	2.1654 ± 0.4326	0.2663 ± 0.3201	17.9083 ± 6.3285	21.4613 ± 14.2423	9.4120	-12.9650 ± 15.5850
Hayden VOR	9/18/95	6	0.9352 ± 0.2302	11.0220 ± 12.7270	1.8554 ± 0.8927	1.9463 ± 0.1161	12.8959 ± 1.5557	2.9094 ± 0.6949	80.6197 ± 35.2064	31.5642 ± 12.8741	9.4120	39.6435 ± 37.4864
Hayden VOR	9/18/95	12	0.9170 ± 0.2439	17.4671 ± 19.2572	1.2419 ± 0.6035	2.9179 ± 0.1849	5.7879 ± 1.1824	0.5036 ± 0.7843	36.5311 ± 12.6608	28.8354 ± 19.3213	9.4120	-1.7163 ± 23.1000
Hayden VOR	9/19/95	6	0.0000 ± 0.0000	8.3374 ± 10.4006	12.4793 ± 3.3002	0.9285 ± 0.0507	33.5317 ± 4.3395	2.9333 ± 0.6988	1956.5579 ± 1000.4648	58.2102 ± 11.7638	9.4120	1888.9357 ± 1000.5340
Hayden VOR	9/19/95	12	2.0421 ± 0.3806	15.0610 ± 15.0635	1.2441 ± 0.6034	4.8671 ± 0.3608	1.1437 ± 0.7074	0.5780 ± 0.4125	25.7316 ± 8.7205	24.9360 ± 15.1069	9.4120	-8.6164 ± 17.4432
Hayden VOR	9/20/95	6	2.2801 ± 0.4075	10.9170 ± 11.8260	0.1858 ± 0.0892	3.3992 ± 0.2204	4.7869 ± 0.7078	0.6844 ± 0.4748	32.2662 ± 11.1583	22.2534 ± 11.8661	9.4120	0.6008 ± 16.2884
Hayden VOR	9/20/95	12	1.7466 ± 0.3082	7.6785 ± 7.9216	0.0144 ± 0.0038	2.2346 ± 0.1569	3.8668 ± 0.4760	0.4846 ± 0.2778	25.7661 ± 8.5151	16.0255 ± 7.9483	9.4120	0.3286 ± 11.6483
Hayden VOR	9/21/95	6	0.2329 ± 0.0909	3.9380 ± 4.6004	1.3019 ± 0.6269	0.4810 ± 0.0283	2.8928 ± 0.6844	0.8513 ± 0.3114	23.4098 ± 8.5374	9.6979 ± 4.7044	9.4120	4.2999 ± 9.7477
Hayden VOR	9/21/95	12	0.8288 ± 0.1940	13.9007 ± 13.8123	0.2210 ± 0.1051	0.3014 ± 0.0223	3.3503 ± 0.5282	0.0861 ± 0.3571	15.2822 ± 5.1136	18.6883 ± 13.8288	9.4120	-12.8181 ± 14.7440
Hayden VOR	9/24/95	6	0.0829 ± 0.0353	5.5687 ± 3.1082	0.5399 ± 0.0732	3.3627 ± 0.9095	0.0000 ± 0.0000	0.0000 ± 0.0000	22.8188 ± 7.3306	9.5542 ± 3.2396	9.4120	3.8526 ± 8.0145
Hayden VOR	9/24/95	12	0.9686 ± 0.1701	3.4116 ± 3.3509	0.0253 ± 0.0117	1.9937 ± 0.1528	2.3268 ± 0.2360	0.2142 ± 0.1047	18.2028 ± 6.1475	8.9402 ± 3.3686	9.4120	-0.1494 ± 7.0099
Hayden VOR	9/27/95	6	2.2064 ± 0.4073	12.5074 ± 12.4477	1.0656 ± 0.5065	2.6417 ± 0.1974	2.1878 ± 0.6124	0.5099 ± 0.3324	22.1667 ± 7.6513	21.1188 ± 12.4857	9.4120	-8.3641 ± 14.6436
Hayden VOR	9/27/95	12	2.5217 ± 0.4447	13.0838 ± 12.8053	0.1475 ± 0.0715	11.4766 ± 0.8887	2.9509 ± 0.4403	0.6640 ± 0.2998	26.3518 ± 9.0414	30.8445 ± 12.8550	9.4120	-13.9047 ± 15.7162
Hayden VOR	9/30/95	6	0.1429 ± 0.1223	7.0293 ± 10.7615	0.1138 ± 0.0556	0.0000 ± 0.0000	1.6260 ± 1.1993	1.8137 ± 0.9786	1033.1205 ± 648.1220	10.7257 ± 10.8731	9.4120	1012.9828 ± 648.2132
Hayden VOR	9/30/95	12	0.8479 ± 0.1659	5.5448 ± 5.7925	0.5932 ± 0.2840	1.7622 ± 0.1213	4.0572 ± 0.5140	0.5192 ± 0.2375	29.0950 ± 9.6716	13.3245 ± 5.8307	9.4120	6.3585 ± 11.2932
Hayden VOR	10/1/95	6	3.6732 ± 0.4681	8.2529 ± 8.5759	1.8804 ± 0.4323	0.0000 ± 0.0000	9.4596 ± 1.1757	0.7011 ± 0.3180	50.4707 ± 19.6928	23.9672 ± 8.6854	9.4120	17.0915 ± 21.5231
Hayden VOR	10/1/95	12	1.7025 ± 0.2335	2.7694 ± 2.7385	0.1831 ± 0.0872	1.4086 ± 0.1070	0.8723 ± 0.1733	0.3013 ± 0.1111	14.6667 ± 5.8798	7.2372 ± 2.7596	9.4120	-1.9825 ± 6.4952
Hayden VOR	10/2/95	6	2.2470 ± 0.3977	10.5356 ± 10.7032	0.3796 ± 0.1811	2.2669 ± 0.1634	1.4804 ± 0.4332	1.2346 ± 0.3496	18.3109 ± 6.3681	18.1441 ± 10.7278	9.4120	-9.2452 ± 12.4755
Hayden VOR	10/2/95	12	1.5923 ± 0.2503	8.9767 ± 8.8295	0.0416 ± 0.0196	0.0000 ± 0.0000	0.8834 ± 0.2645	0.4573 ± 0.2221	11.6667 ± 4.2566	11.9513 ± 8.8398	9.4120	-9.6966 ± 9.8113
Hayden VOR	10/7/95	6	5.6721 ± 0.5619	5.9879 ± 6.0127	0.6365 ± 0.3033	0.0000 ± 0.0000	1.0900 ± 0.3536	0.2752 ± 0.1877	19.0000 ± 7.3508	13.6617 ± 6.0597	9.4120	-4.0737 ± 9.5265
Hayden VOR	10/7/95	12	3.1970 ± 0.5202	6.6240 ± 6.4876	0.1998 ± 0.0945	1.6287 ± 0.1256	1.5972 ± 0.2550	0.2599 ± 0.1628	18.3646 ± 6.3204	13.5066 ± 6.5173	9.4120	-4.5540 ± 9.0787
Hayden VOR	10/8/95	6	6.2282 ± 0.8929	4.0518 ± 4.1382	0.1213 ± 0.0578	11.3195 ± 0.8062	2.7528 ± 0.3290	1.6885 ± 0.2442	37.6441 ± 11.8687	26.1621 ± 4.3293	9.4120	2.0700 ± 12.6336
Hayden VOR	10/8/95	12	2.7411 ± 0.4241	2.8411 ± 2.7826	0.1971 ± 0.0935	5.7211 ± 0.4422	1.3091 ± 0.1852	0.3445 ± 0.1015	20.5768 ± 6.5078	13.1540 ± 2.8586	9.4120	-1.9892 ± 7.1080
Hayden VOR	10/9/95	6	4.2045 ± 0.6734	5.7158 ± 5.6657	1.6130 ± 0.7661	3.6689 ± 0.2761	0.0000 ± 0.0000	0.3353 ± 0.1691	22.1172 ± 6.5158	15.5375 ± 5.7659	9.4120	-2.8323 ± 8.7006
Hayden VOR	10/9/95	12	5.1080 ± 0.8648	17.1213 ± 16.7447	0.0530 ± 0.0253	4.1289 ± 0.3201	1.1048 ± 0.4376	0.5500 ± 0.3785	20.2615 ± 6.4939	28.0660 ± 16.7801	9.4120	-17.2165 ± 17.9928
Hayden VOR	10/10/95	6	4.0433 ± 0.5381	6.0979 ± 6.0239	0.3086 ± 0.1465	3.9881 ± 0.3026	0.8914 ± 0.2501	0.7875 ± 0.1843	21.1537 ± 7.1468	16.1168 ± 6.0652	9.4120	-4.3751 ± 9.3735
Hayden VOR	10/10/95	12	4.2833 ± 0.5720	6.5647 ± 6.4274	0.5694 ± 0.2697	2.9595 ± 0.2292	0.3285 ± 0.2992	0.4239 ± 0.1672	20.1598 ± 6.8380	15.1293 ± 6.4716	9.4120	-4.3815 ± 9.4149
Hayden VOR	10/11/95	6	3.7121 ± 0.5066	7.8843 ± 7.7967	0.1616 ± 0.0766	2.6578 ± 0.2015	0.6527 ± 0.2546	0.2245 ± 0.2053	19.9286 ± 6.5095	15.2930 ± 7.8230	9.4120	-4.7764 ± 10.1771
Hayden VOR	10/11/95	12	3.3512 ± 0.4719	9.8124 ± 9.5626	0.0856 ± 0.0405	1.3193 ± 0.1033	0.9420 ± 0.2642	0.5585 ± 0.2219	16.0111 ± 5.5501	16.0690 ± 9.5811	9.4120	-9.4699 ± 11.0725
Hayden VOR	10/12/95	6	4.5741 ± 0.6385	12.3282 ± 12.1391	0.1750 ± 0.0833	2.4543 ± 0.1876	4.2532 ± 0.6046	0.4443 ± 0.3064	32.8315 ± 10.2955	24.2291 ± 12.1765	9.4120	-0.8096 ± 15.9457
Hayden VOR	10/12/95	12	6.7357 ± 0.8893	10.6644 ± 10.8010	0.0690 ± 0.0331	4.8421 ± 0.3506	4.6779 ± 0.5745	0.4720 ± 0.3301	31.1538 ± 10.2931	27.4611 ± 10.8635	9.4120	-5.7193 ± 14.9654
Hayden VOR	10/13/95	6	2.3851 ± 0.3257	4.1007 ± 4.1223	0.0988 ± 0.0466	1.3386 ± 0.0983	0.7746 ± 0.1944	0.3180 ± 0.1471	13.8333 ± 5.2239	9.0158 ± 4.1438	9.4120	-4.5945 ± 6.6678
Hayden VOR	10/13/95	12	2.5424 ± 0.3599	6.9426 ± 6.8004	0.1691 ± 0.0801	0.0945 ± 0.0076	0.5225 ± 0.2139	0.2916 ± 0.1696	12.3333 ± 4.5920	10.5627 ± 6.8159	9.4120	-7.6414 ± 8.2185
Hayden VOR	10/14/95	6	2.2259 ± 0.3210	4.3829 ± 4.3162	0.9573 ± 0.4541	3.3691 ± 0.2577	0.0000 ± 0.0000	0.1826 ± 0.1261	15.8939 ± 5.6877	11.1178 ± 4.3613	9.4120	-4.6359 ± 7.1673
Hayden VOR	10/14/95	12	1.3197 ± 0.2005	2.6037 ± 2.5506	0.6827 ± 0.3235	0.3666 ± 0.0288	0.0000 ± 0.0000	0.1827 ± 0.0887	13.0000 ± 4.7650	5.1554 ± 2.5805	9.4120	-1.5674 ± 5.4189
Juniper Mountain	2/23/95	12	1.2339 ± 0.2648	6.6472 ± 6.6889	0.1458 ± 0.0697	0.0000 ± 0.0000	1.5761 ± 0.2769	1.0092 ± 0.2291	14.3333 ± 1.7436	10.6122 ± 6.7041	9.1820	-5.4609 ± 6.9271
Juniper Mountain	3/27/95	6	0.4877 ± 0.1217	3.3229 ± 3.3765	0.0495 ± 0.0235	0.0000 ± 0.0000	4.8459 ± 0.5576	0.1190 ± 0.1137	-99.0000 ± -99.0000	8.8250 ± 3.4264	9.1820	-99.0000 ± -99.0000
Juniper Mountain	3/28/95	6	0.5282 ± 0.1098	2.7264 ± 2.8001	0.0292 ± 0.0142	0.4054 ± 0.0285	5.1351 ± 0.5864	0.3145 ± 0.1100	-99.0000 ± -99.0000	9.1388 ± 2.8652	9.1820	-99.0000 ± -99.0000
Juniper Mountain	3/29/95	6	1.4654 ± 0.2135	2.0655 ± 2.3138	0.0750 ± 0.0358	1.4700 ± 0.0910	7.3730 ± 0.8395	0.5799 ± 0.1493	-99.0000 ± -99.0000	13.0288 ± 2.4771	9.1820	-99.0000 ± -99.0000
Juniper Mountain	5/7/95	6	9.6248 ± 1.1524	9.1426 ± 9.7303	0.1274 ± 0.0610	4.3429 ± 0.2891	5.3940 ± 0.7409	0.8565 ± 0.3726	-99.0000 ± -99.0000	29.4882 ± 9.8378	9.1820	-99.0000 ± -99.0000
Juniper Mountain	6/14/95	6	1.6240 ± 0.2176	2.2261 ± 2.1730	0.0485 ± 0.0230	7.0105 ± 0.5458	4.0064 ± 0.4640	0.1357 ± 0.0611	40.4629 ± 0.8231	15.0512 ± 2.2993	9.1820	16.2297 ± 2.4422
Juniper Mountain	6/15/95	6	2.9810 ± 0.5174	11.7123 ± 11.5735	0.0249 ± 0.0120	6.2983 ± 0.4780	3.7203 ± 0.5359	0.3989 ± 0.2927	38.3438 ± 0.8041	25.1357 ± 11.6110	9.1820	4.0261 ± 11.6388
Juniper Mountain	6/16/95	6	0.1111 ± 0.0846	3.0073 ± 2.9555	0.0312 ± 0.0147	0.1532 ± 0.0115	0.3155 ± 0.0959	0.0364 ± 0.0792	28.3438 ± 0.6897	3.6547 ± 2.9594	9.1820	15.5071 ± 3.0387
Juniper Mountain	6/29/95	6	2.5845 ± 0.4721	11.0144 ± 11.4907	0.0220 ± 0.0106	0.8350 ± 0.0577	1.7781 ± 0.4997	0.2834 ± 0.3999	23.8901 ± 0.9886	16.5174 ± 11.5183	9.1820	-1.8093 ± 11.5606
Juniper Mountain	8/7/95	6	1.4565 ± 0.3105	7.6068 ± 7.4467	0.0663 ± 0.0316	8.6116 ± 0.6664	2.7520 ± 0.3756	0.2798 ± 0.1872	30.3792 ± 1.4359	20.7730 ± 7.4947	9.1820	0.4242 ± 7.6310
Juniper Mountain	8/7/95	12	0.8756 ± 0.2311	6.4040 ± 6.2546	0.0263 ± 0.0124	5.0738 ± 0.3946	2.3410 ± 0.3157	0.2582 ± 0.1580	25.3366 ± 1.3880	14.9789 ± 6.2812	9.1820	1.1757 ± 6.4327
Juniper Mountain	8/8/95	6	2.4765 ± 0.4647	11.0628 ± 10.8916	0.0581 ± 0.0279	5.8107 ± 0.4443	4.0947 ± 0.5569	0.3488 ± 0.2755	33.6312 ± 1.4119	23.8516 ± 10.9283	9.1820	0.5976 ± 11.0191
Juniper Mountain	8/8/95	12	2.8792 ± 0.5318	13.8258 ± 13.5464	0.0314 ± 0.0147	5.5782 ± 0.4308	2.7238 ± 0.4790	0.3863 ± 0.3230	28.8653 ± 1.4006	25.4247 ± 13.5760	9.1820	-5.7414 ± 13.6481
Juniper Mountain	8/9/95	6	1.8156 ± 0.3485	5.7879 ± 5.6604	0.2747 ± 0.1301	2.1199 ± 0.1648	0.5496 ± 0.2213	0.3734 ± 0.1523	20.2660 ± 1.3937	10.9211 ± 5.6814	9.1820	0.1629 ± 5.8498
Juniper Mountain	8/9/95	12	2.2429 ± 0.4206	8.7731 ± 8.5759	0.0291 ± 0.0135	4.1037 ± 0.3182	1.5792 ± 0.2938	0.3707 ± 0.2099	22.7931 ± 1.4173	17.0987 ± 8.5997	9.1820	-3.4876 ± 8.7157

Table D.2 (cont.)

Individual Source Contribution to Light Extinction at the Six Sites between 02/16/95 and 10/29/95 during the Mt. Zirkel Visibility Study

Site	Date	Start Hour[a]	Primary Geological SCE ± σ (Mm^{-1})	Primary Motor Vehicle SCE ± σ (Mm^{-1})	Coal-Fired Generating Station SCE ± σ (Mm^{-1})	Vegetative Burning SCE ± σ (Mm^{-1})	Secondary Ammonium Sulfate SCE ± σ (Mm^{-1})	Secondary Ammonium Nitrate SCE ± σ (Mm^{-1})	Measured Extinction ± σ (Mm^{-1})	Calculated[b] Extinction ± σ (Mm^{-1})	Rayleigh Coefficient	Unexplained[c] Extinction ± σ (Mm^{-1})
Juniper Mountain	8/21/95	6	0.7416 ± 0.2817	8.3569 ± 8.5439	0.0084 ± 0.0042	0.4643 ± 0.0333	4.3942 ± 0.5924	0.3530 ± 0.3013	24.8000 ± 1.7487	14.3184 ± 8.5744	9.1820	1.2996 ± 8.7509
Juniper Mountain	8/21/95	12	1.7913 ± 0.3476	11.7377 ± 11.7290	0.0175 ± 0.0088	1.4241 ± 0.1057	4.0431 ± 0.5849	0.3269 ± 0.3232	30.4273 ± 0.9169	19.3406 ± 11.7536	9.1820	1.9047 ± 11.7893
Juniper Mountain	8/22/95	6	0.3499 ± 0.1969	4.3250 ± 4.4518	0.0000 ± 0.0000	1.0423 ± 0.0730	4.4105 ± 0.5298	0.3556 ± 0.1849	26.7398 ± 1.3708	10.4833 ± 4.4919	9.1820	7.0745 ± 4.6964
Juniper Mountain	8/23/95	6	1.1681 ± 0.3185	13.0634 ± 13.6838	0.0194 ± 0.0095	0.6716 ± 0.0459	5.4167 ± 0.8246	0.3753 ± 0.4903	31.4862 ± 1.3805	20.7145 ± 13.7212	9.1820	1.5897 ± 13.7905
Juniper Mountain	8/24/95	6	0.3892 ± 0.2049	4.7316 ± 4.9086	0.0220 ± 0.0106	0.1226 ± 0.0088	4.4207 ± 0.5400	0.1355 ± 0.2013	24.9795 ± 1.3776	9.8216 ± 4.9466	9.1820	5.9759 ± 5.1348
Juniper Mountain	8/24/95	12	0.3107 ± 0.1849	4.5094 ± 4.5438	0.0067 ± 0.0034	0.7136 ± 0.0525	2.4664 ± 0.3262	0.1165 ± 0.1626	18.5000 ± 1.3789	8.1233 ± 4.5624	9.1820	1.1947 ± 4.7662
Juniper Mountain	8/25/95	6	0.6344 ± 0.1885	9.4891 ± 9.5836	0.0124 ± 0.0059	0.6194 ± 0.0449	2.6572 ± 0.4407	0.2097 ± 0.2843	22.2201 ± 0.9234	13.6222 ± 9.5999	9.1820	-0.5841 ± 9.6442
Juniper Mountain	8/26/95	6	0.4328 ± 0.1662	4.8265 ± 4.8015	0.0159 ± 0.0078	1.3178 ± 0.0987	2.8790 ± 0.3628	0.2805 ± 0.1543	20.9613 ± 1.4187	9.7525 ± 4.8215	9.1820	2.0268 ± 5.0259
Juniper Mountain	9/2/95	6	1.4489 ± 0.3824	19.7661 ± 19.6161	0.0149 ± 0.0073	0.0000 ± 0.0000	5.1127 ± 1.1204	0.5209 ± 0.5128	28.9542 ± 1.4089	26.8635 ± 19.6585	9.1820	-7.0913 ± 19.7089
Juniper Mountain	9/2/95	12	0.6576 ± 0.2074	7.5303 ± 7.3930	0.1345 ± 0.0638	1.9276 ± 0.1479	3.7988 ± 0.5557	0.3057 ± 0.1911	23.6554 ± 1.3817	14.3545 ± 7.4210	9.1820	0.1189 ± 7.5485
Juniper Mountain	9/24/95	6	0.4896 ± 0.1945	5.4339 ± 5.7391	0.0305 ± 0.0148	1.8802 ± 0.1263	4.6741 ± 0.5877	0.4972 ± 0.2503	27.7581 ± 1.3868	13.0055 ± 5.7792	9.1820	5.5706 ± 5.9433
Juniper Mountain	9/24/95	12	0.2633 ± 0.1522	3.9590 ± 3.9032	0.0177 ± 0.0087	1.7554 ± 0.1338	2.5372 ± 0.3128	0.1964 ± 0.1241	19.3333 ± 1.3961	8.7290 ± 3.9229	9.1820	1.4223 ± 4.1639
Juniper Mountain	9/27/95	6	1.3084 ± 0.2936	16.0912 ± 15.9638	0.0636 ± 0.0306	2.2393 ± 0.1681	2.9414 ± 0.5324	0.2562 ± 0.4050	22.4247 ± 1.3868	22.9001 ± 15.9814	9.1820	-9.6574 ± 16.0415
Juniper Mountain	9/27/95	12	1.9041 ± 0.4204	21.3453 ± 20.9413	0.0814 ± 0.0396	2.5828 ± 0.1987	2.7360 ± 0.5990	0.4169 ± 0.4807	27.2018 ± 1.4327	29.0665 ± 20.9606	9.1820	-11.0467 ± 21.0095
Juniper Mountain	10/7/95	6	1.7104 ± 0.2884	6.7609 ± 6.6746	0.0952 ± 0.0451	0.5831 ± 0.0443	1.2856 ± 0.2324	0.1434 ± 0.1773	13.6667 ± 1.4482	10.5786 ± 6.6875	9.1820	-6.0939 ± 6.8425
Juniper Mountain	10/8/95	6	0.6325 ± 0.1931	5.3427 ± 5.4766	0.0475 ± 0.0225	10.1432 ± 0.7182	2.0403 ± 0.2887	0.6416 ± 0.2094	32.9707 ± 1.4467	18.8478 ± 5.5384	9.1820	4.9409 ± 5.7242
Juniper Mountain	10/8/95	12	0.6512 ± 0.1889	6.9371 ± 6.8294	0.0215 ± 0.0104	2.6630 ± 0.2039	1.1481 ± 0.2206	0.1668 ± 0.1758	21.1070 ± 1.5029	11.5877 ± 6.8409	9.1820	0.3373 ± 7.0040
Juniper Mountain	10/9/95	6	1.3117 ± 0.2907	6.5283 ± 6.4326	0.0419 ± 0.0197	2.4636 ± 0.1876	0.9296 ± 0.2036	0.2414 ± 0.1690	19.5061 ± 1.4577	11.5165 ± 6.4474	9.1820	-1.1924 ± 6.6101
Juniper Mountain	10/9/95	12	1.2650 ± 0.2426	7.3562 ± 7.2177	0.0217 ± 0.0103	2.4852 ± 0.1911	1.0809 ± 0.2204	0.2704 ± 0.1798	22.1718 ± 1.4618	12.4794 ± 7.2299	9.1820	0.5104 ± 7.3762
Juniper Mountain	10/10/95	6	1.3170 ± 0.2589	9.5851 ± 9.4525	0.0327 ± 0.0153	3.1481 ± 0.2397	1.1081 ± 0.2810	0.2979 ± 0.2373	24.7568 ± 1.4260	15.4889 ± 9.4662	9.1820	0.0859 ± 9.5730
Juniper Mountain	10/11/95	12	0.9734 ± 0.2652	12.3668 ± 12.0791	0.0434 ± 0.0205	1.3634 ± 0.1063	3.4131 ± 0.4404	0.2107 ± 0.2734	21.1711 ± 1.4727	18.3708 ± 12.0936	9.1820	-6.3817 ± 12.1829
Juniper Mountain	10/12/95	6	2.3481 ± 0.5152	28.4043 ± 28.0885	0.1457 ± 0.0693	2.1949 ± 0.1659	2.2110 ± 0.7953	0.3201 ± 0.6832	31.8307 ± 1.4706	35.6241 ± 28.1134	9.1820	-12.9754 ± 28.1518
Juniper Mountain	10/12/95	12	0.9401 ± 0.3187	4.4415 ± 4.4181	0.0309 ± 0.0143	3.3806 ± 0.2533	0.5207 ± 0.1815	0.4397 ± 0.1800	31.7165 ± 2.3672	9.7535 ± 4.4442	9.1820	12.7810 ± 5.0353
Juniper Mountain	10/14/95	6	0.6376 ± 0.1981	2.8722 ± 2.8280	0.0425 ± 0.0201	1.2272 ± 0.0942	0.4863 ± 0.1118	0.1898 ± 0.1003	12.5000 ± 1.4111	5.4556 ± 2.8405	9.1820	-2.1376 ± 3.1717
Juniper Mountain	10/14/95	12	0.4454 ± 0.1706	0.9063 ± 0.8902	0.0221 ± 0.0107	0.2371 ± 0.0183	0.2946 ± 0.0745	0.1381 ± 0.0754	10.8333 ± 0.0000	2.0436 ± 0.9128	9.1820	-0.3923 ± 0.9128
Juniper Mountain	10/16/95	6	1.0288 ± 0.3352	12.4660 ± 12.2067	0.0658 ± 0.0312	1.7259 ± 0.1333	2.1499 ± 0.3837	0.3472 ± 0.2946	13.5000 ± 2.2297	17.7836 ± 12.2216	9.1820	-13.4656 ± 12.4233
Juniper Mountain	10/17/95	6	1.1473 ± 0.2039	2.6015 ± 2.5636	0.0631 ± 0.0300	2.9283 ± 0.2232	1.5165 ± 0.1594	0.2259 ± 0.0758	23.6430 ± 0.7287	8.4826 ± 2.5876	9.1820	5.9784 ± 2.6882
Juniper Mountain	10/18/95	6	1.0317 ± 0.1943	3.5085 ± 3.4430	0.0256 ± 0.0119	1.7515 ± 0.1345	1.4044 ± 0.1619	0.2966 ± 0.0927	21.5360 ± 0.7218	8.0183 ± 3.4562	9.1820	4.3357 ± 3.5308
Juniper Mountain	10/22/95	6	1.3537 ± 0.3324	11.2573 ± 14.5493	0.0260 ± 0.0124	2.3226 ± 0.1224	0.5818 ± 0.8659	0.5394 ± 0.7803	613.8997 ± 0.7115	16.0808 ± 14.6002	9.1820	588.6369 ± 14.6175
Juniper Mountain	10/23/95	6	0.4549 ± 0.1258	1.4881 ± 1.7097	0.0455 ± 0.0224	2.0646 ± 0.1239	5.8434 ± 0.5033	0.5239 ± 0.1412	50.5360 ± 0.7218	10.4204 ± 1.7967	9.1820	30.9336 ± 1.9363

[a] Sampling start time was either 0600 or 1200 MST.

[b] Calculated mass is the sum of the source contribution estimates.

[c] Unexplained mass = Measured mass - Rayleigh coefficient - Calculated mass.

Mt. Zirkel Wilderness Area
Reasonable Attribution Study of Visibility Impairment

Volume II: Results of Data Analysis and Modeling
Final Report

July 1, 1996

APPENDIX E

DATA PLOTS

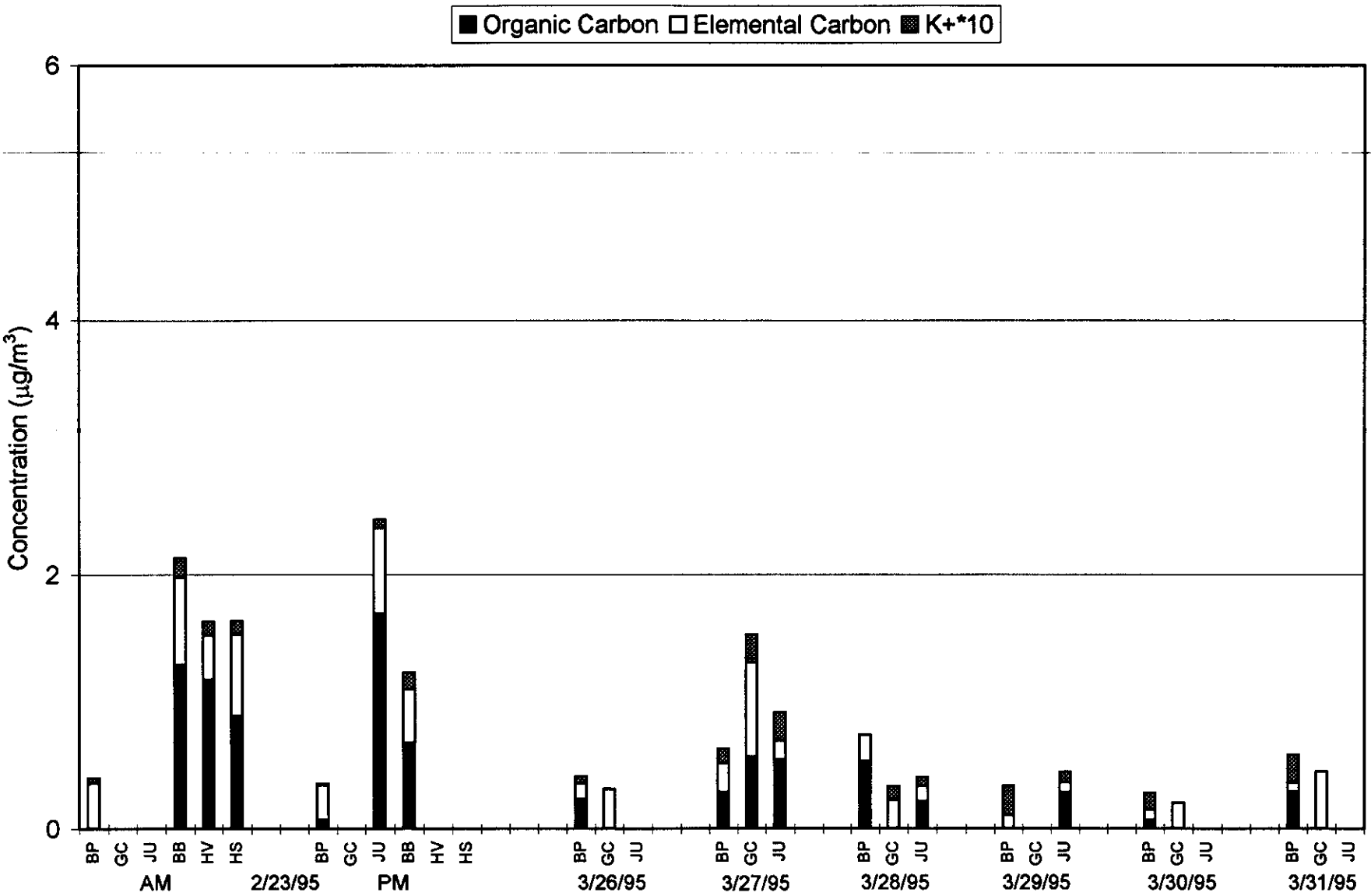


Figure E.1. Time series plots of organic carbon, elemental carbon, and soluble potassium between 2/23/95 and 10/23/95 at all six sites during the Mt. Zirkel Visibility Study.

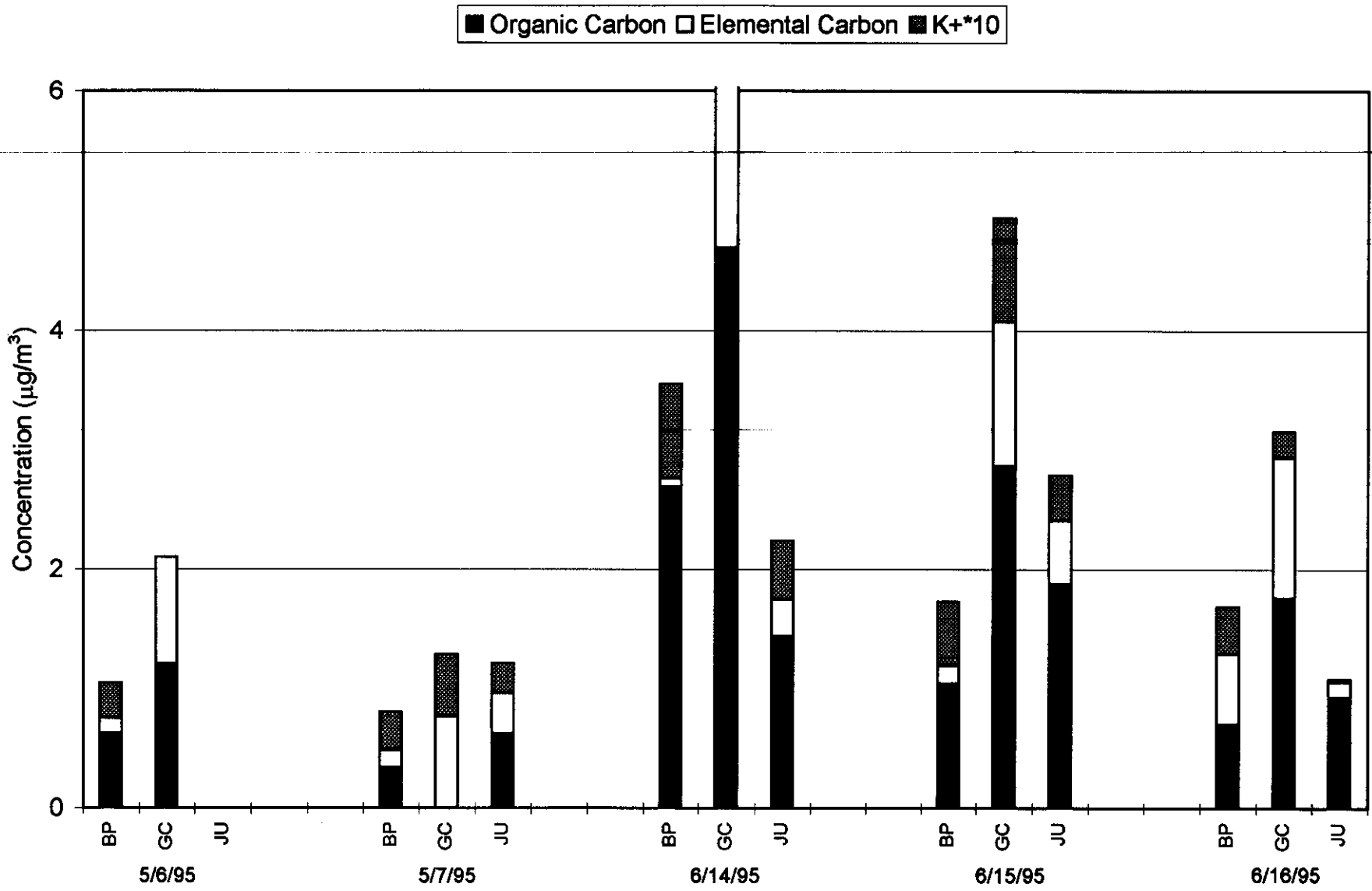


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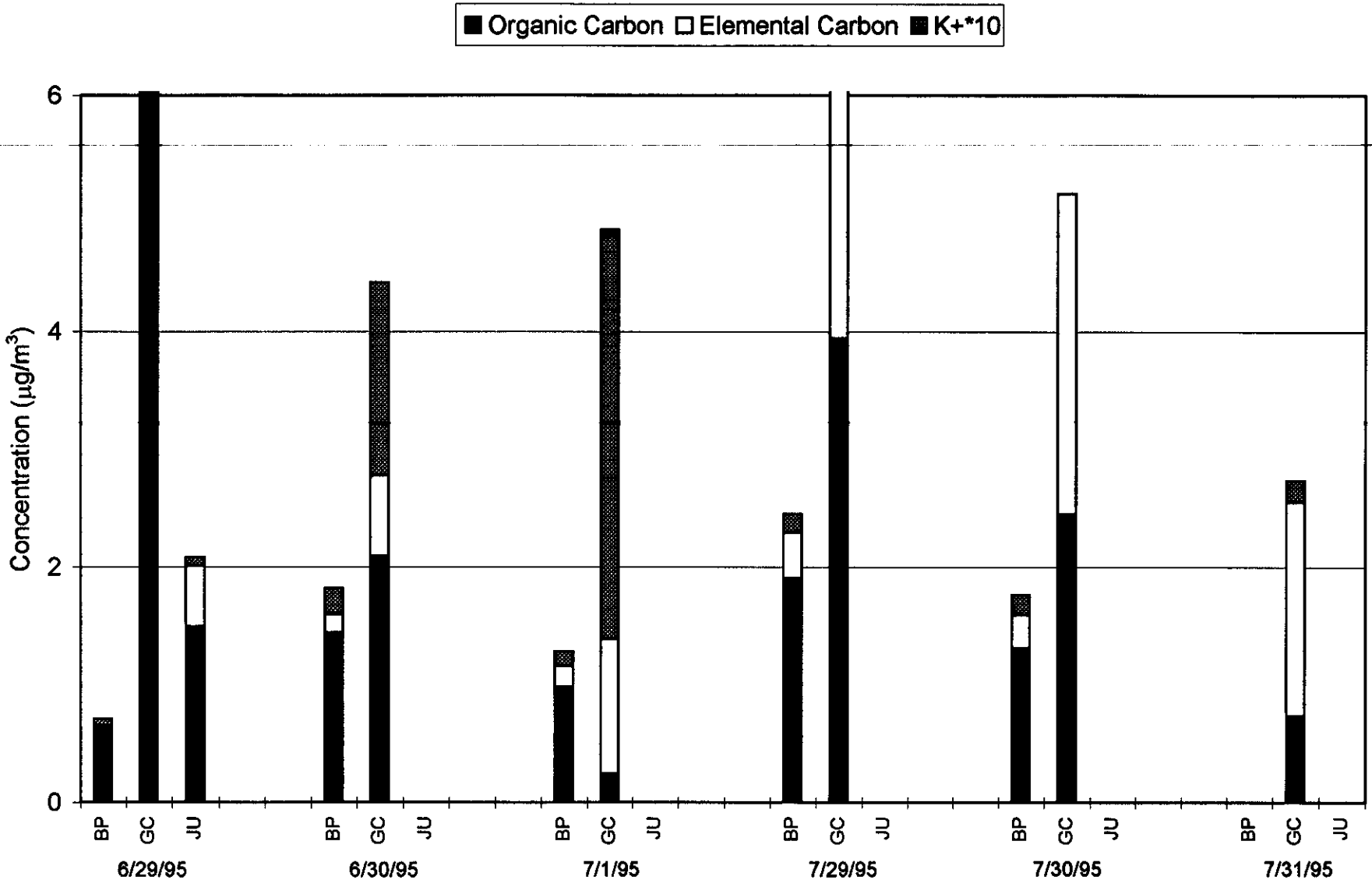


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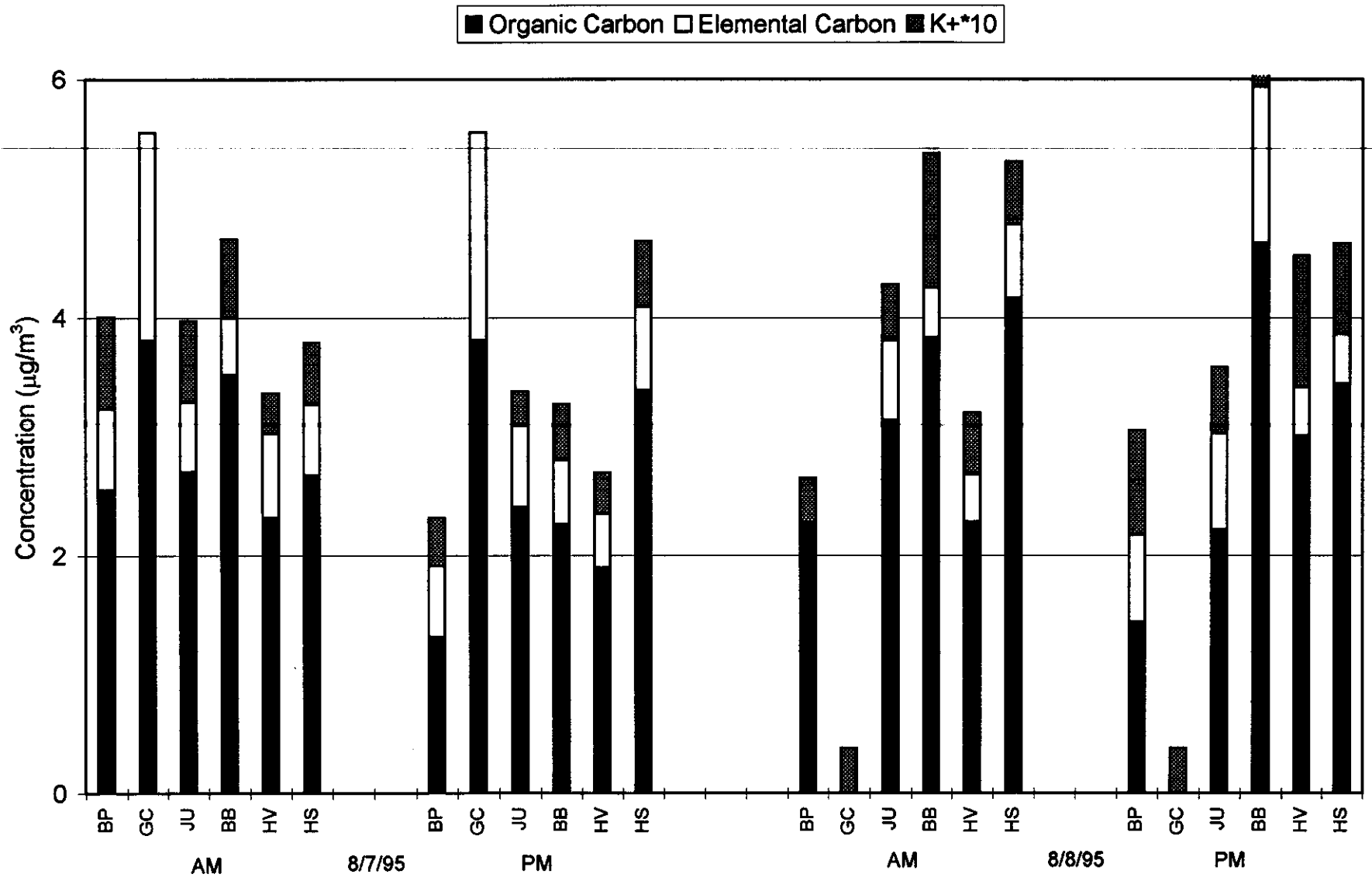


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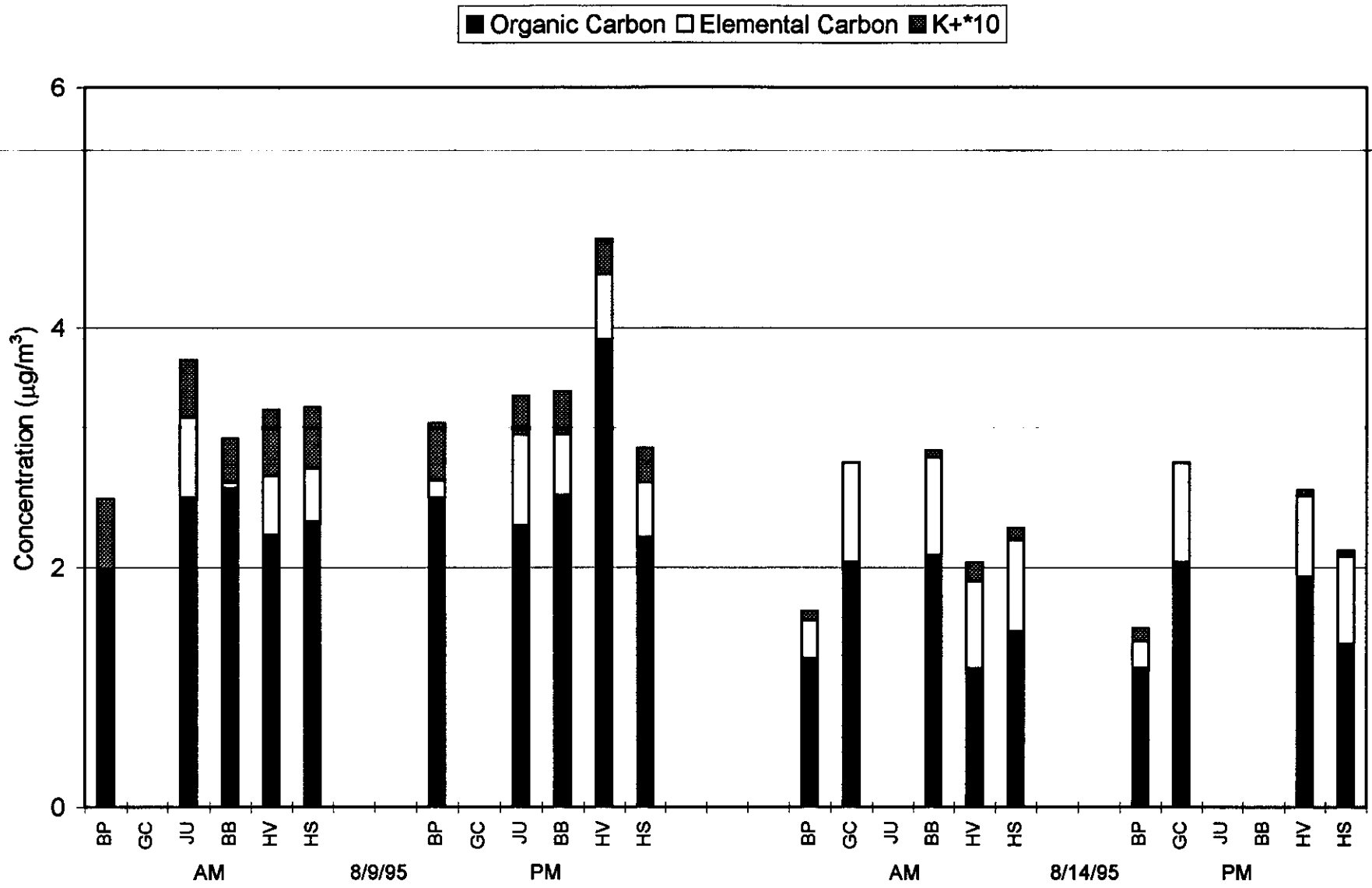


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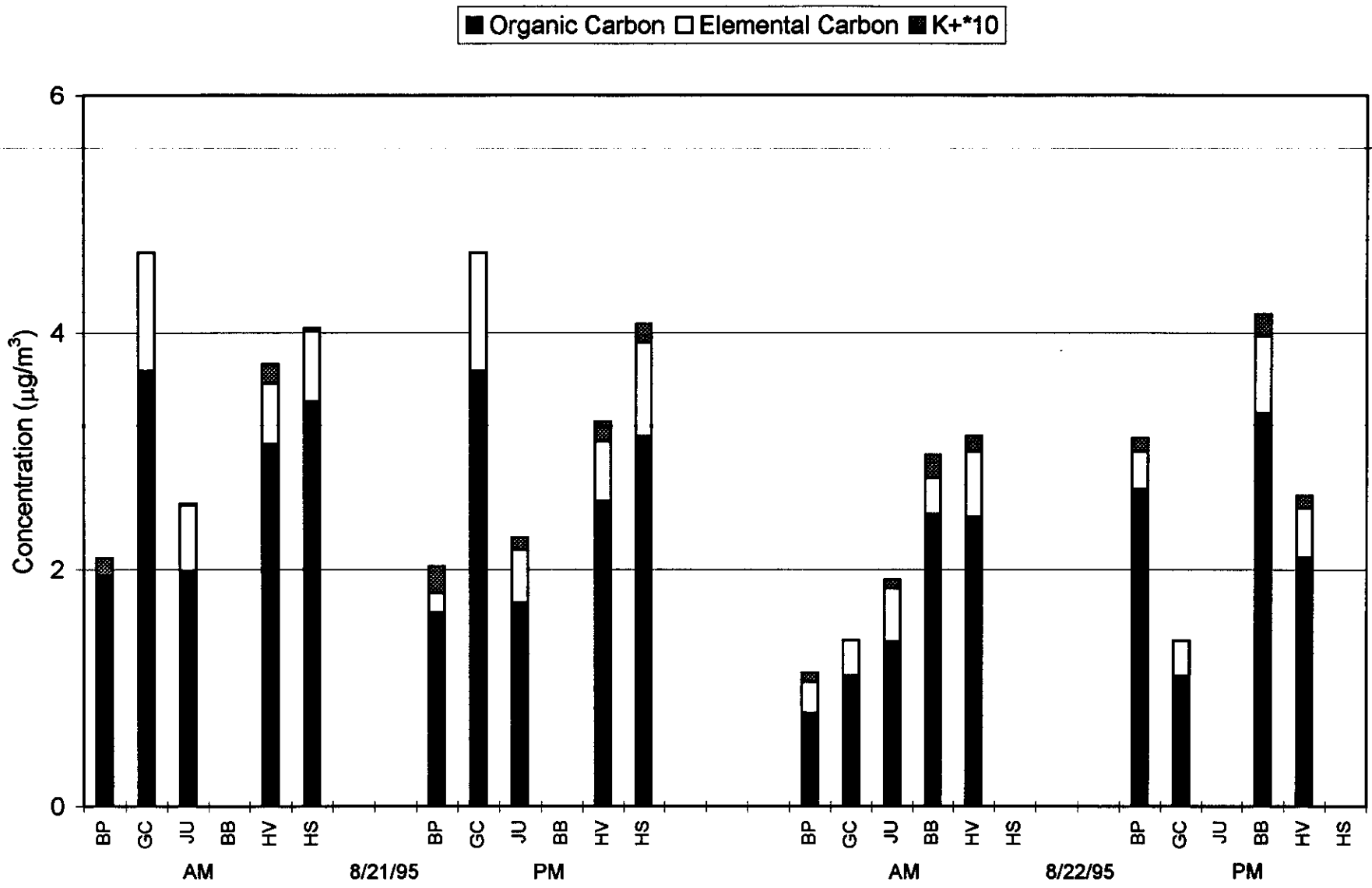


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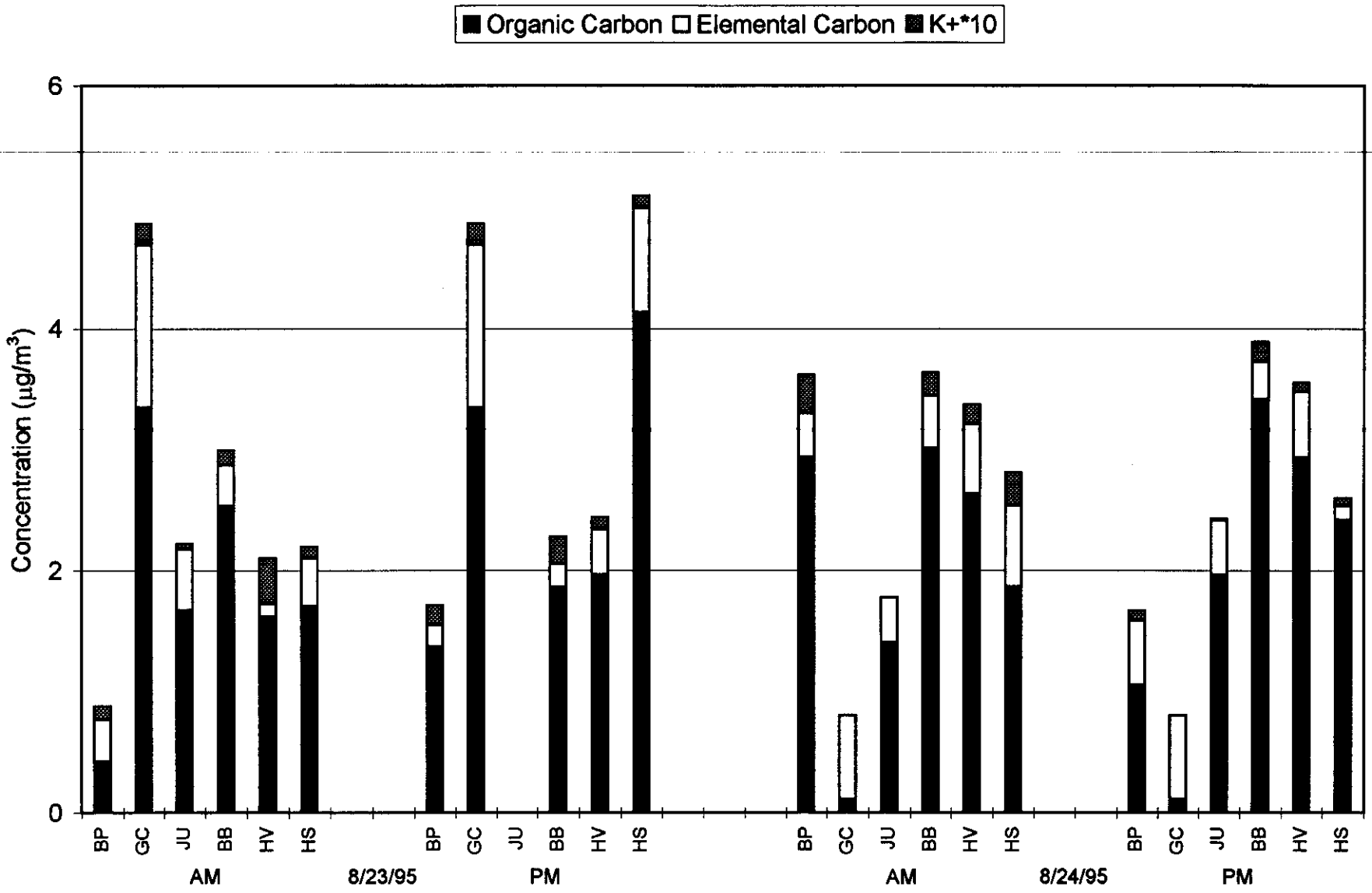


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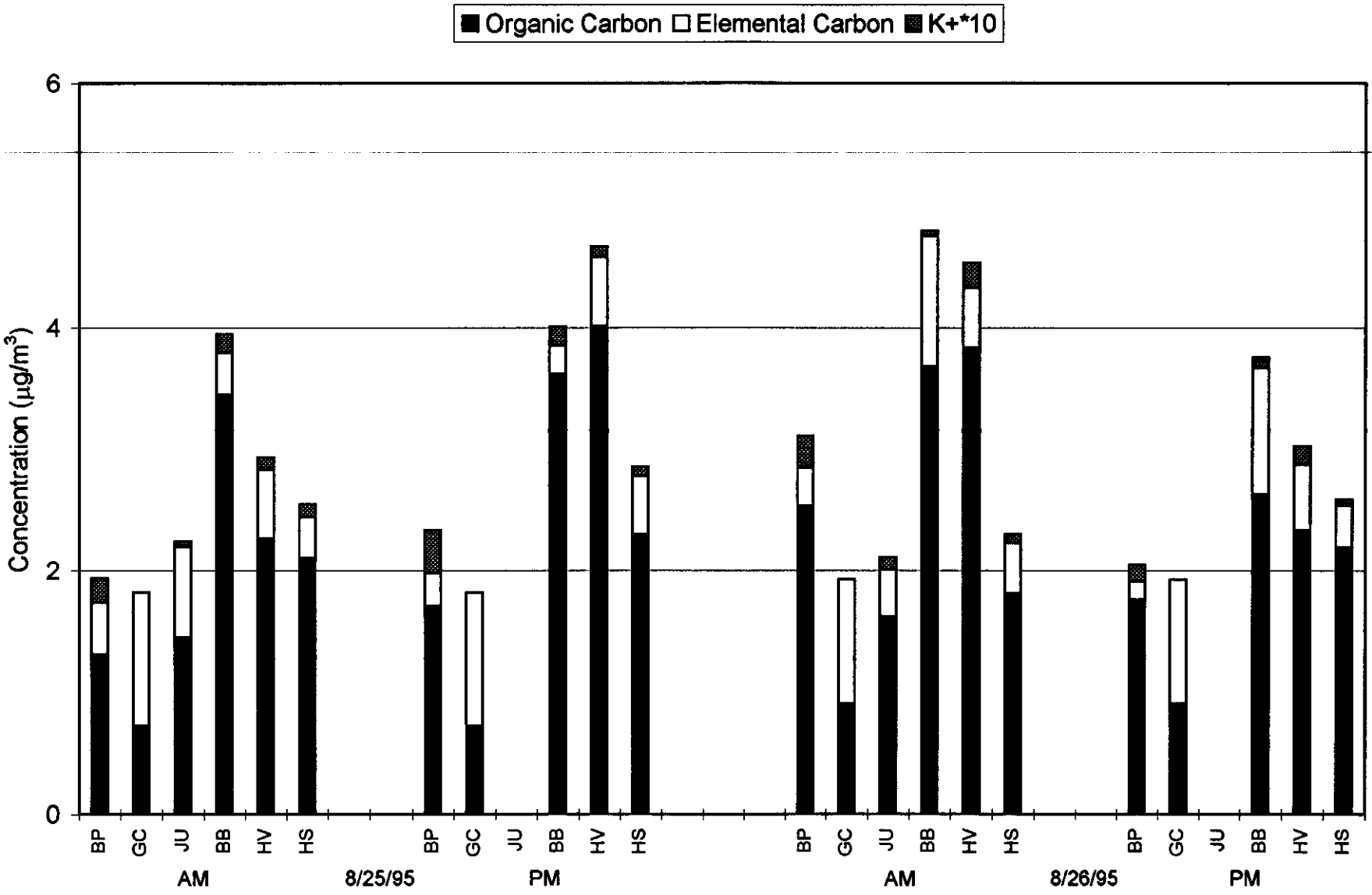


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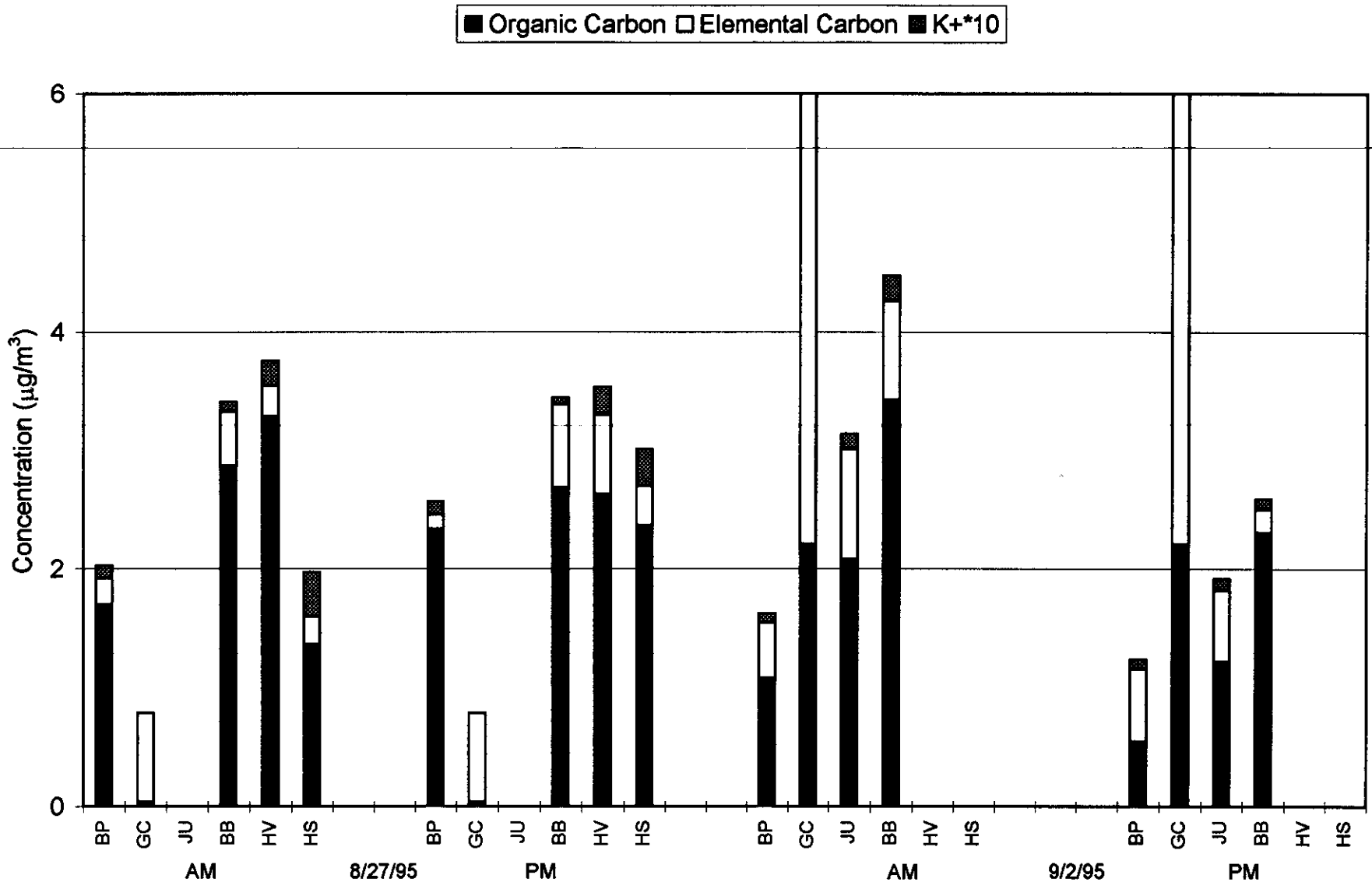


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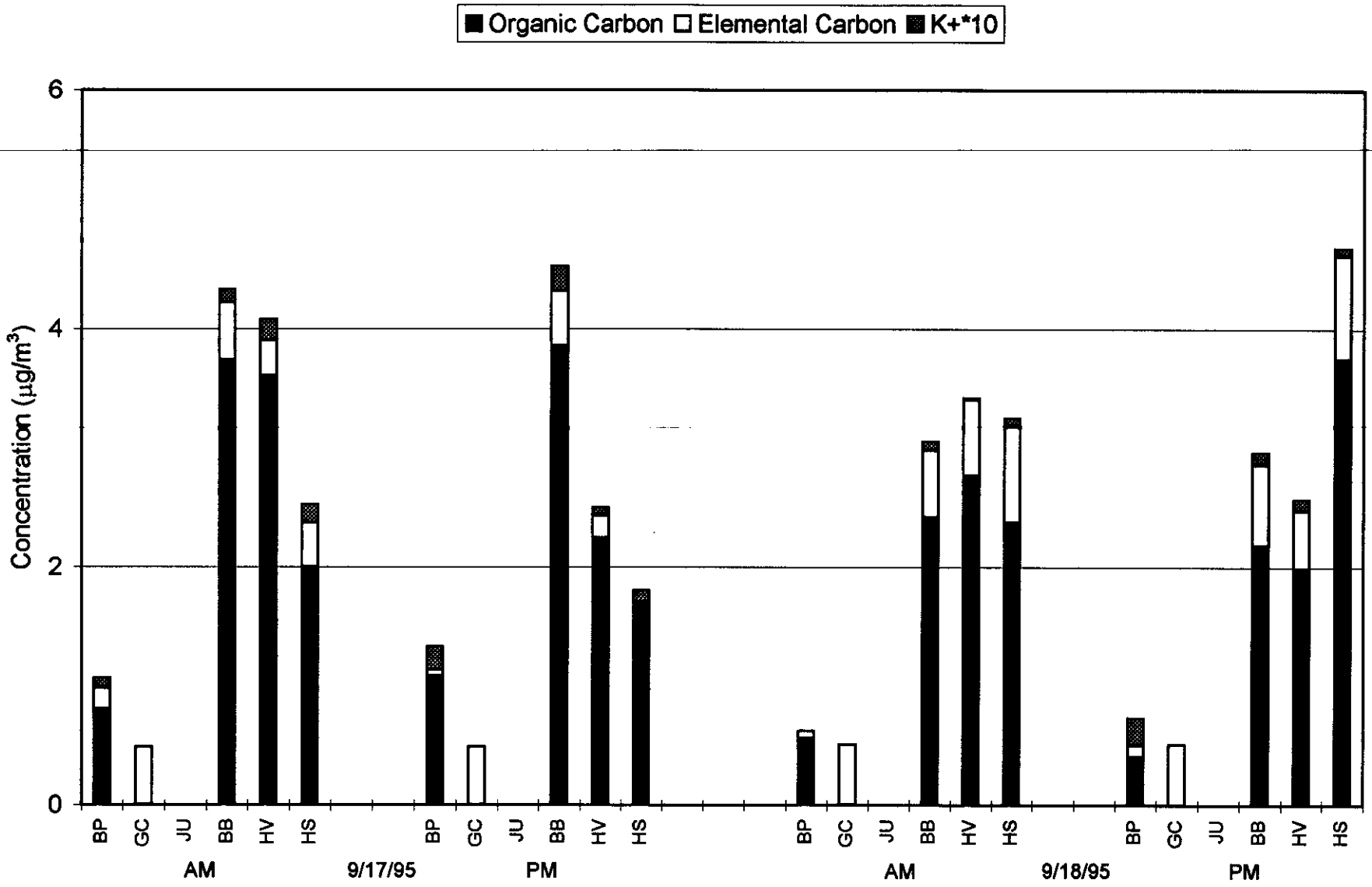


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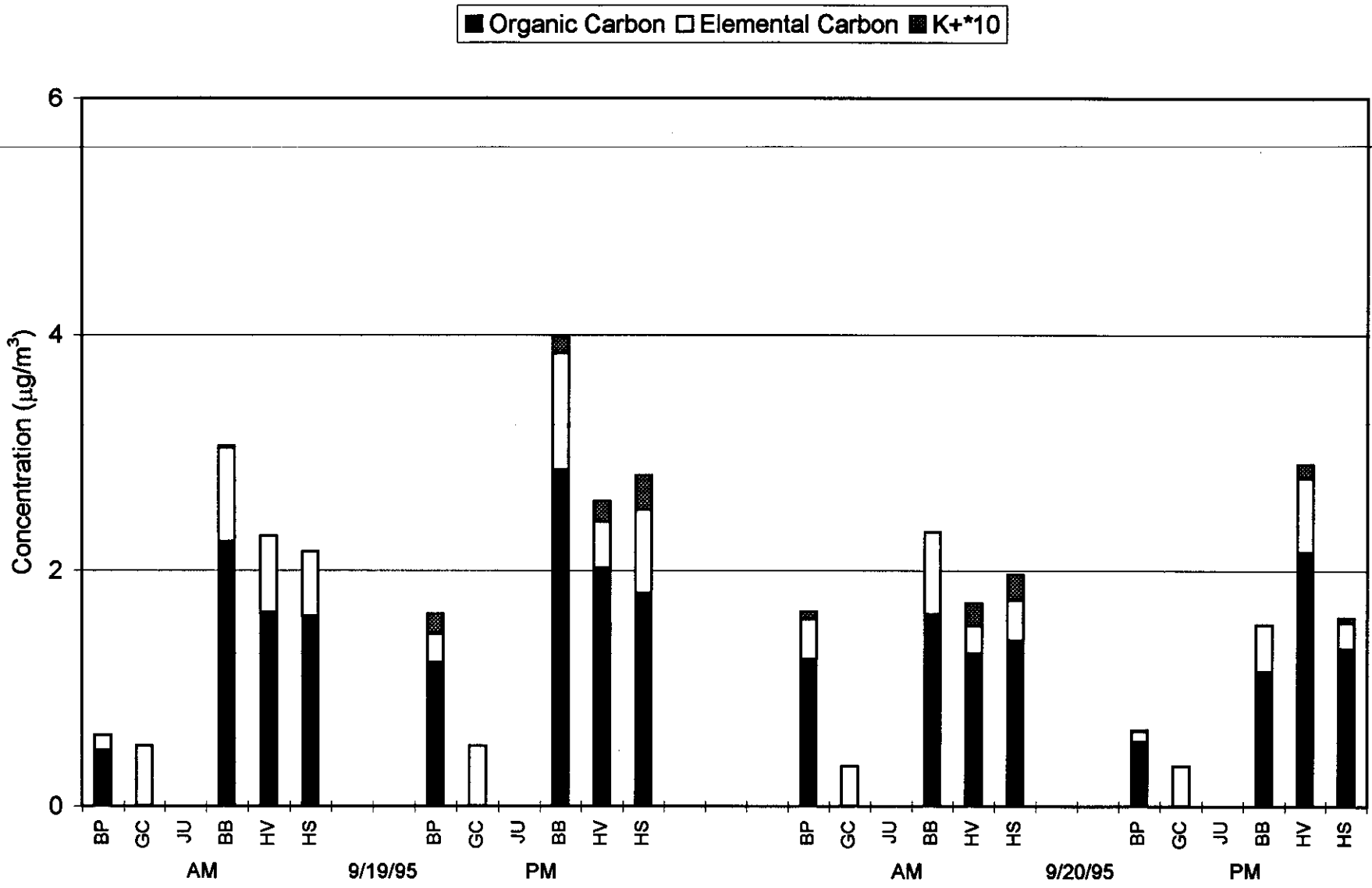


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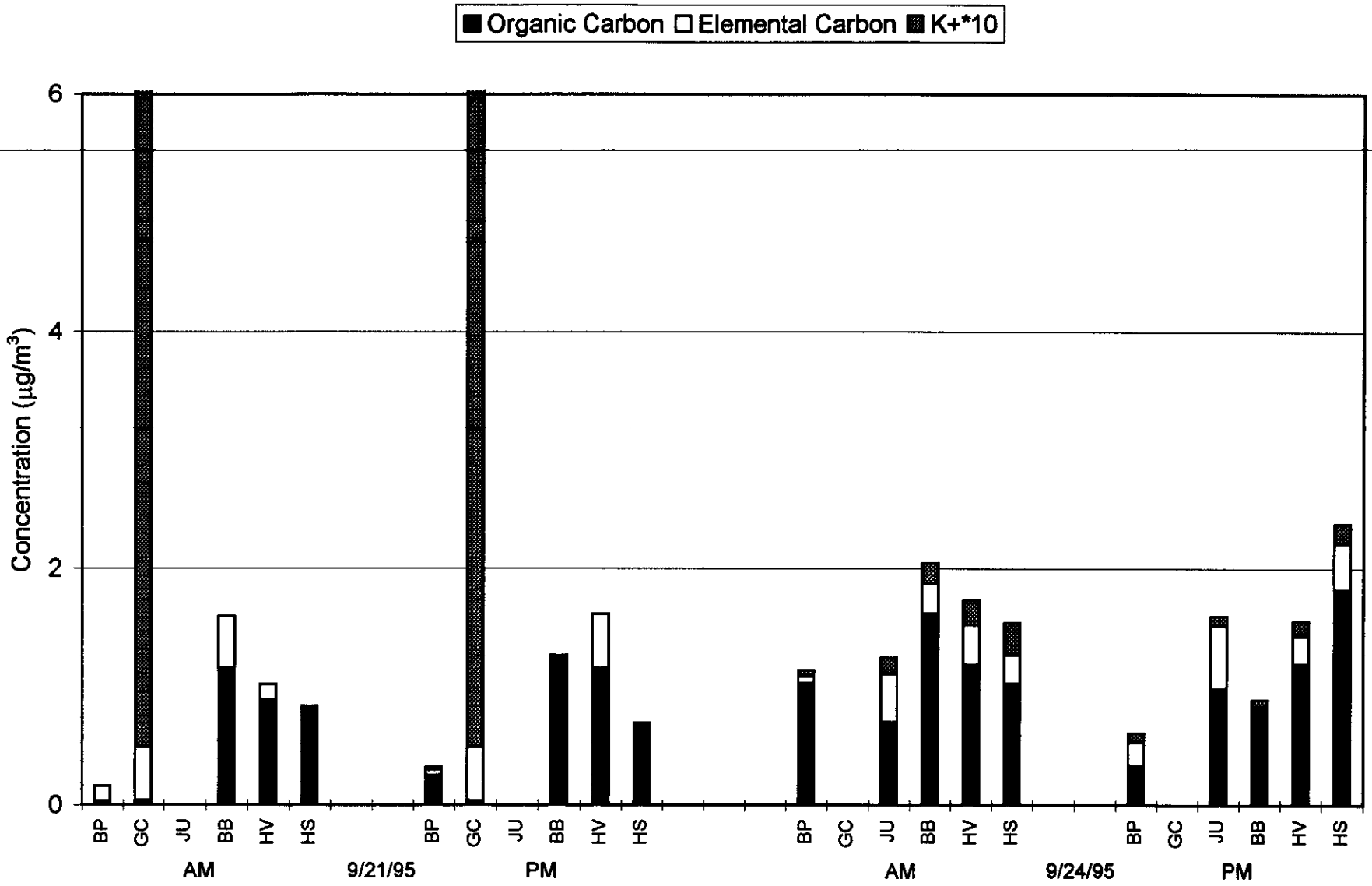


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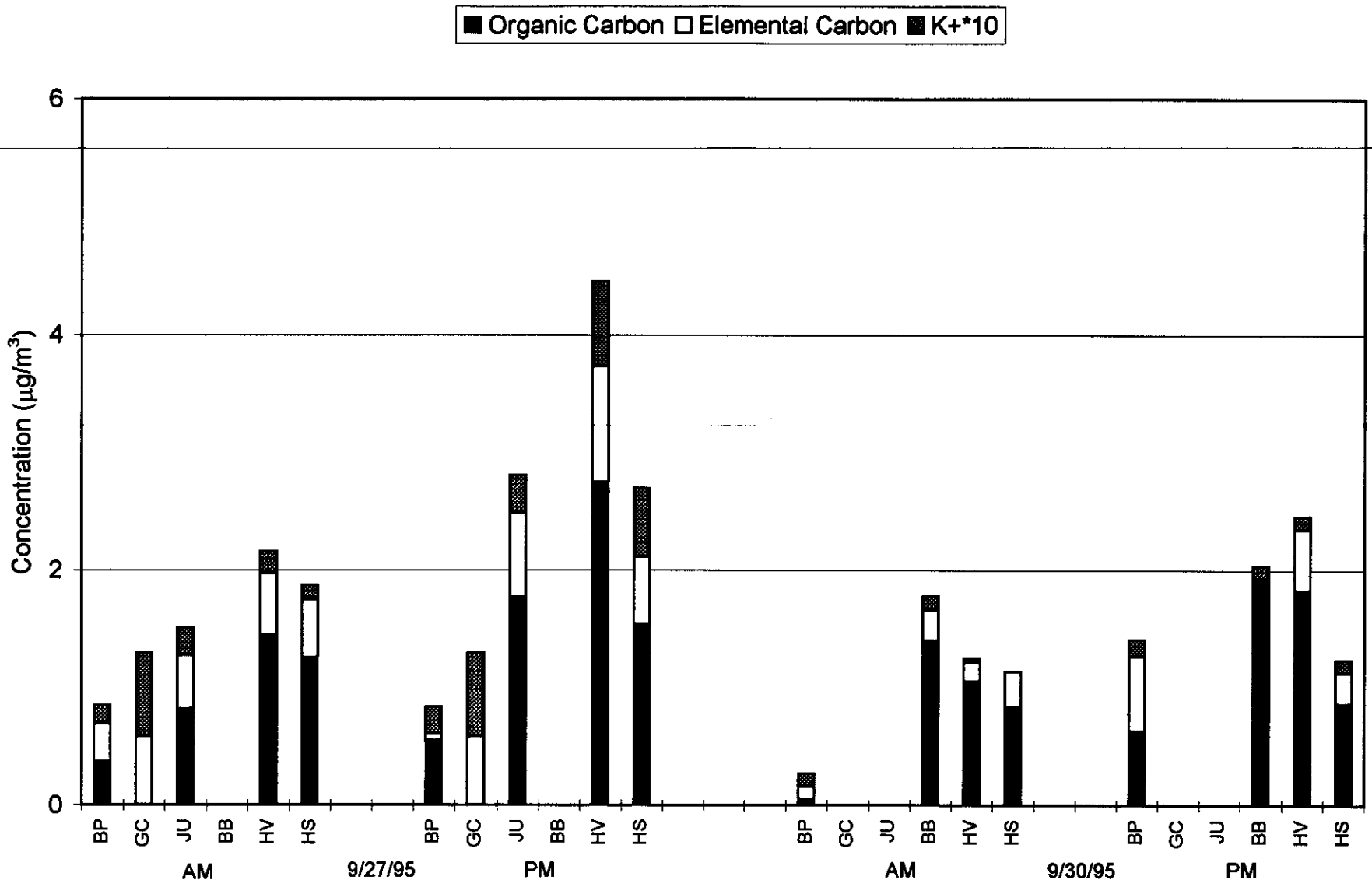


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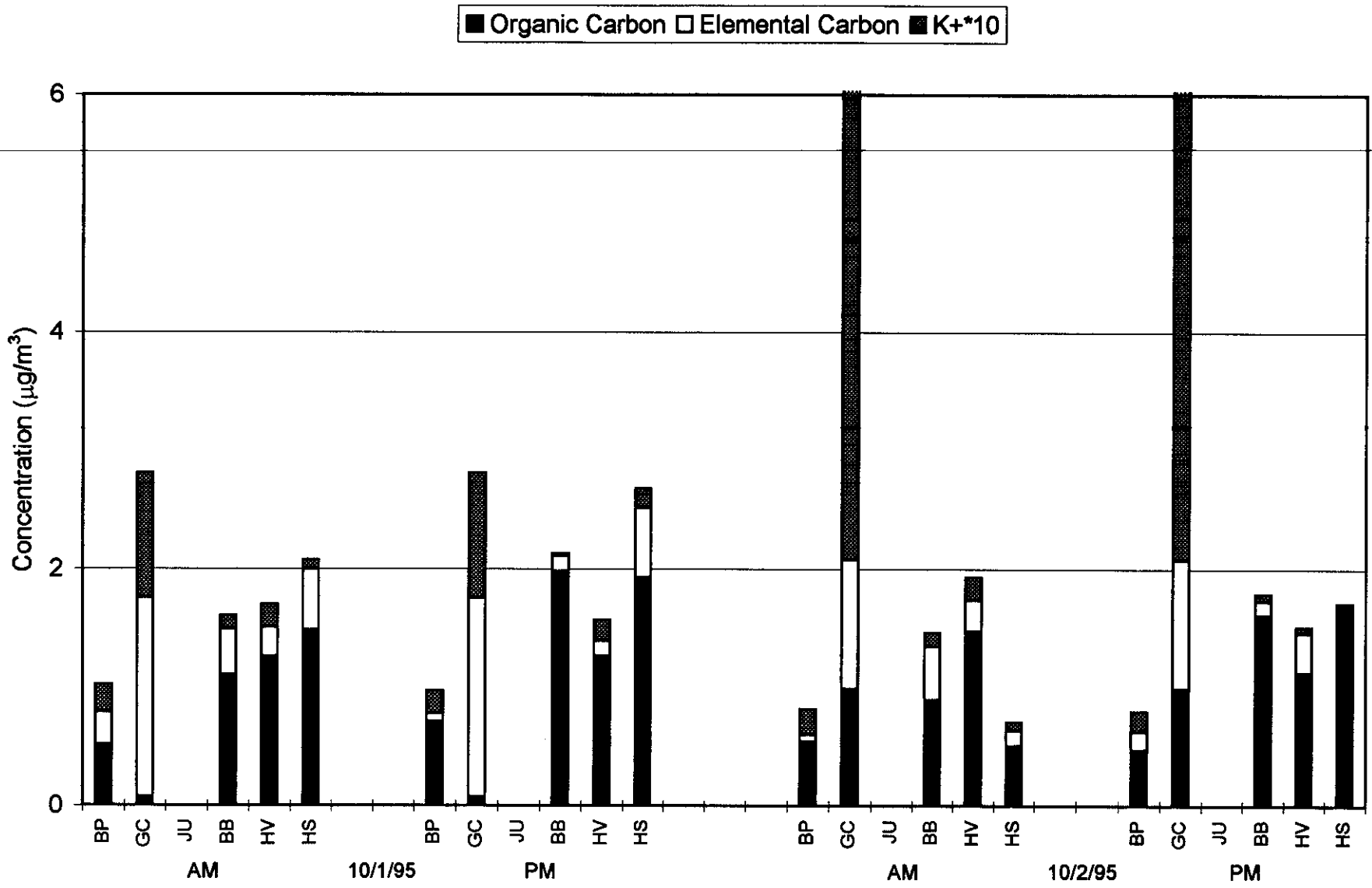


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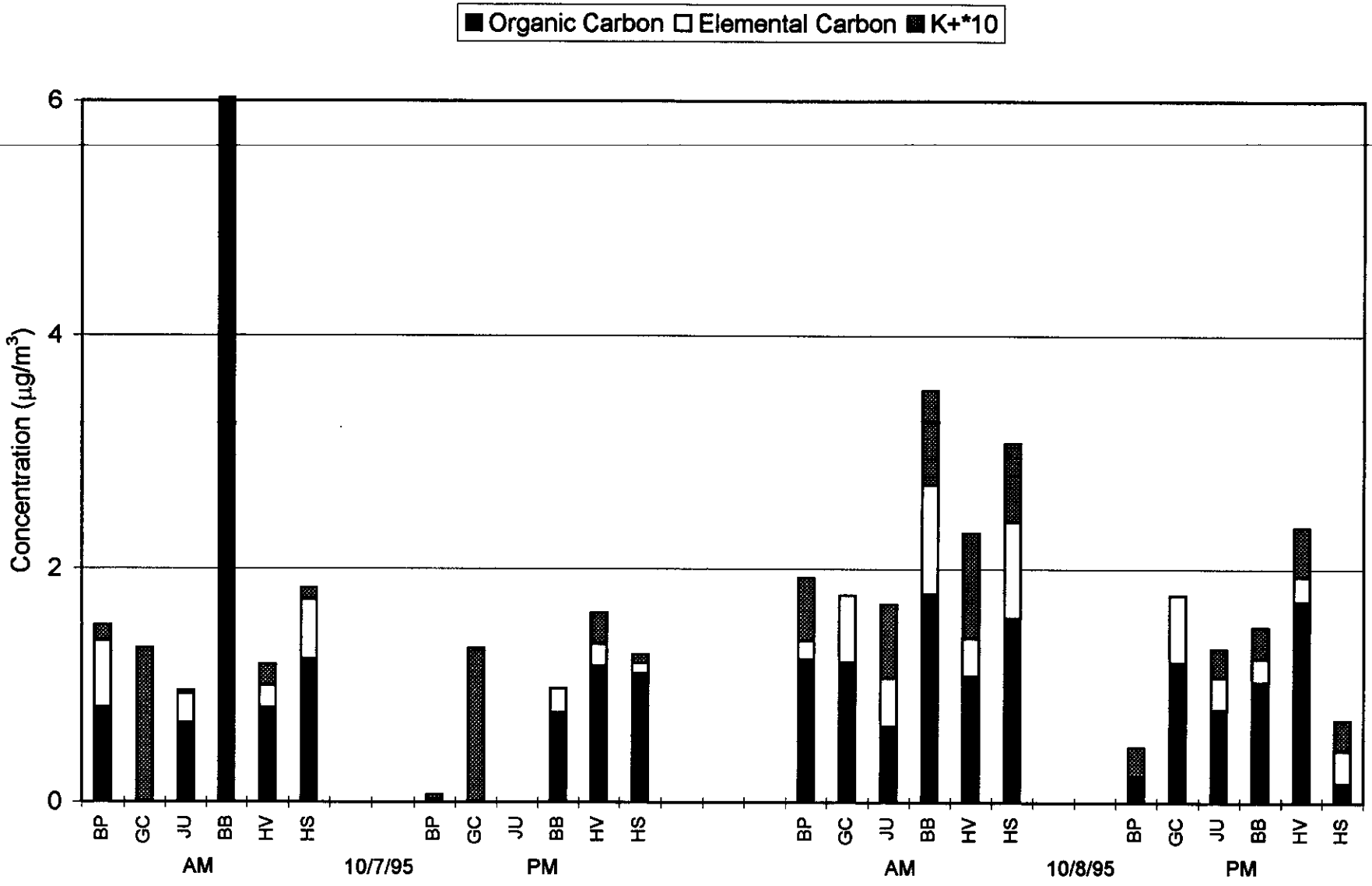


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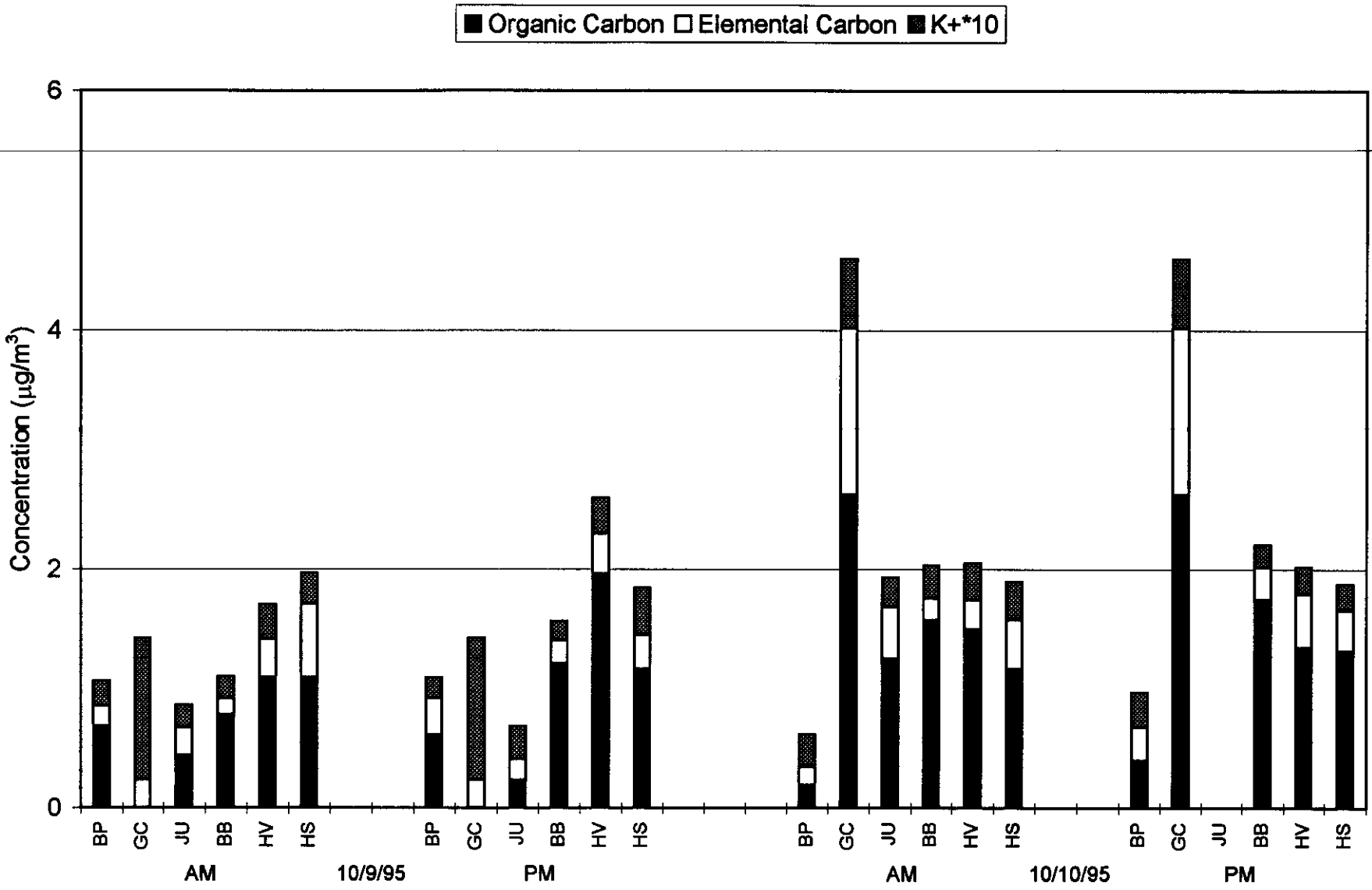


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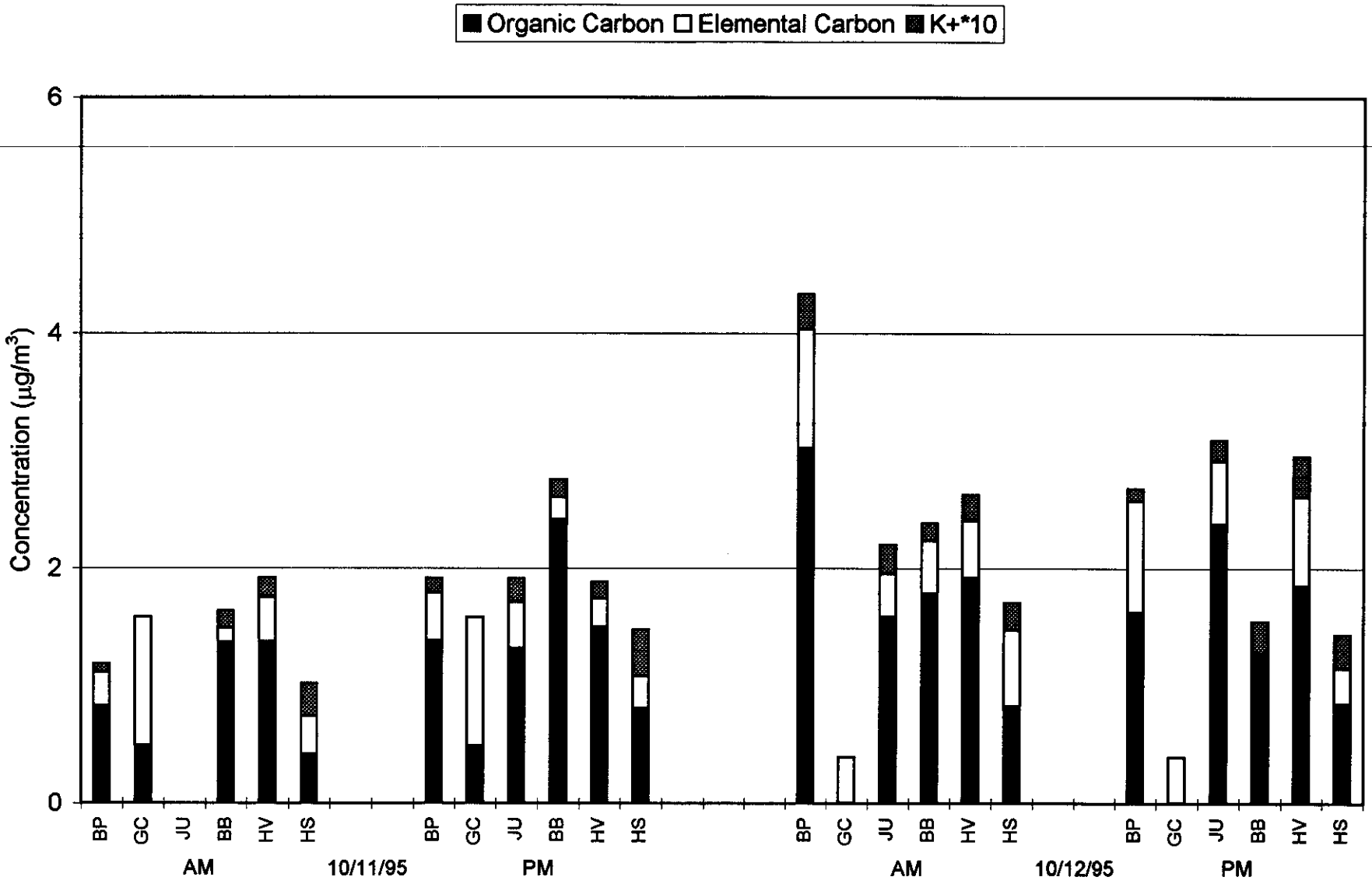


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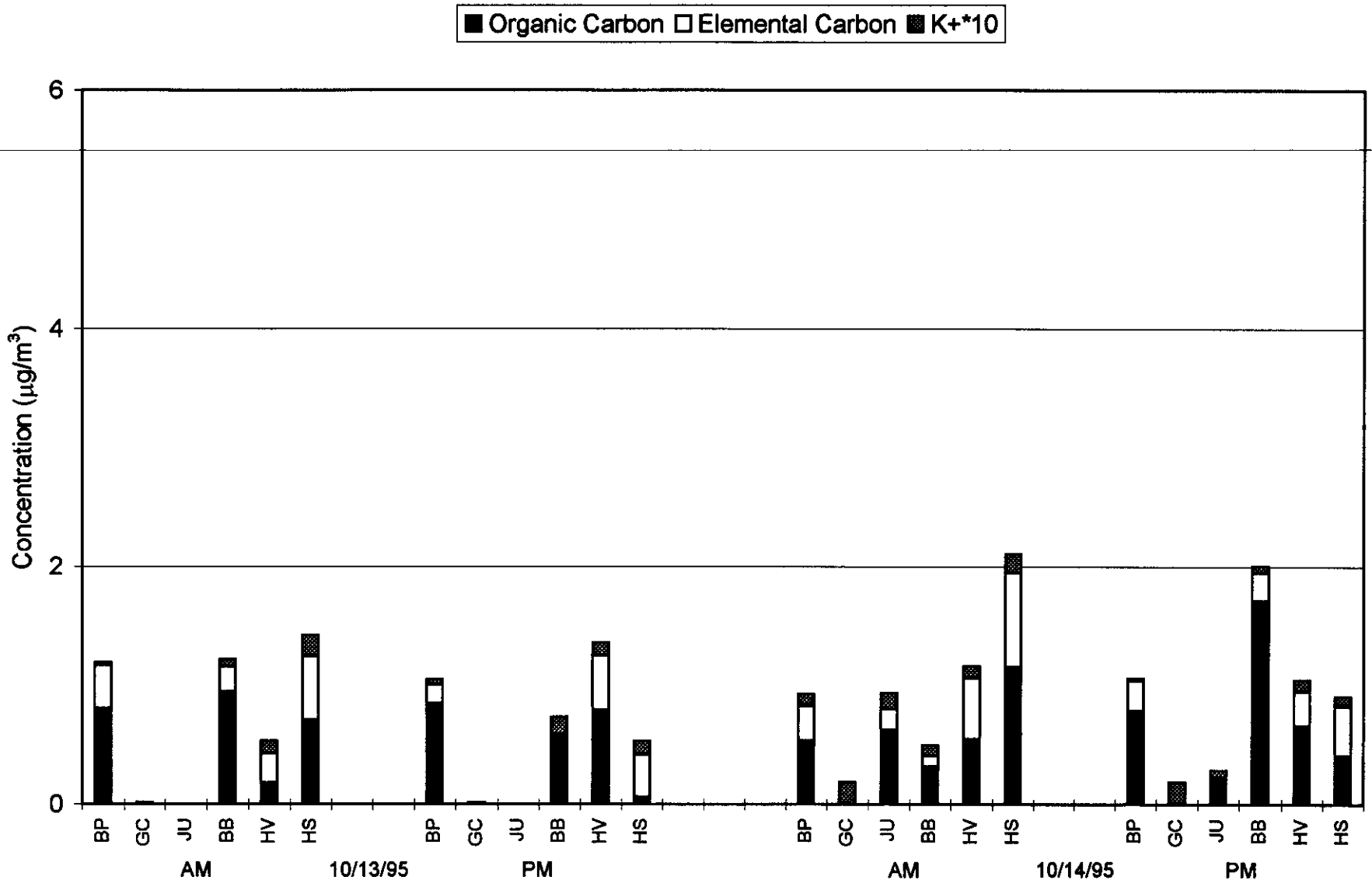


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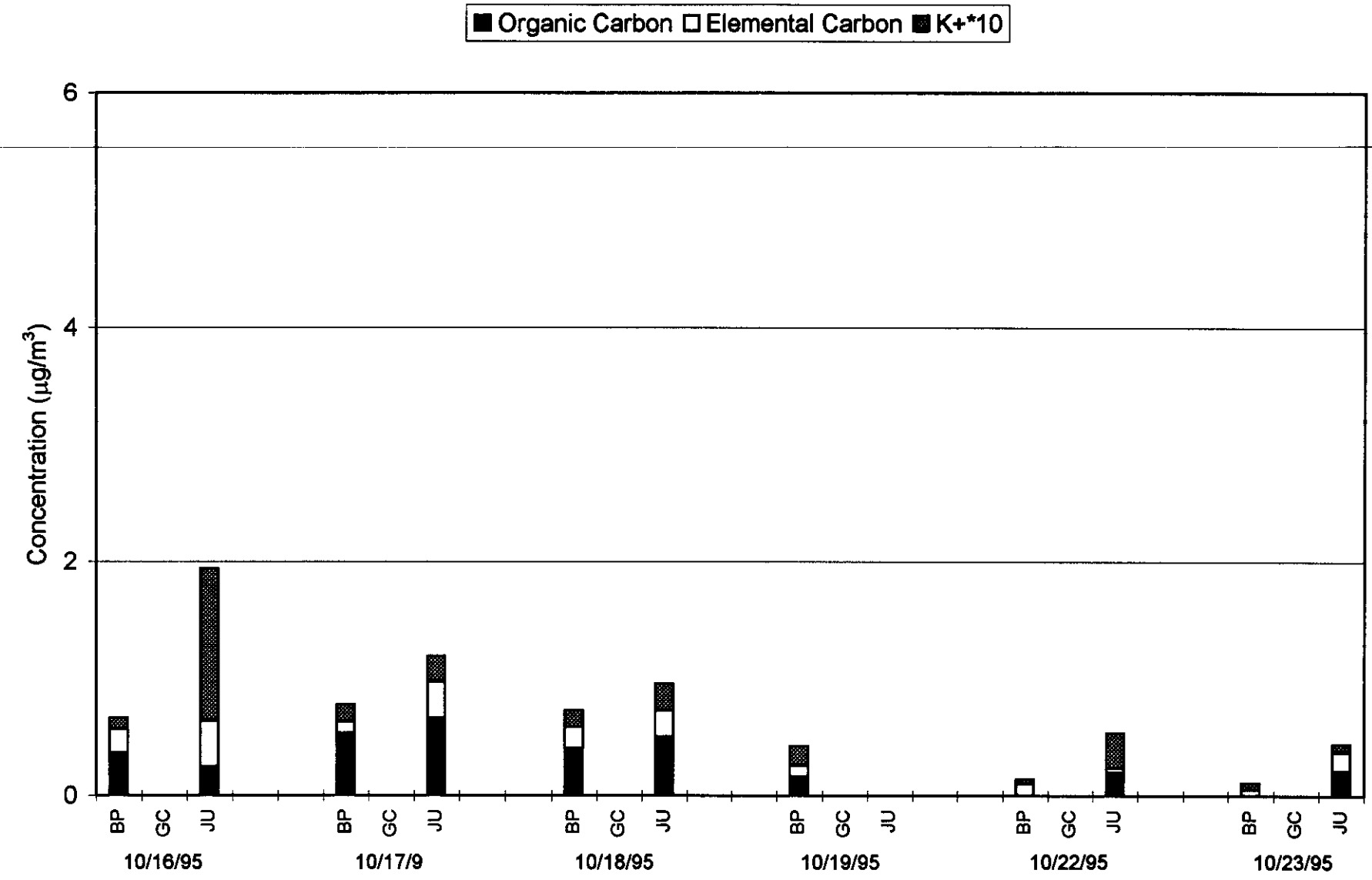


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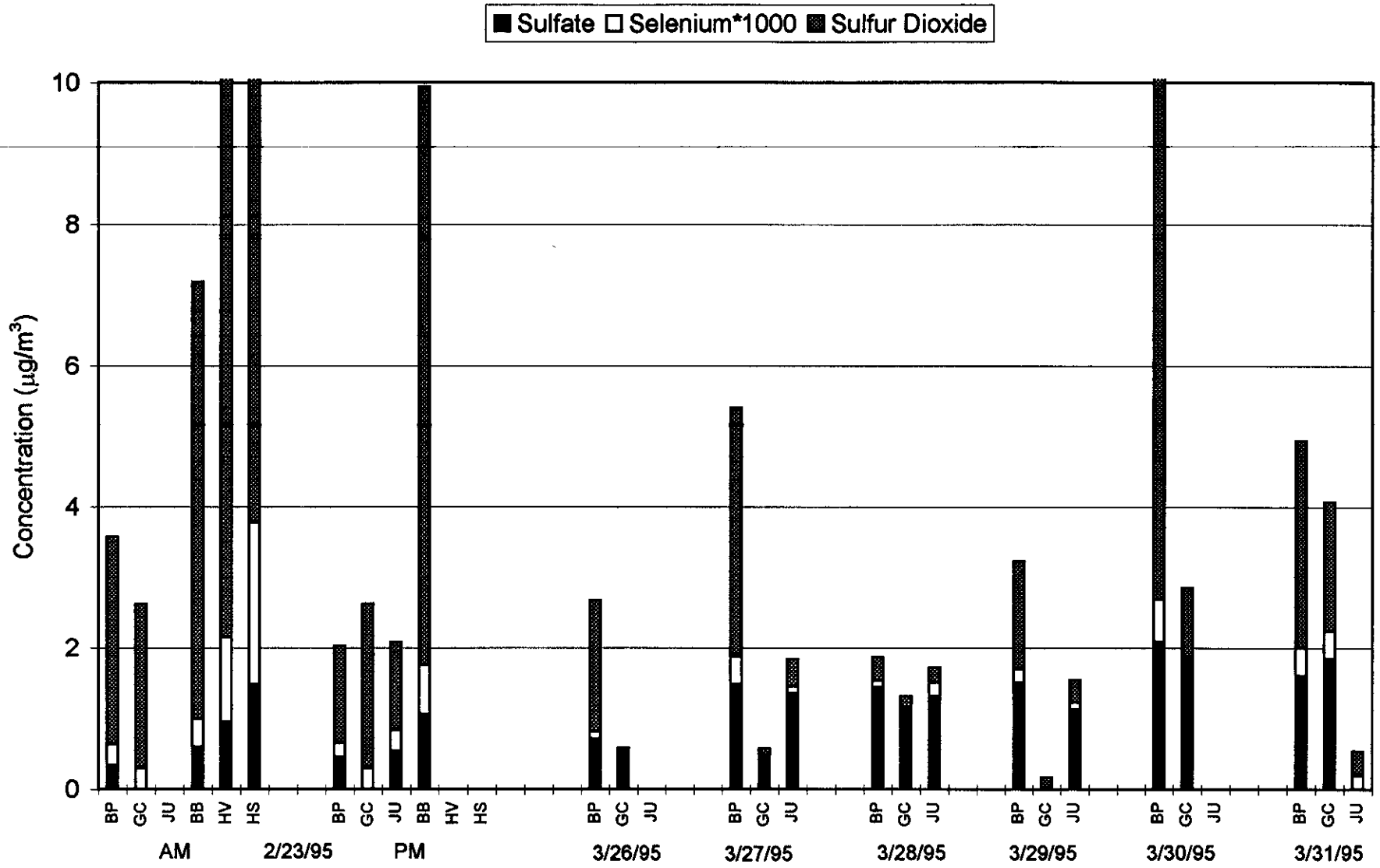


Figure E.2. Time series plots of sulfate, selenium, and sulfur dioxide between 2/23/95 and 10/23/95 at all six sites during the Mt. Zirkel Visibility Study

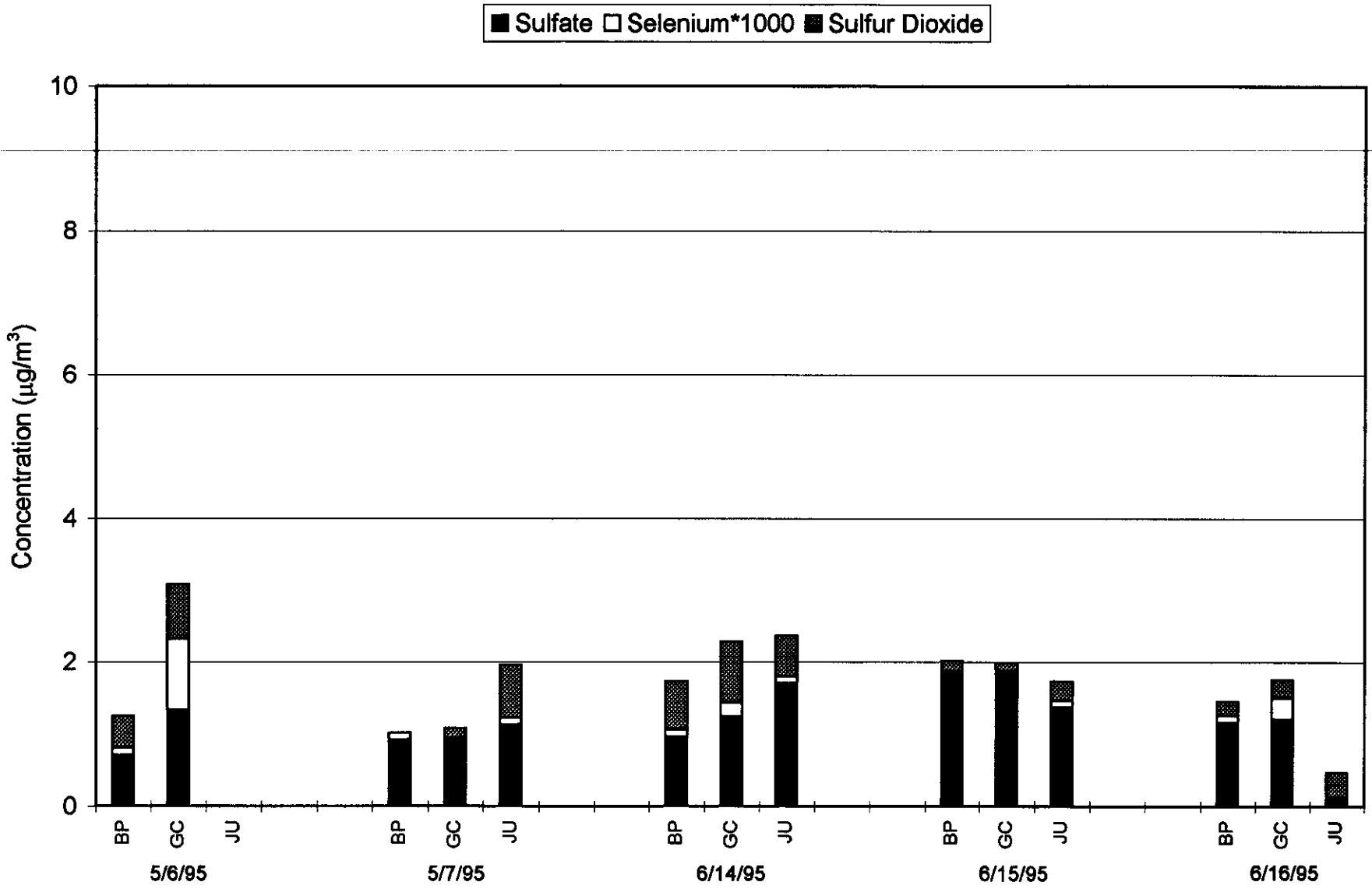


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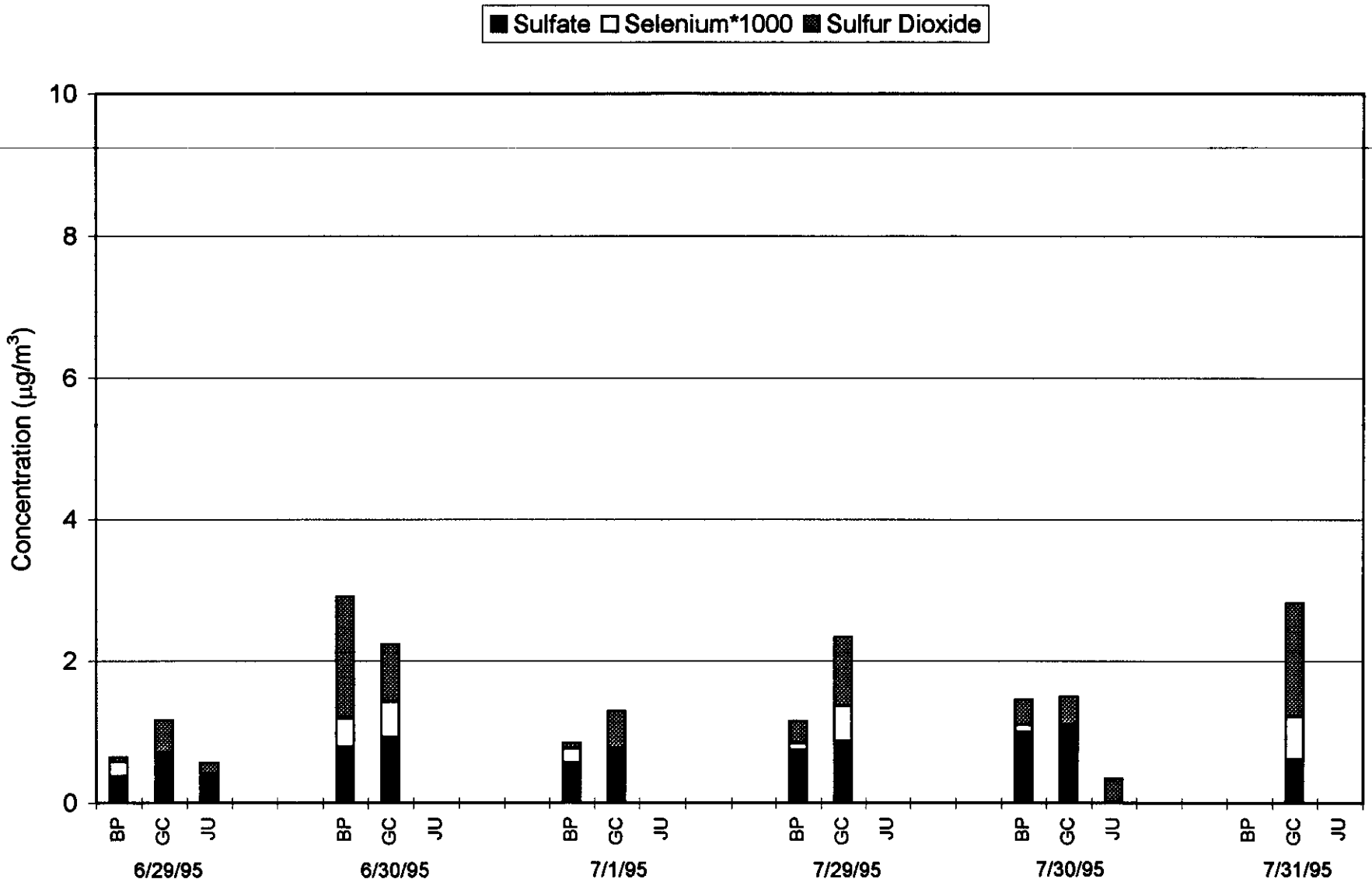


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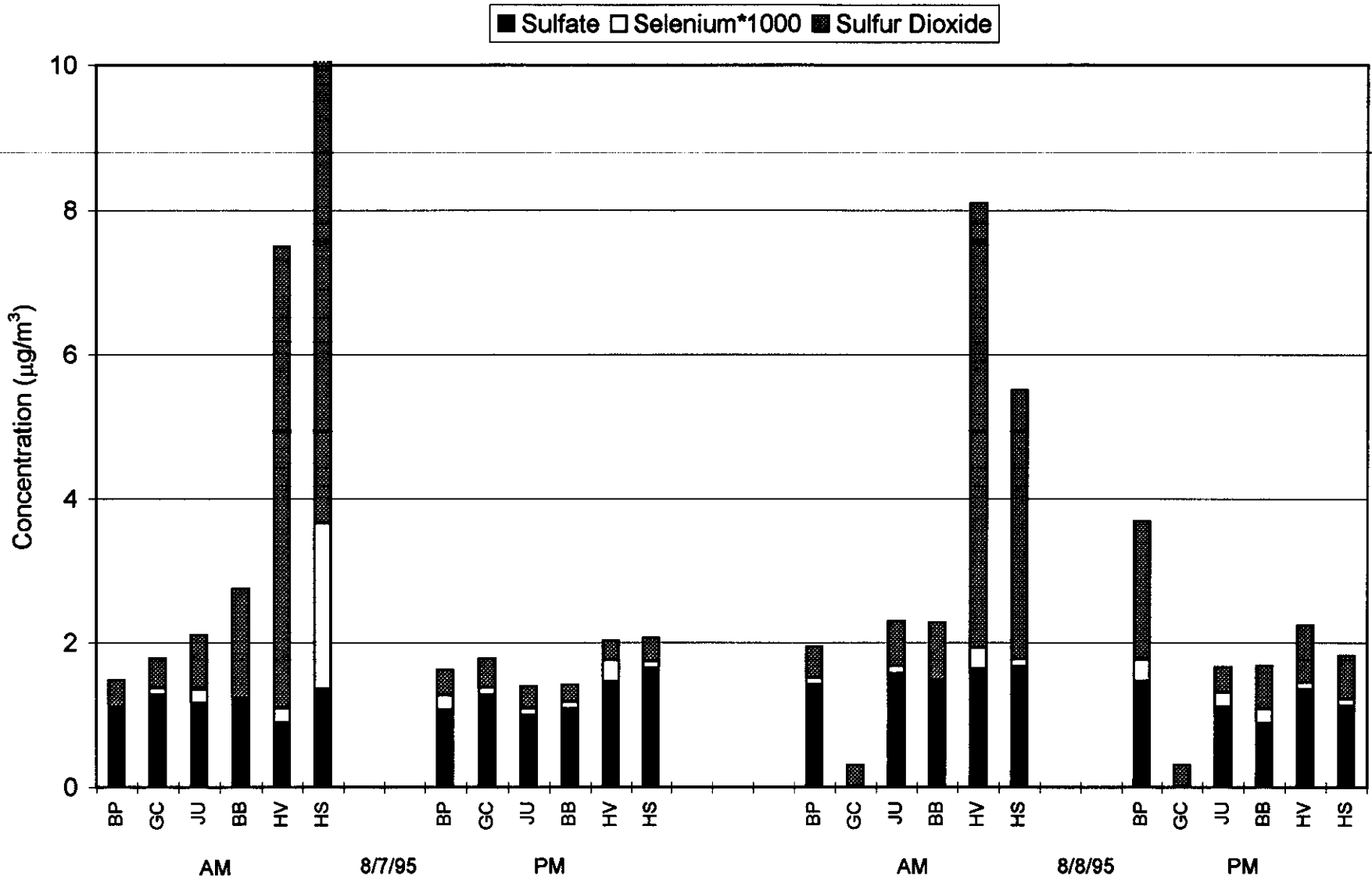


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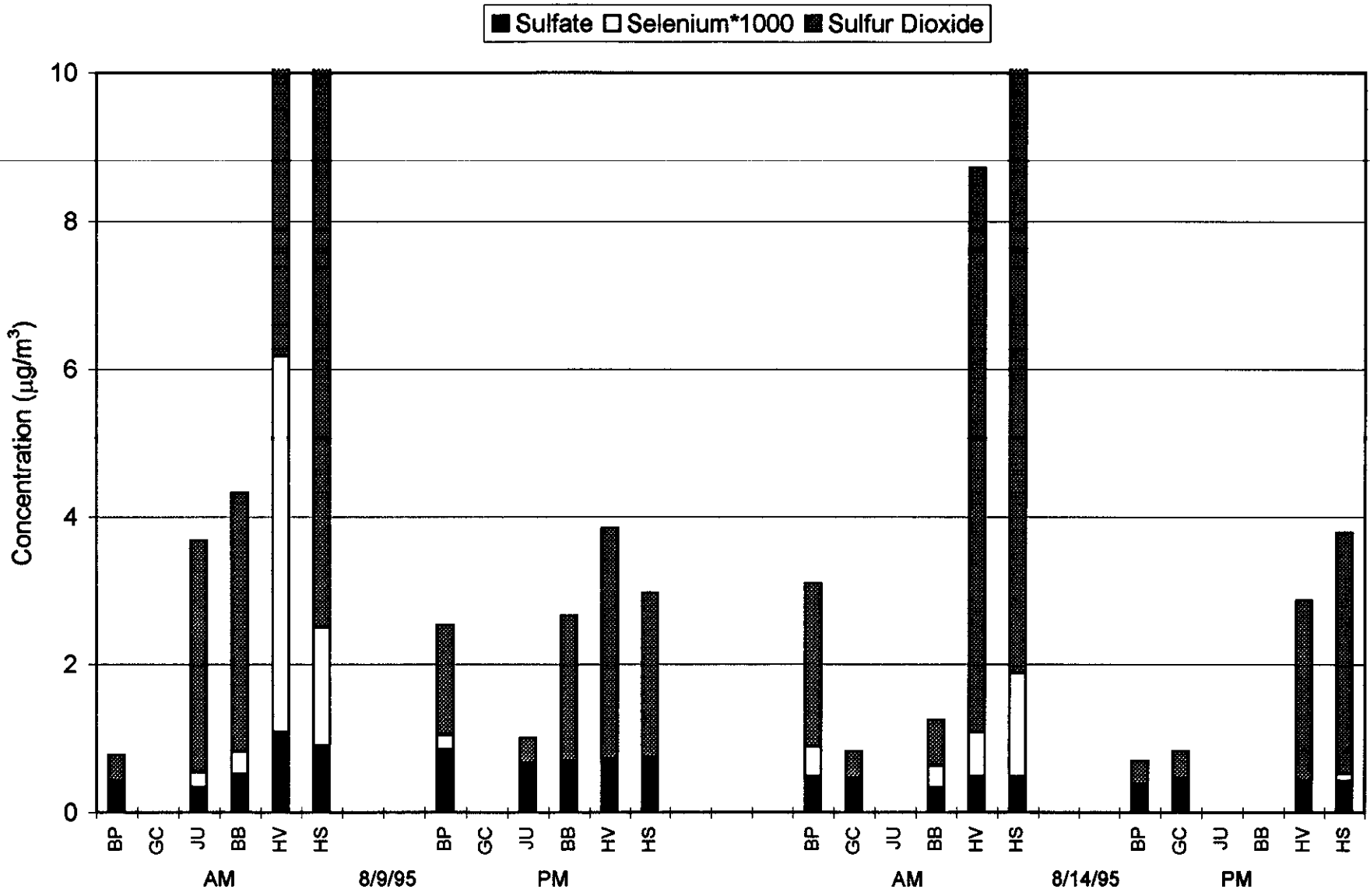


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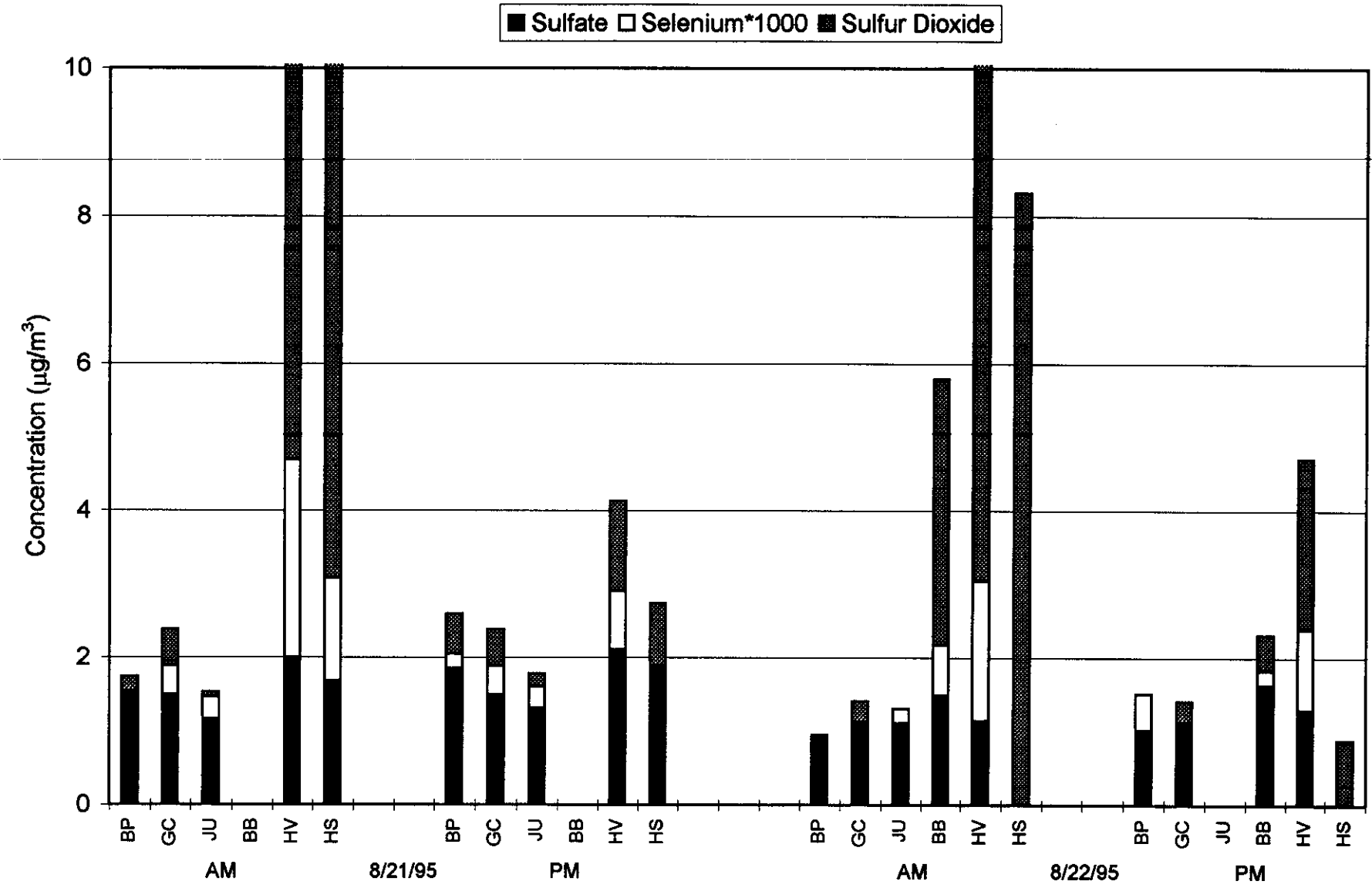


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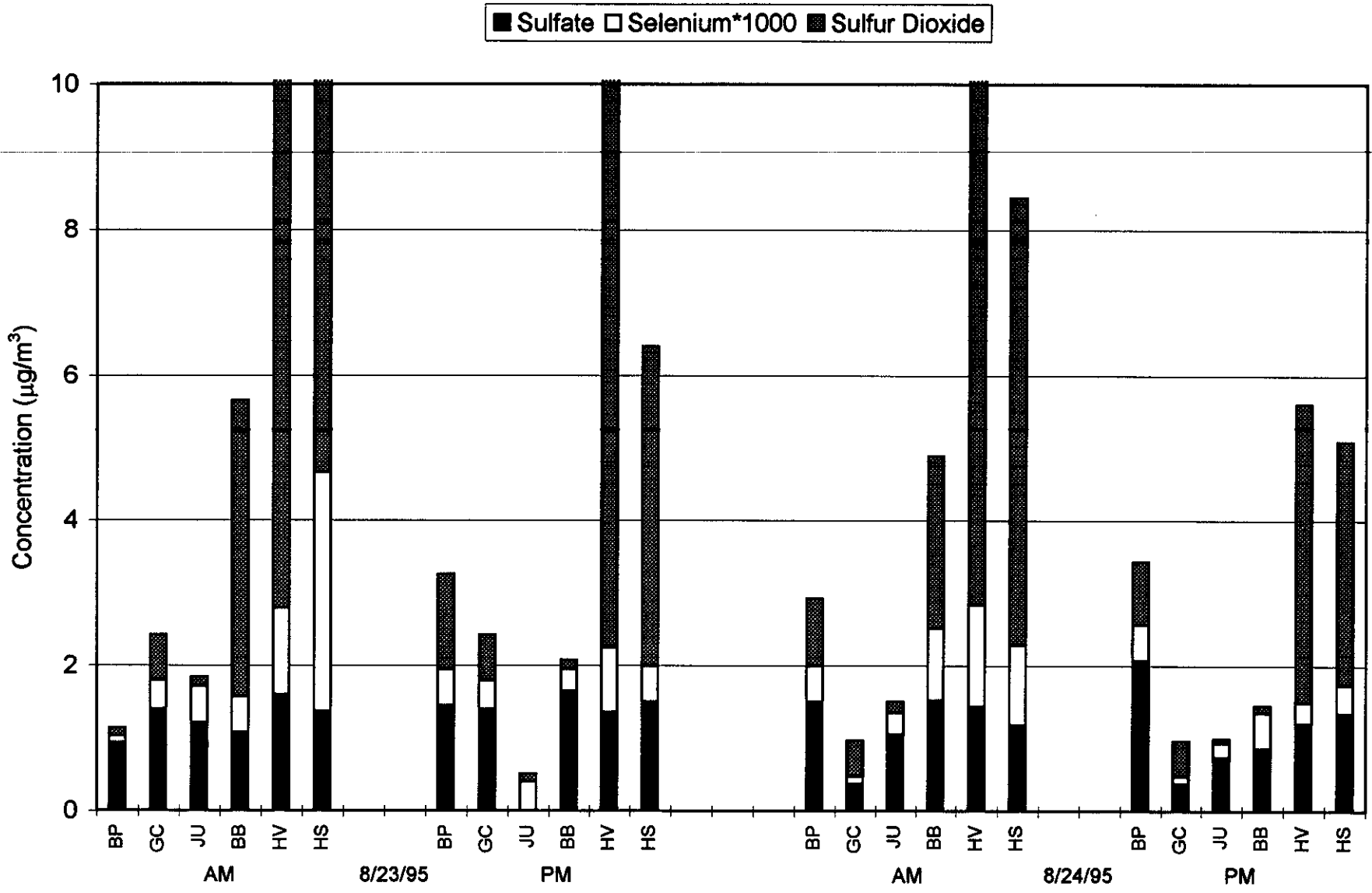


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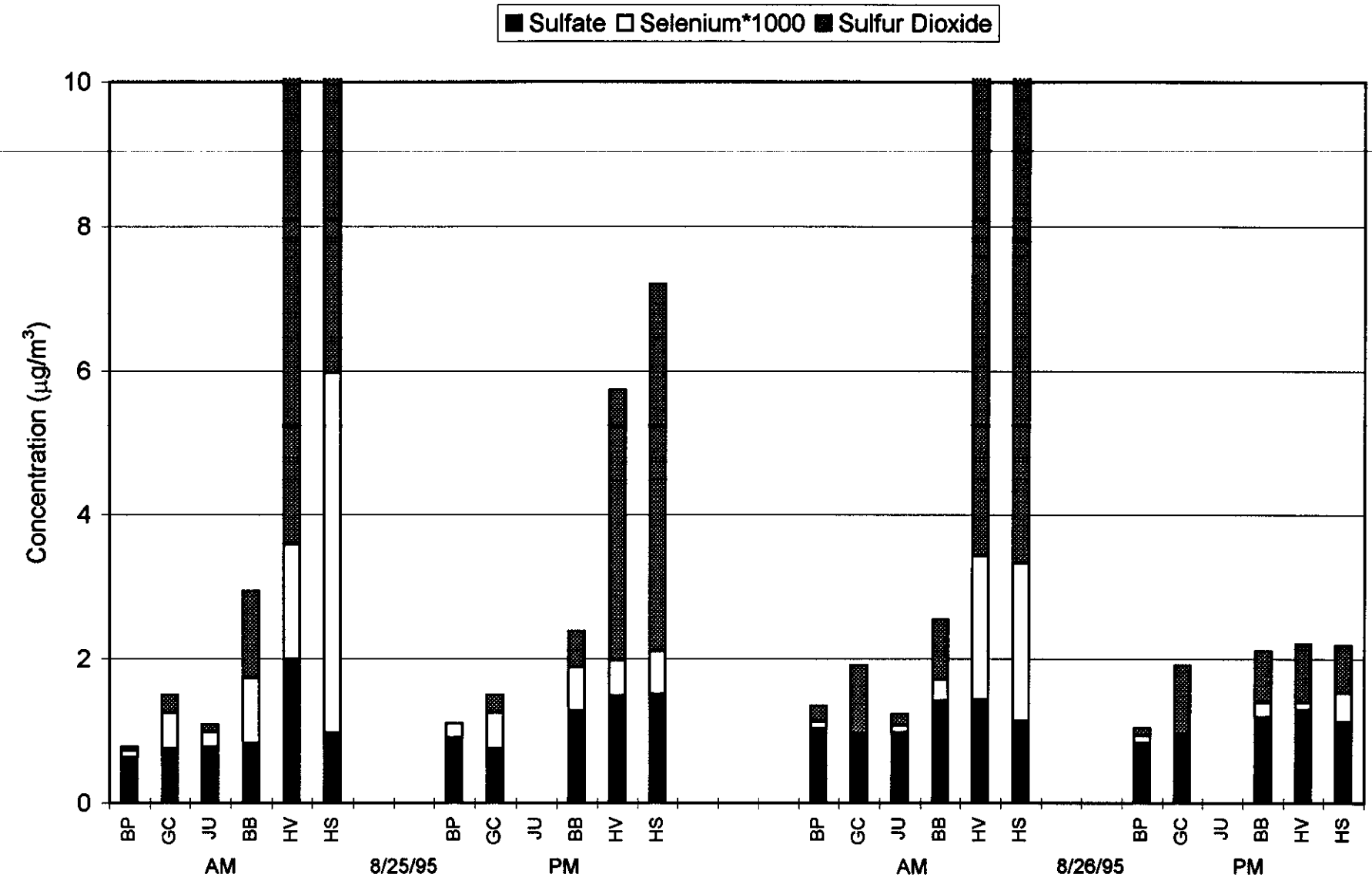


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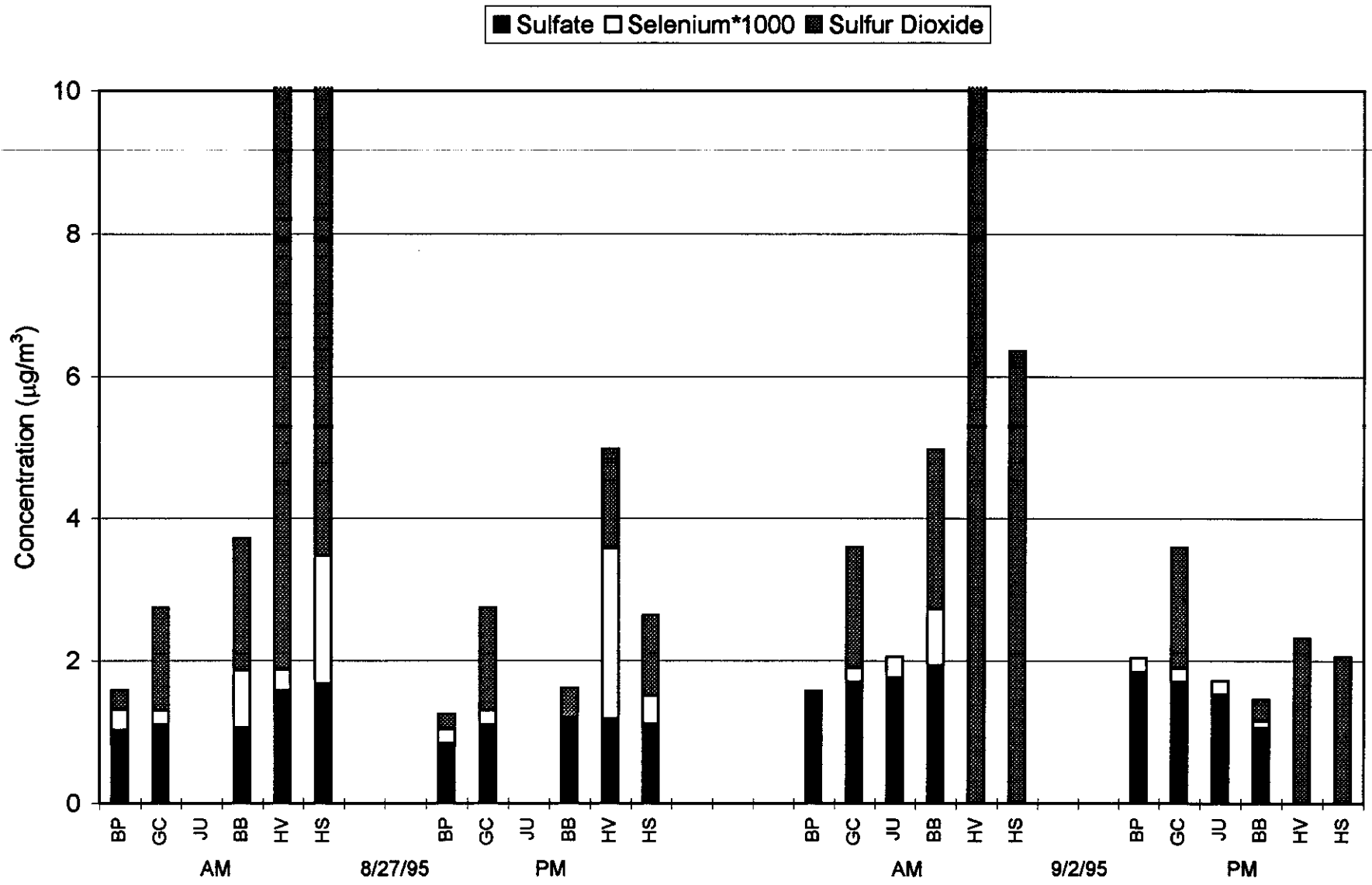


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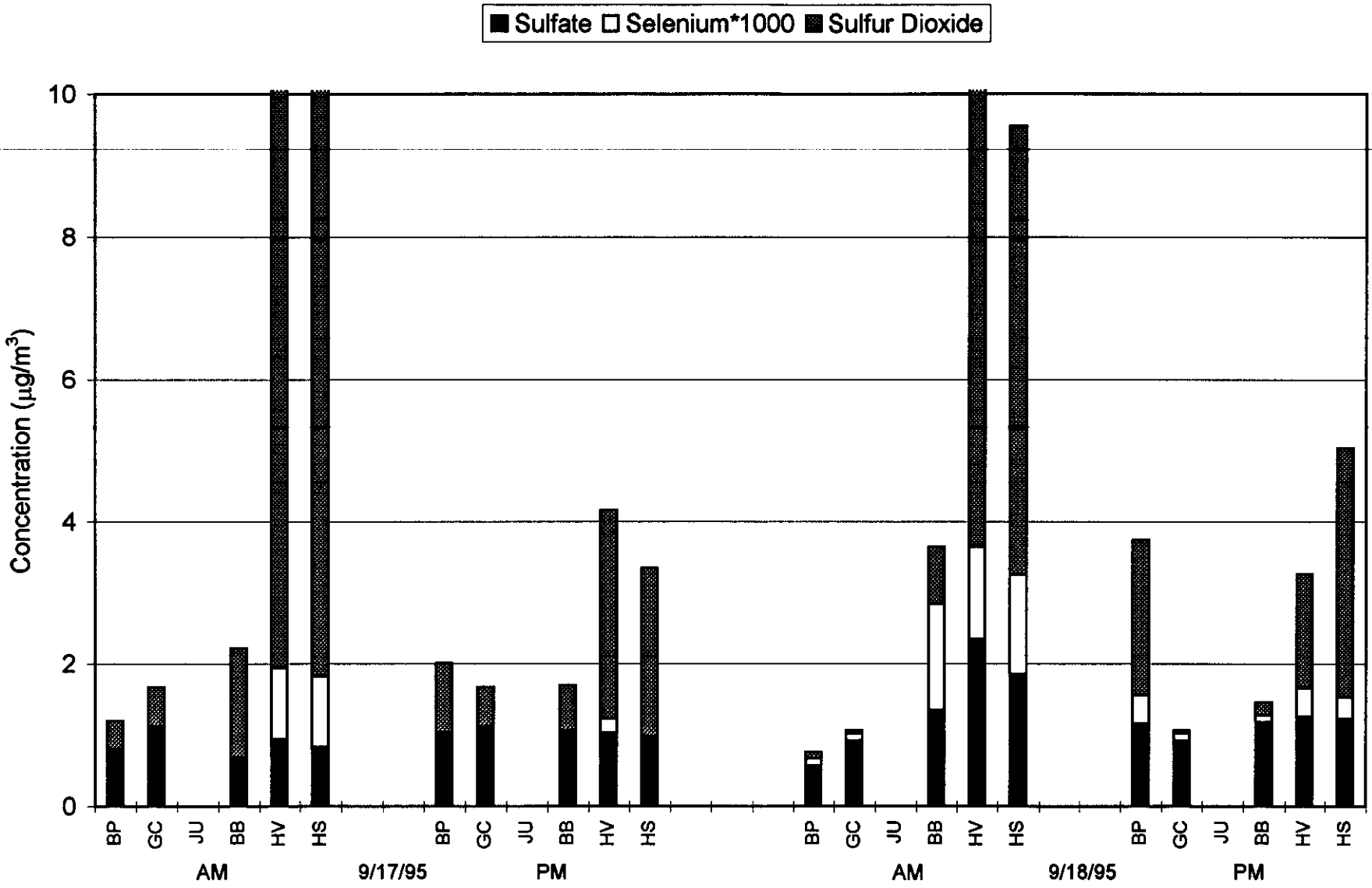


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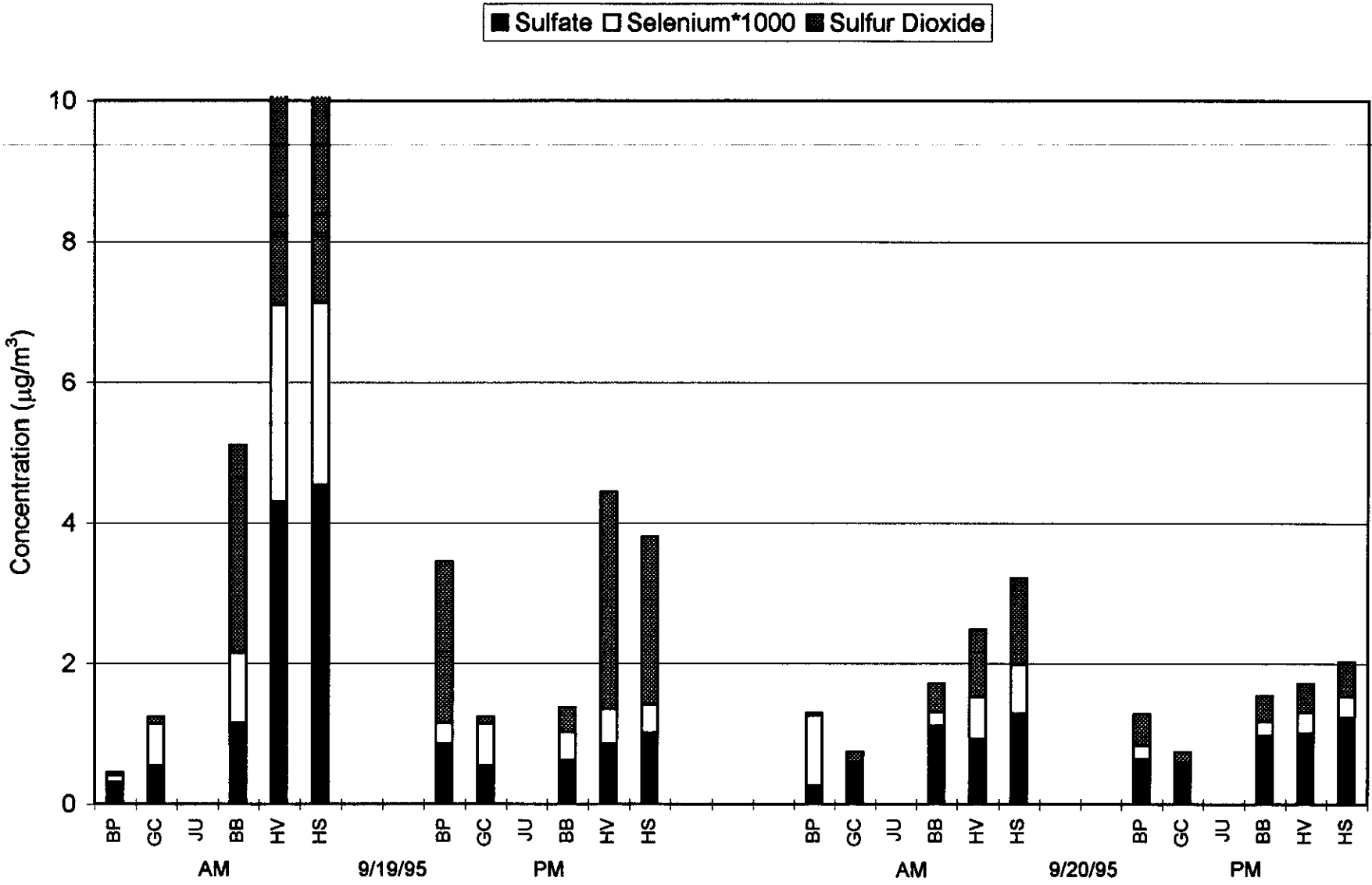


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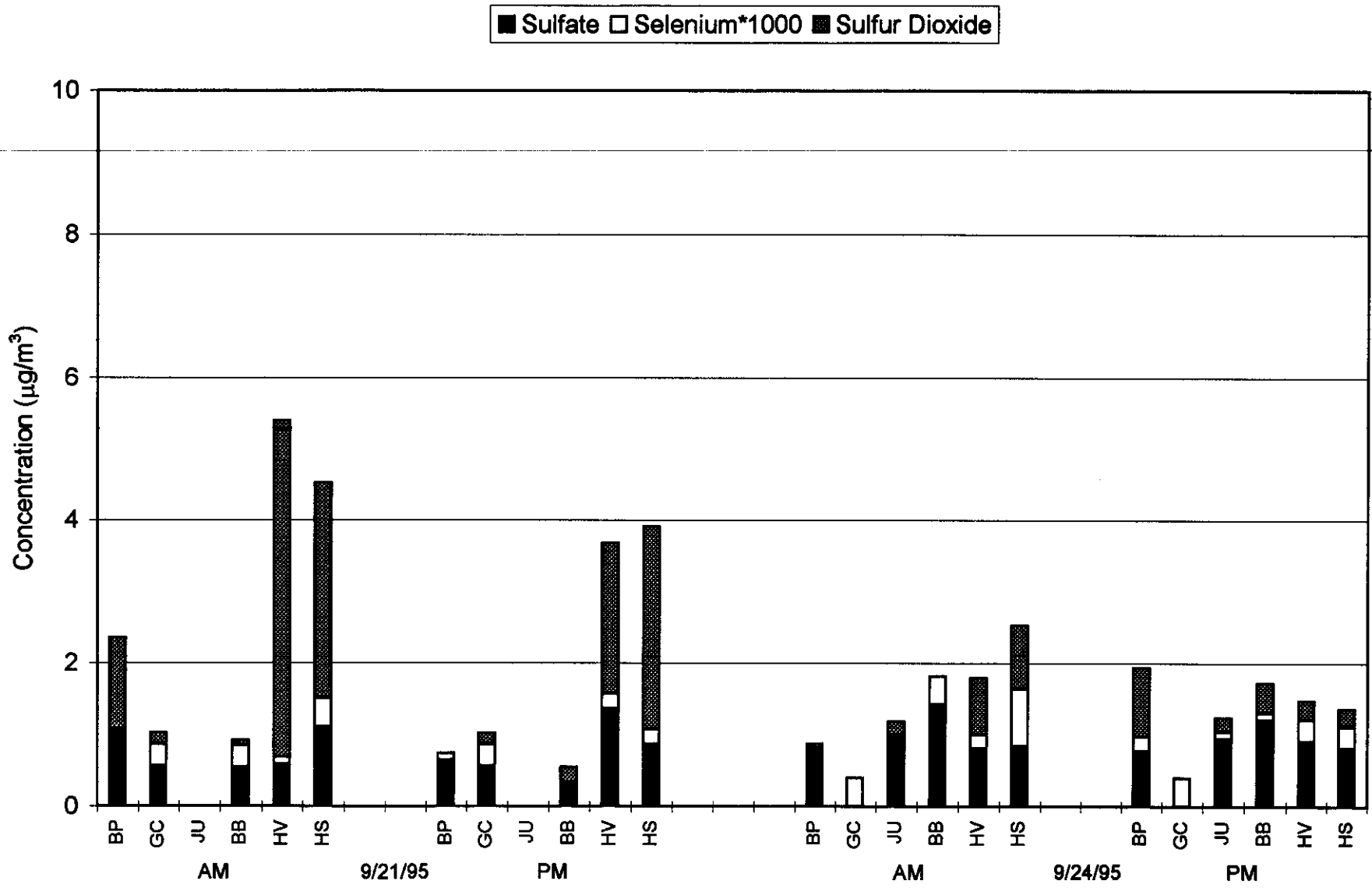


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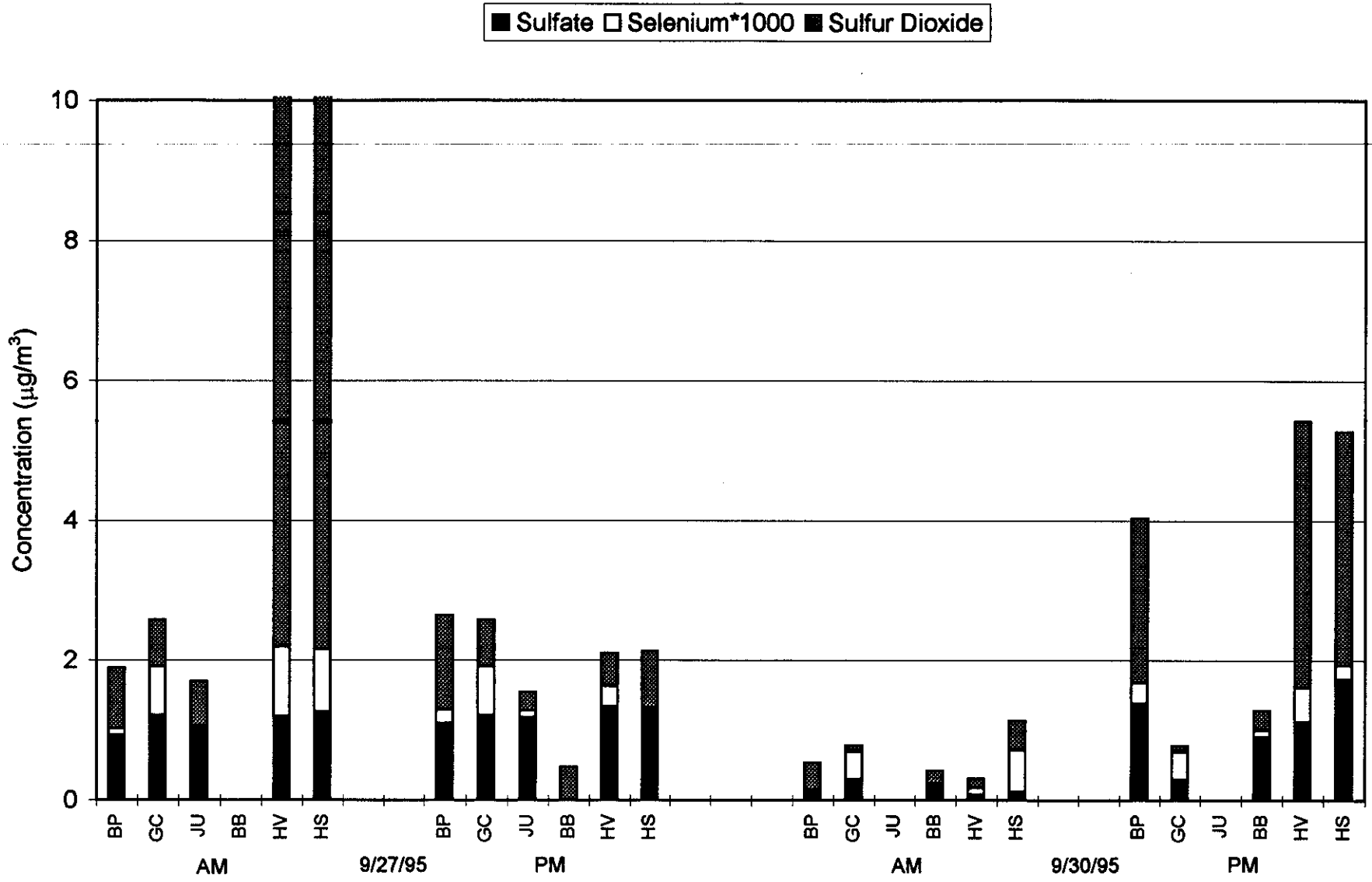


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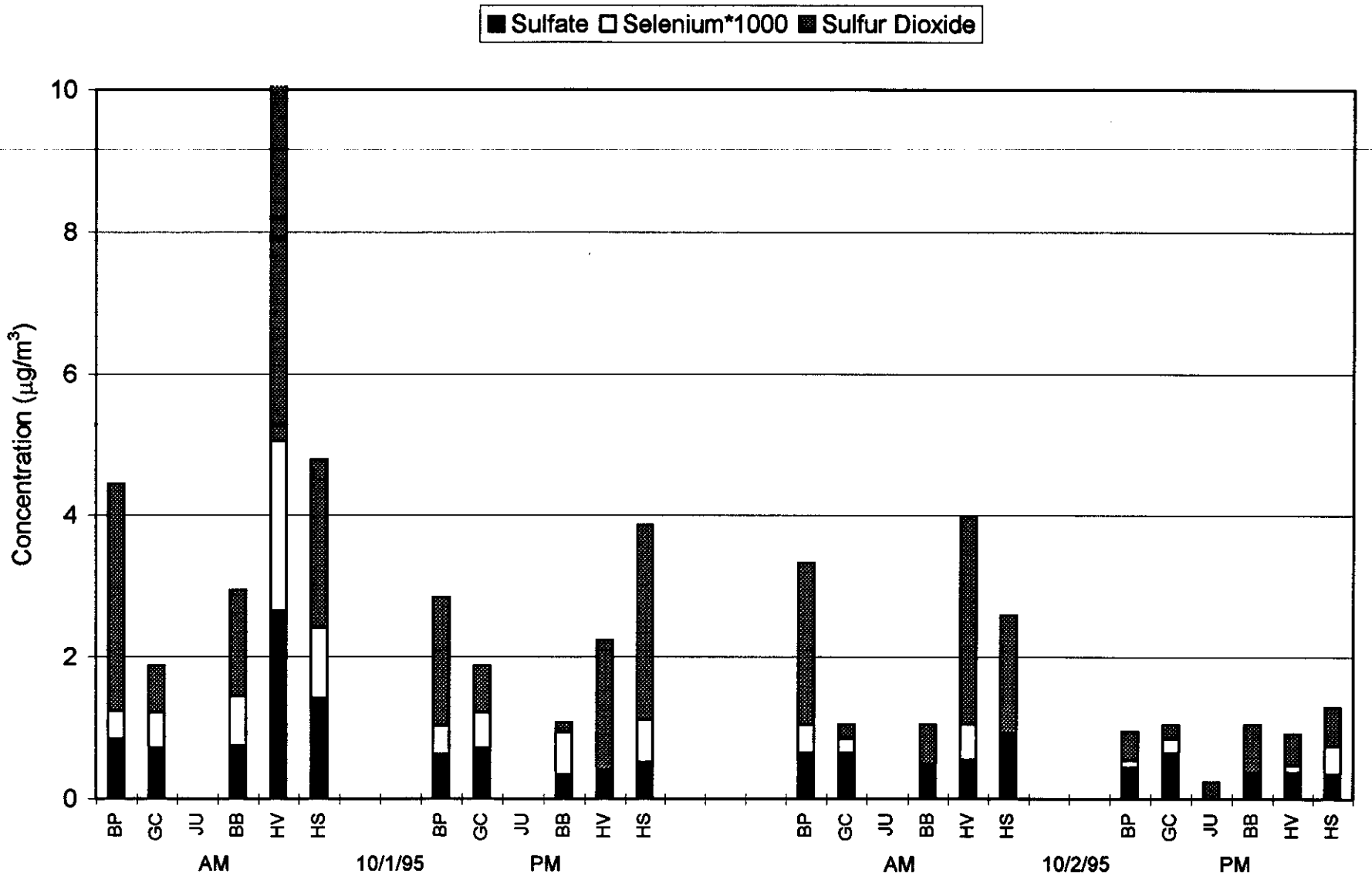


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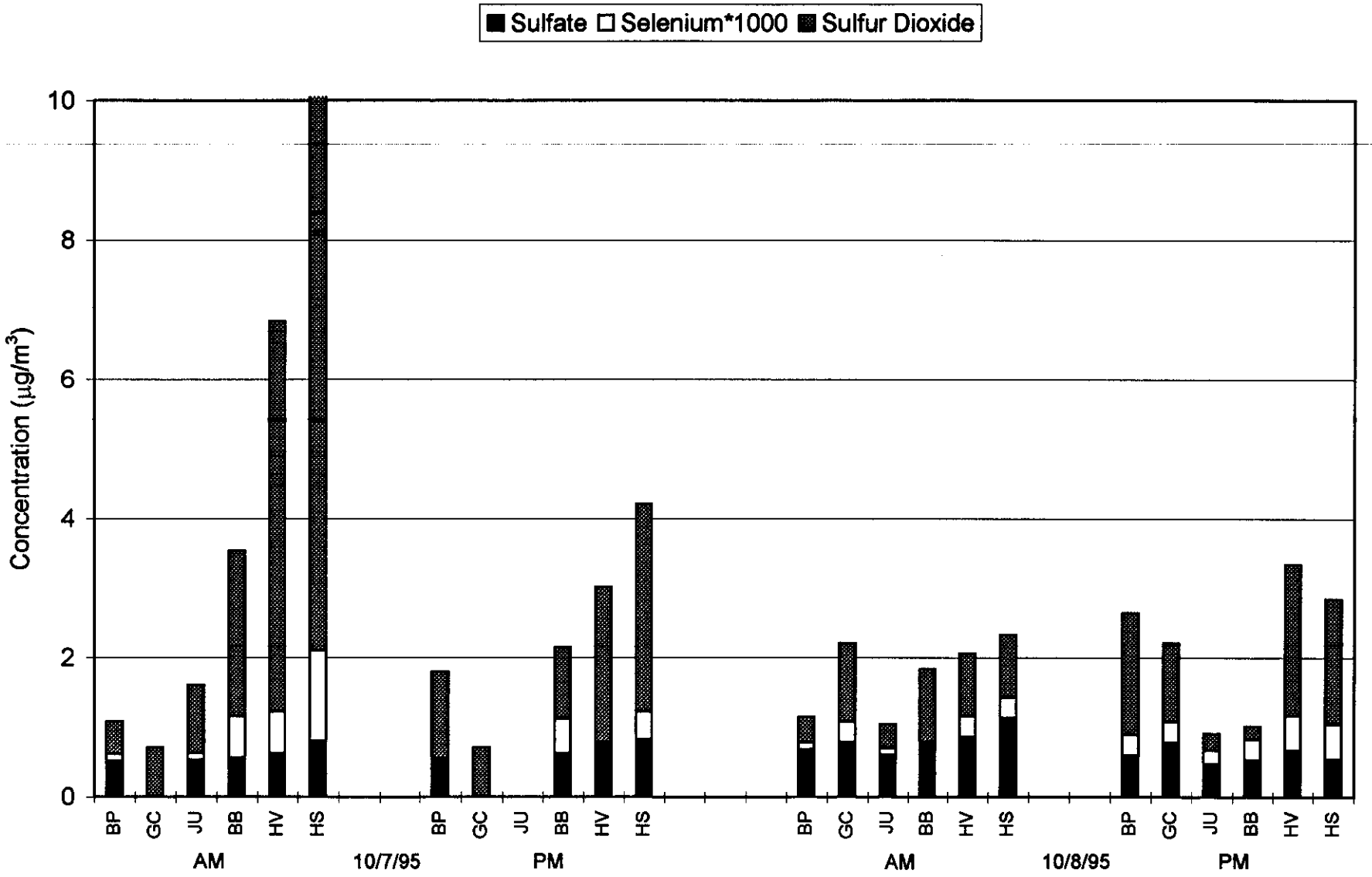


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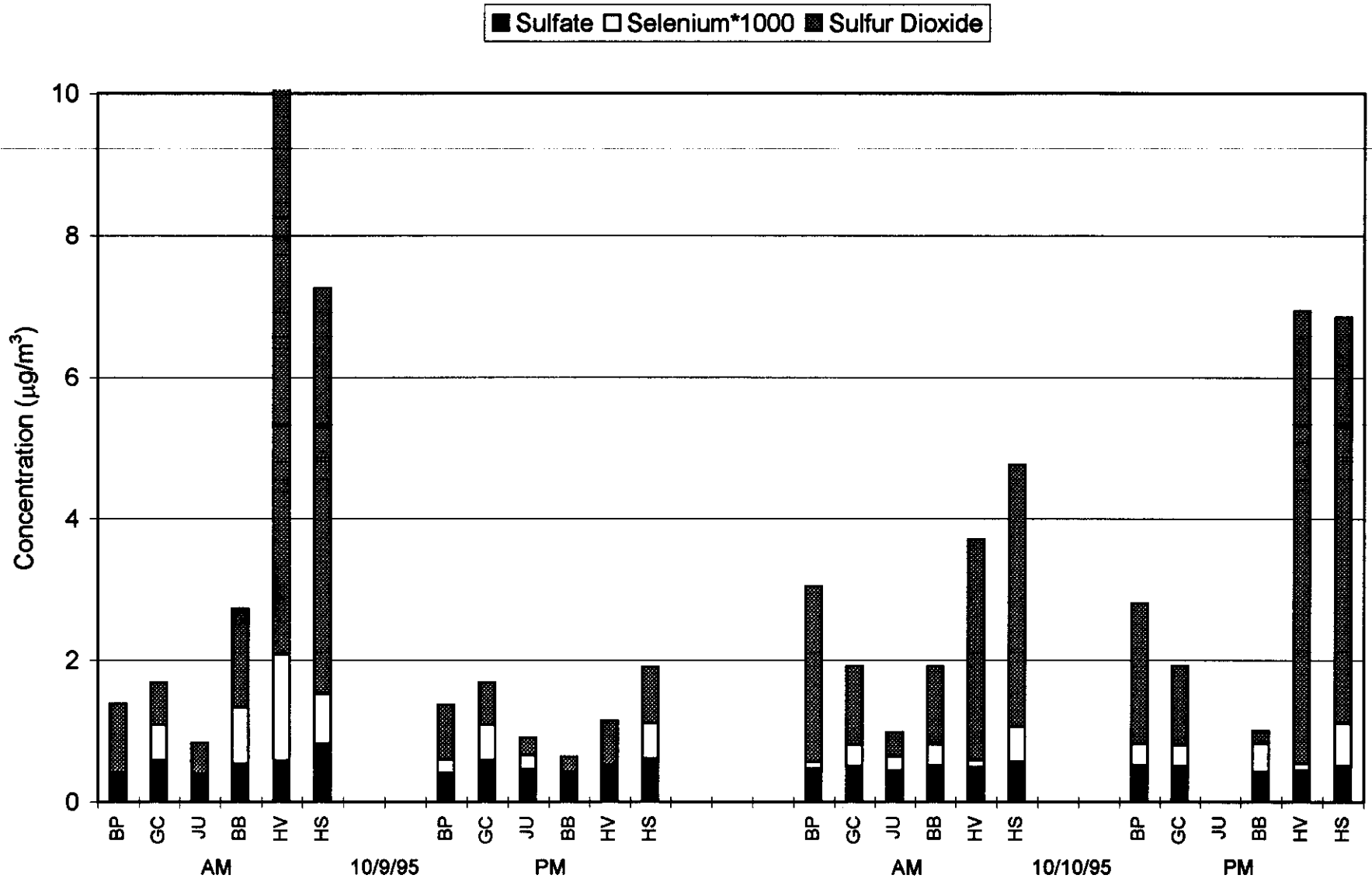


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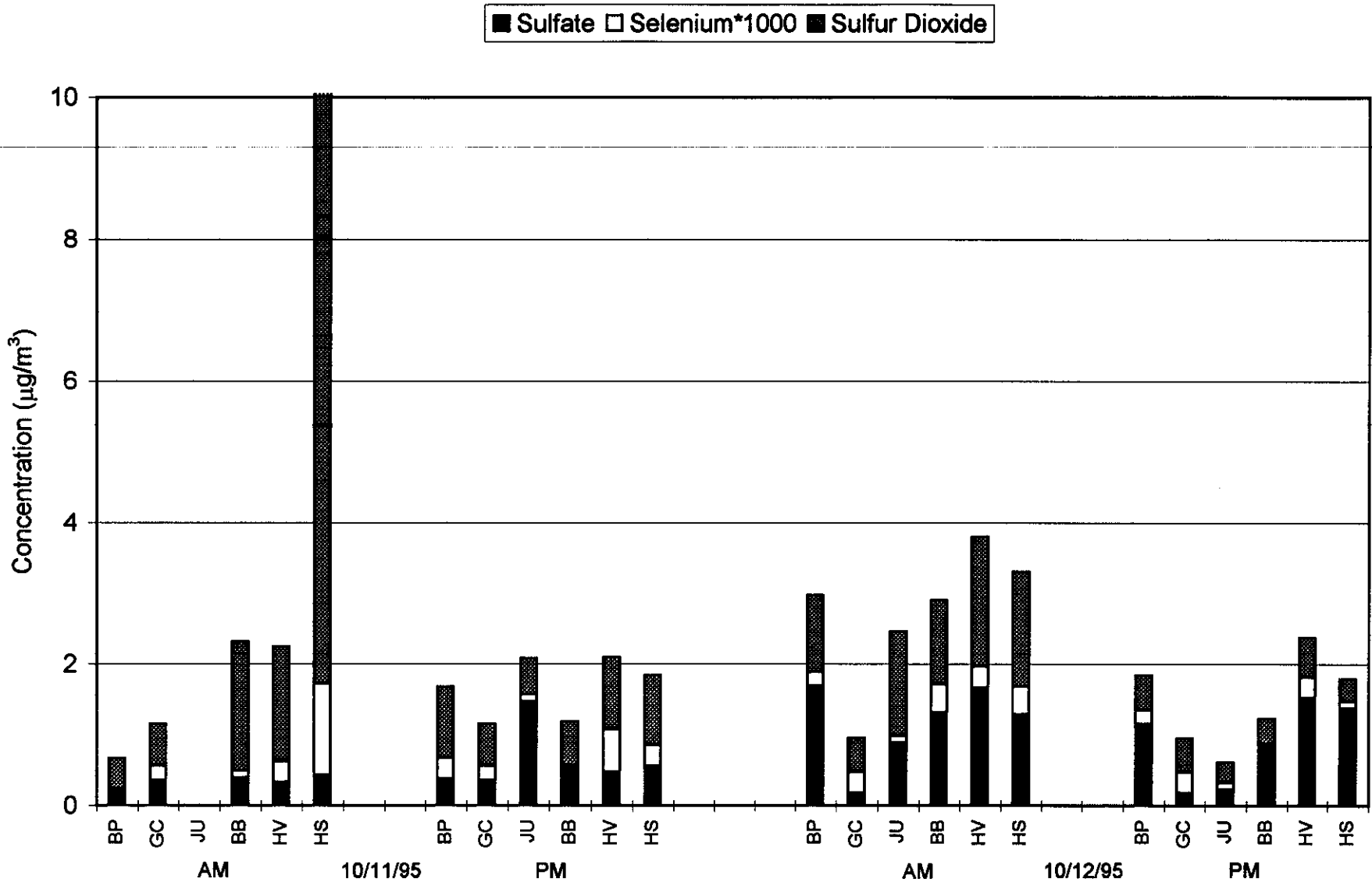


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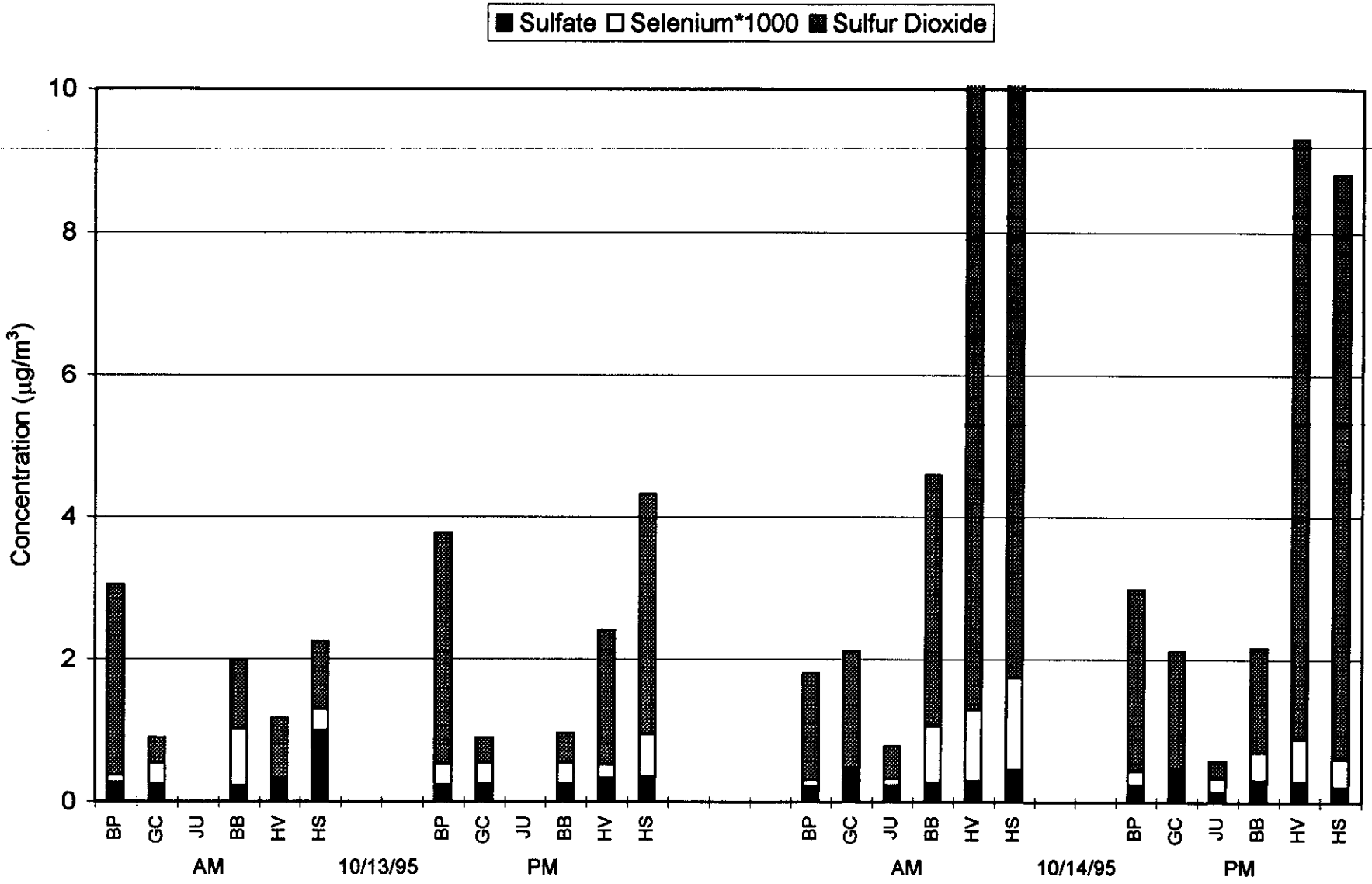


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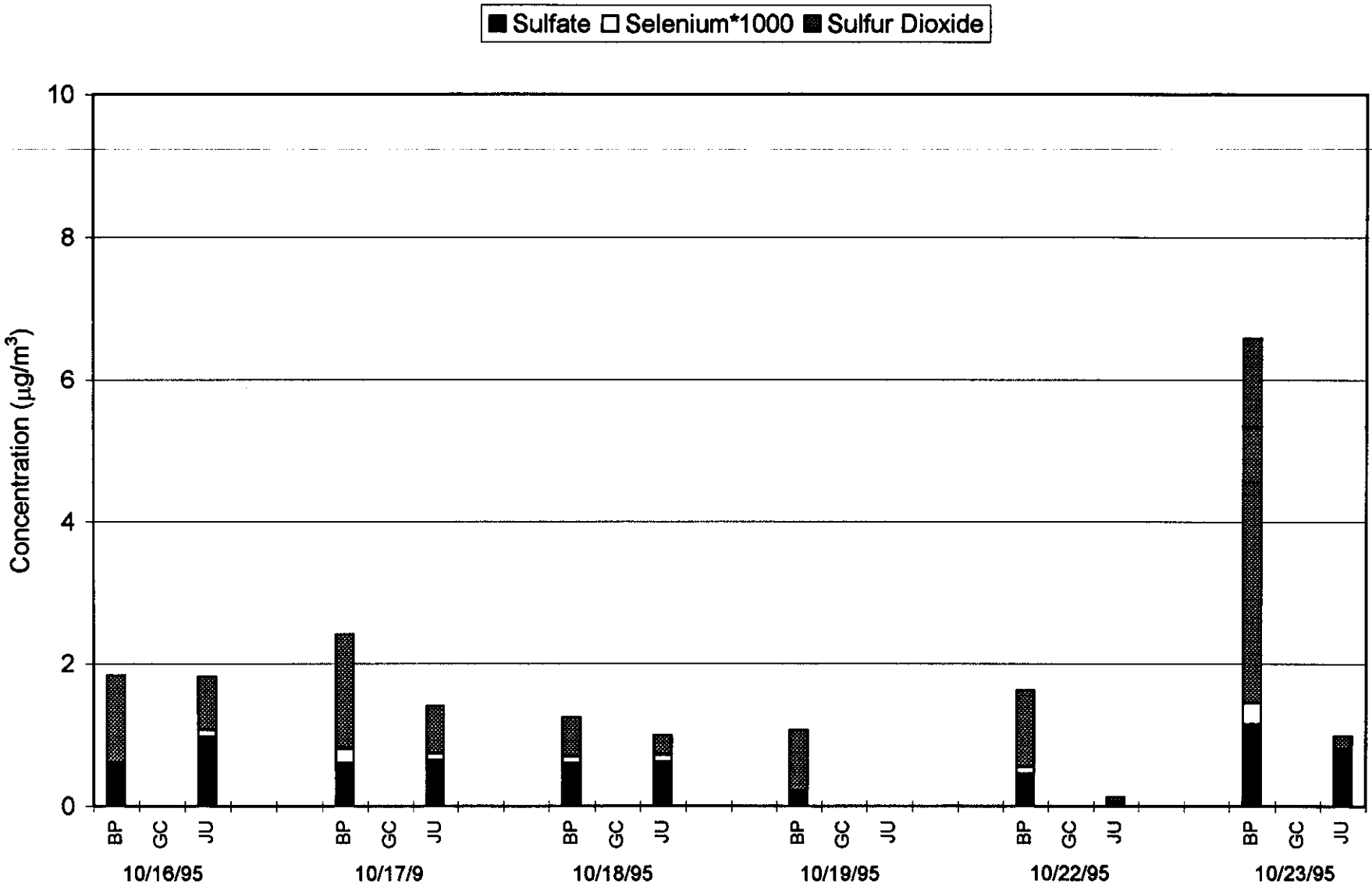


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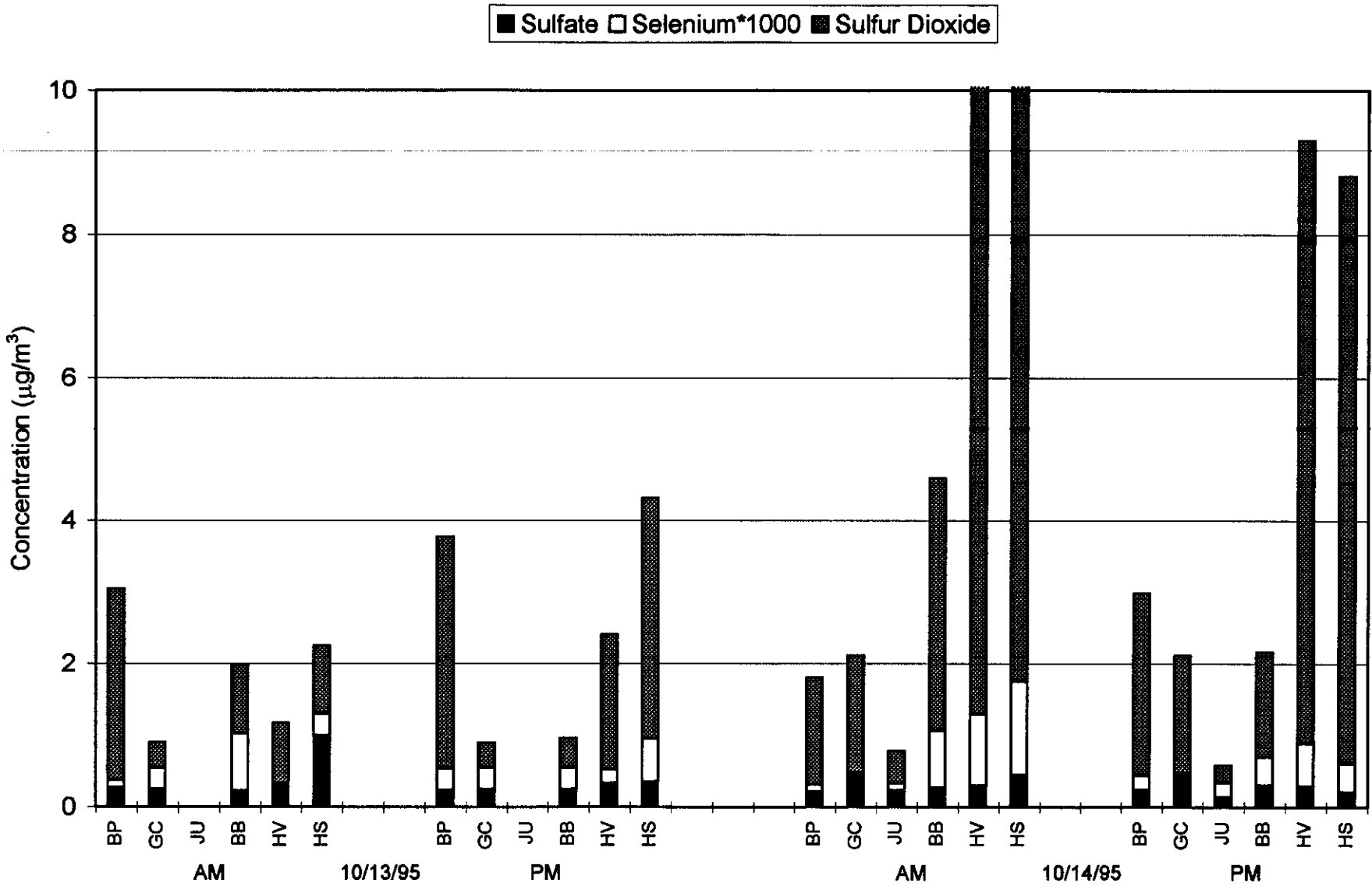


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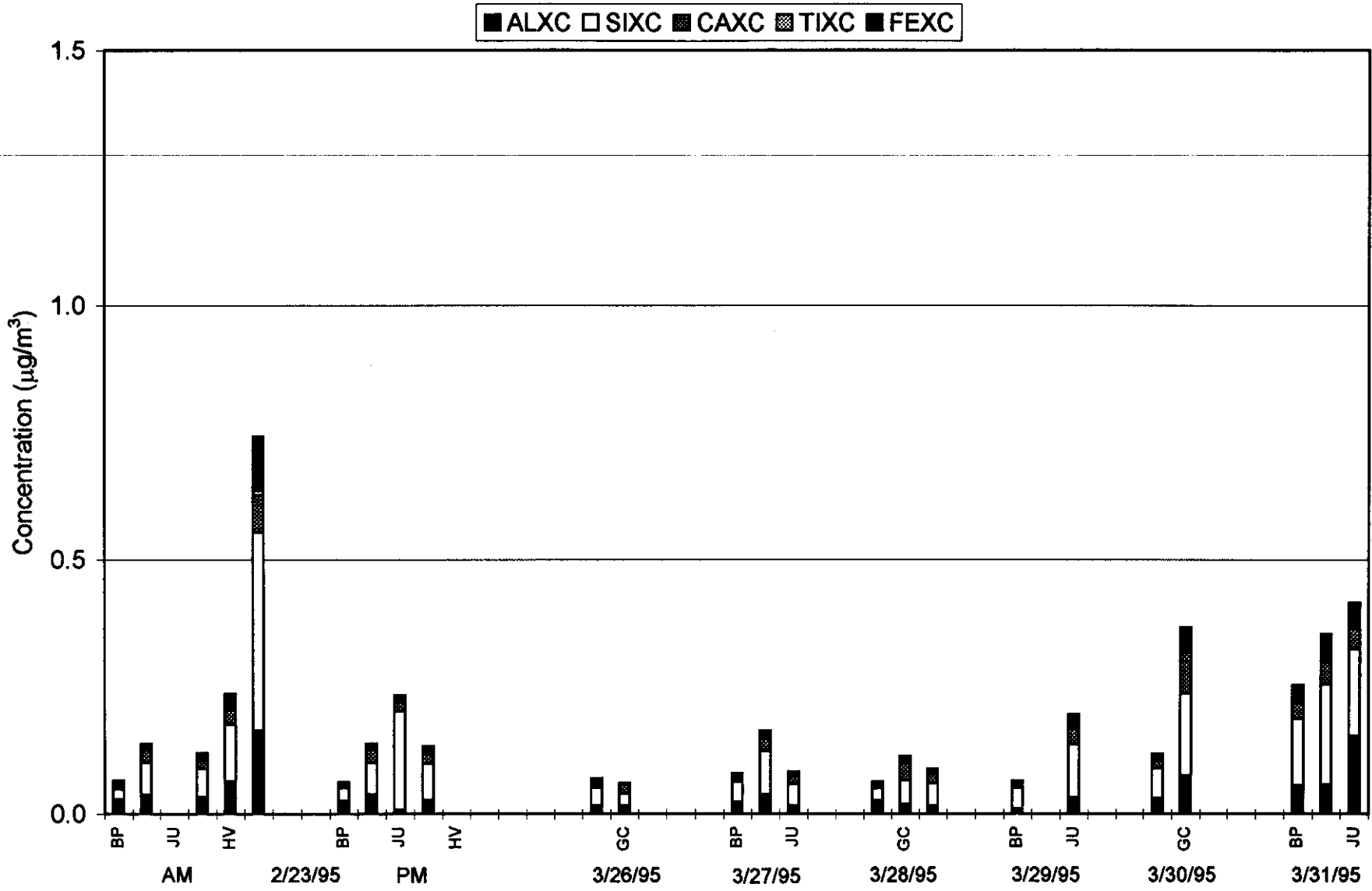


Figure E.3. Time series plots of soil elements between 2/23/95 and 10/23/95 at all six sites during the Mt. Zirkel Visibility Study

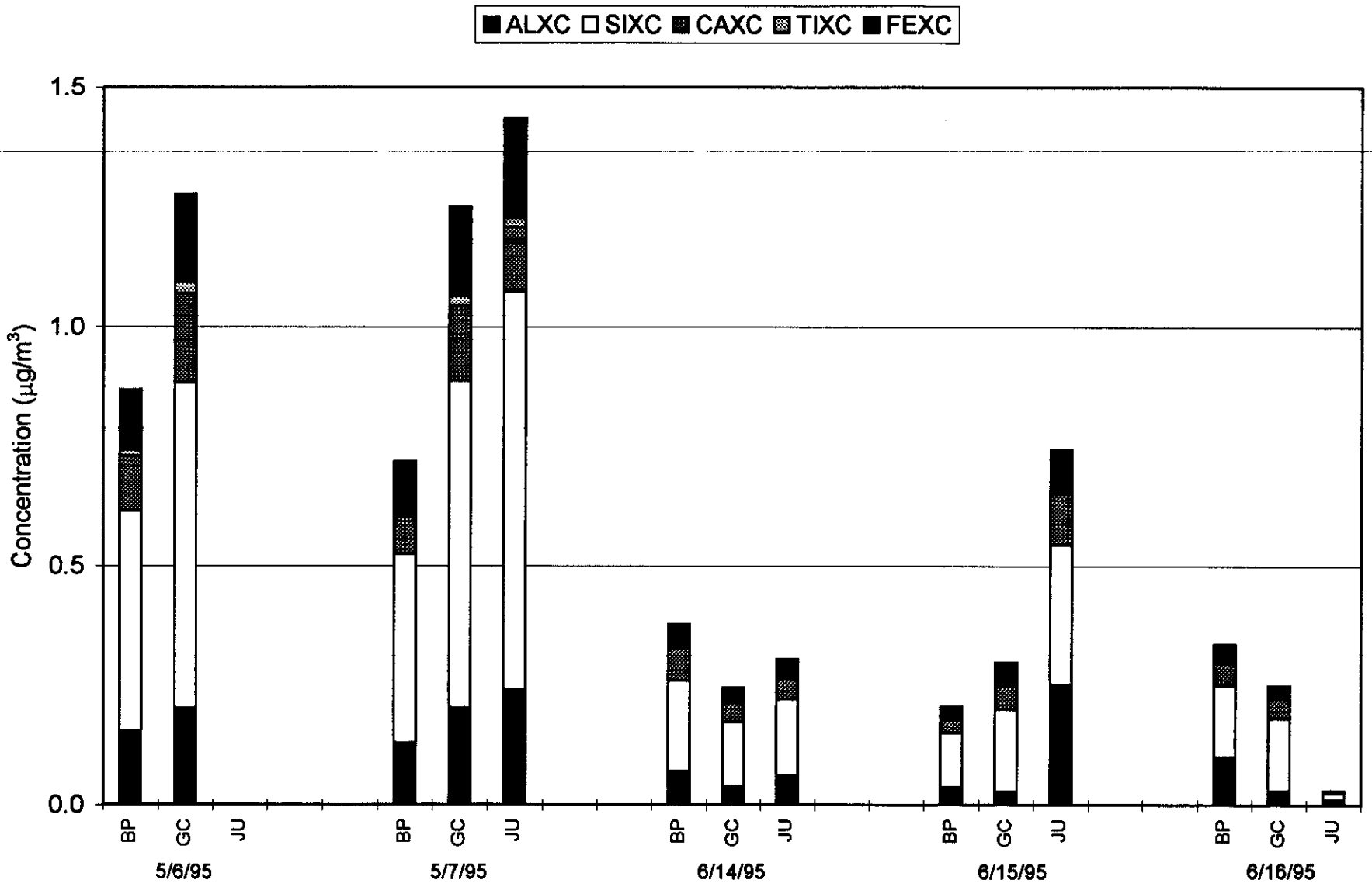


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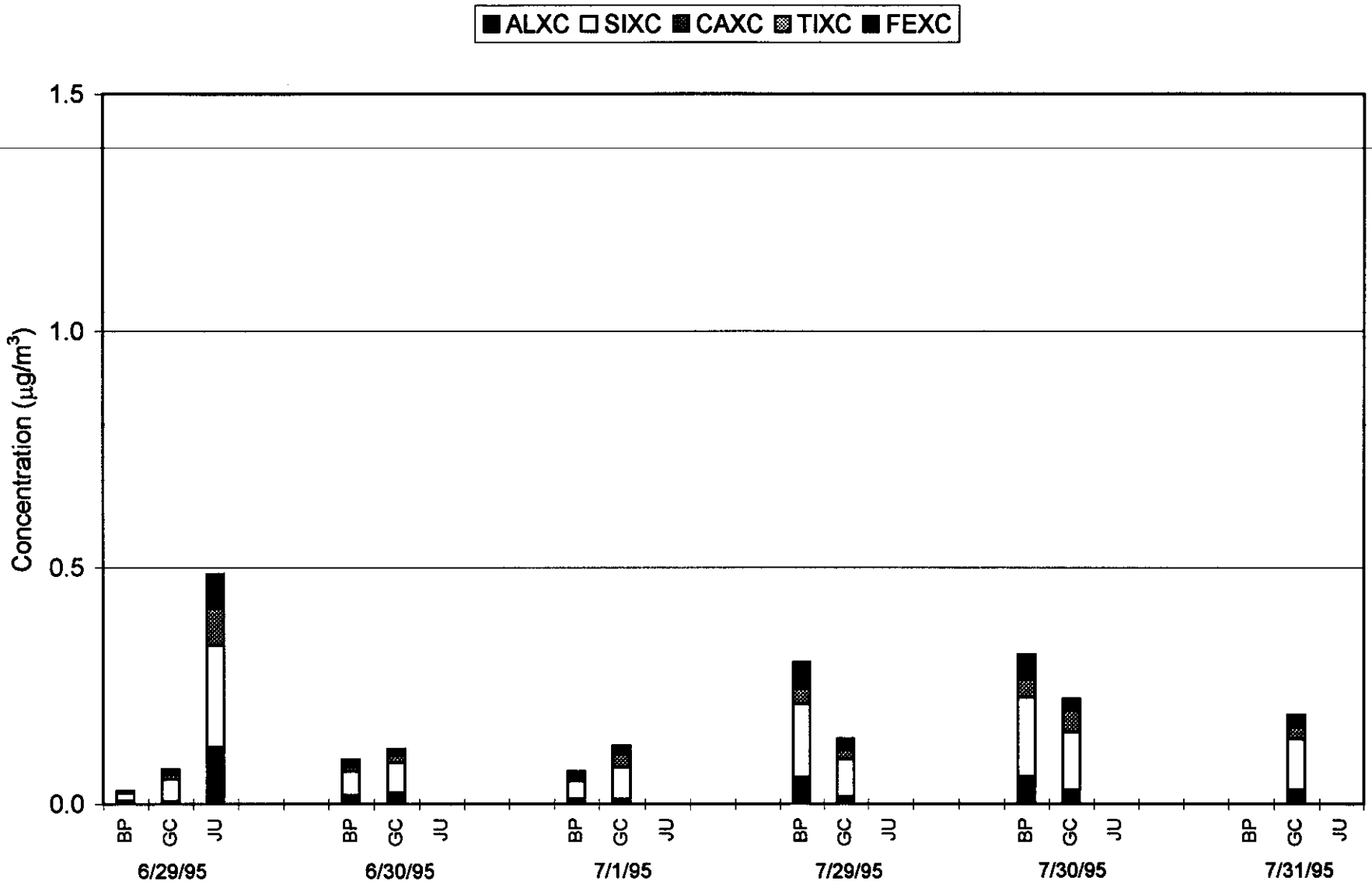


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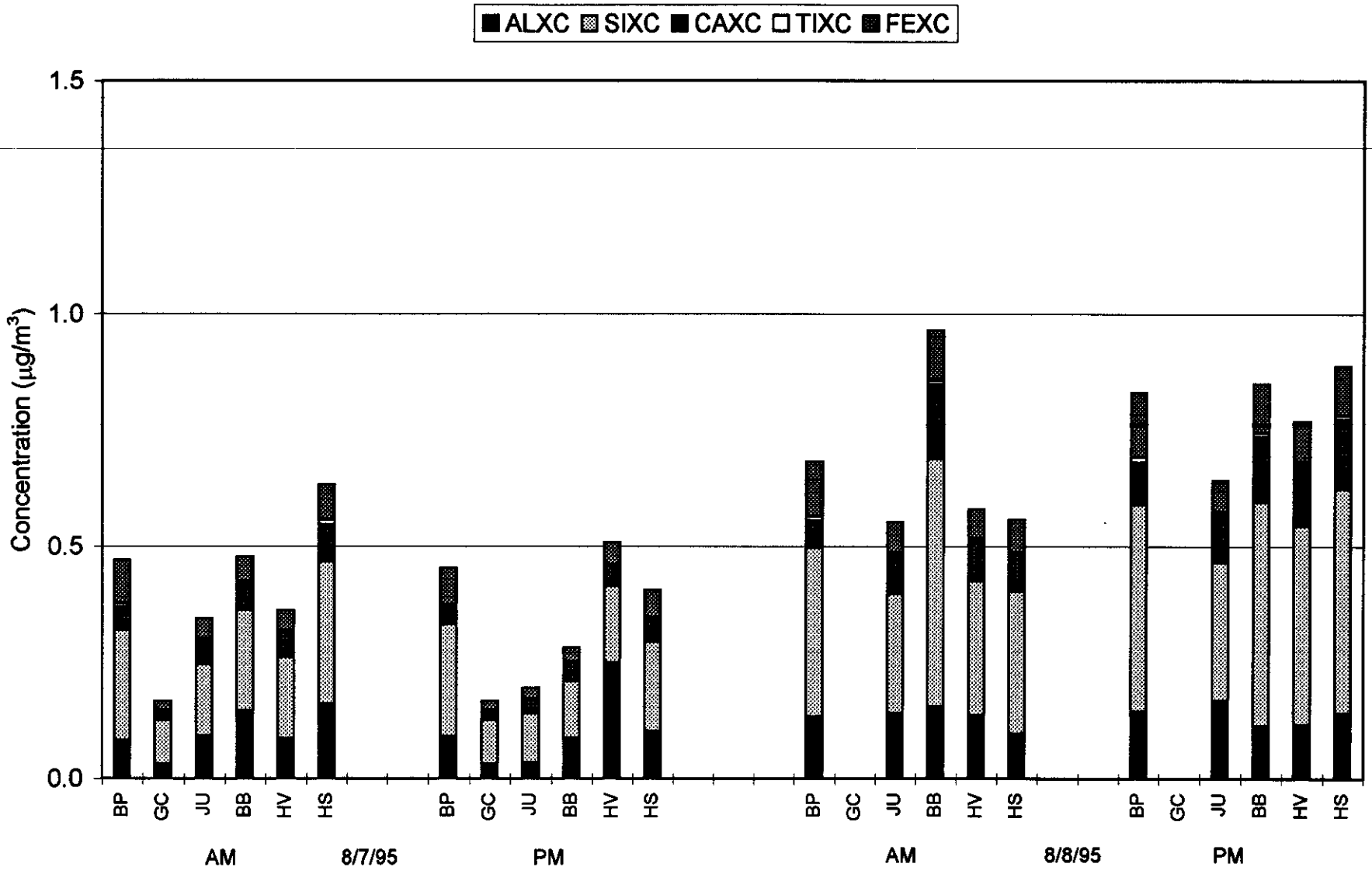


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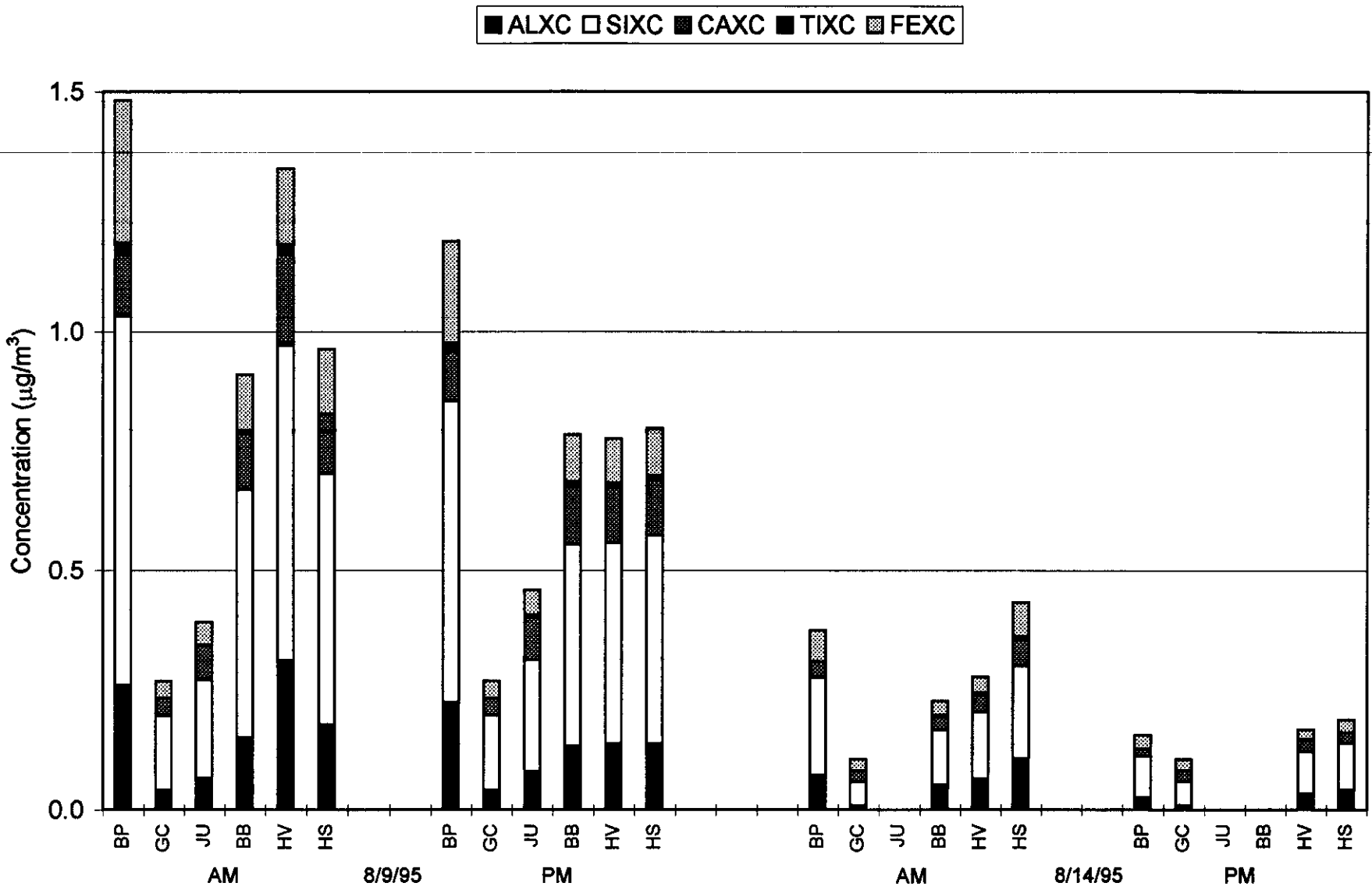


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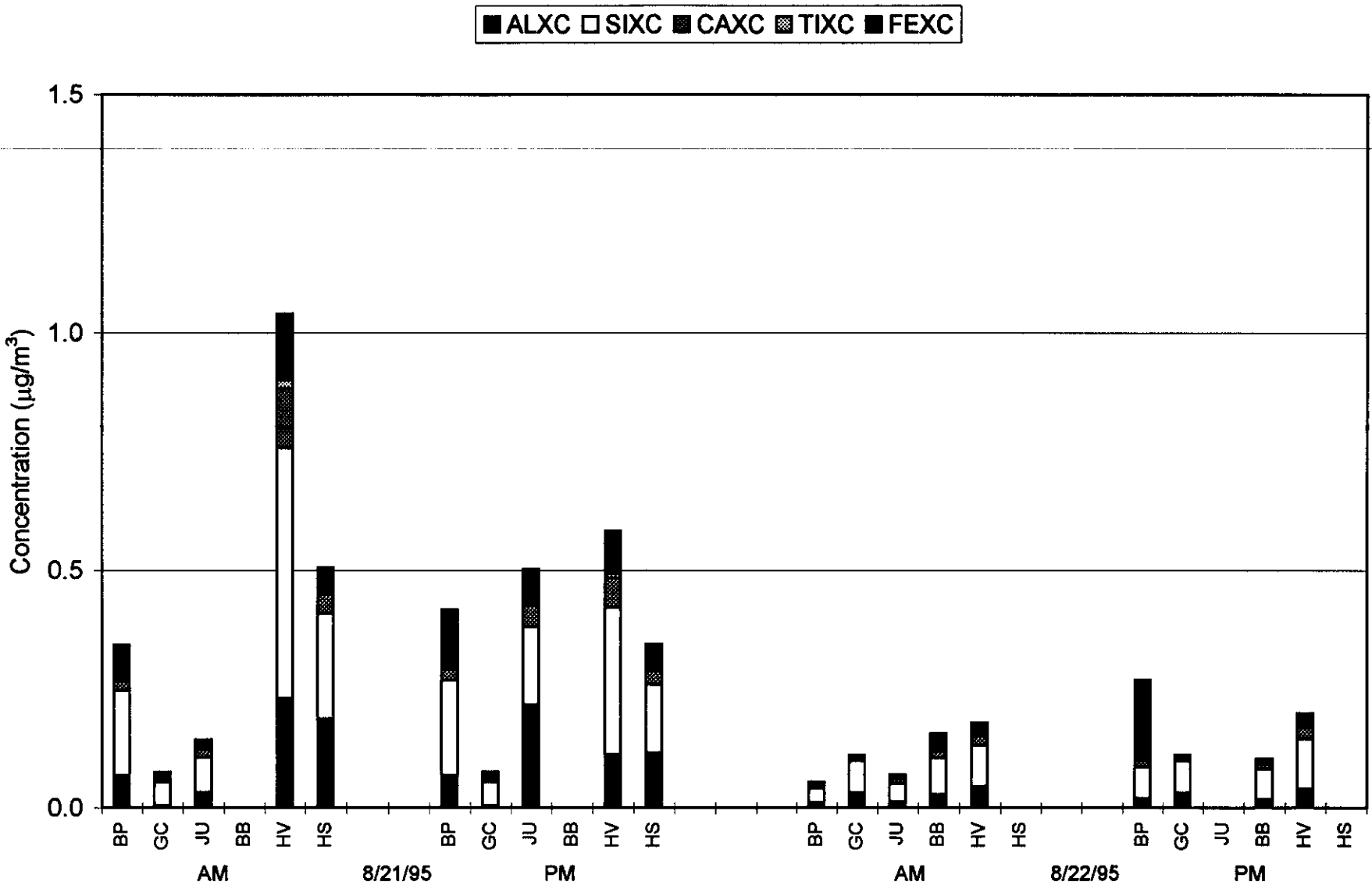


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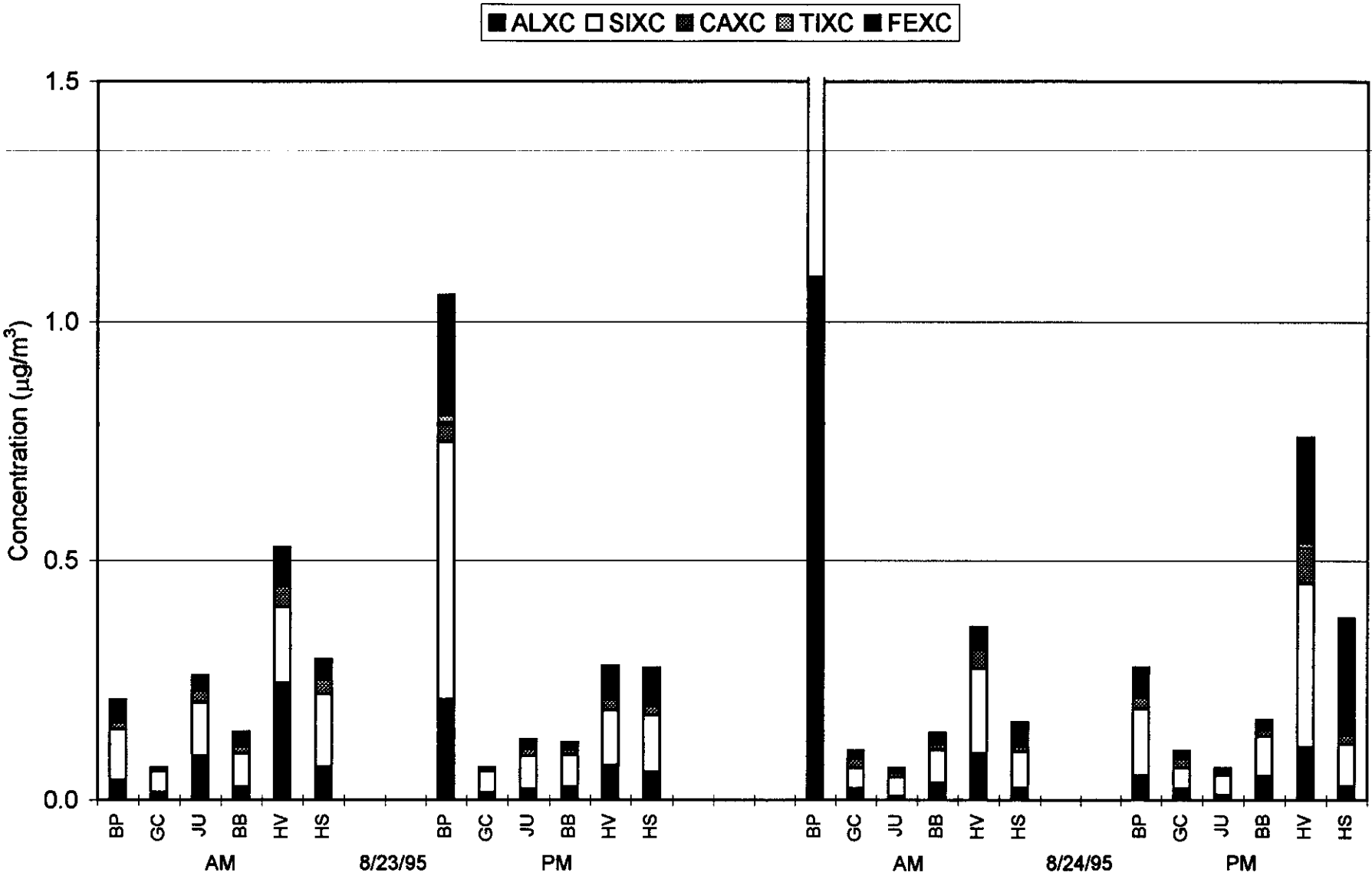


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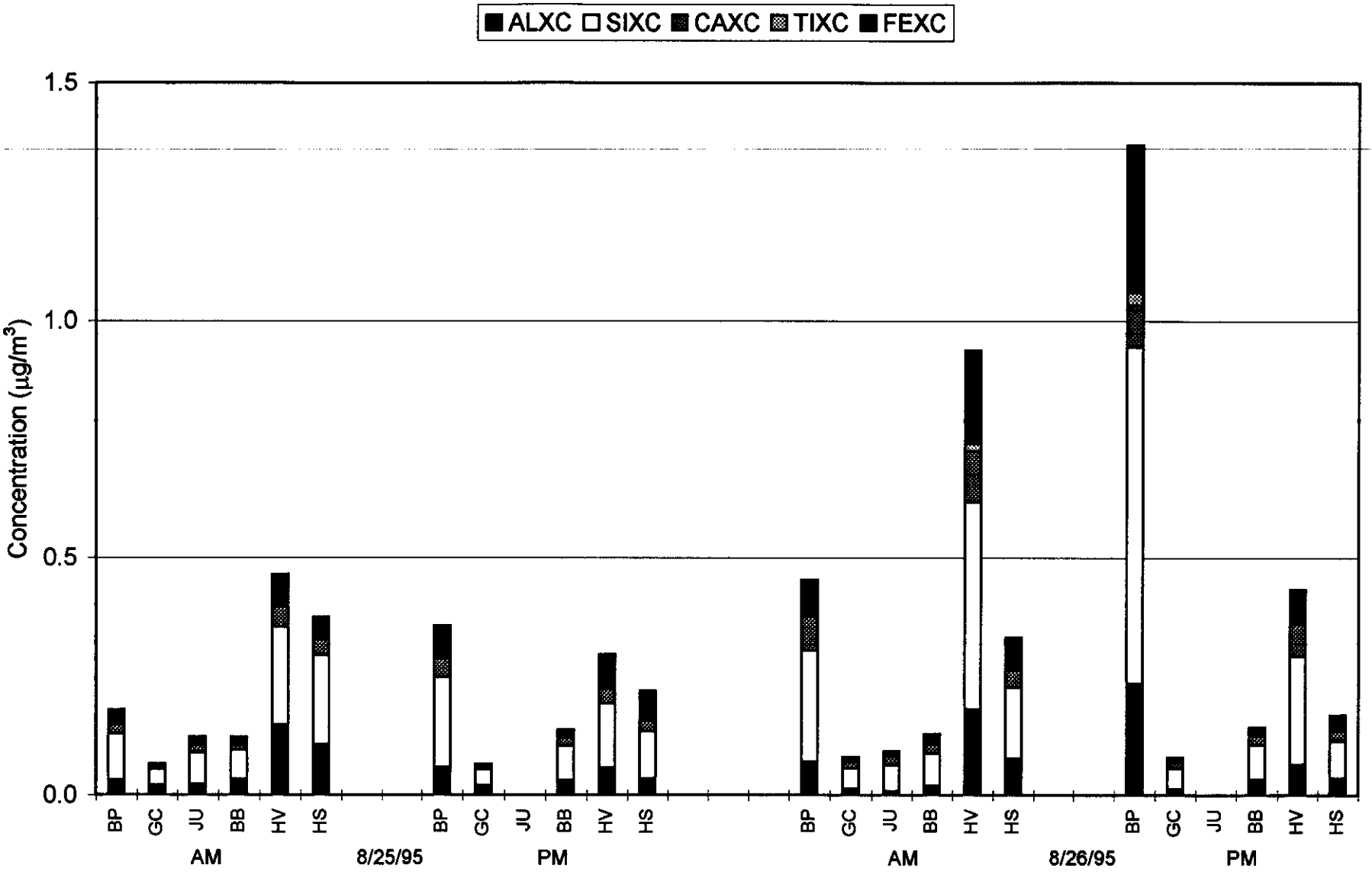


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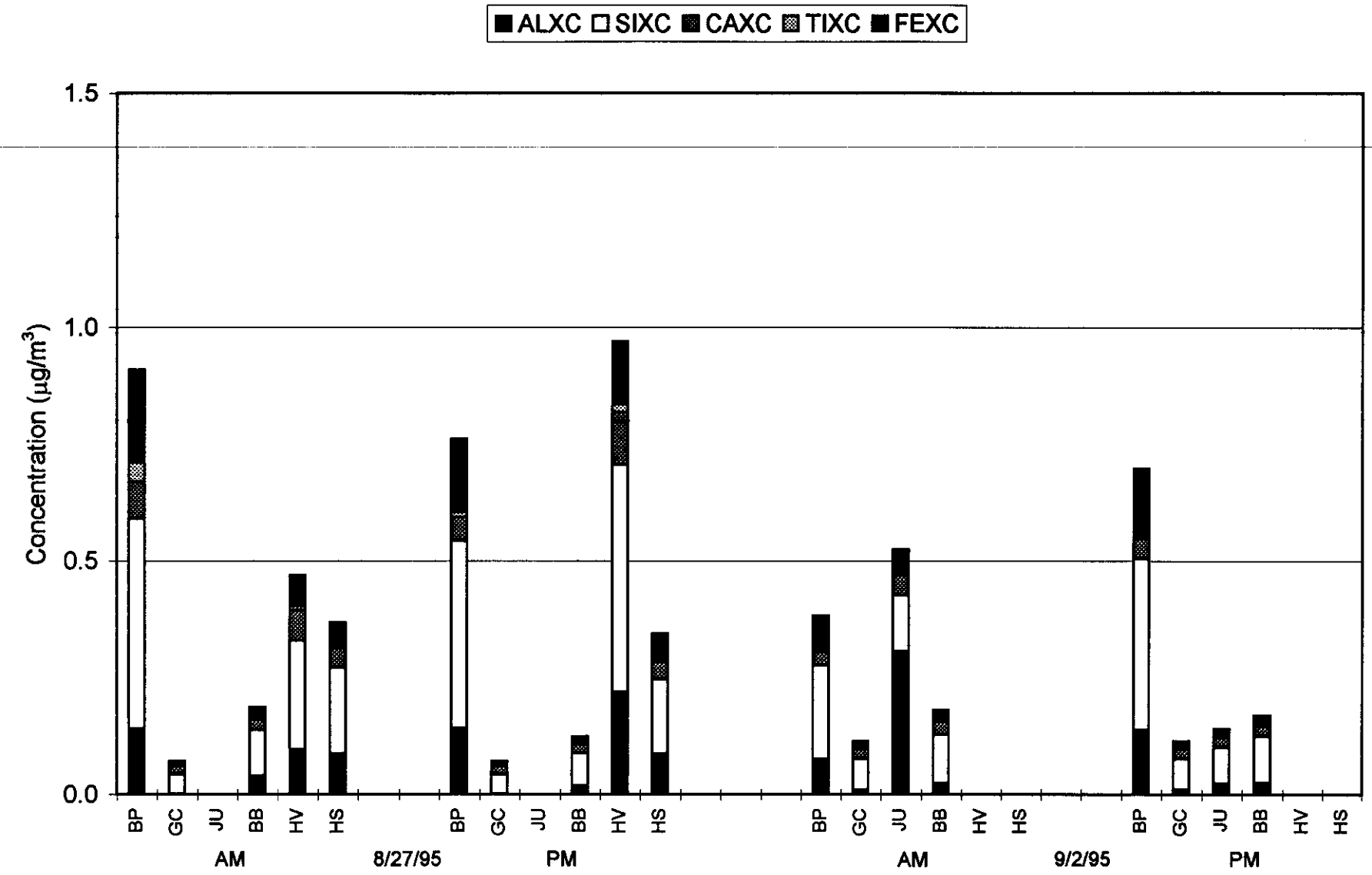


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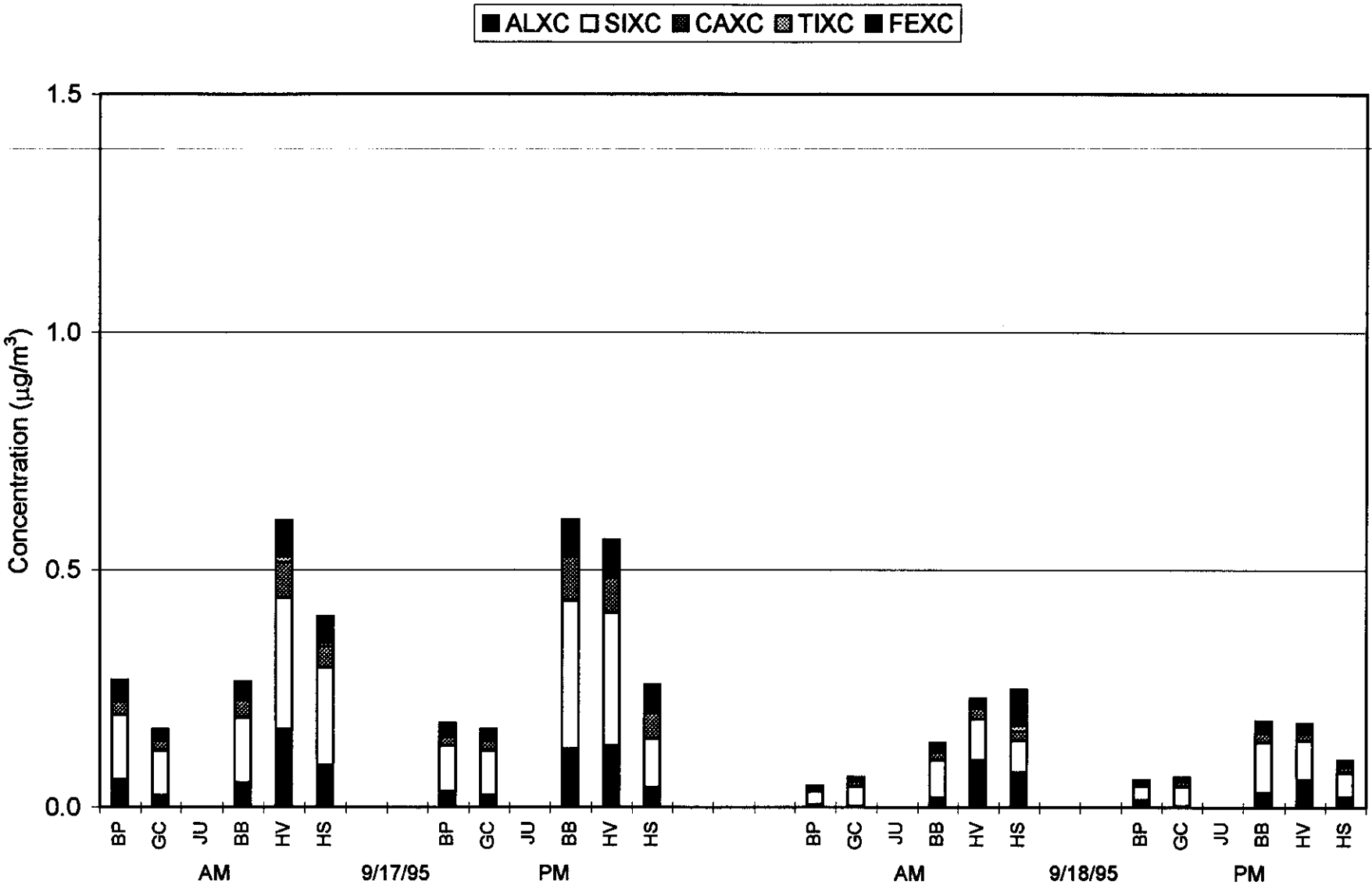


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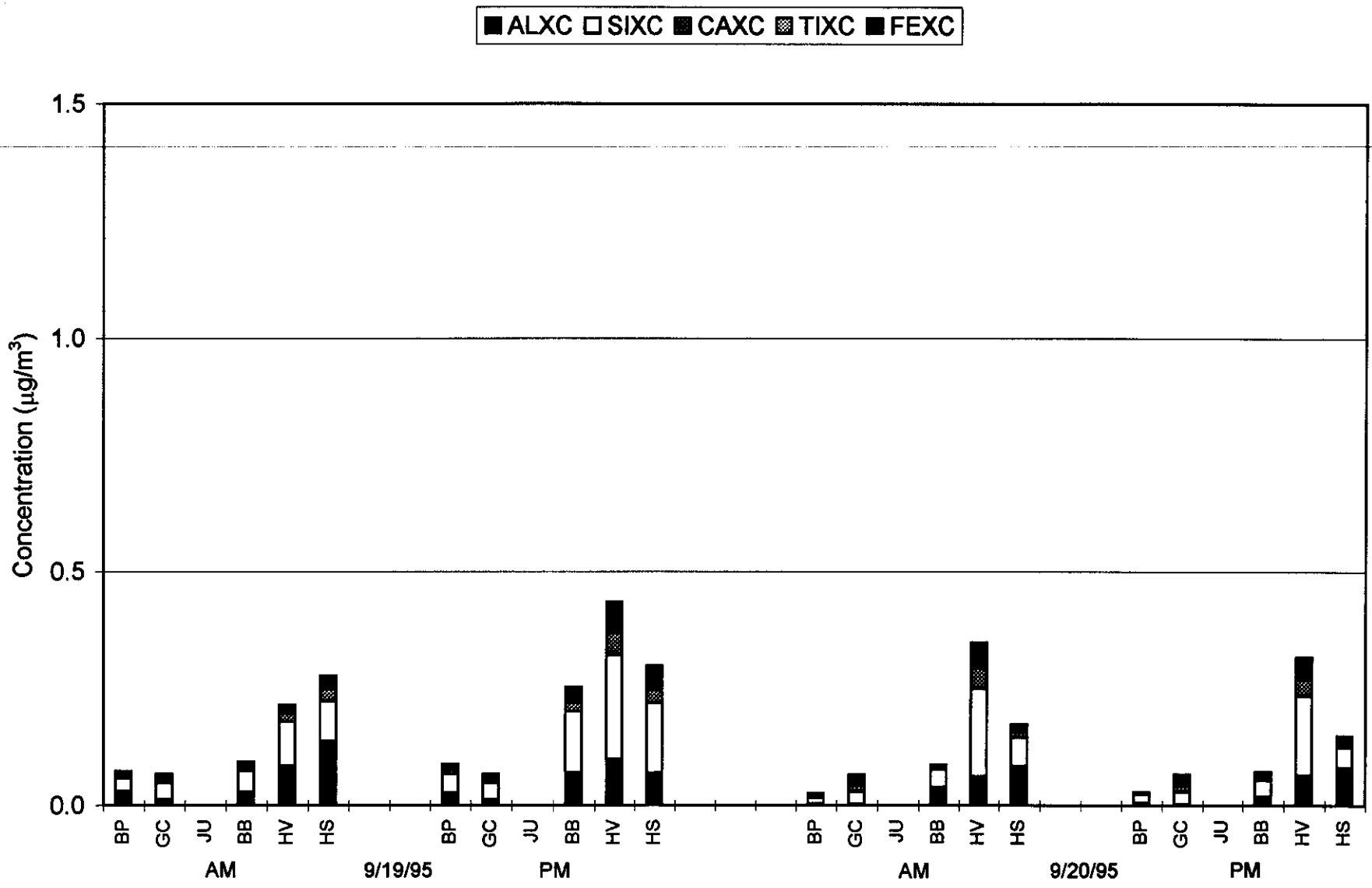


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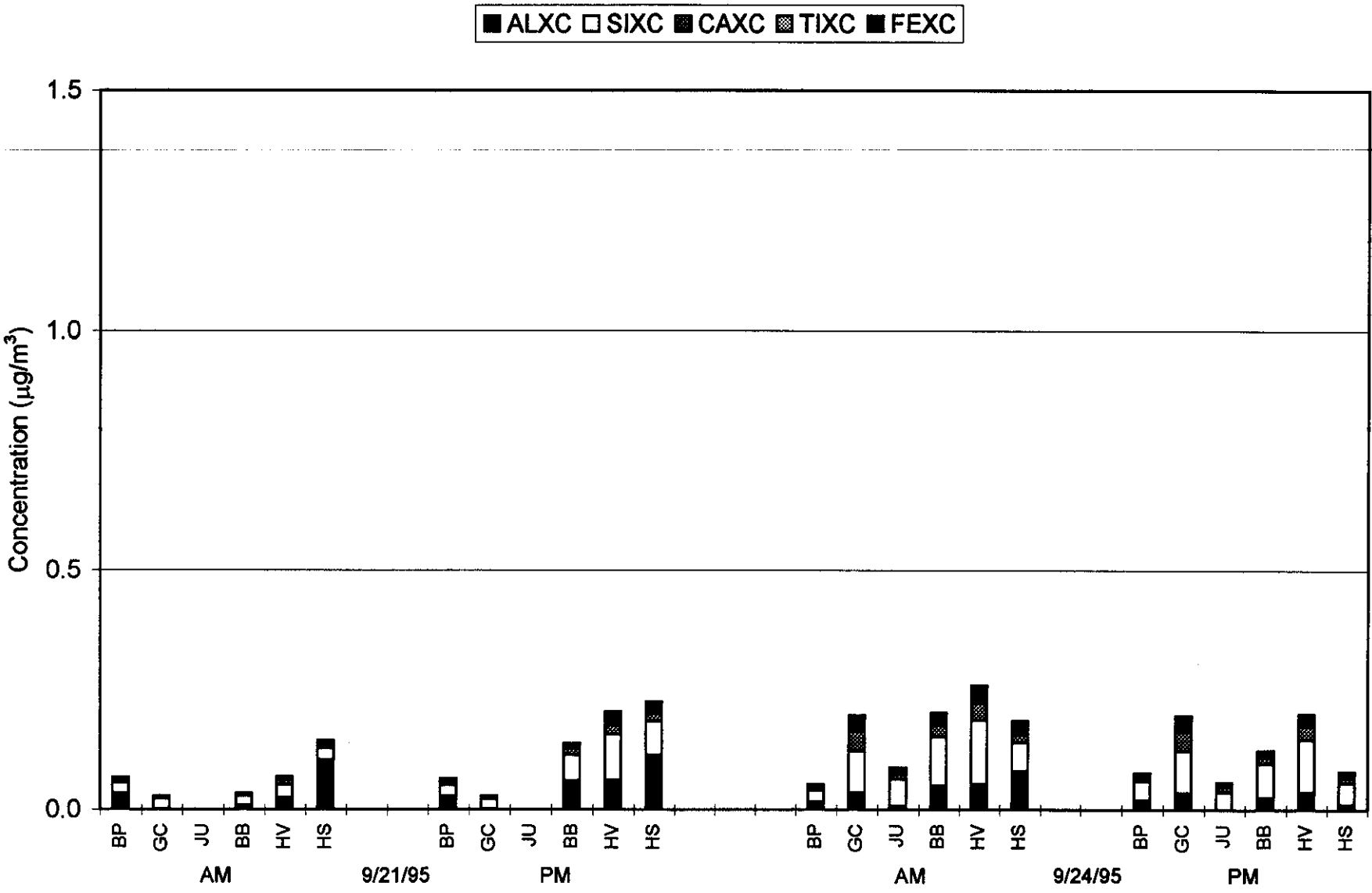


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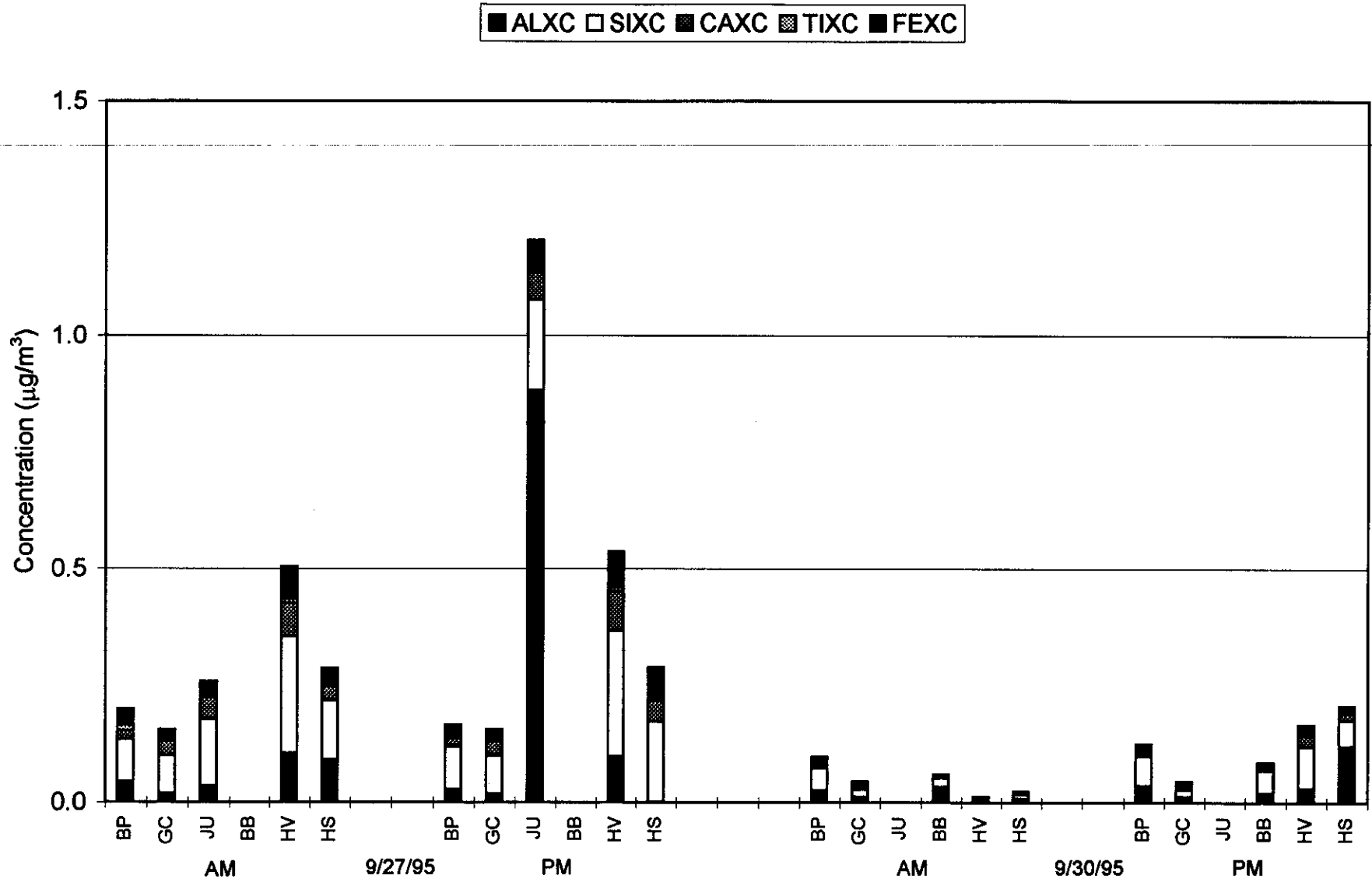


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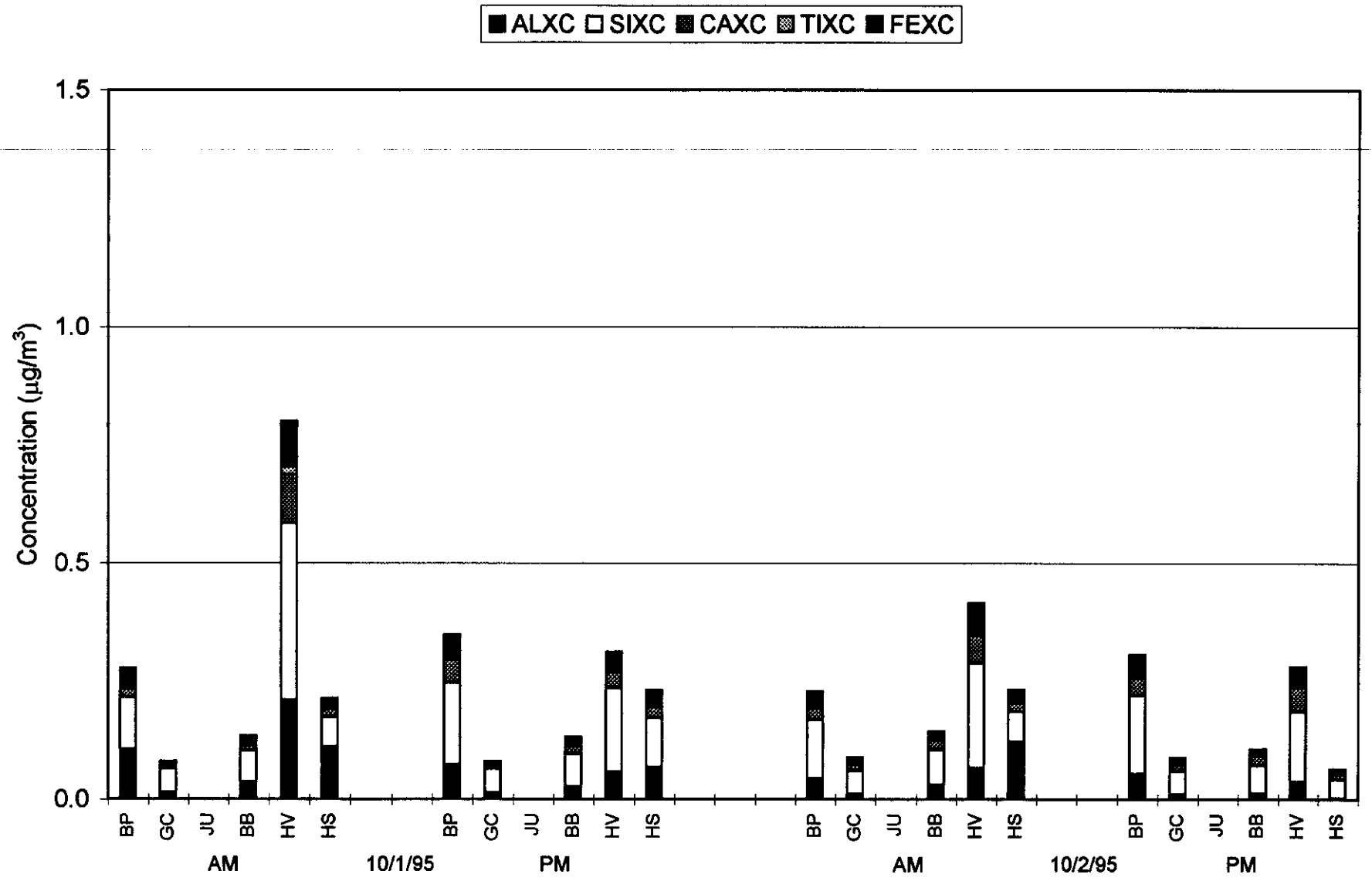


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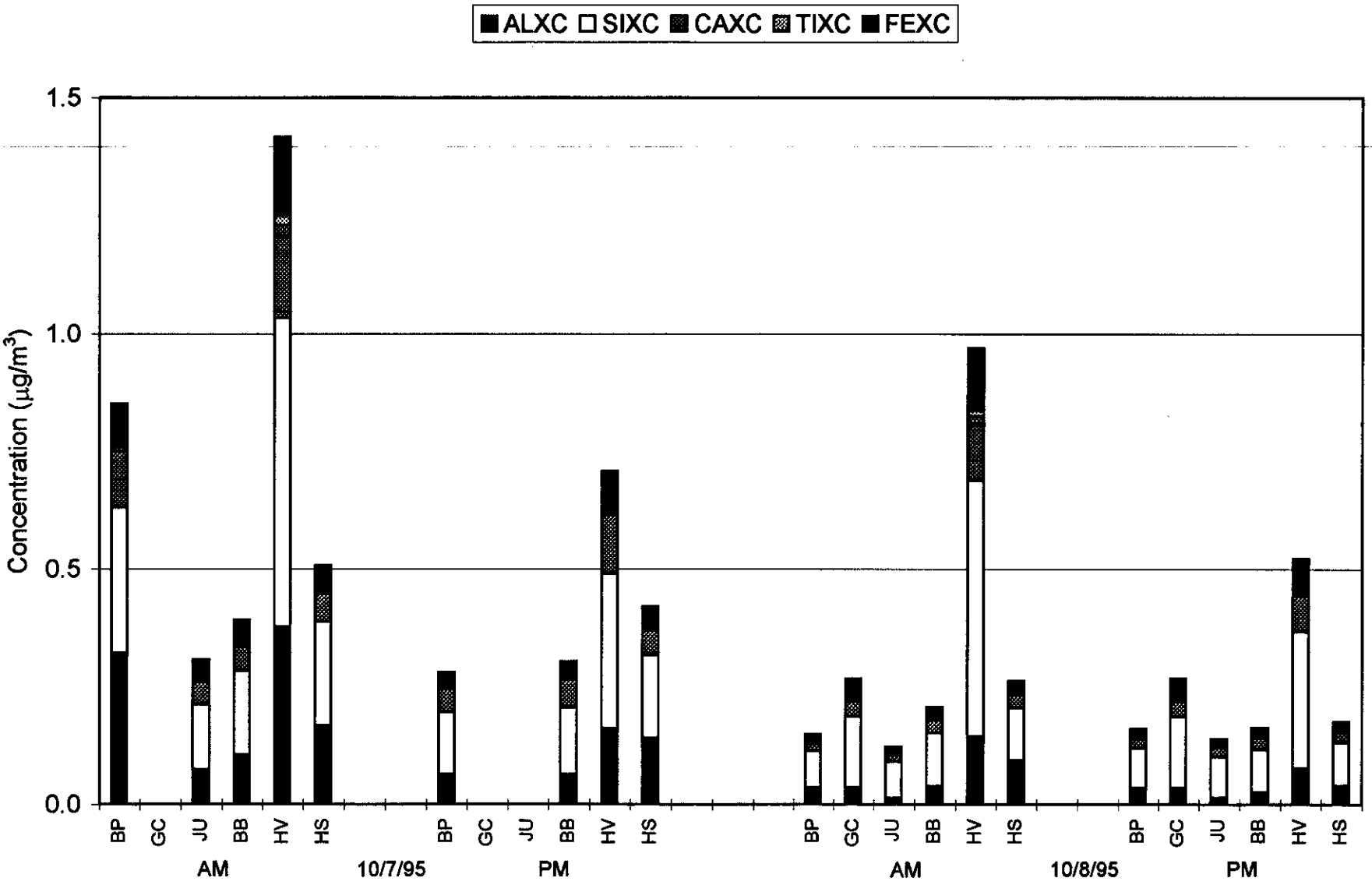


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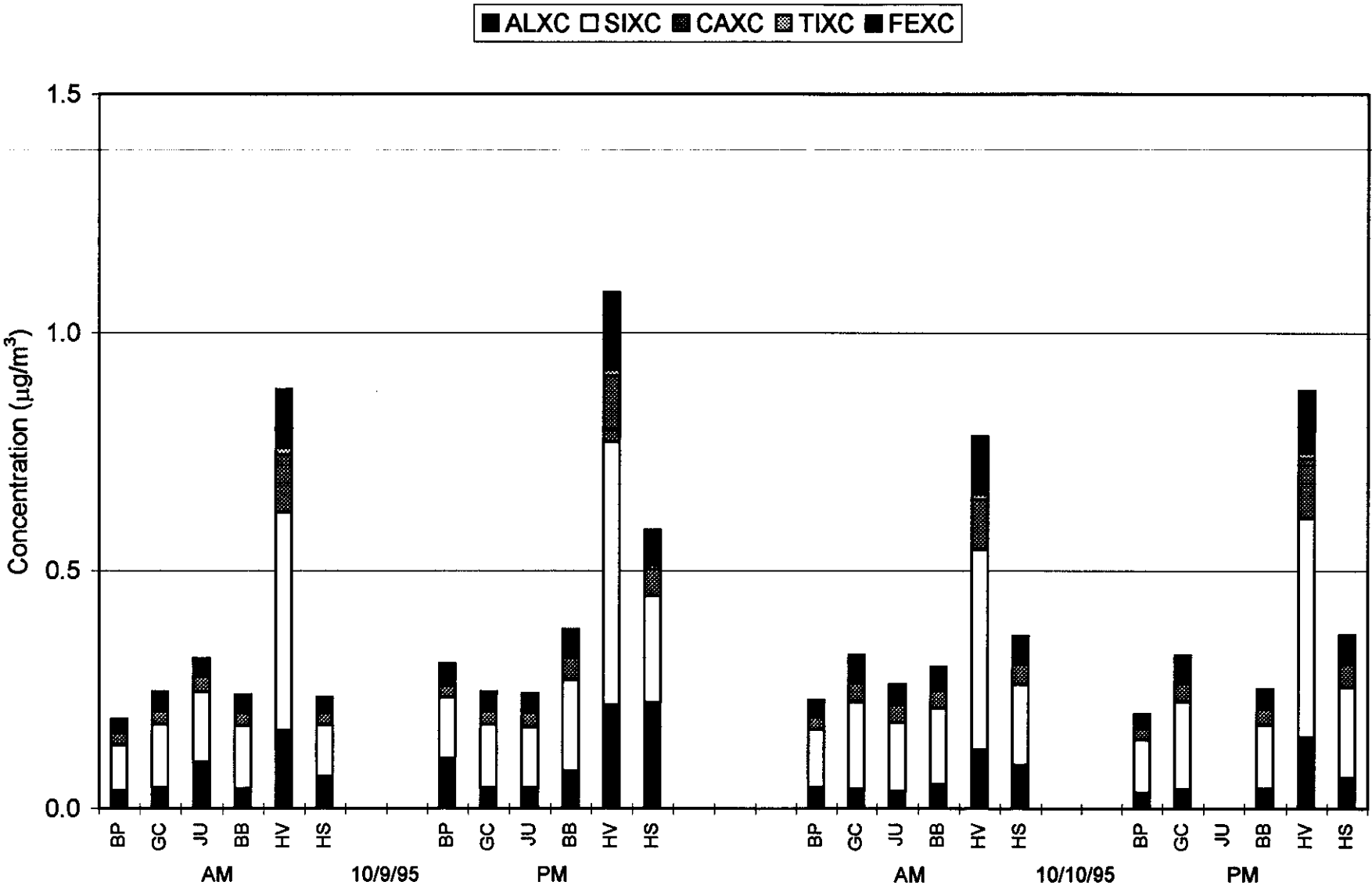


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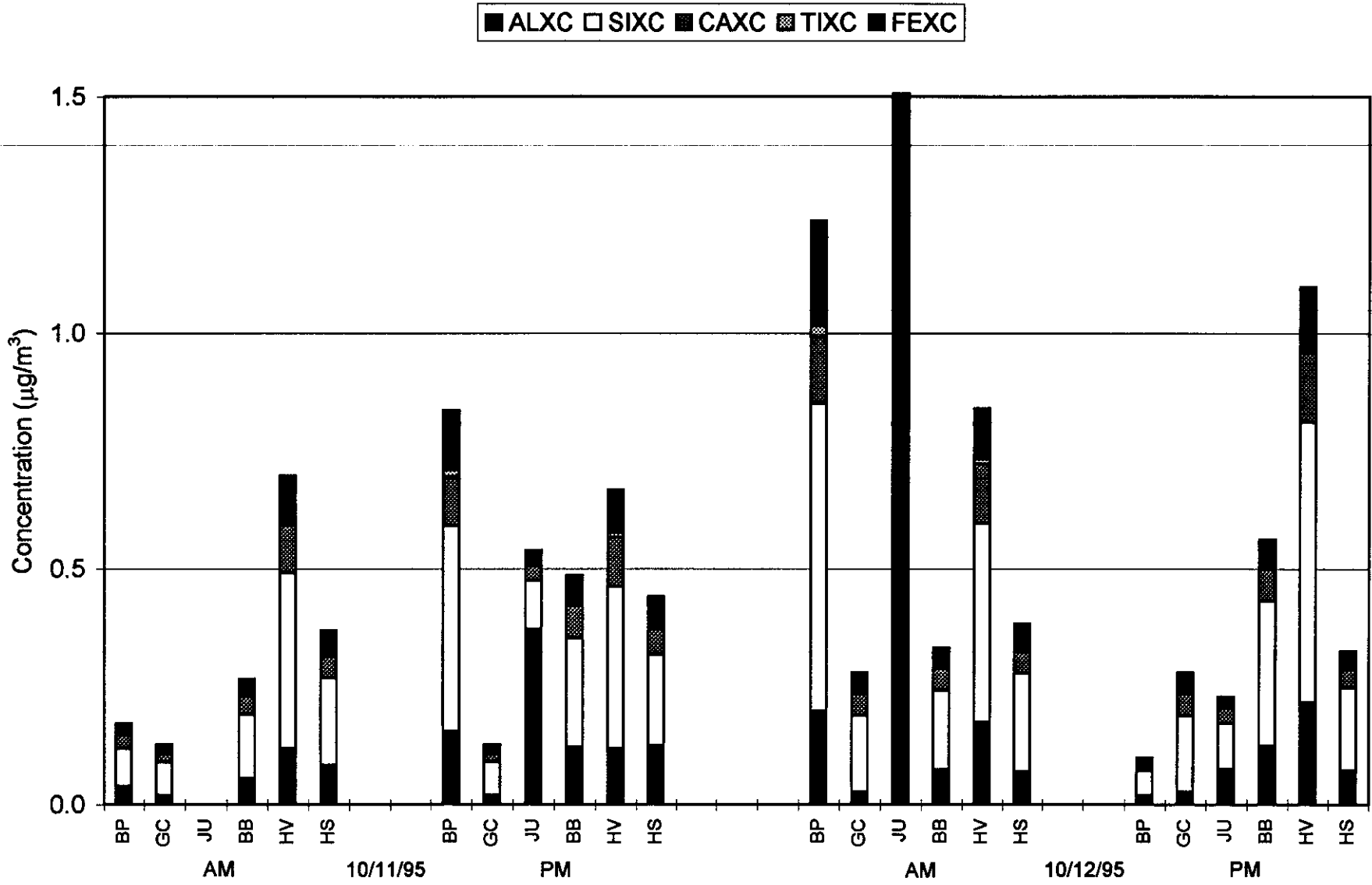


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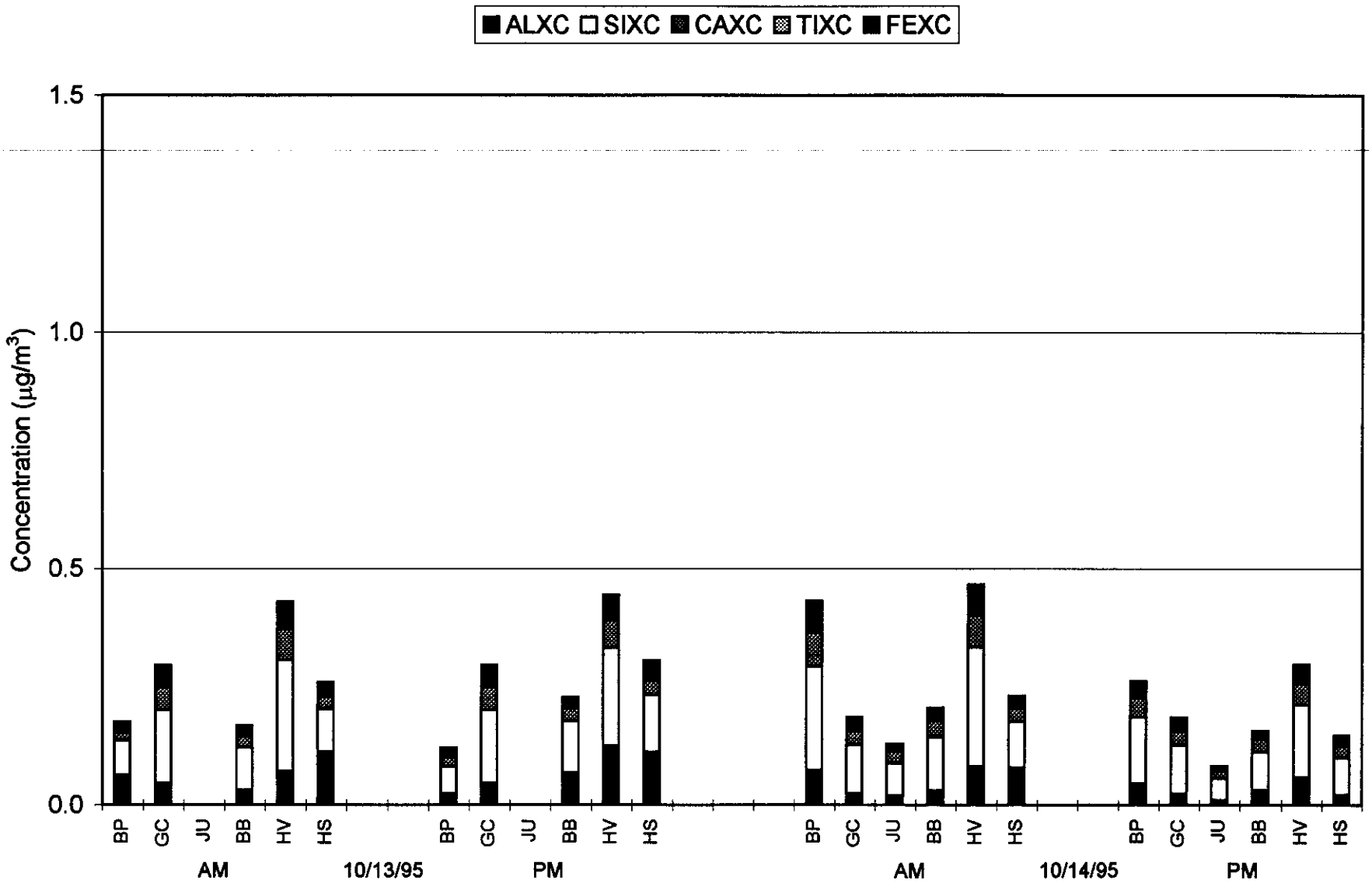


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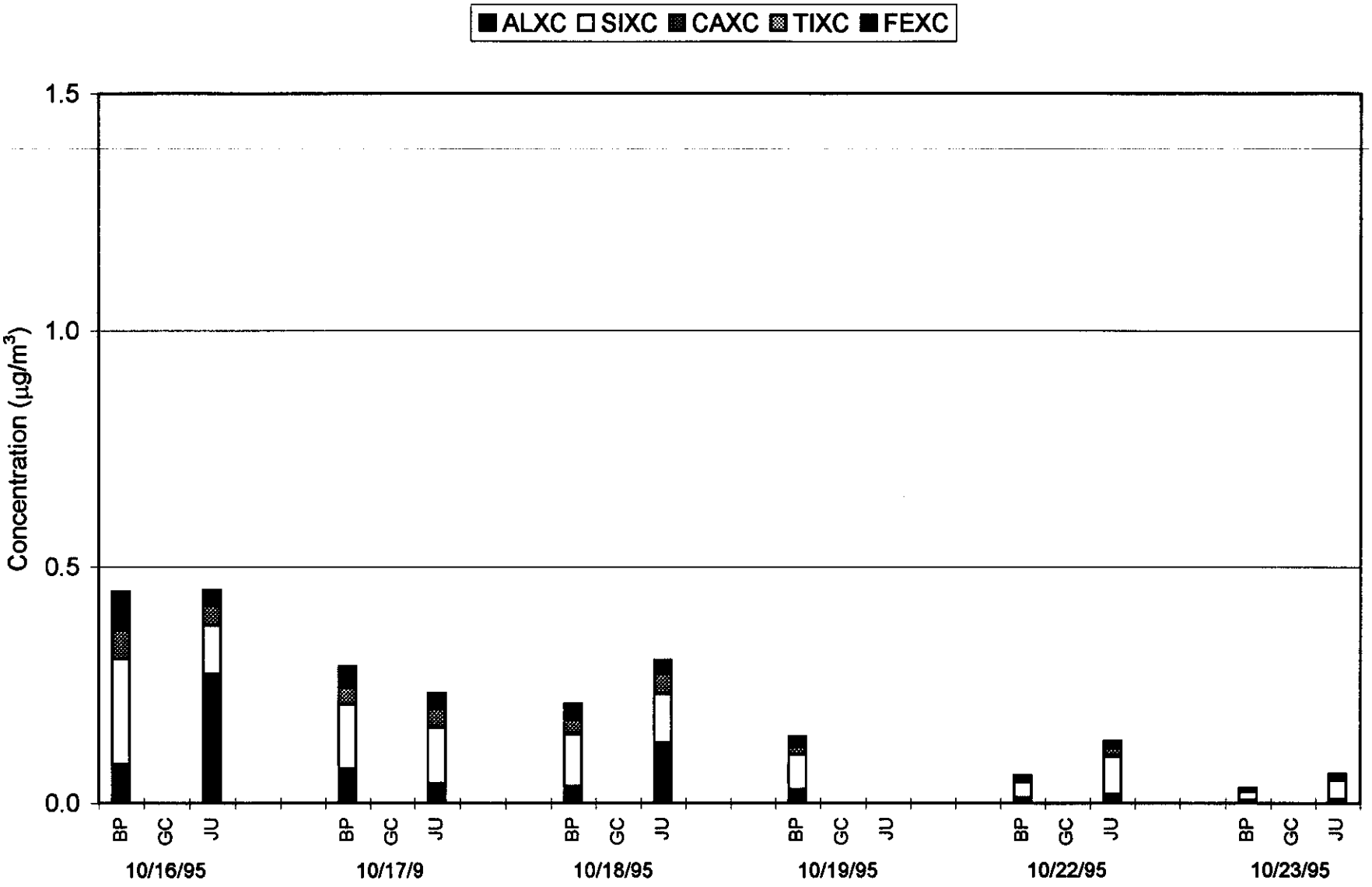


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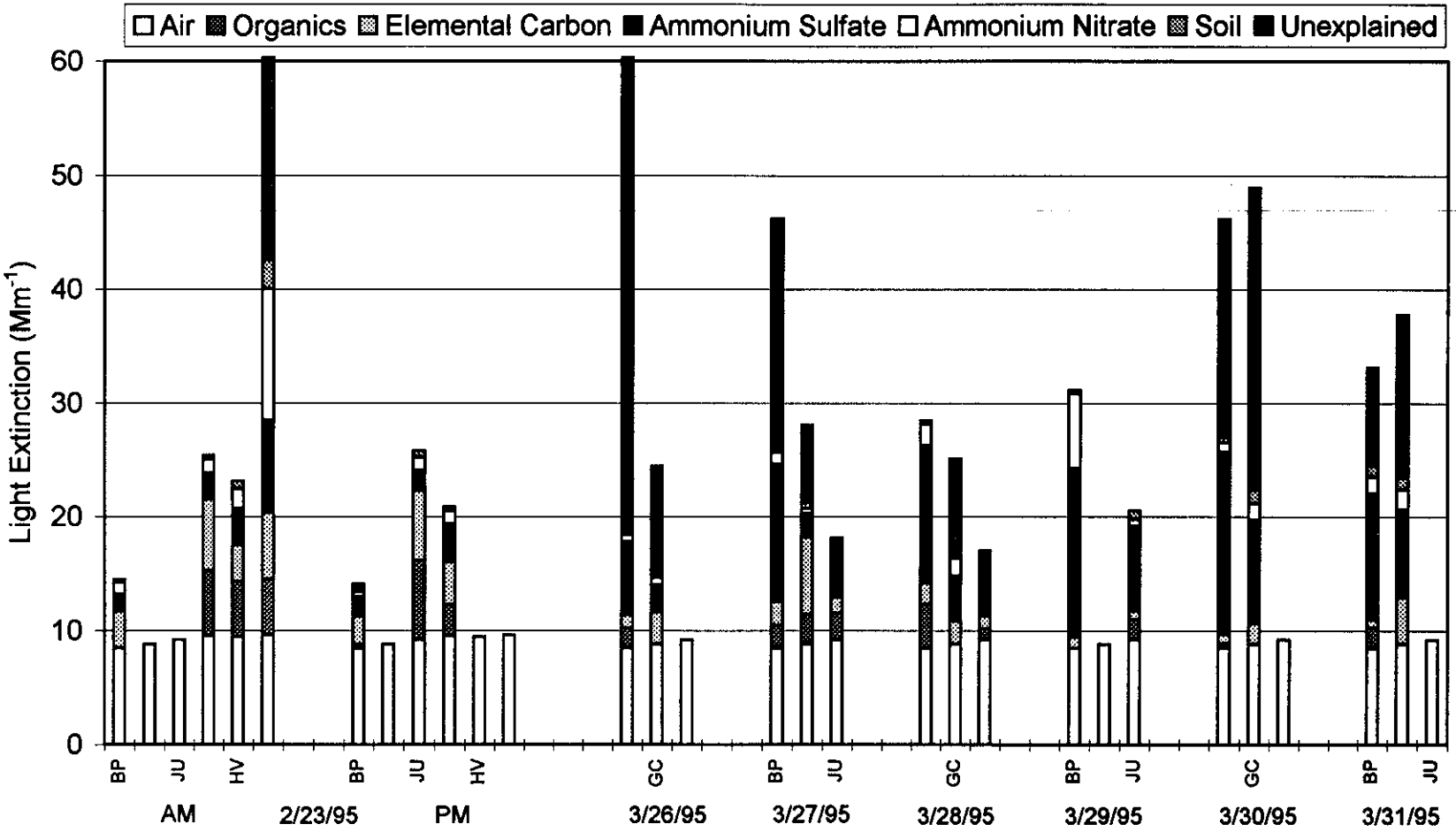


Figure E.4. Time series plots of component contributions to light extinction between 2/23/95 and 10/23/95 at all six sites during the Mt. Zirkel Visibility Study

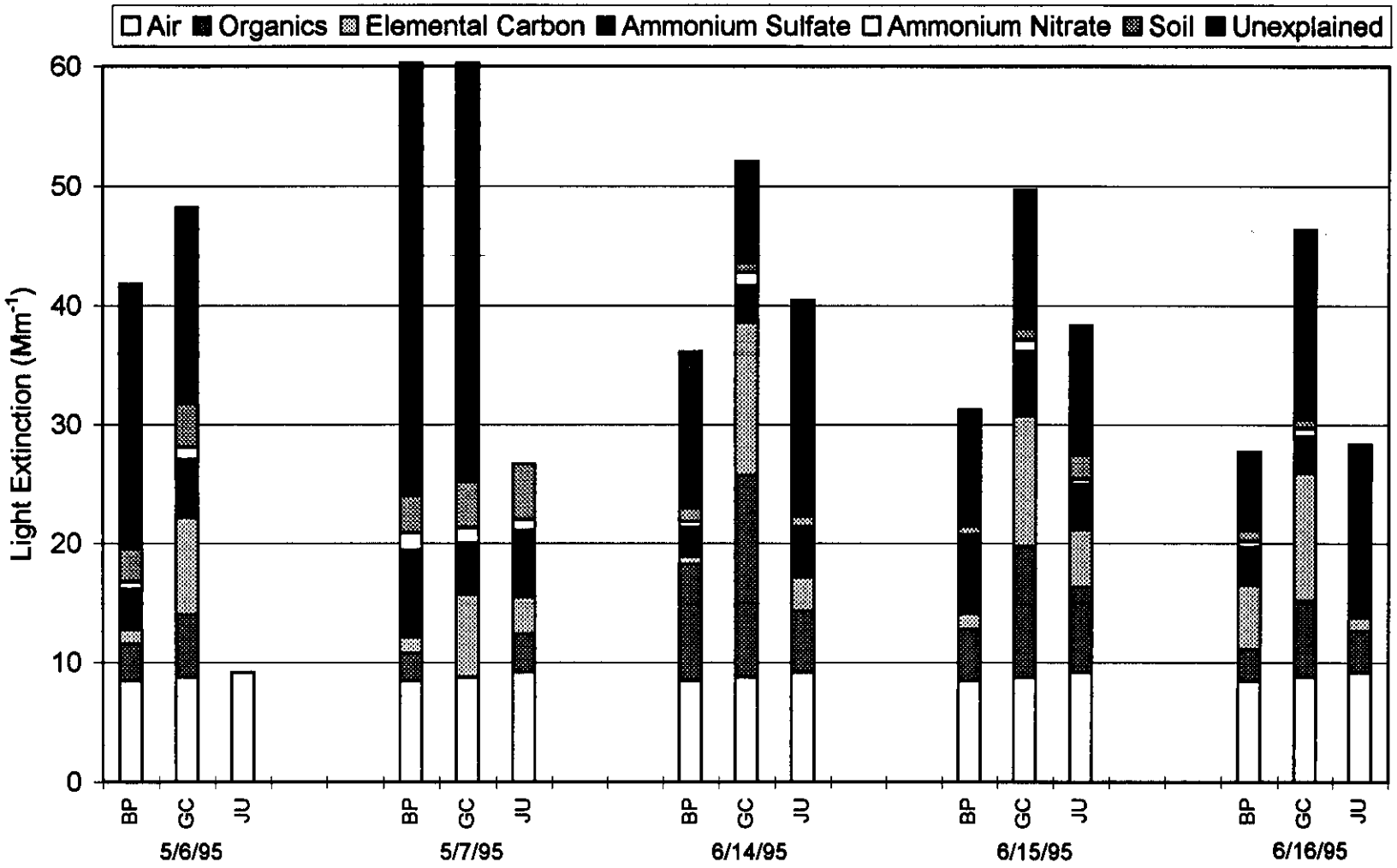


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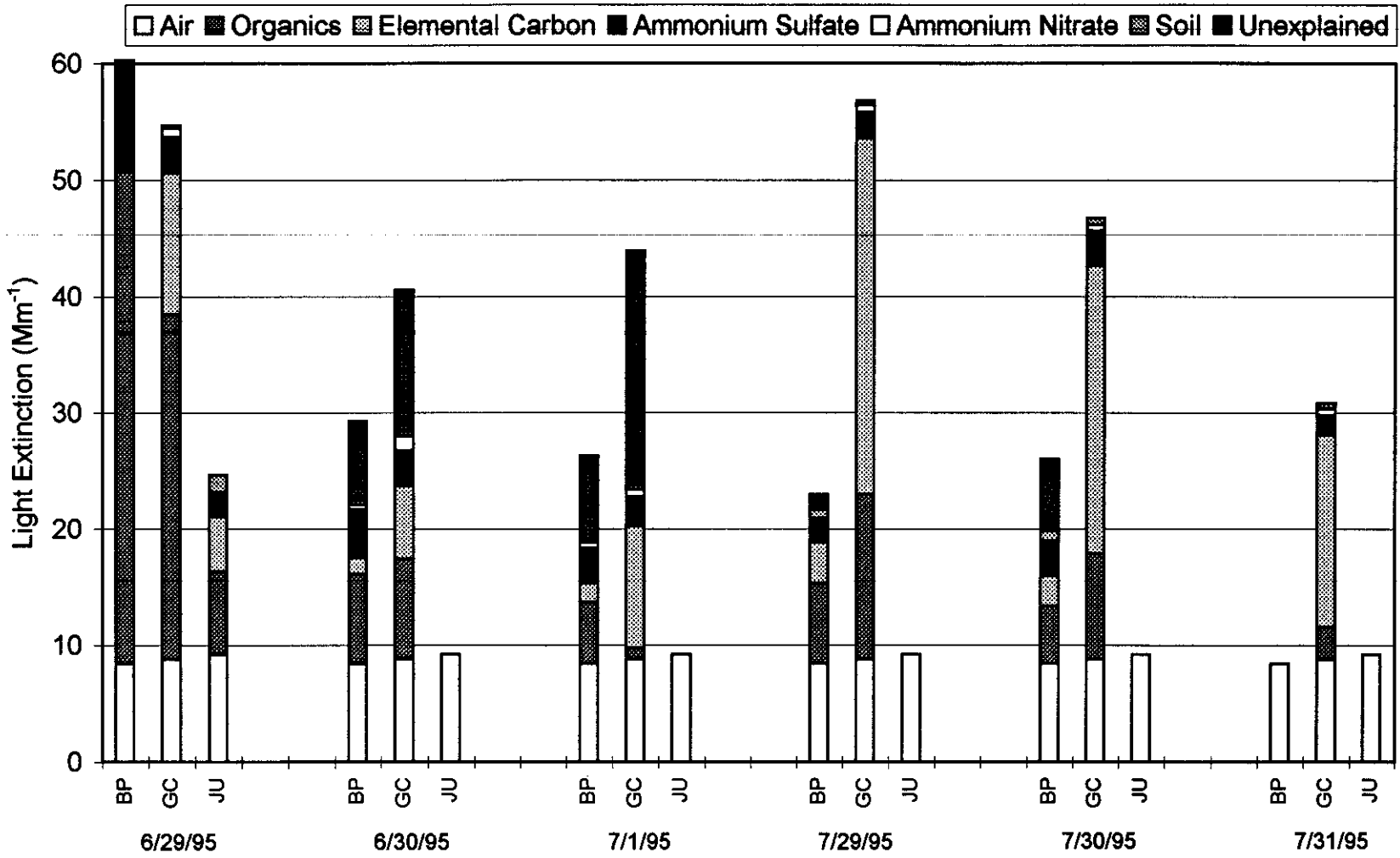


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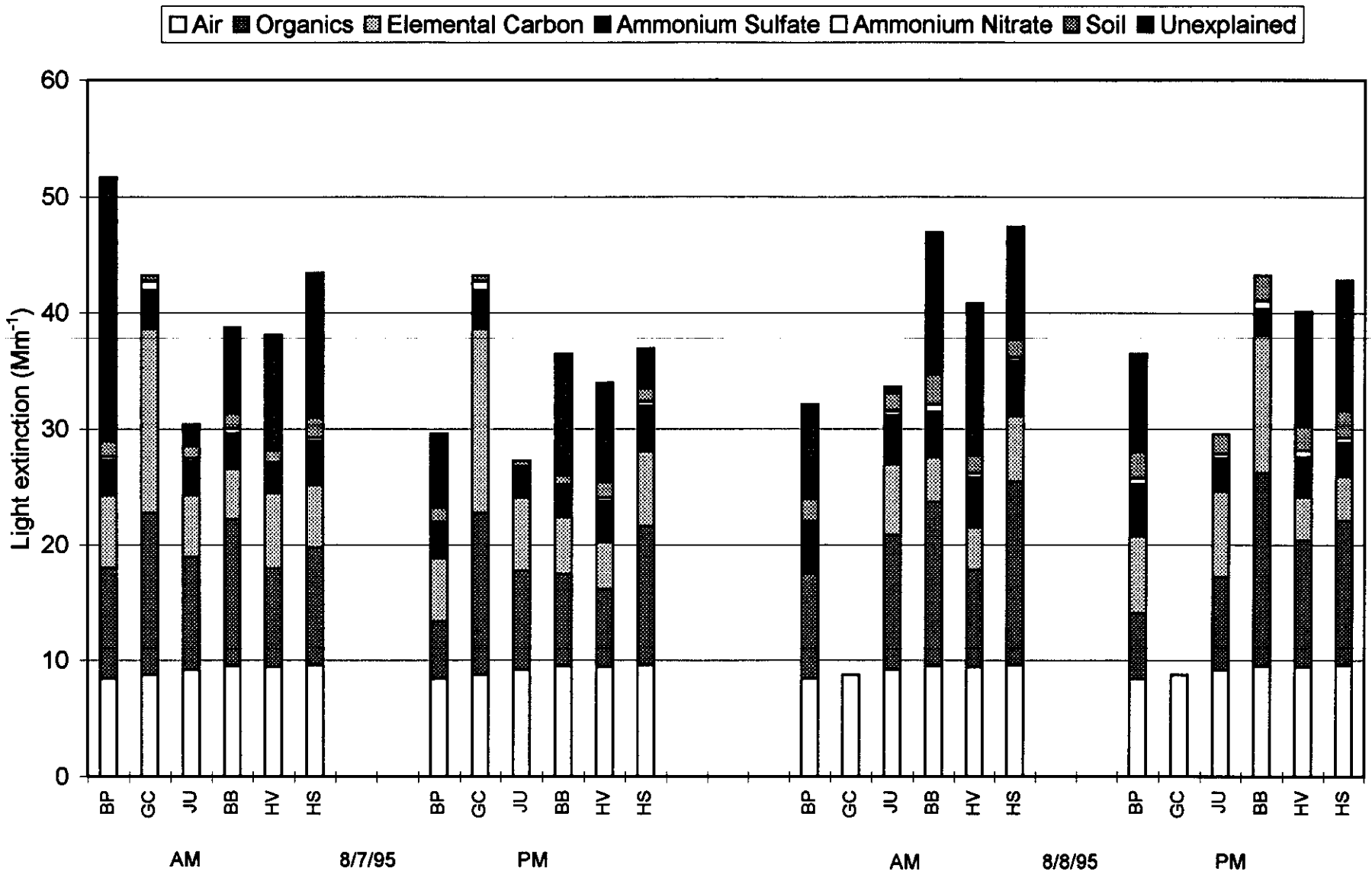


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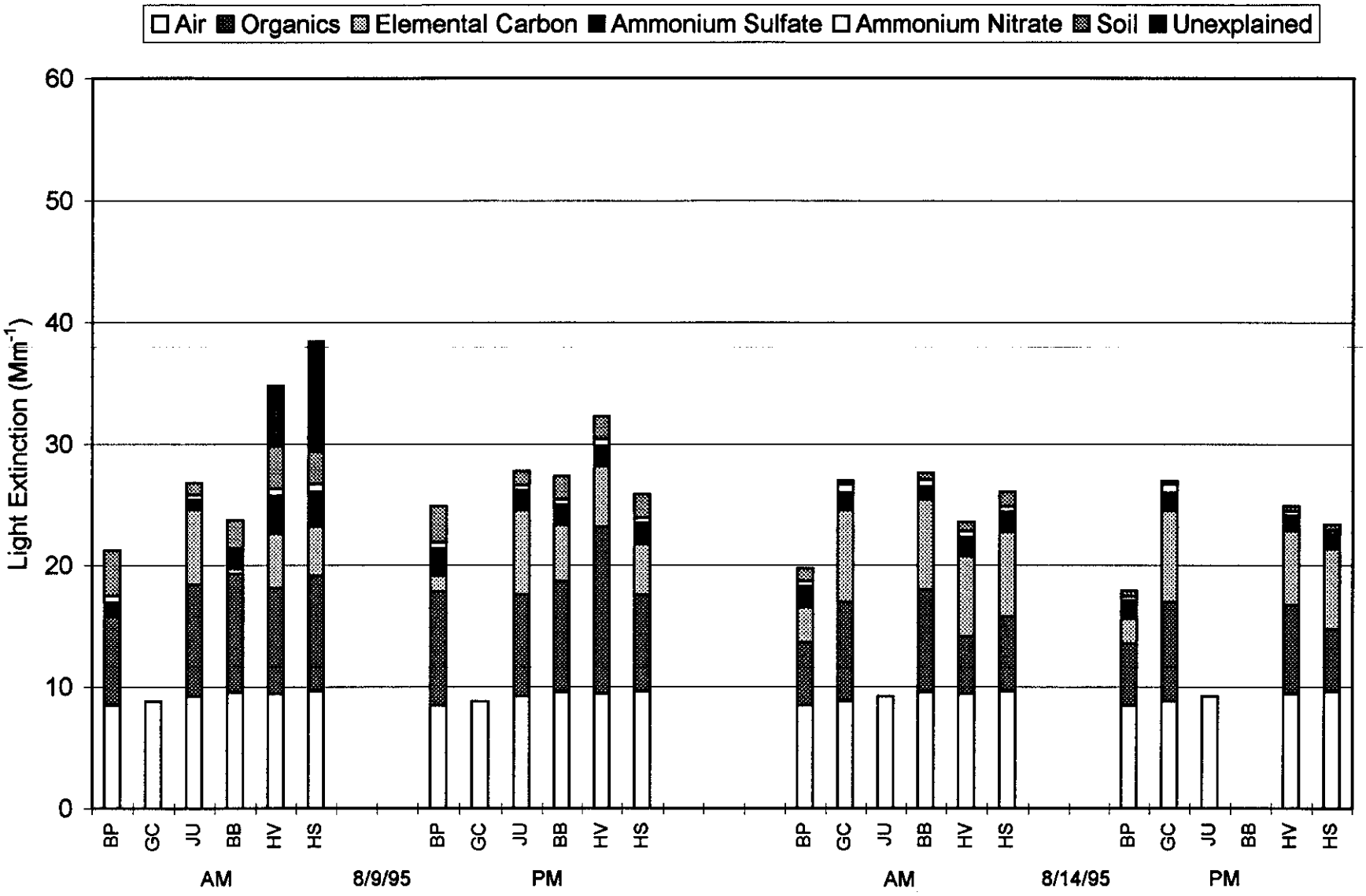


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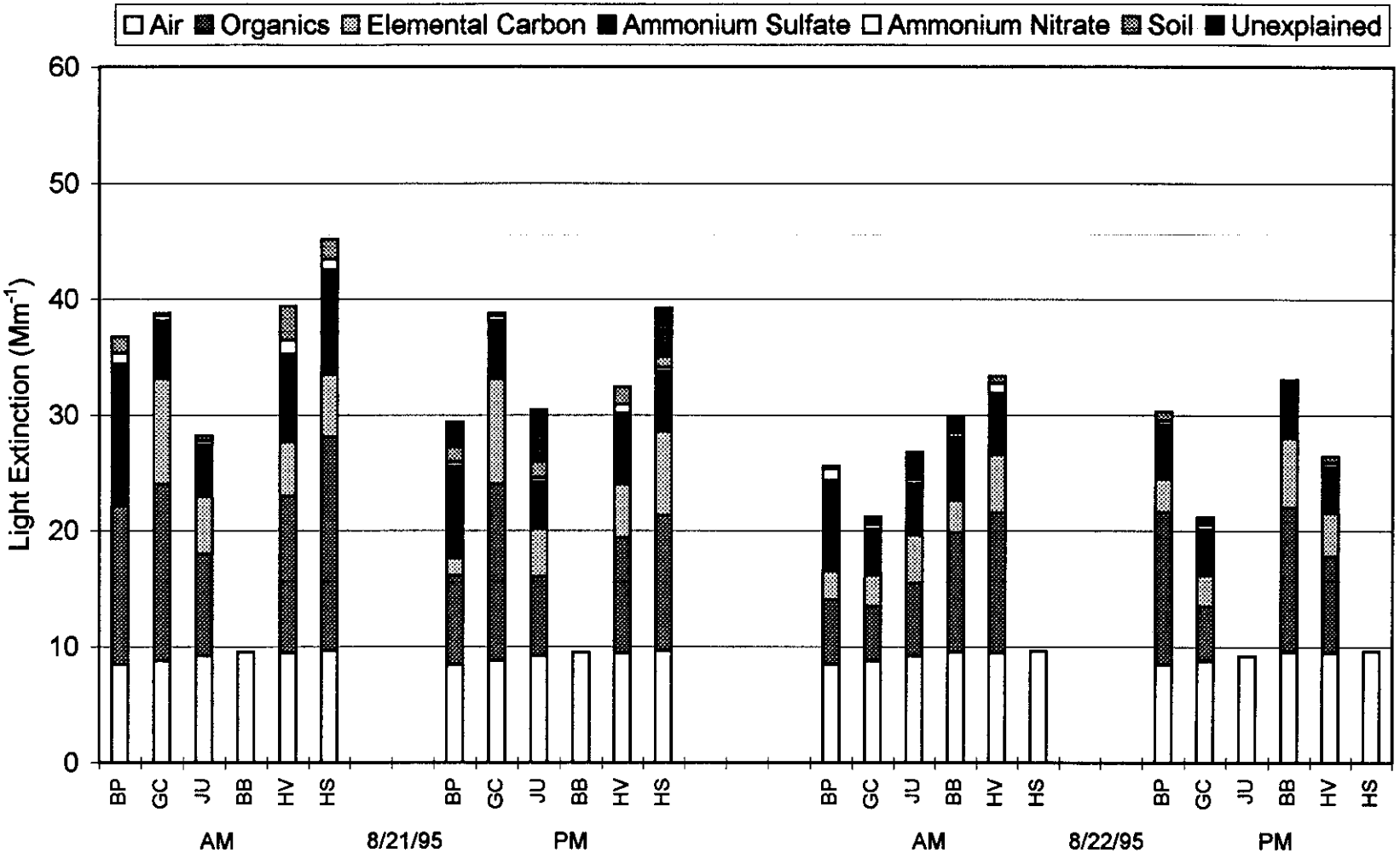


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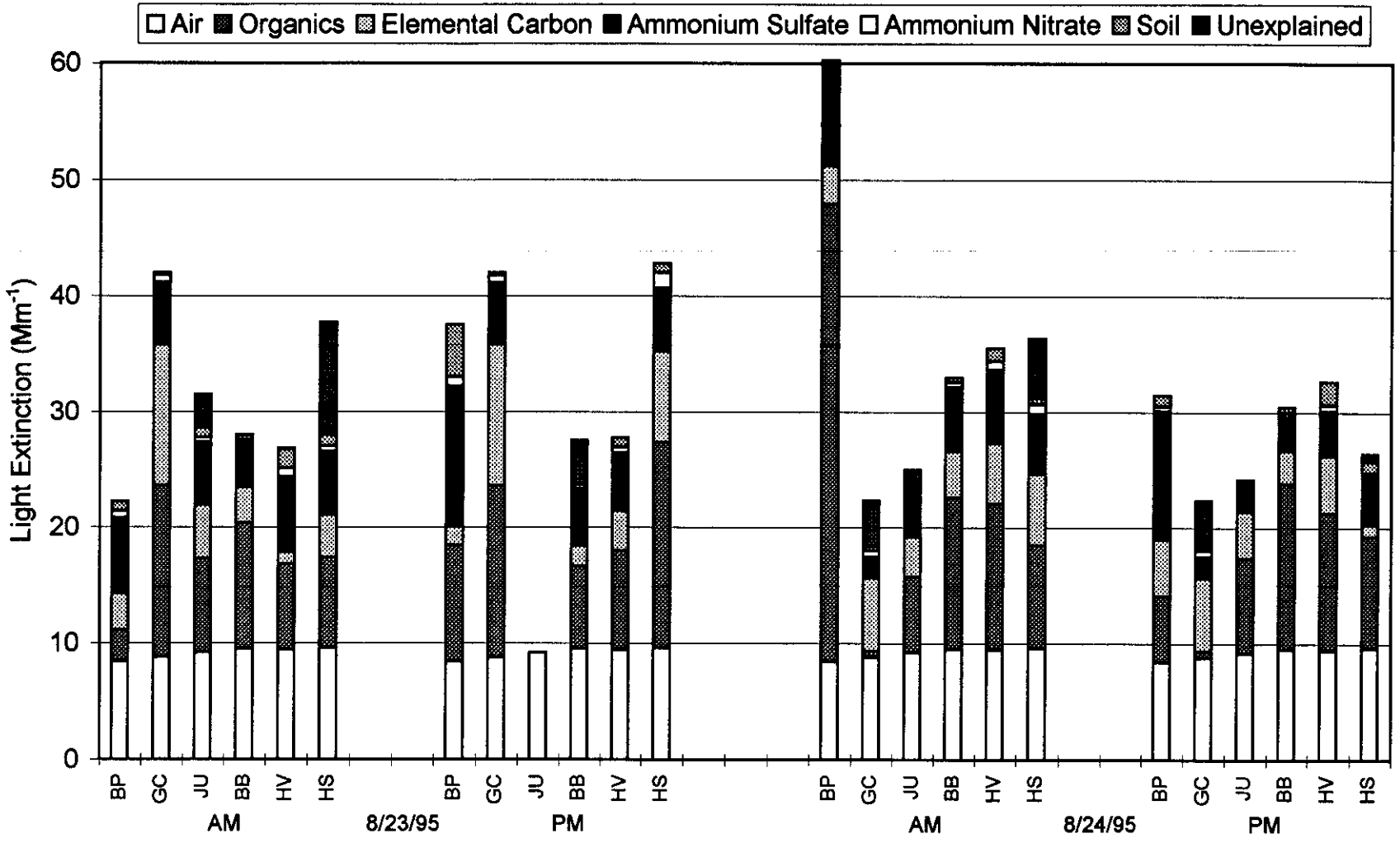


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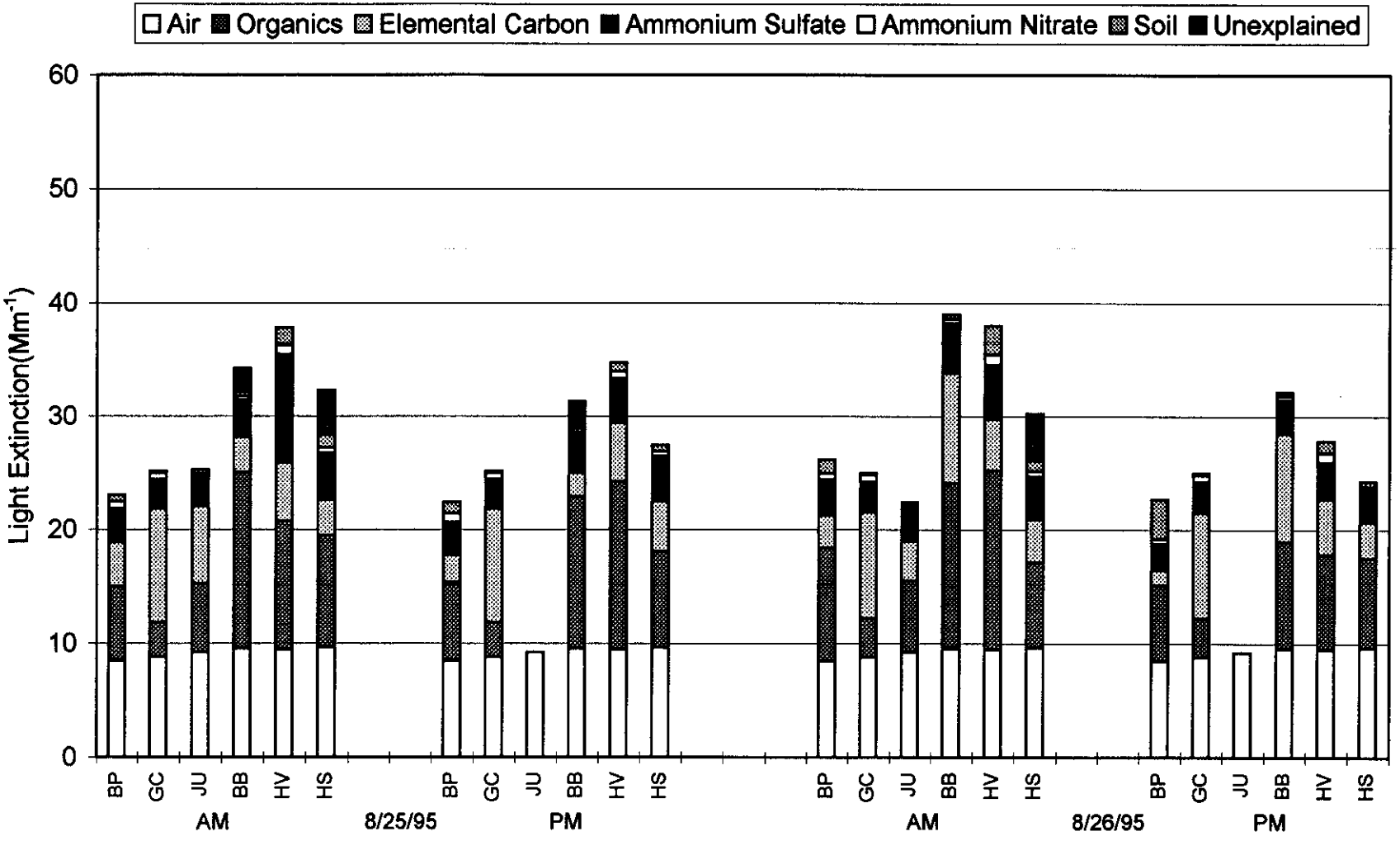


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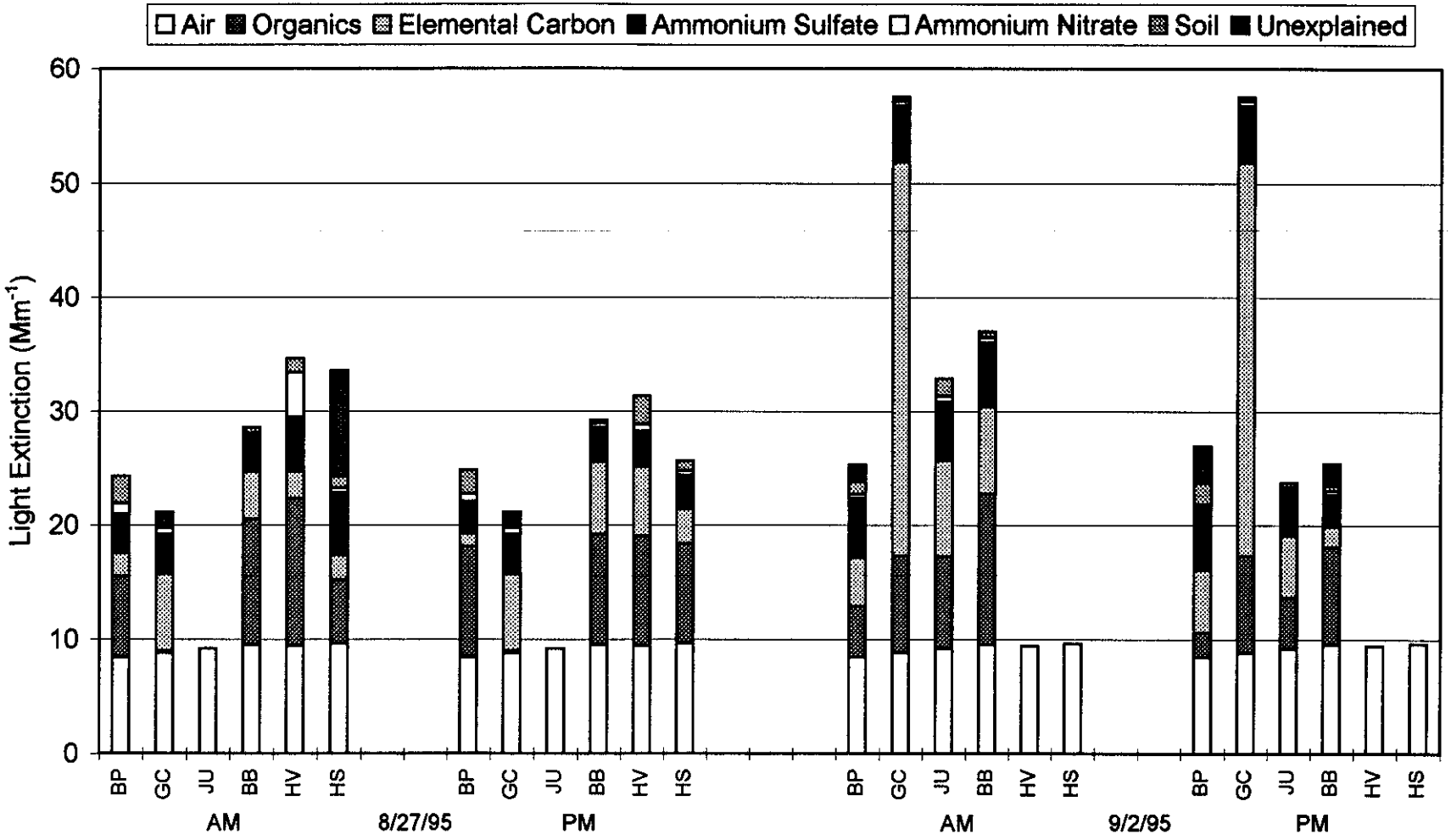


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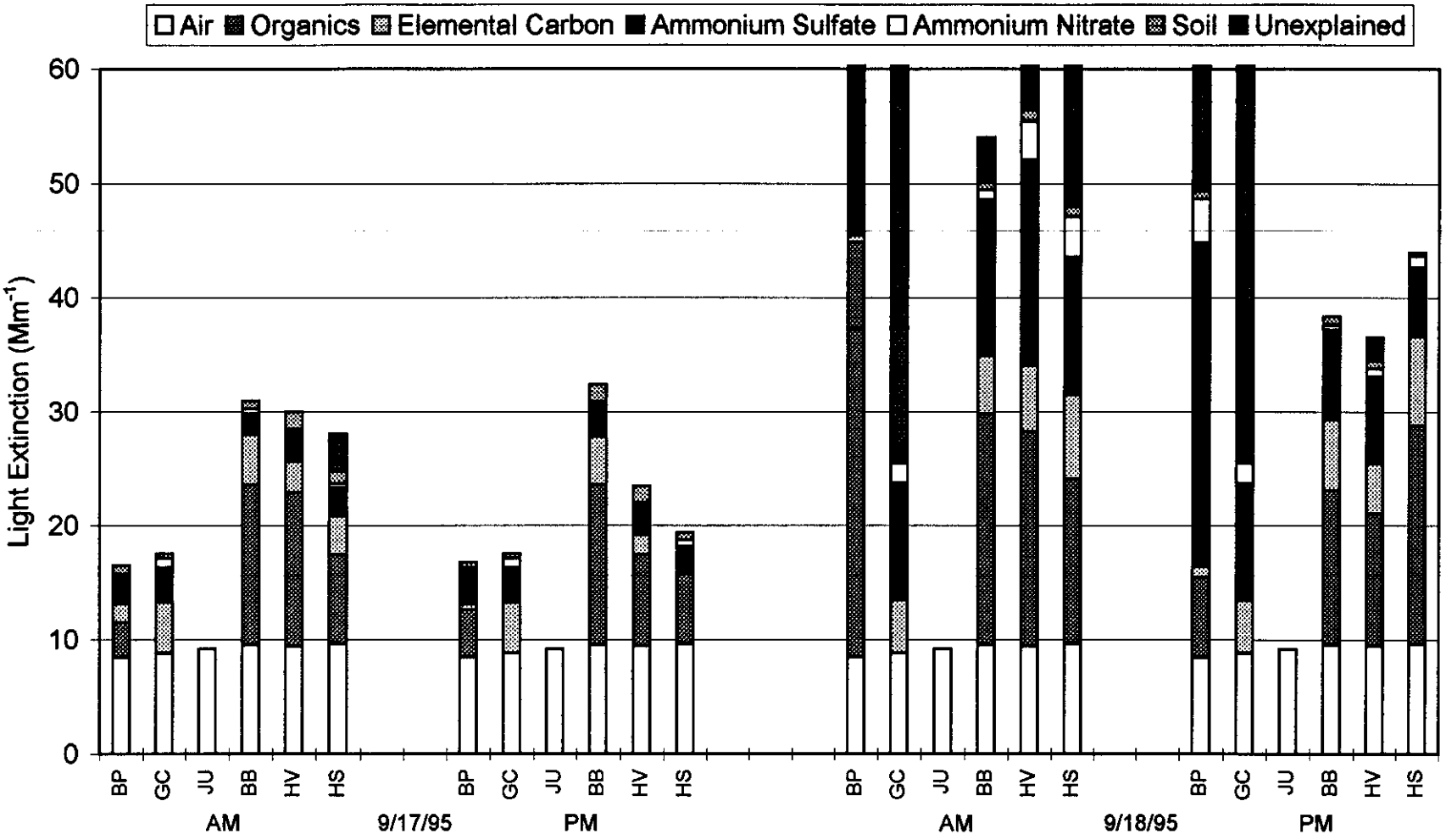


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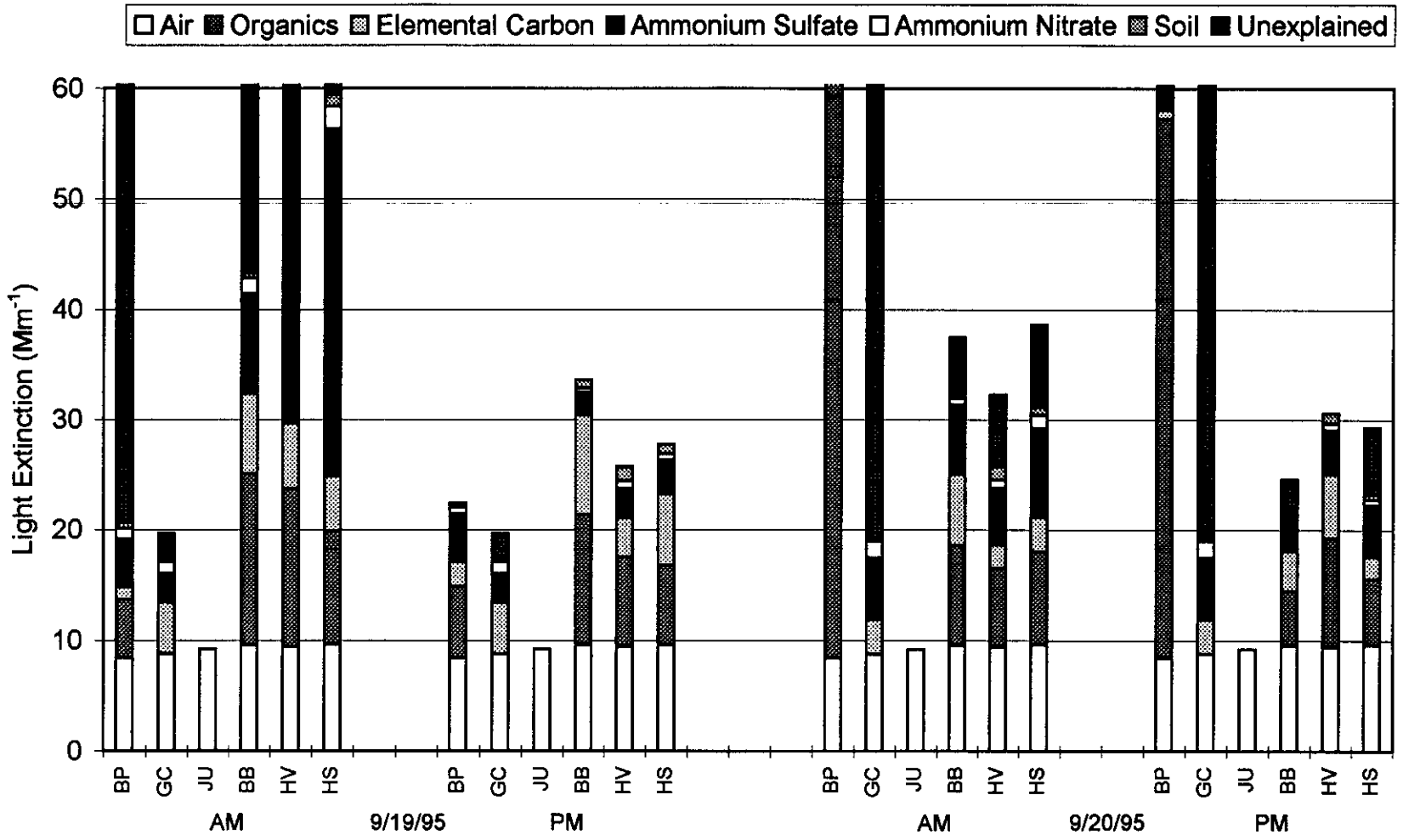


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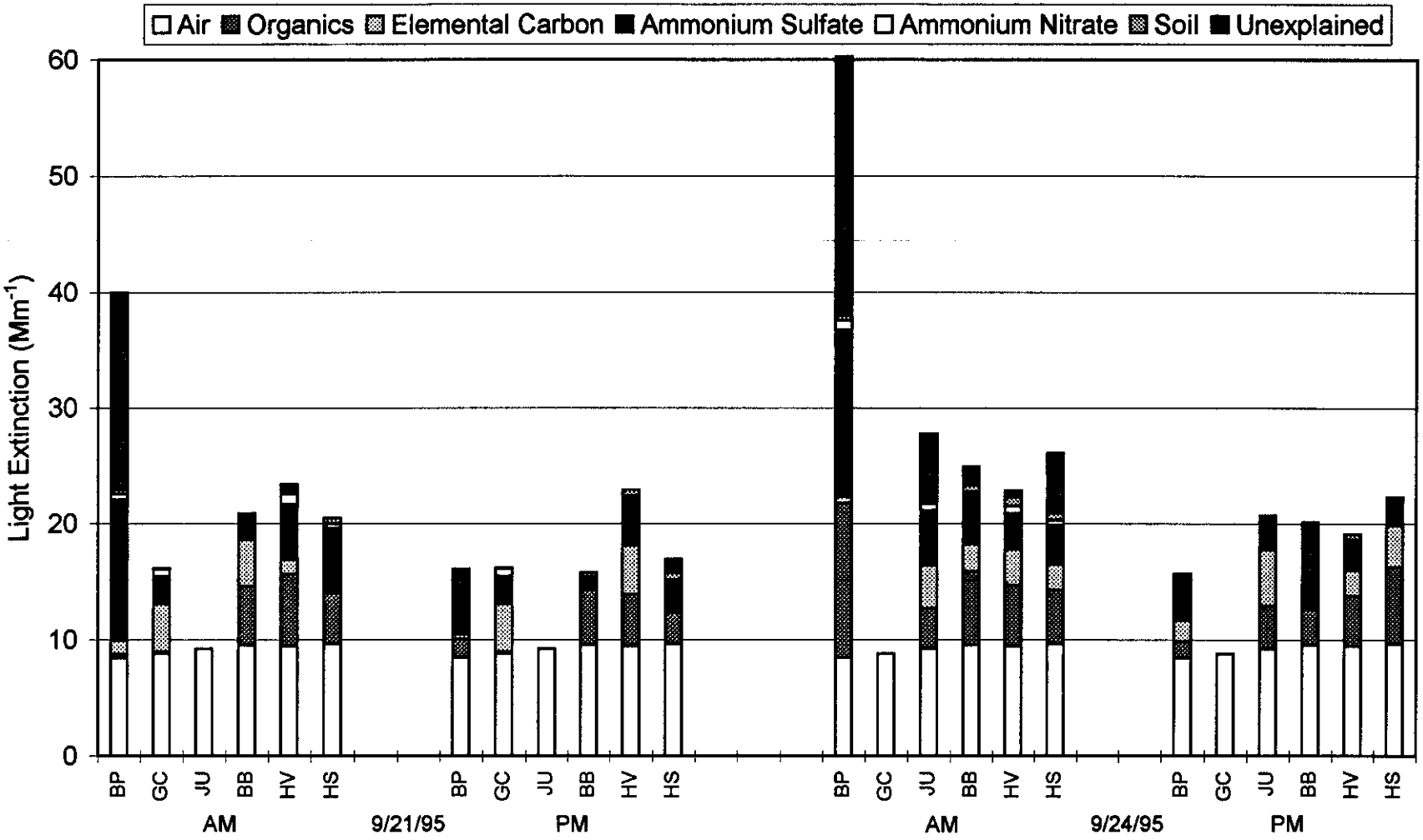


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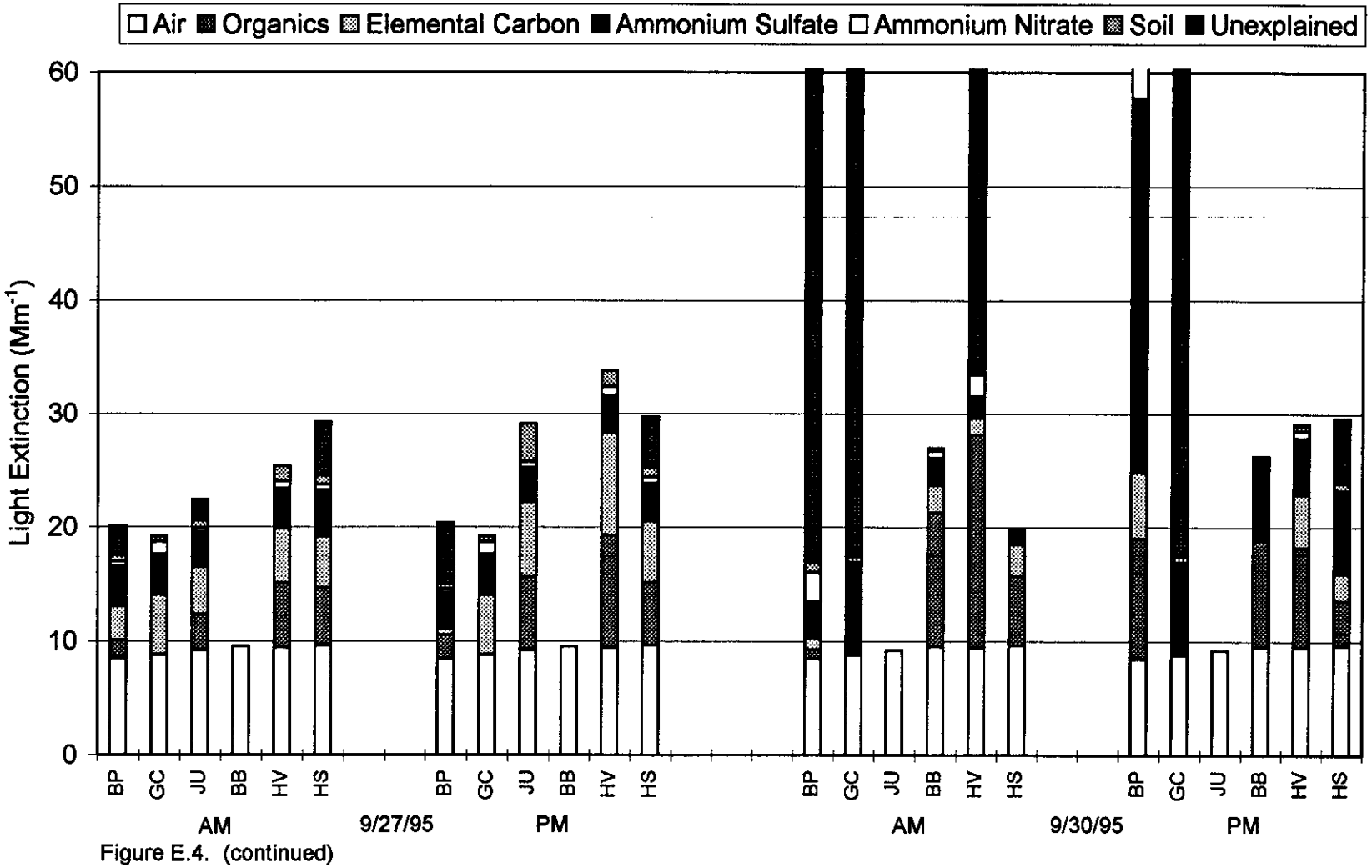


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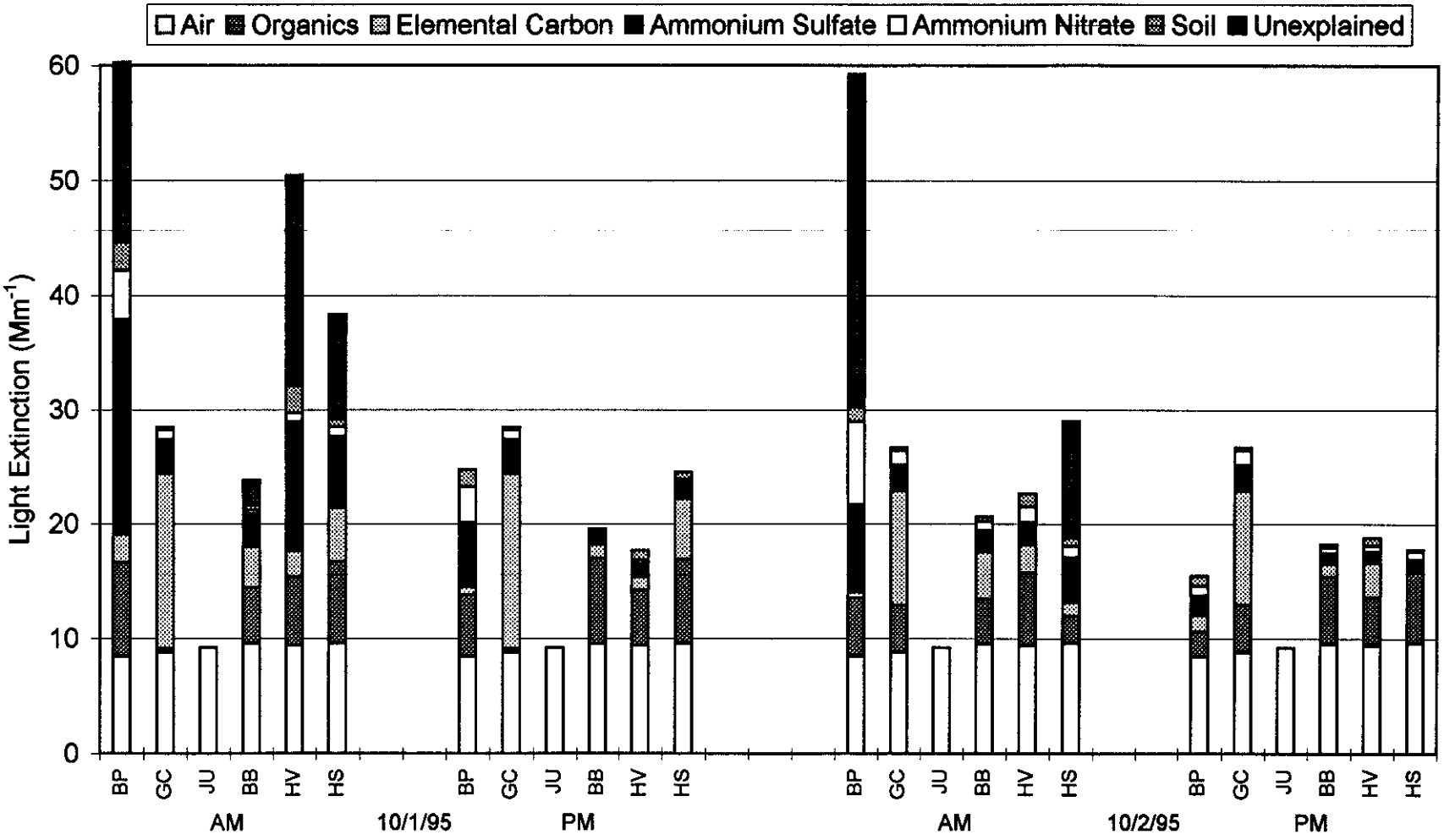


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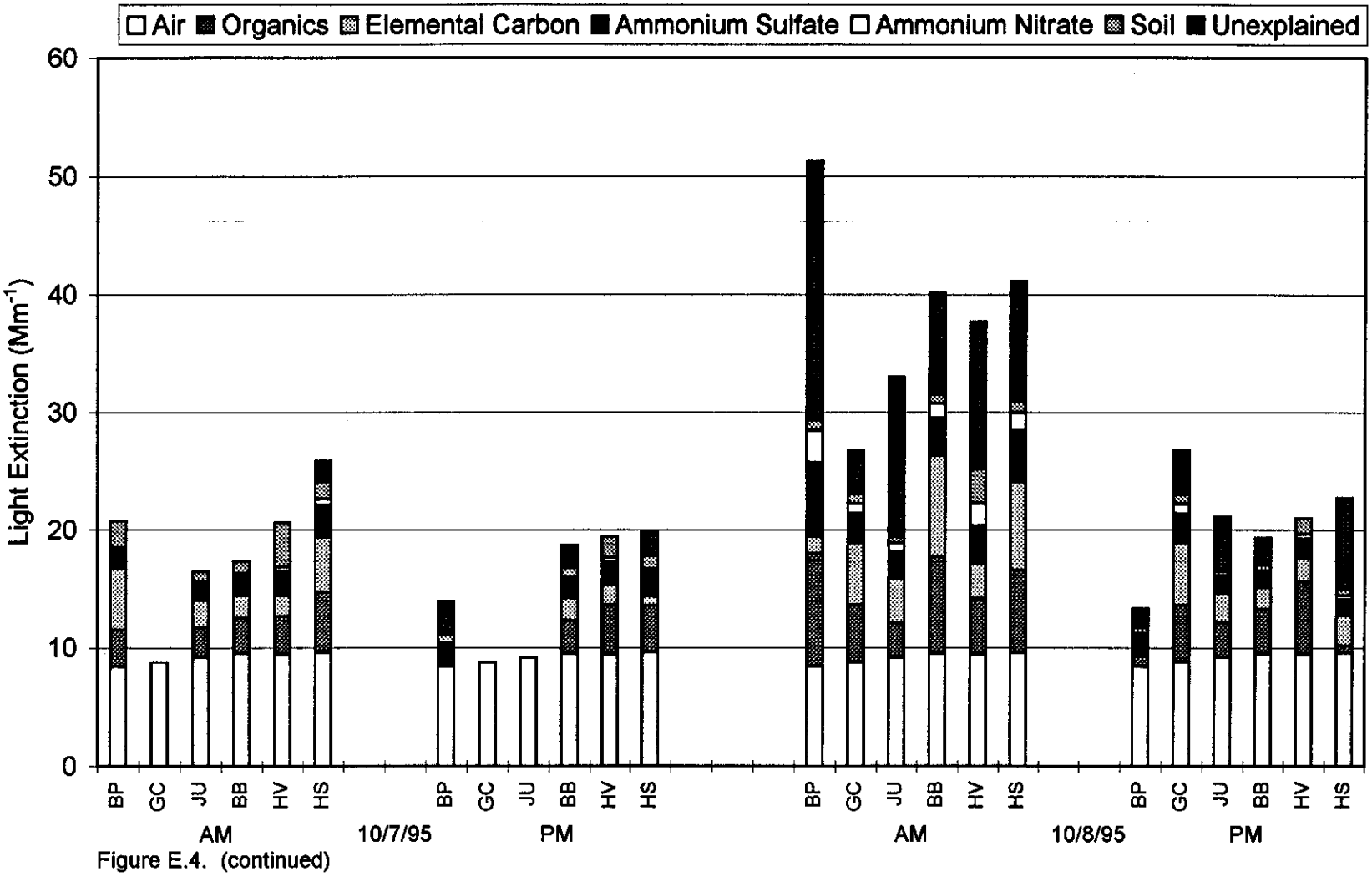


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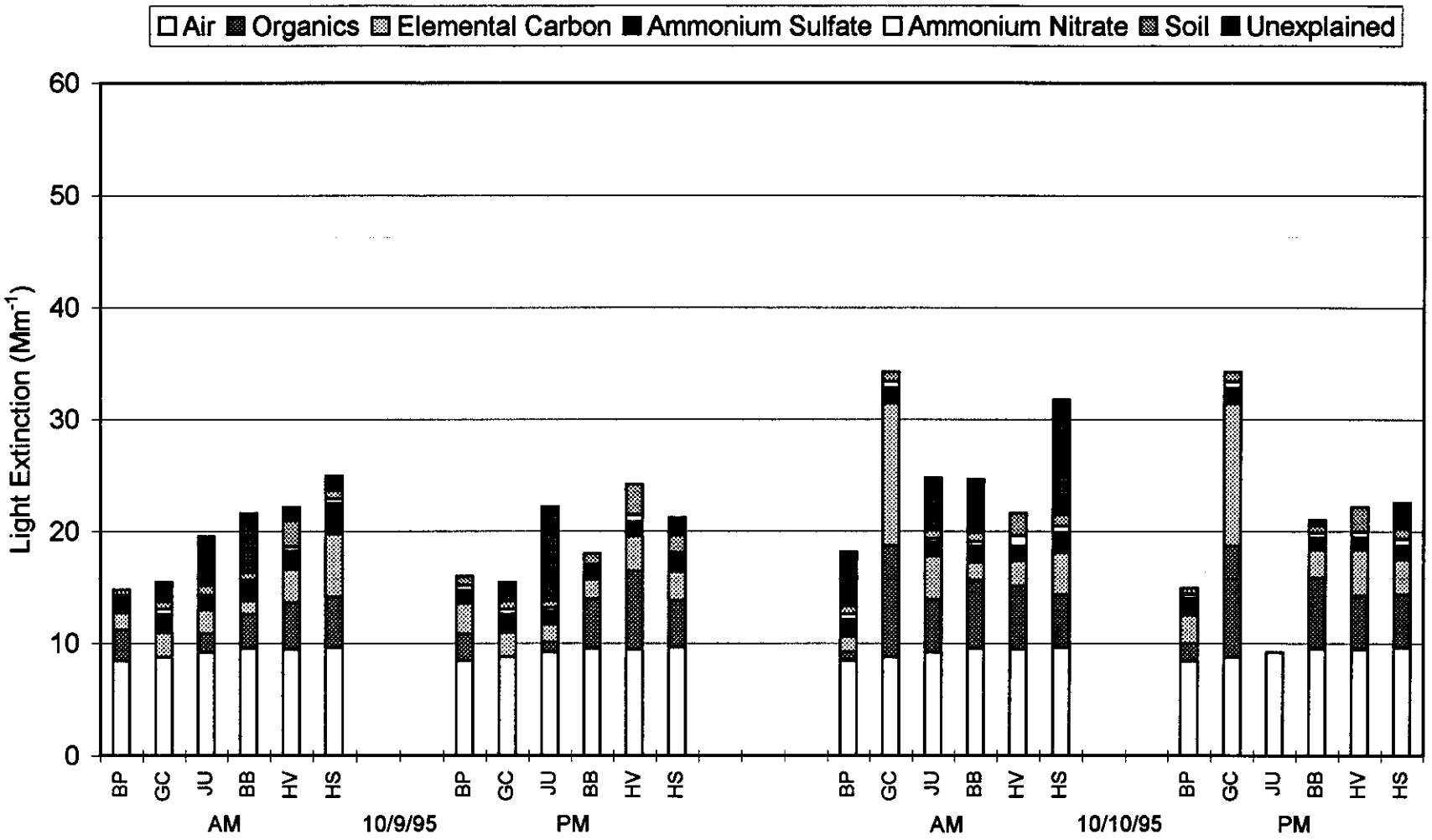


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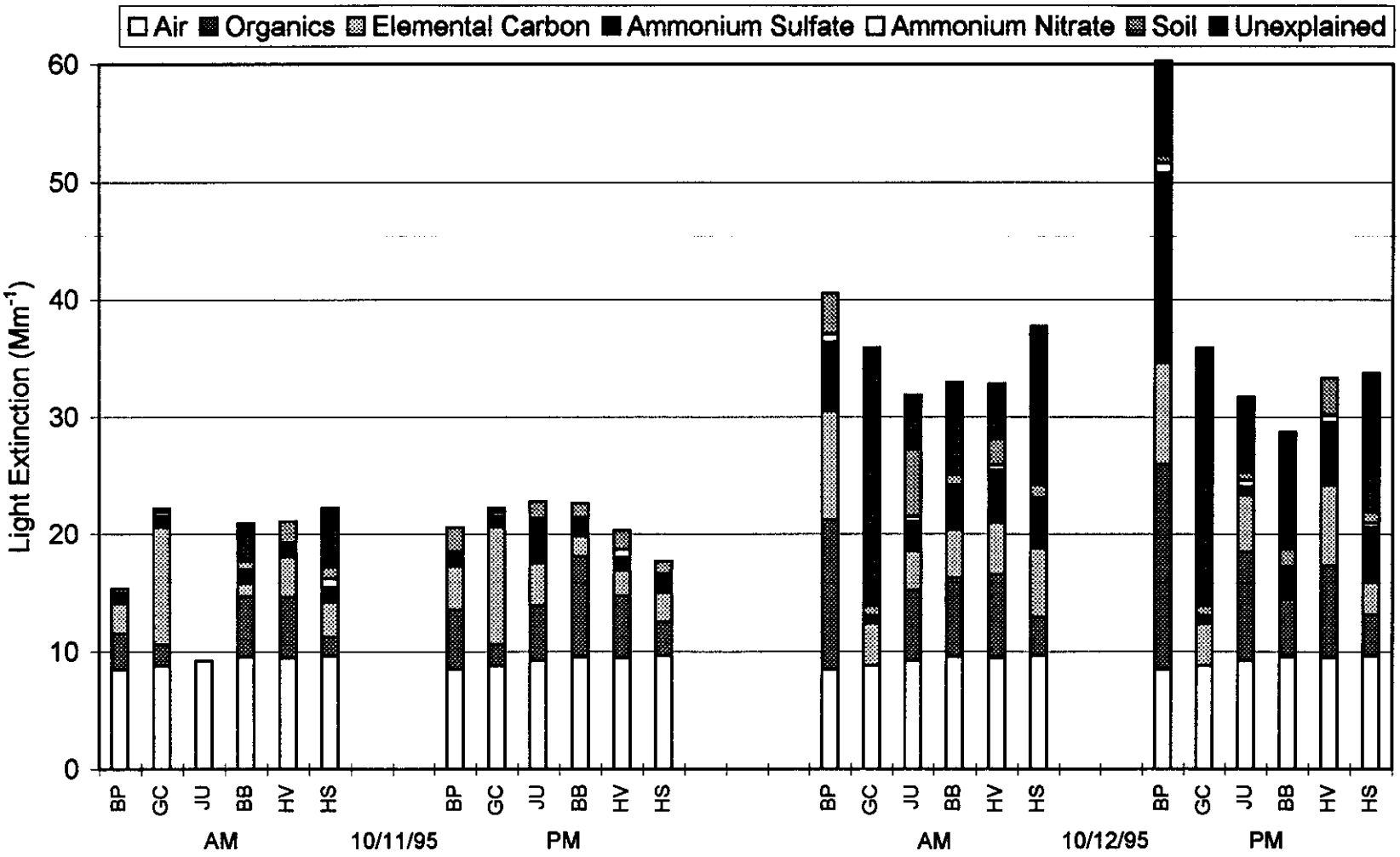


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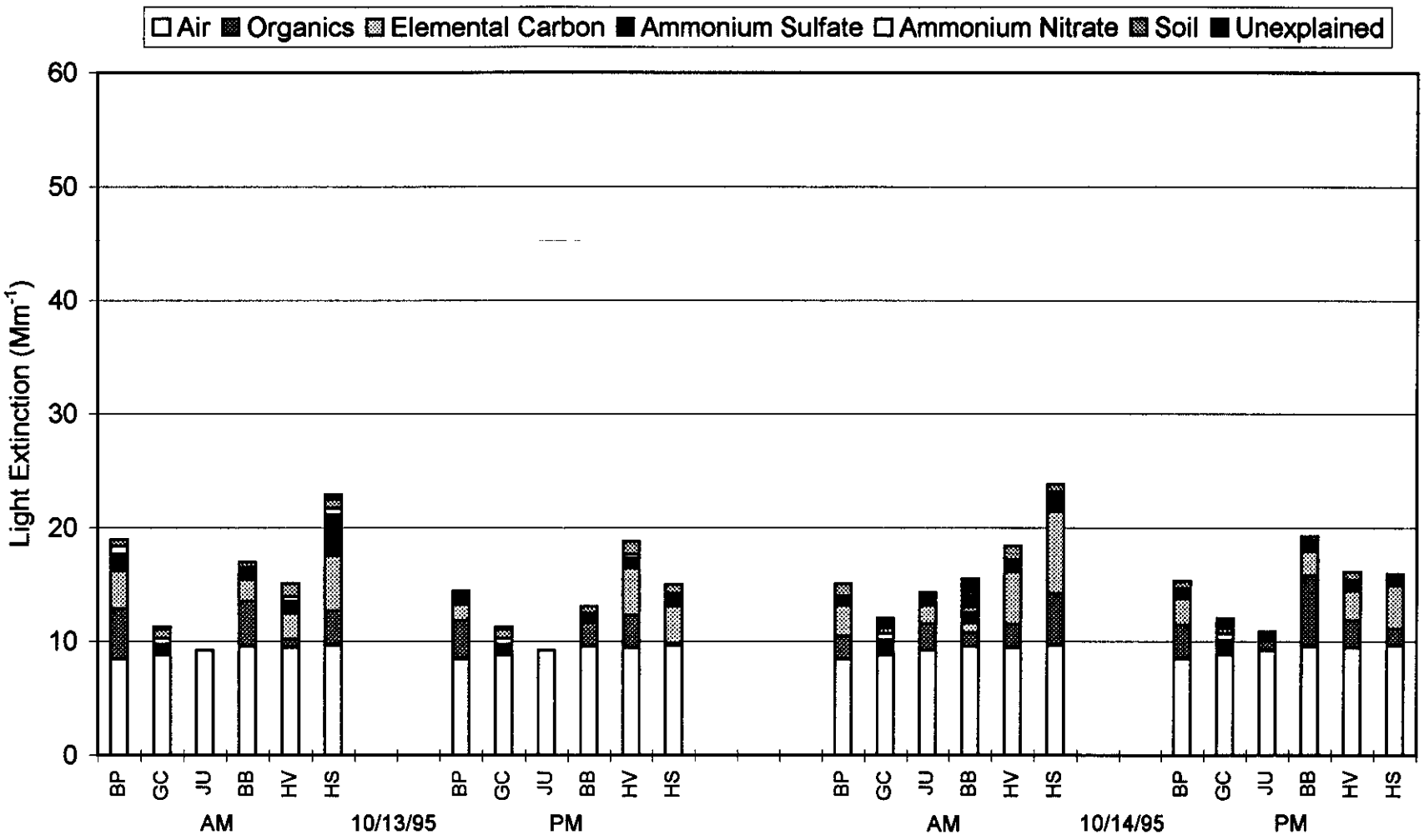


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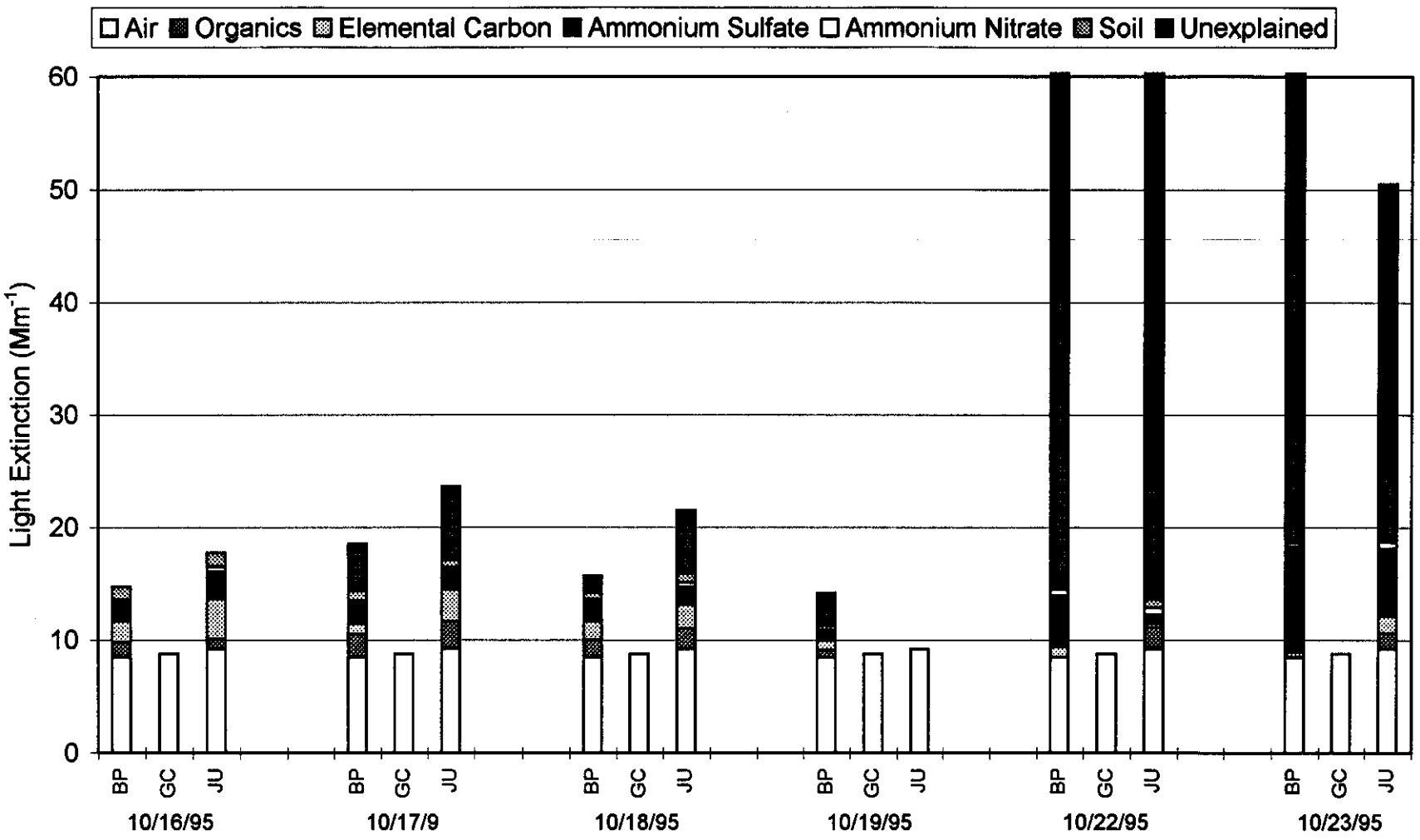


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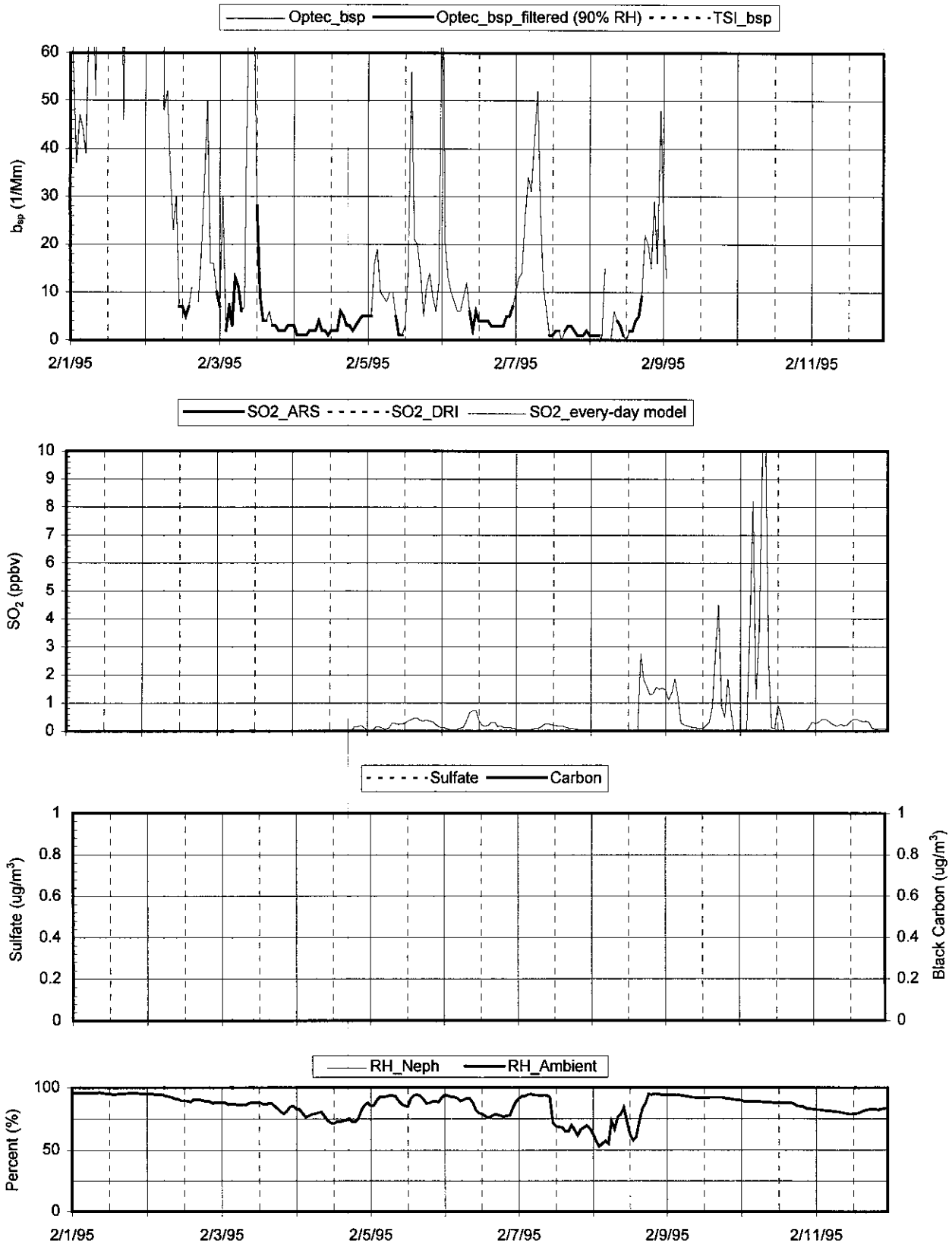


Figure E.5. Hourly b_{sp}, SO_2, sulfate, black carbon, and RH at Buffalo Pass.

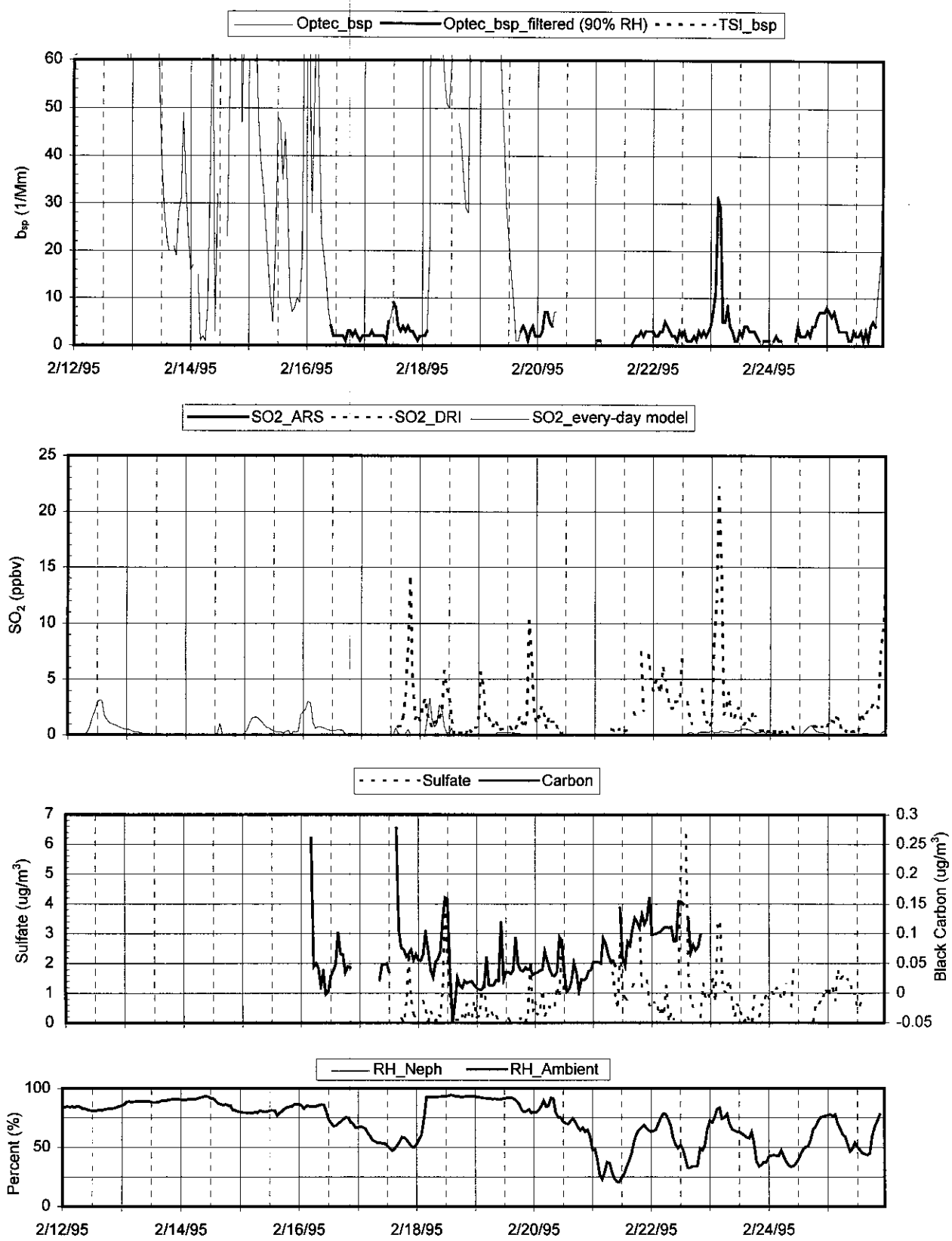


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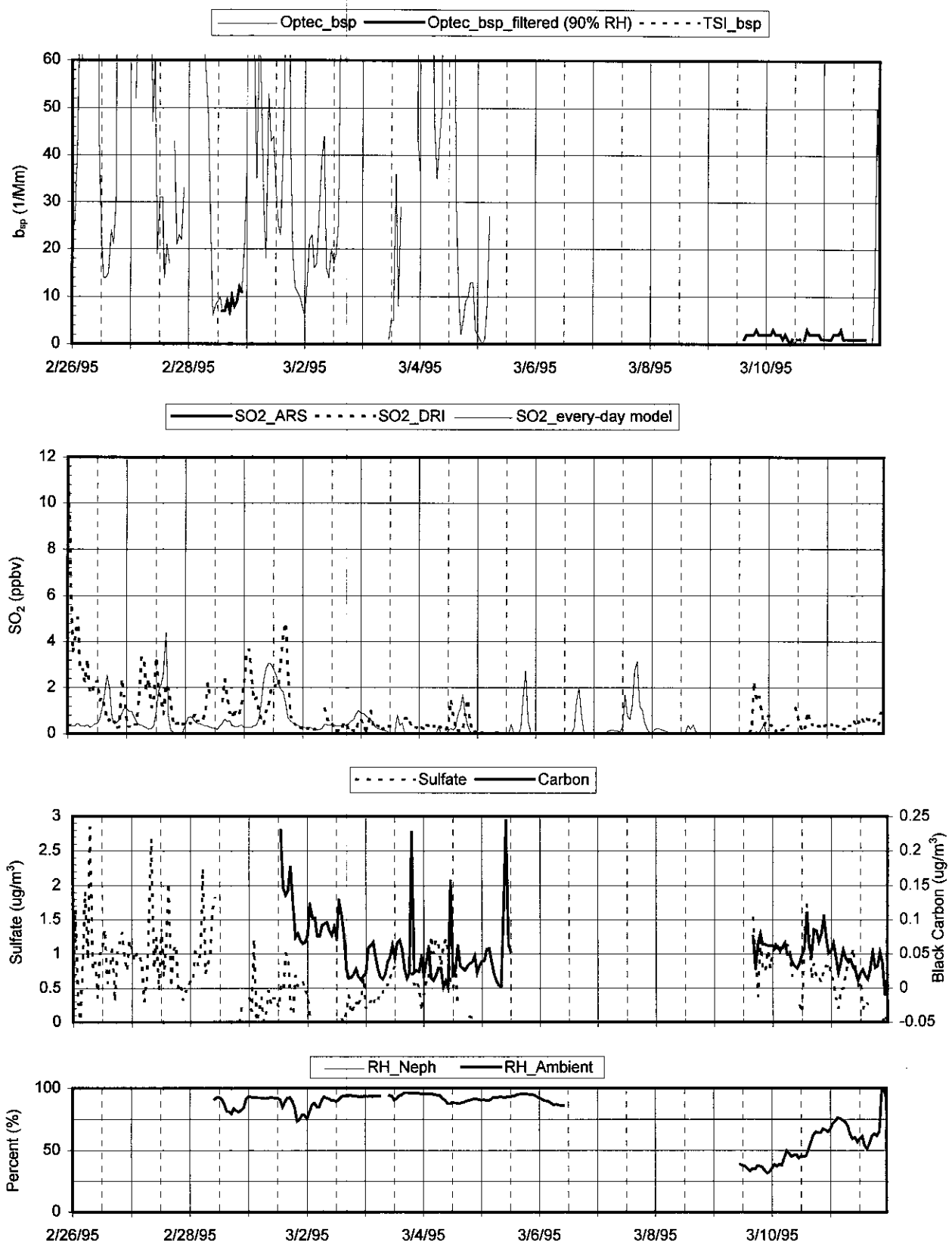


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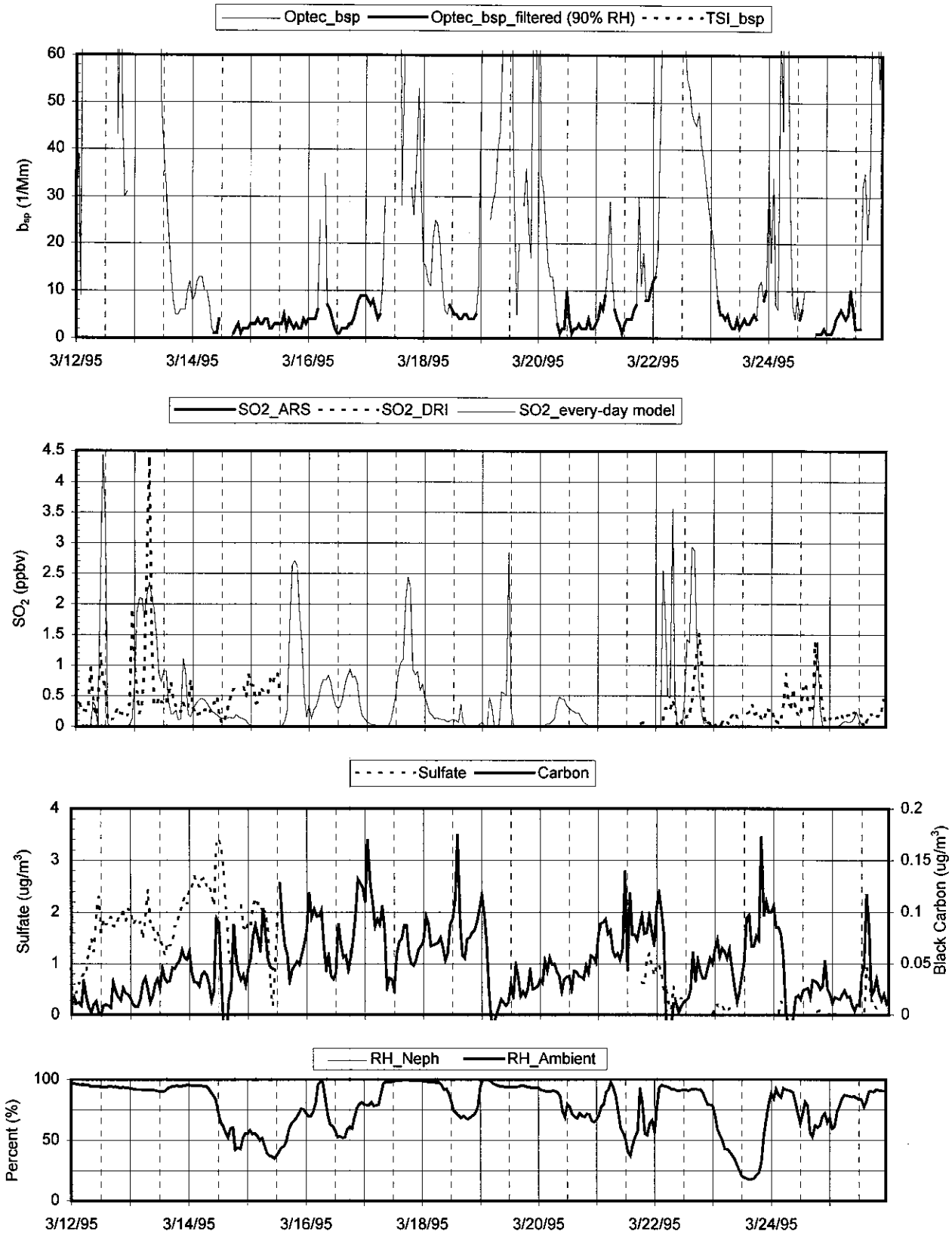


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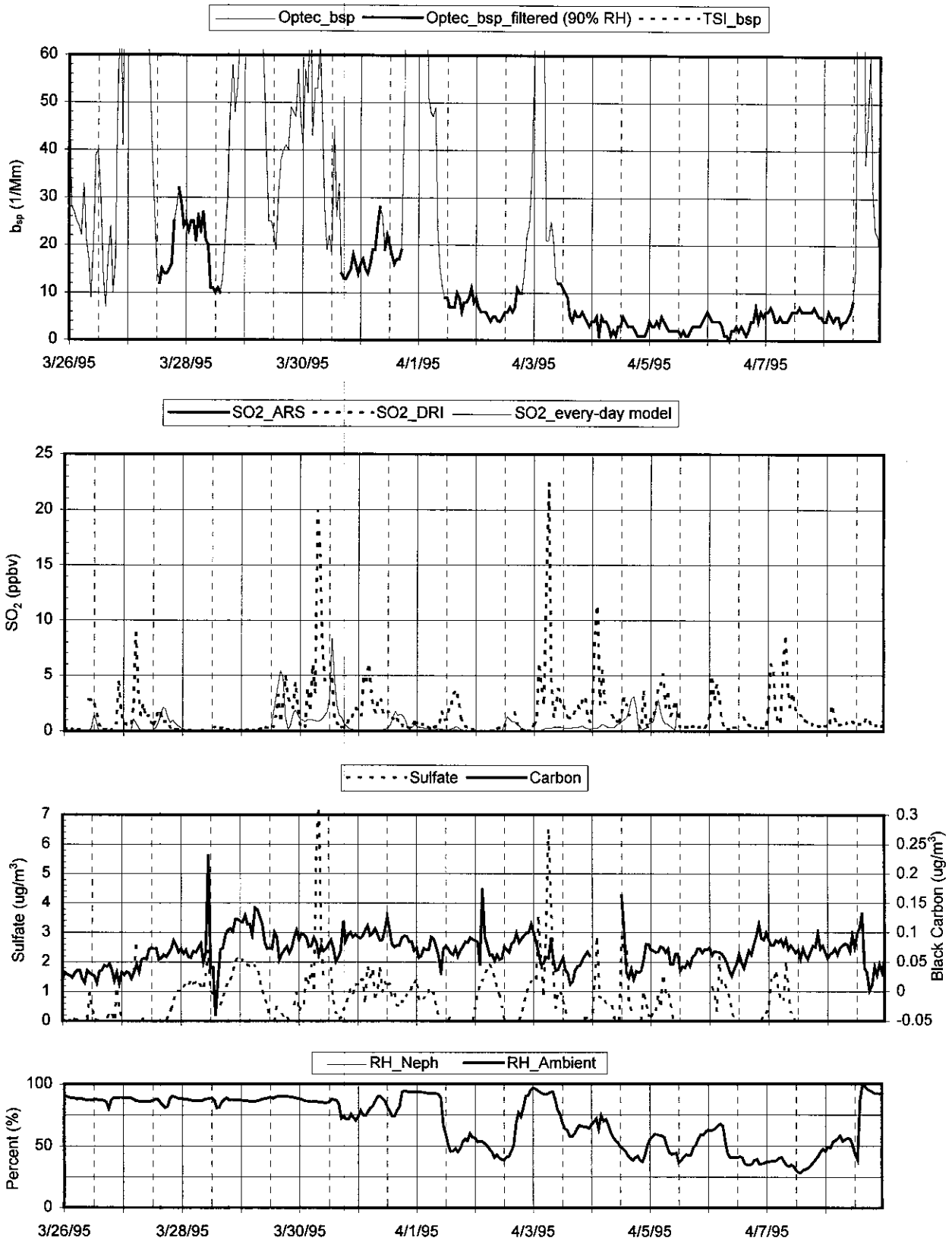


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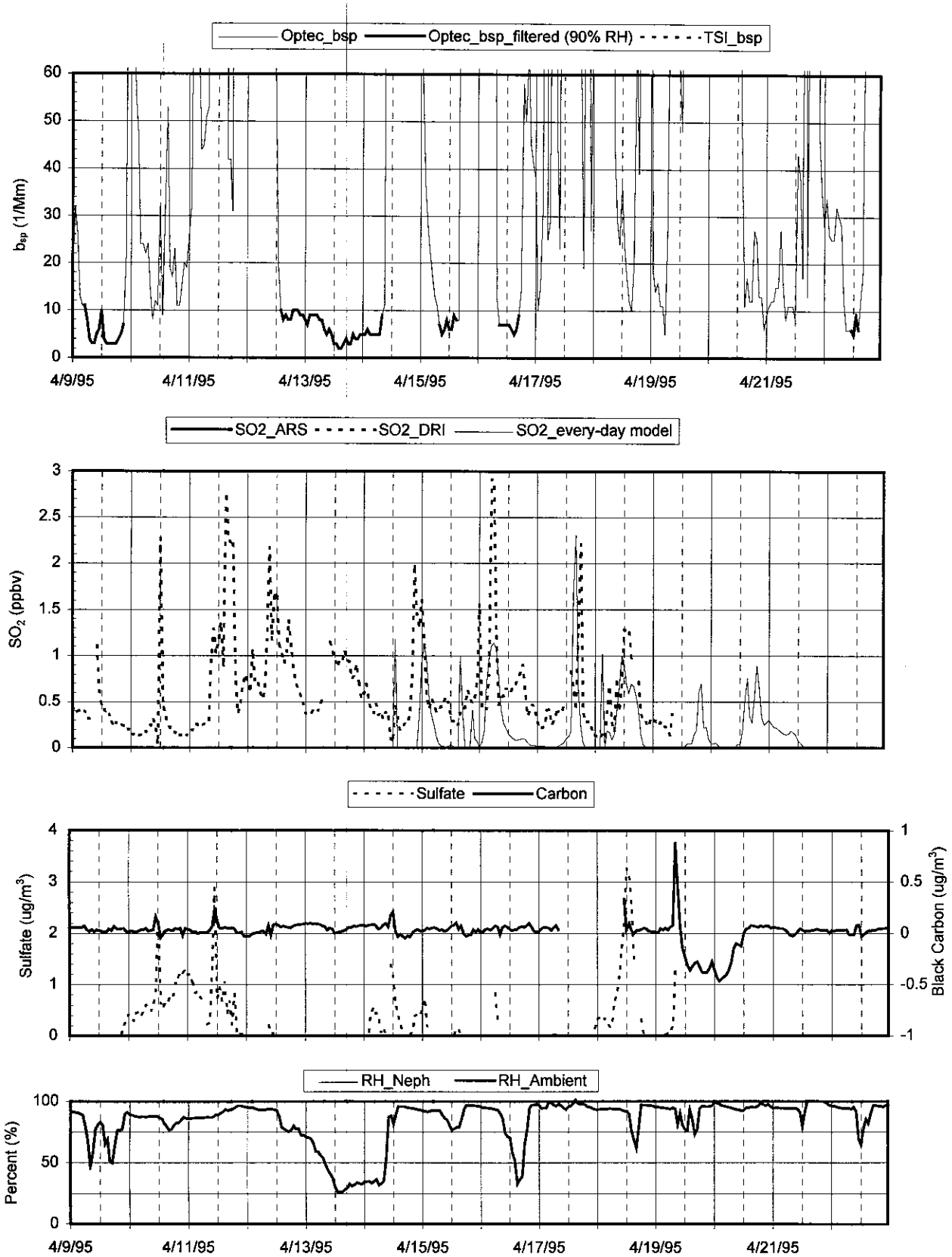


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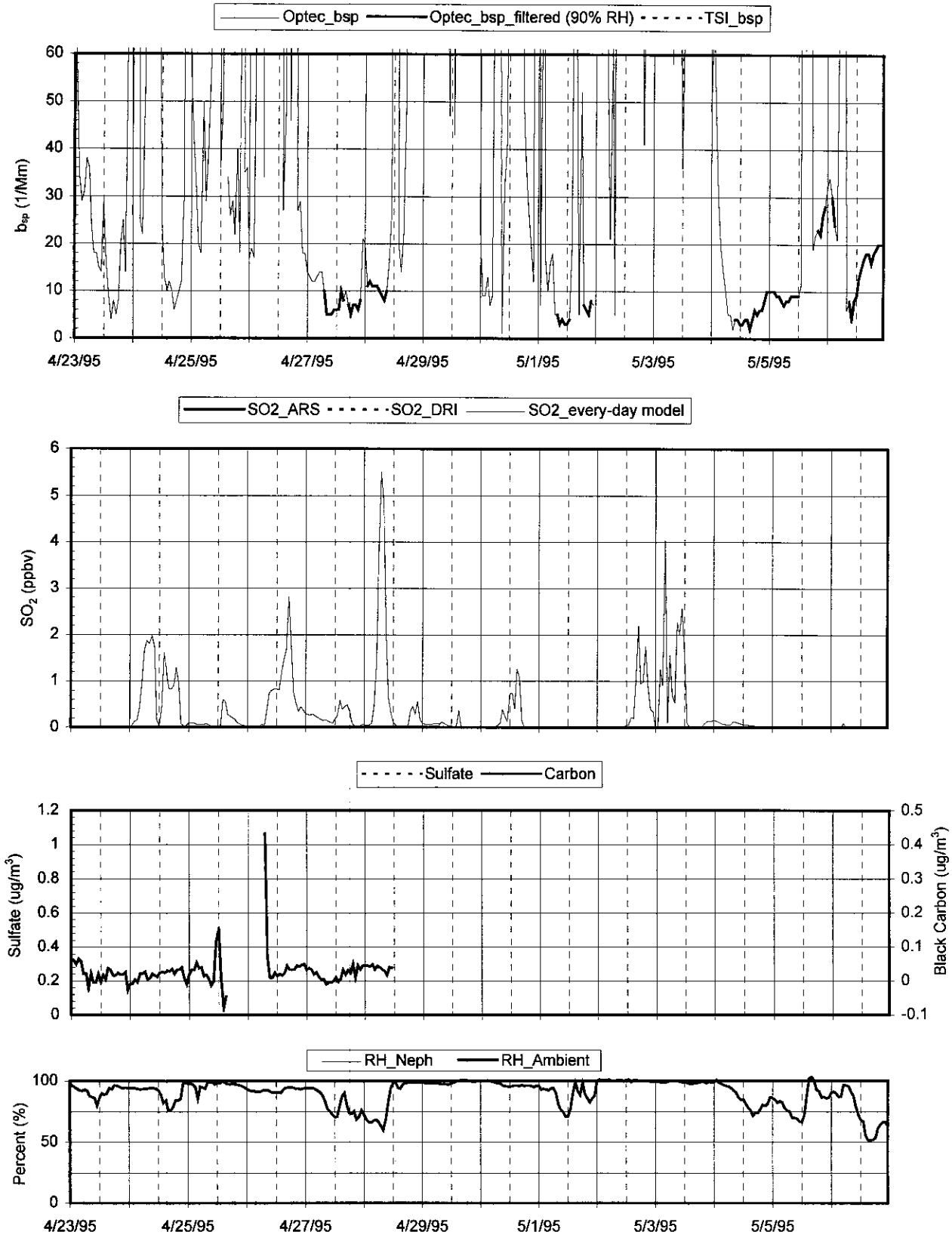


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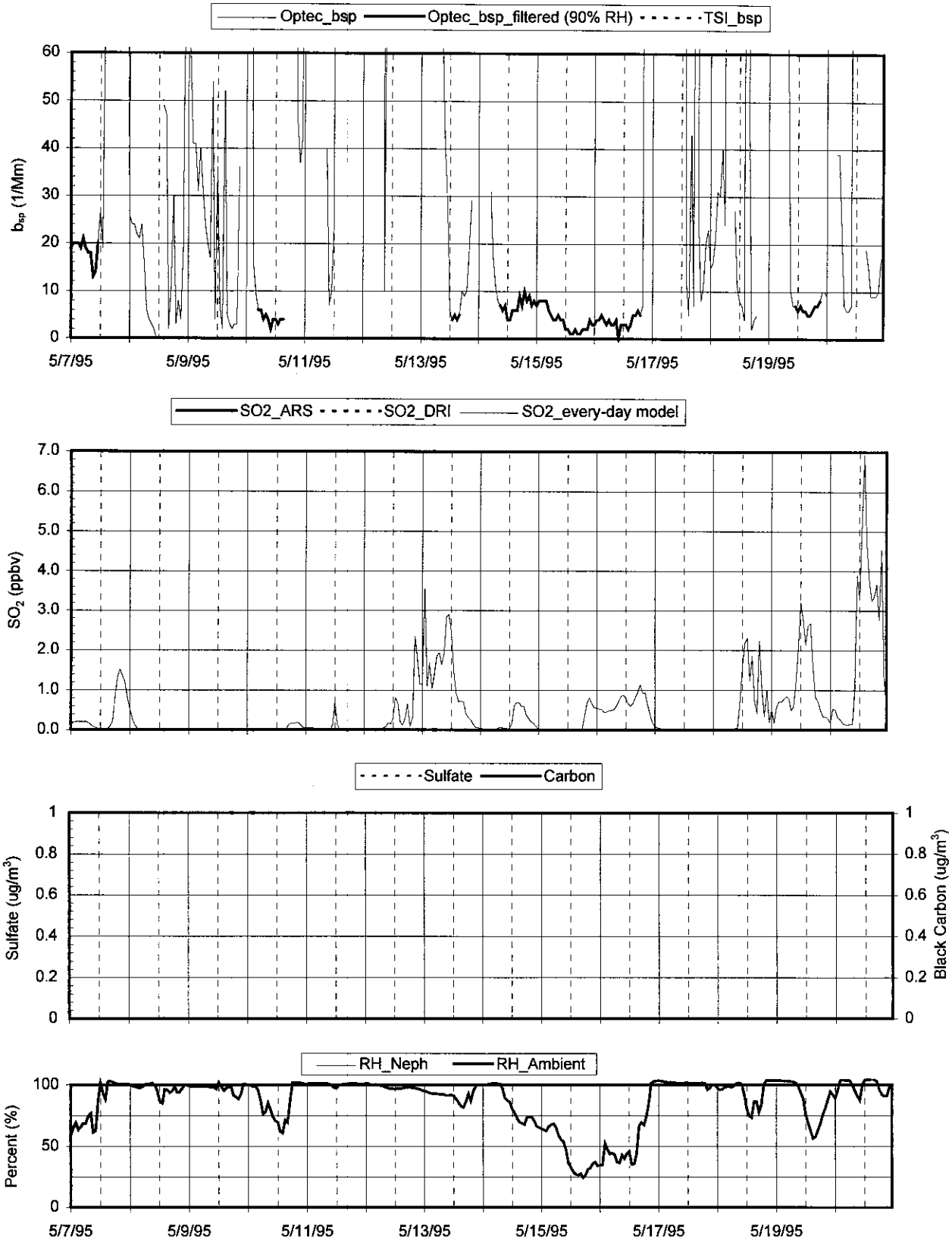


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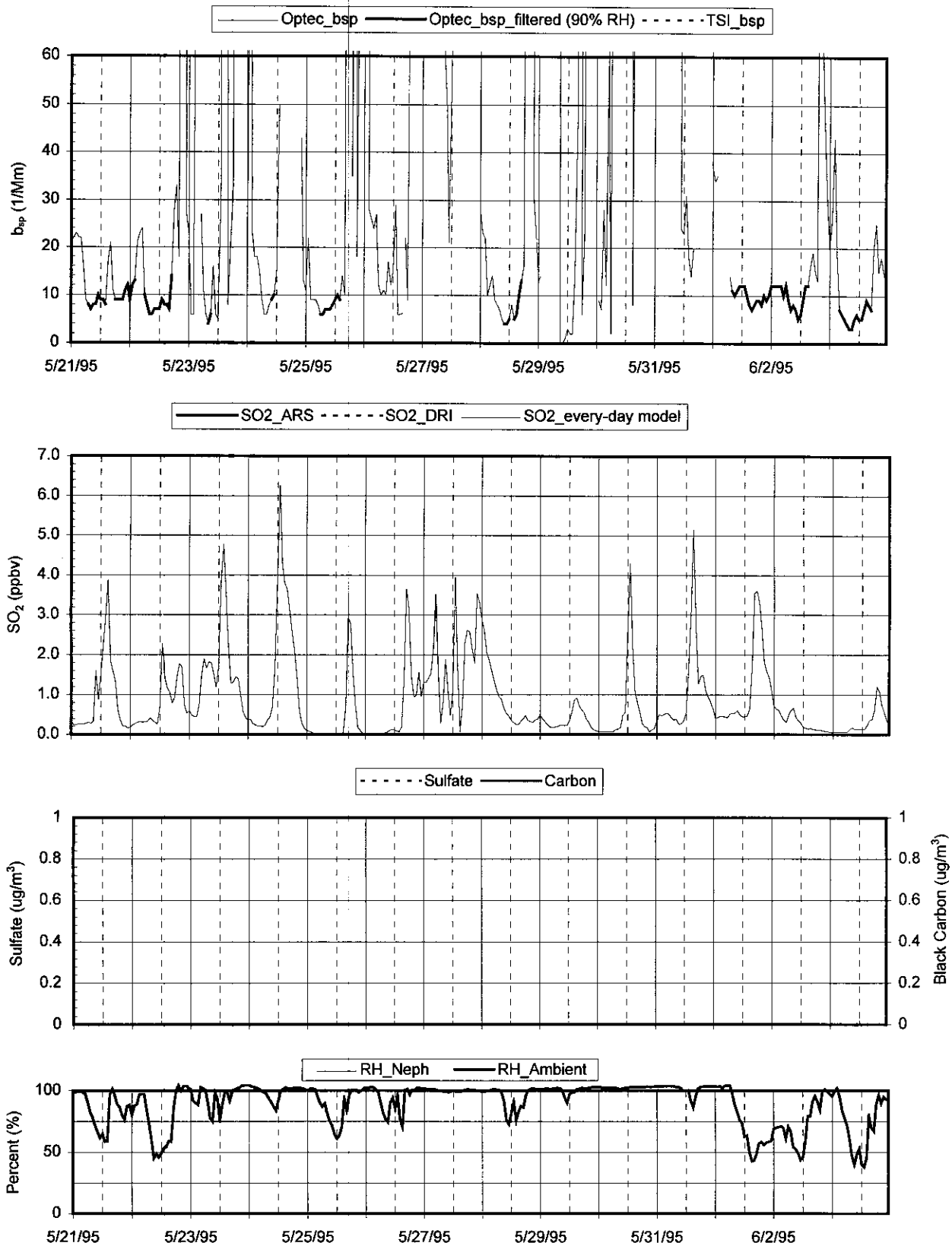


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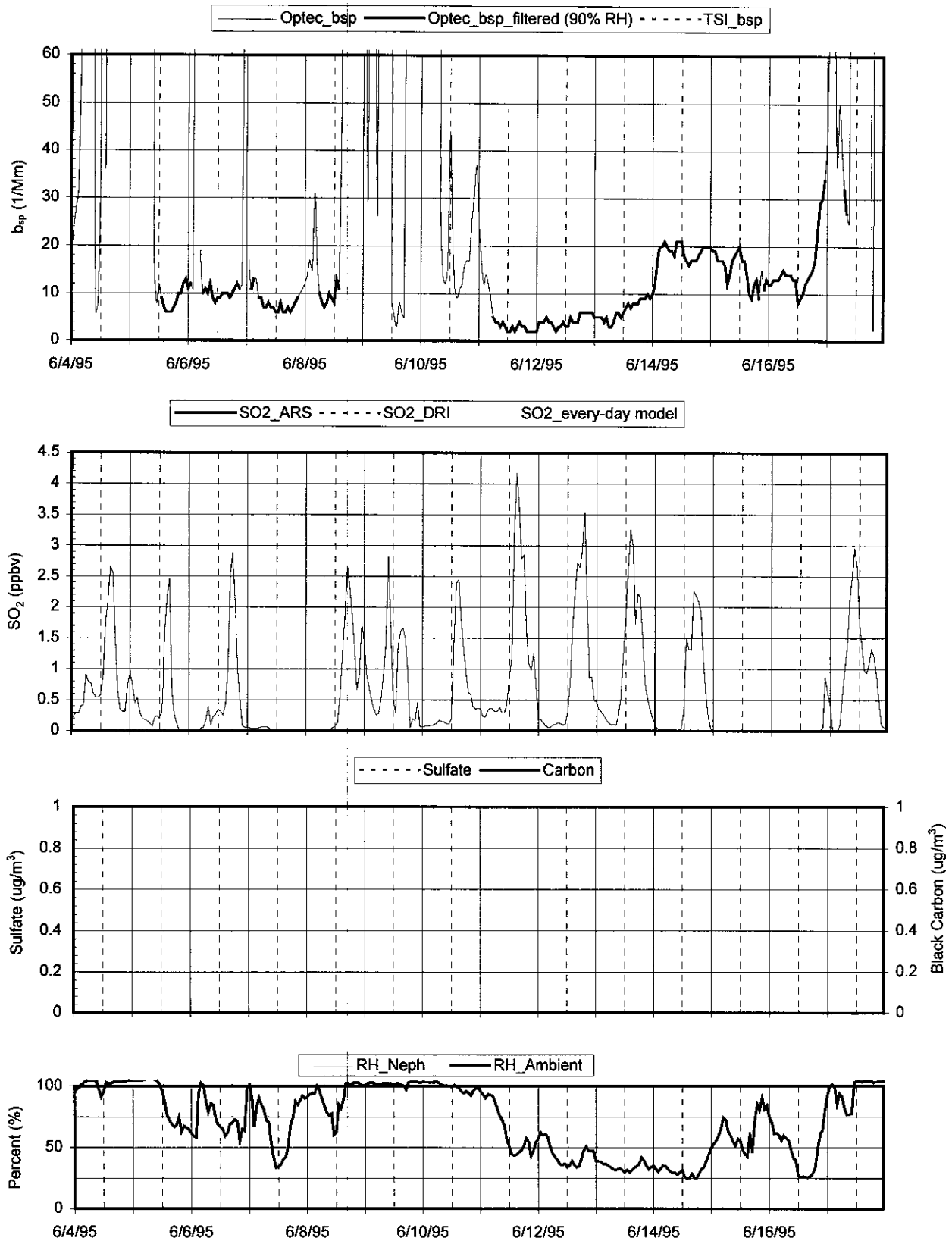


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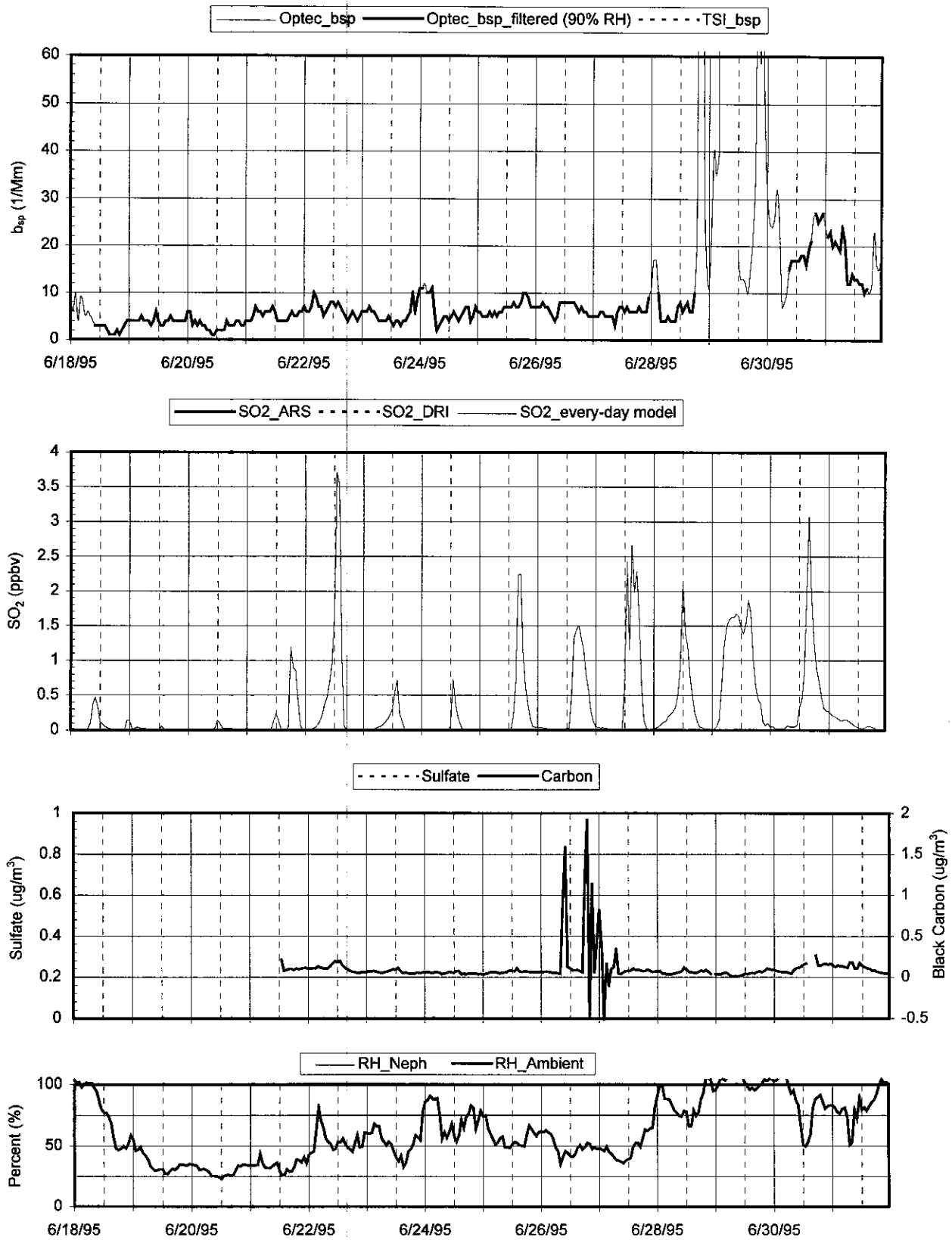


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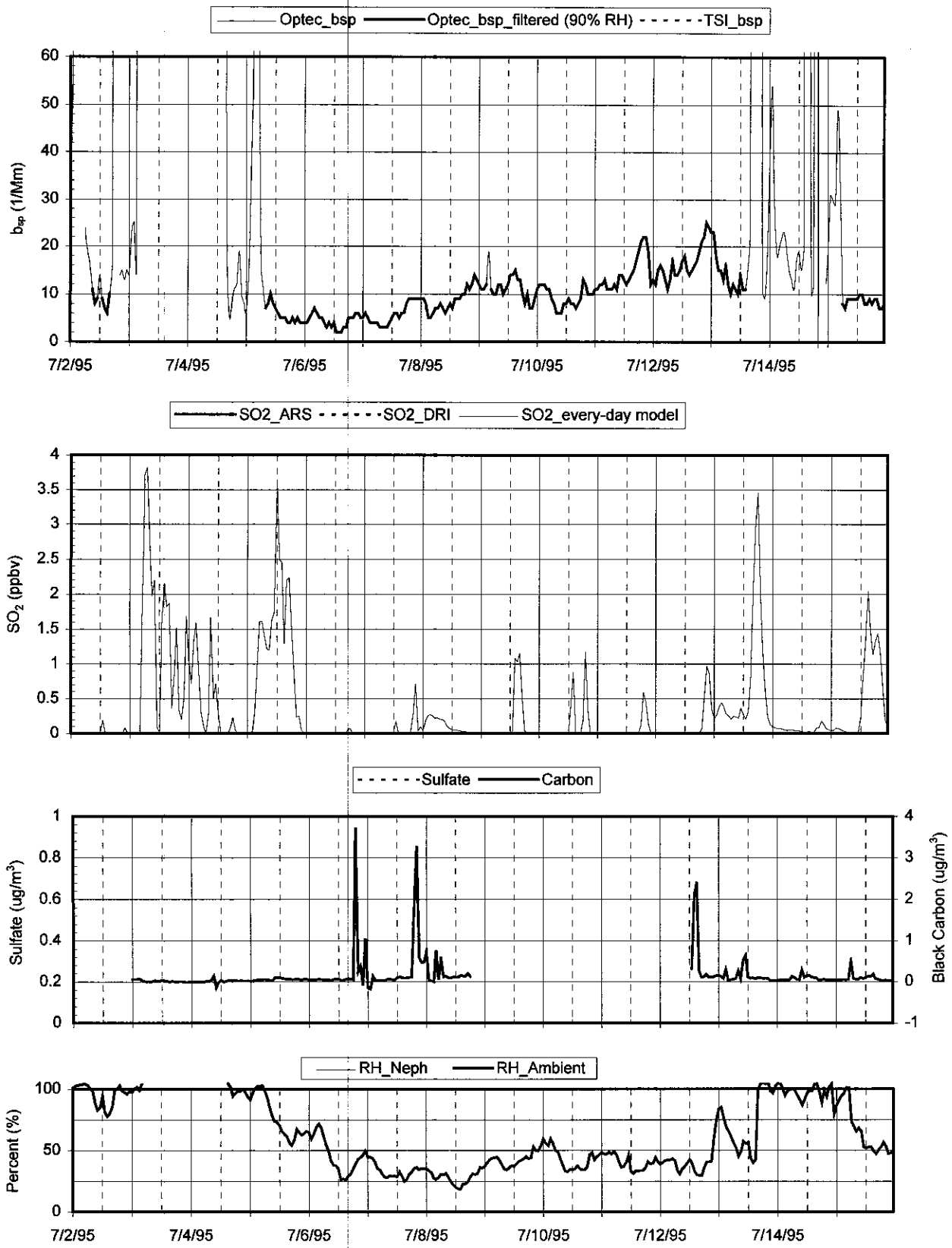


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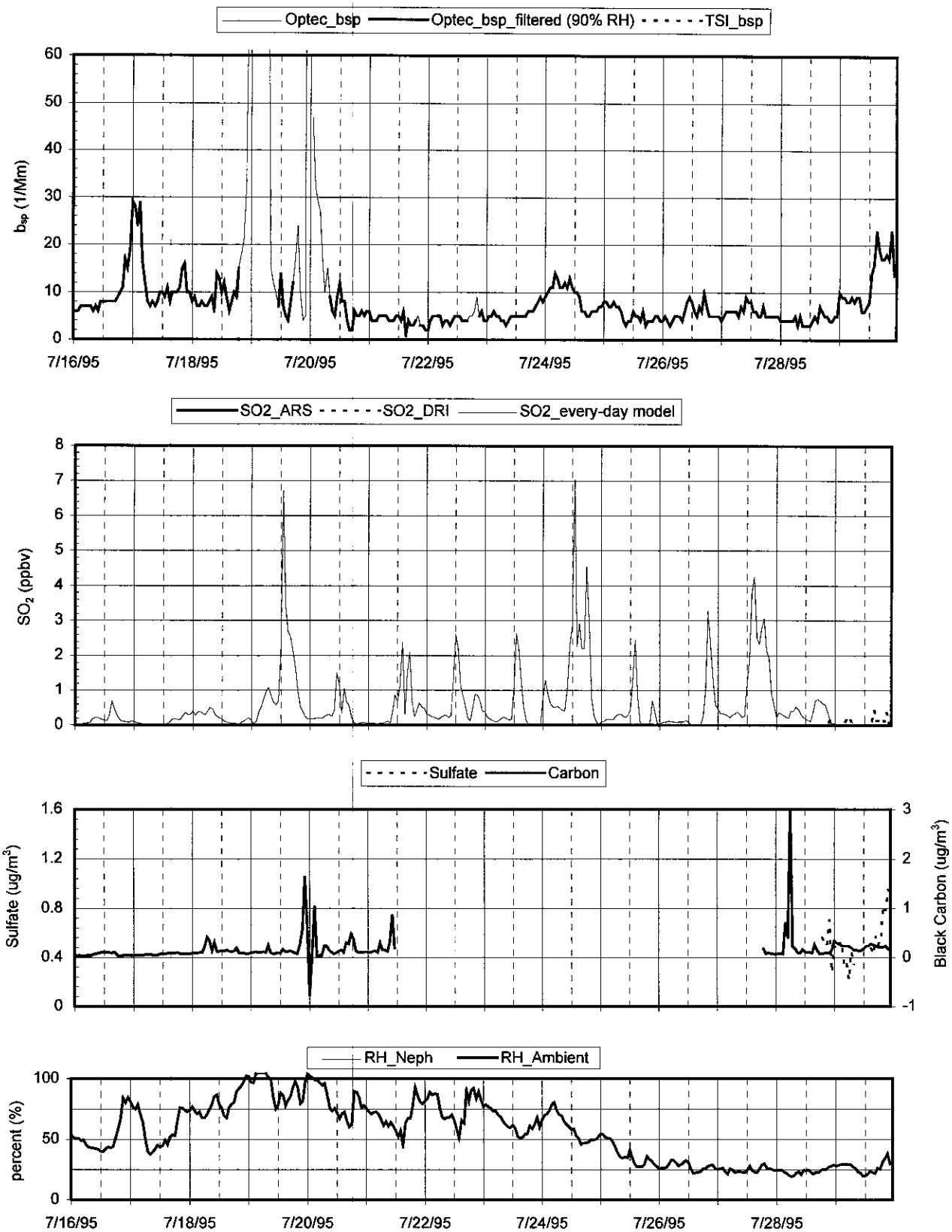


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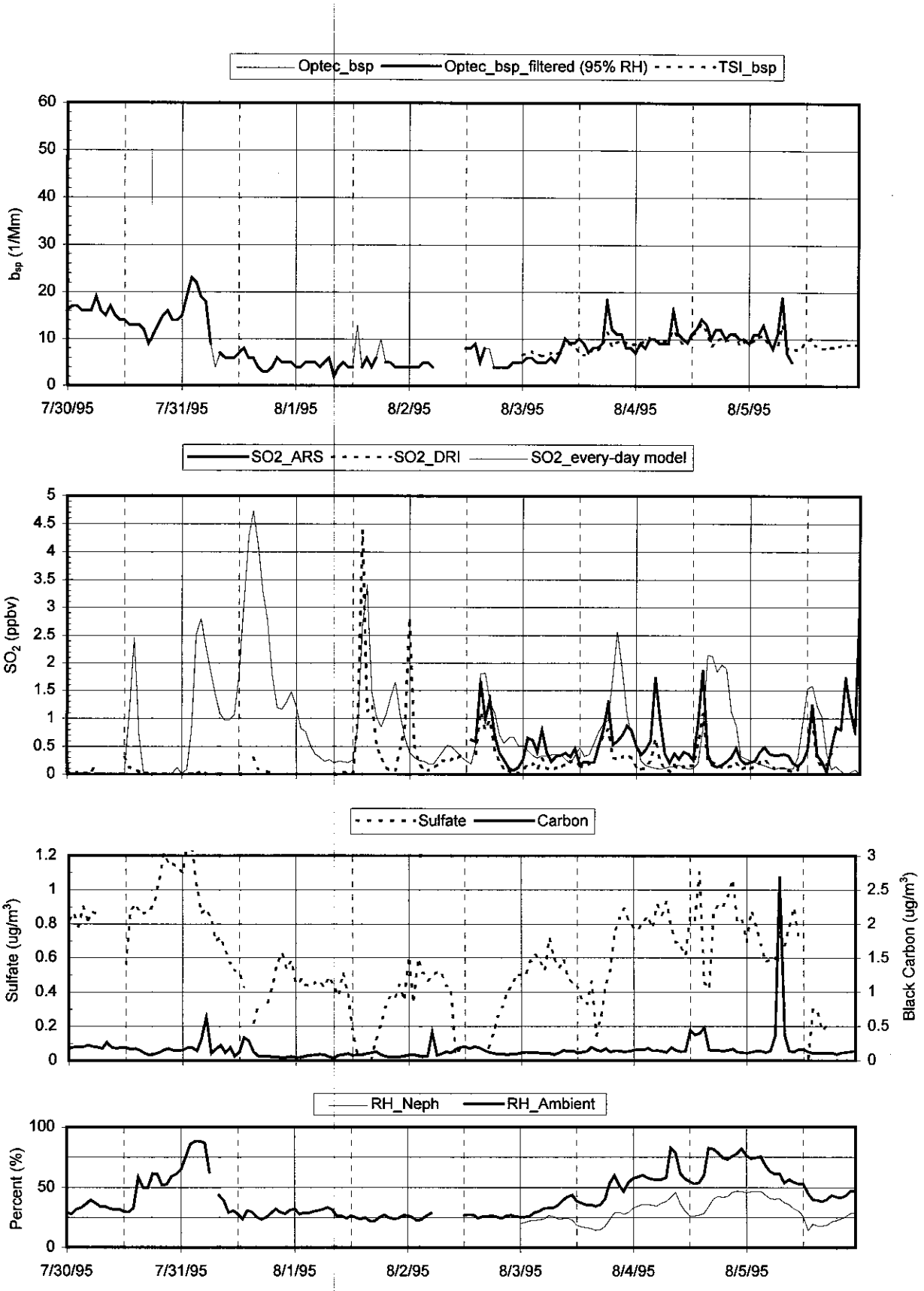


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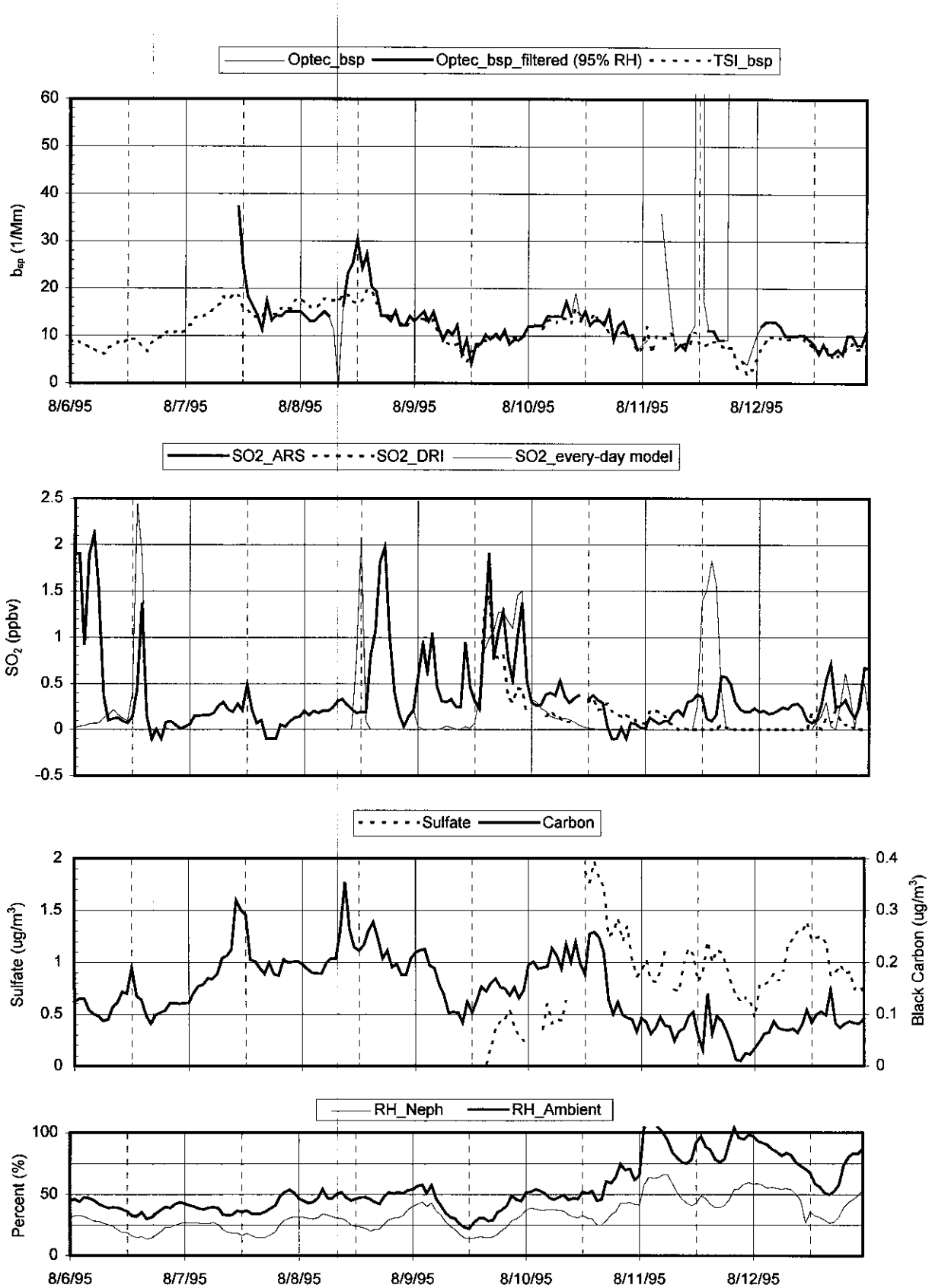


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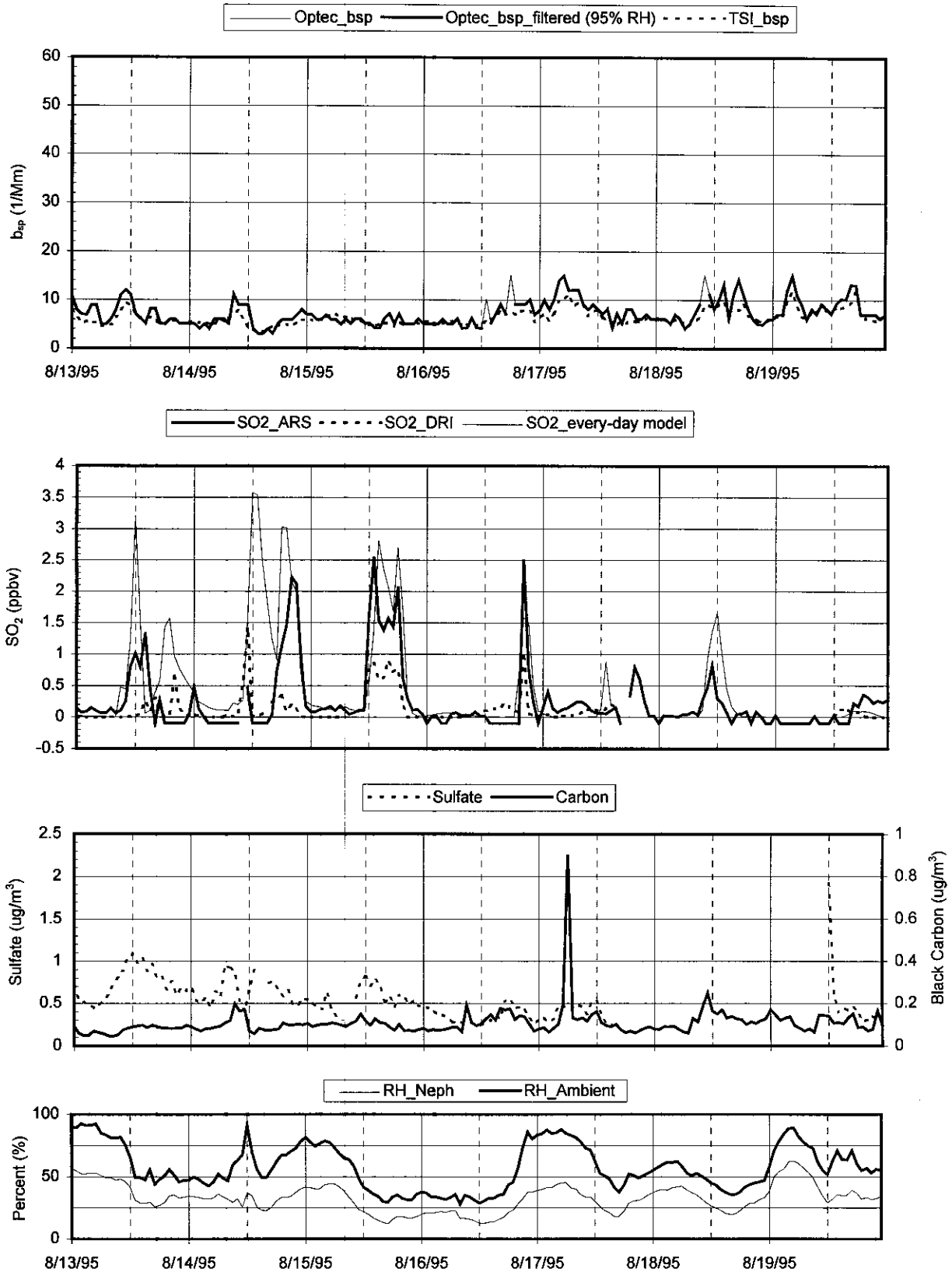


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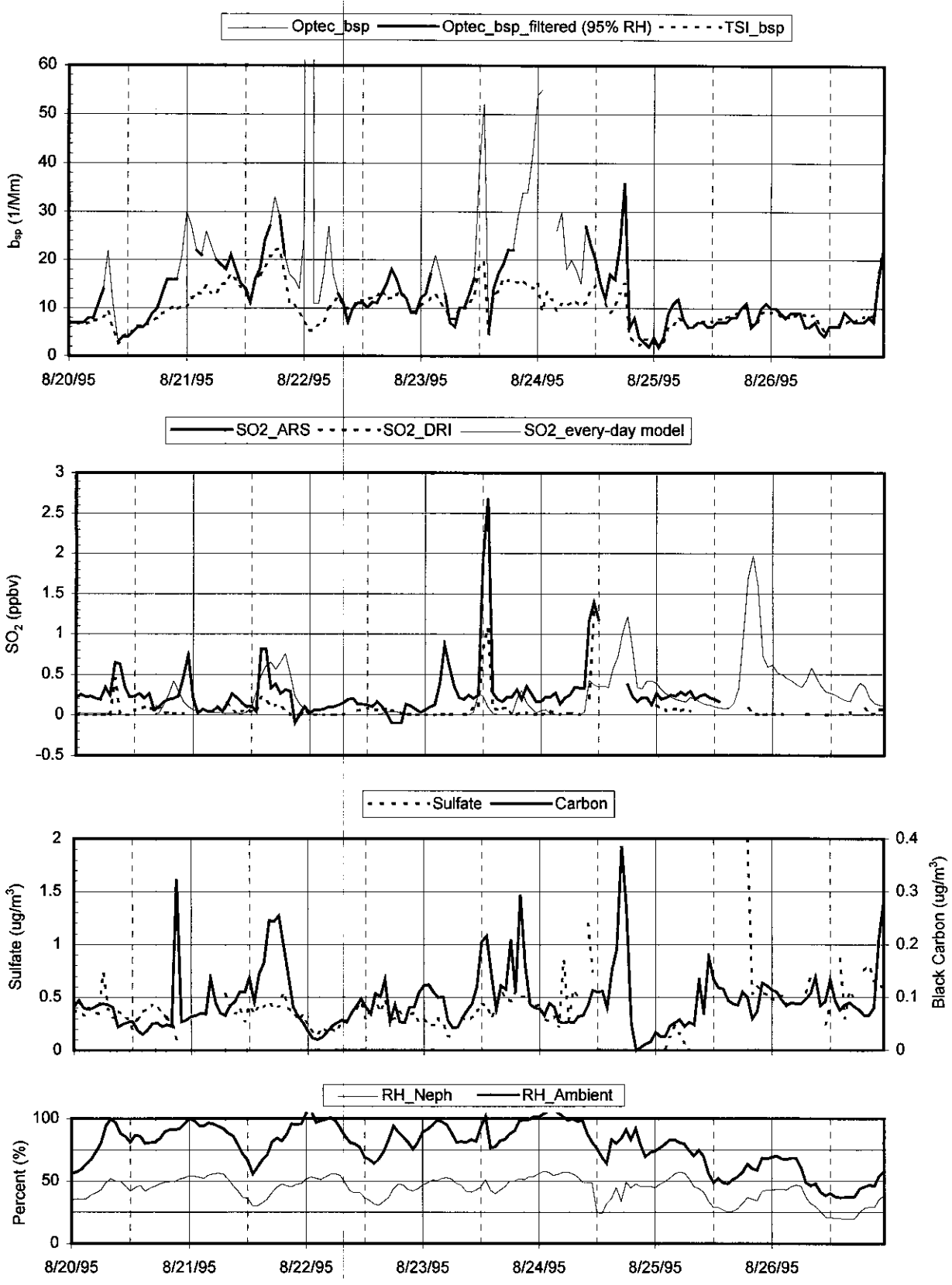


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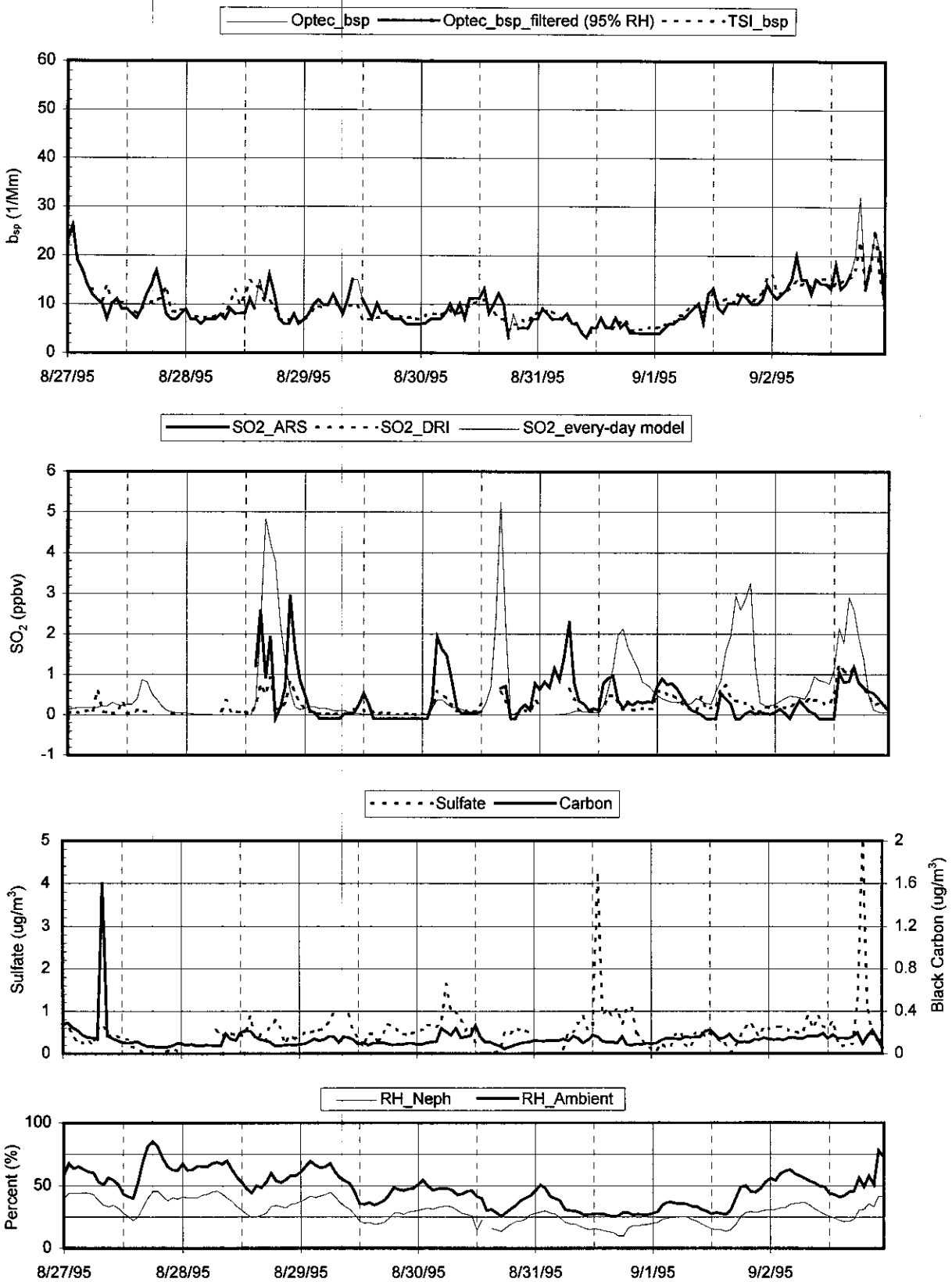


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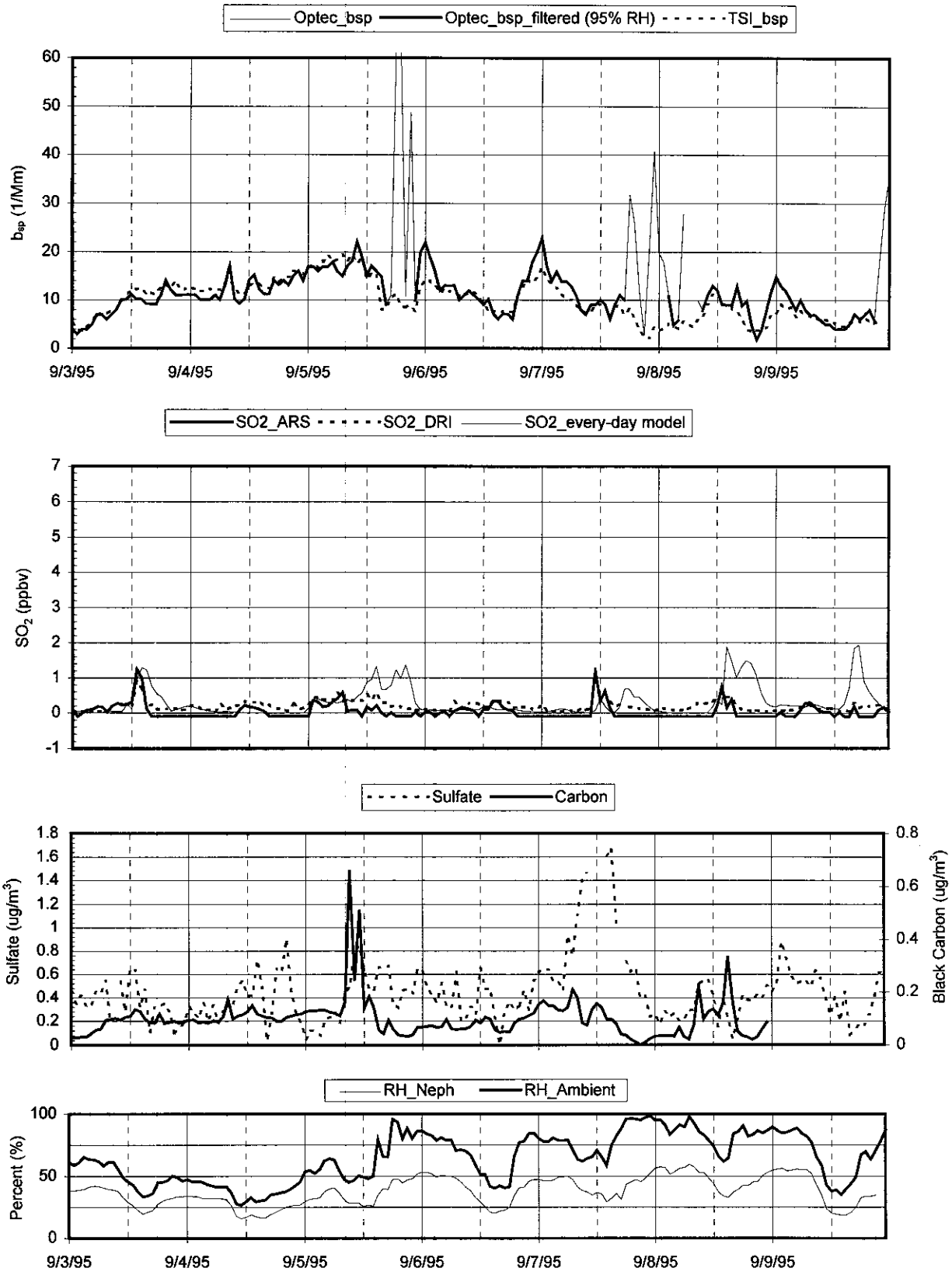


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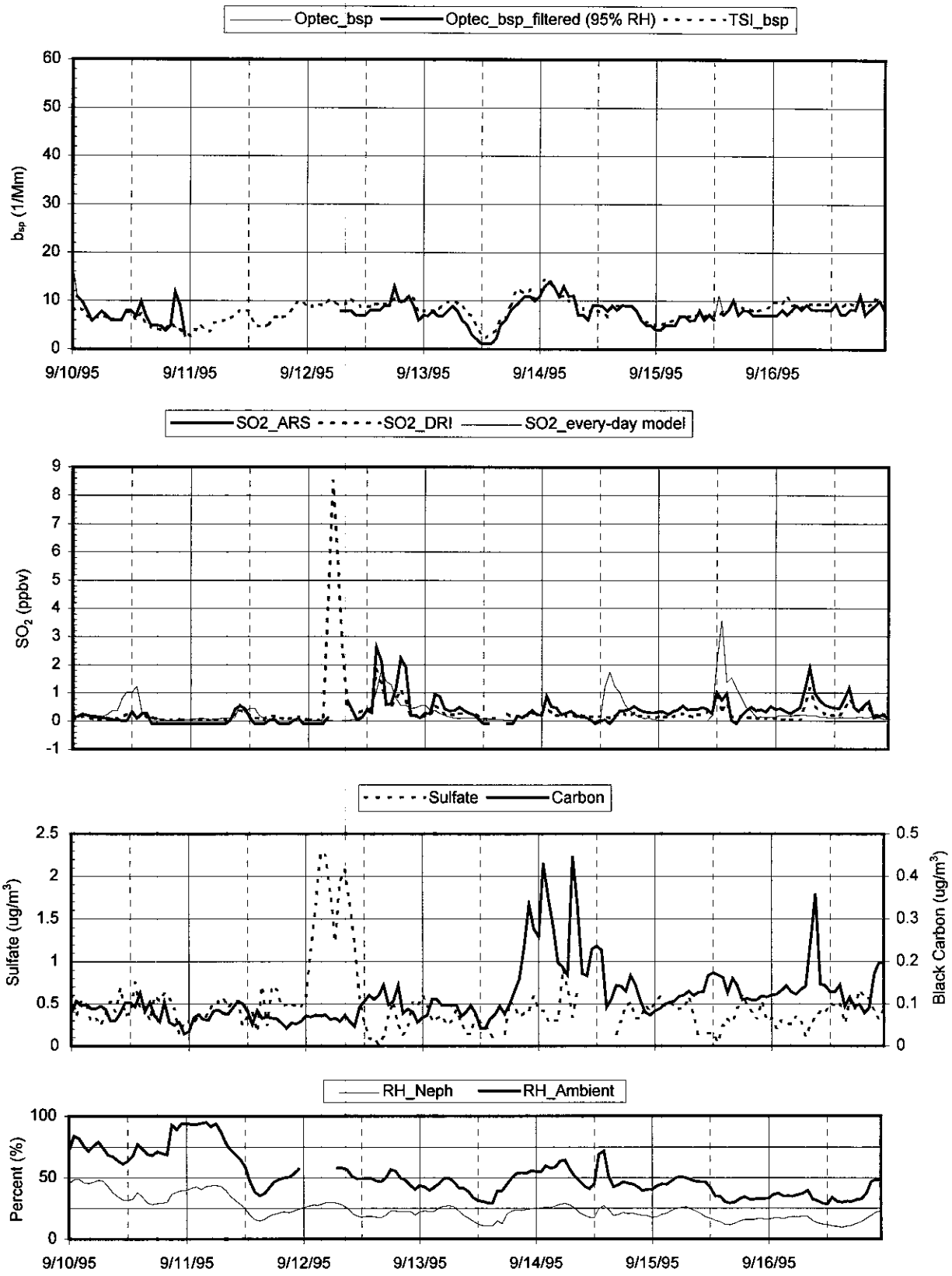


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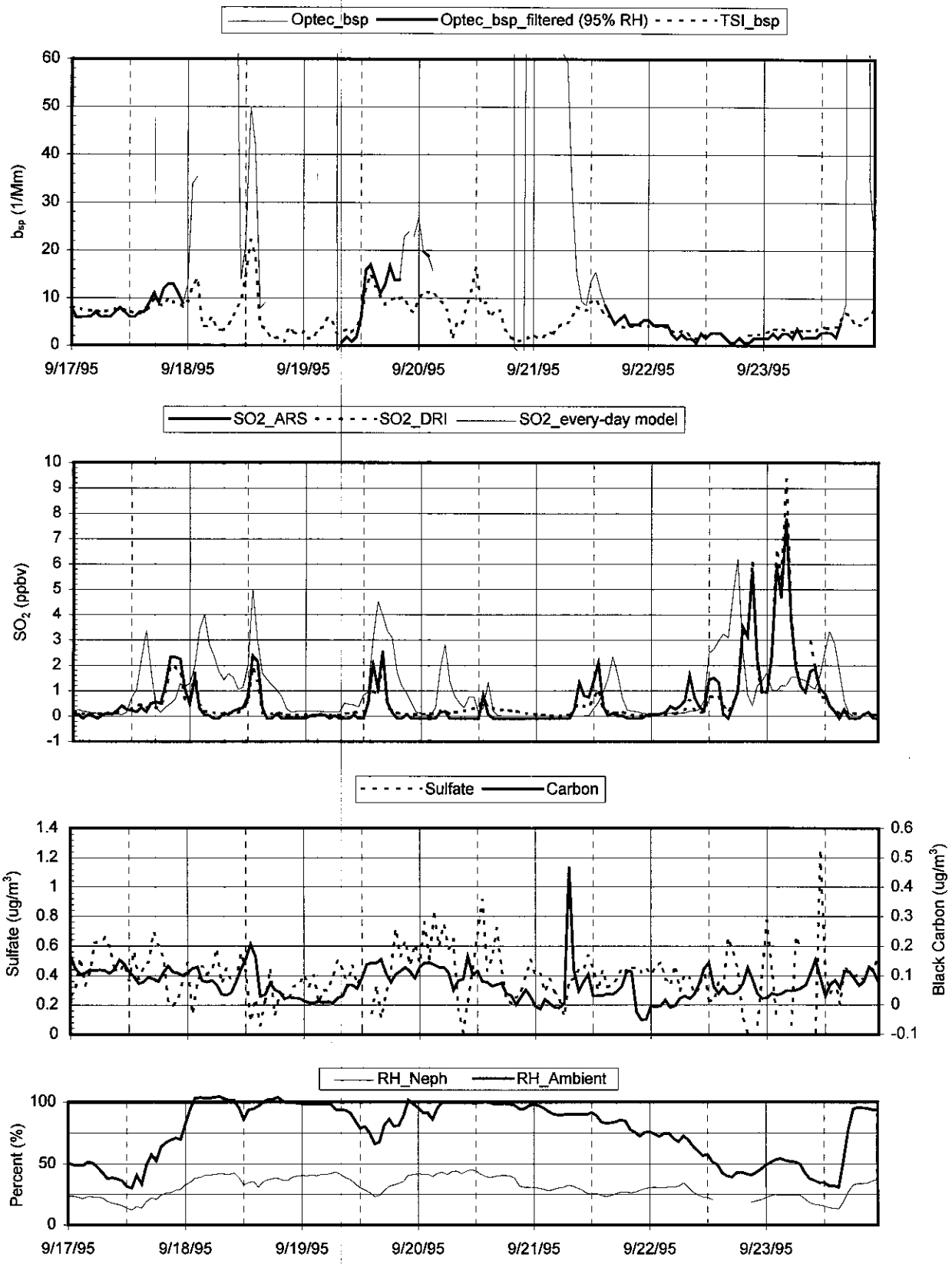


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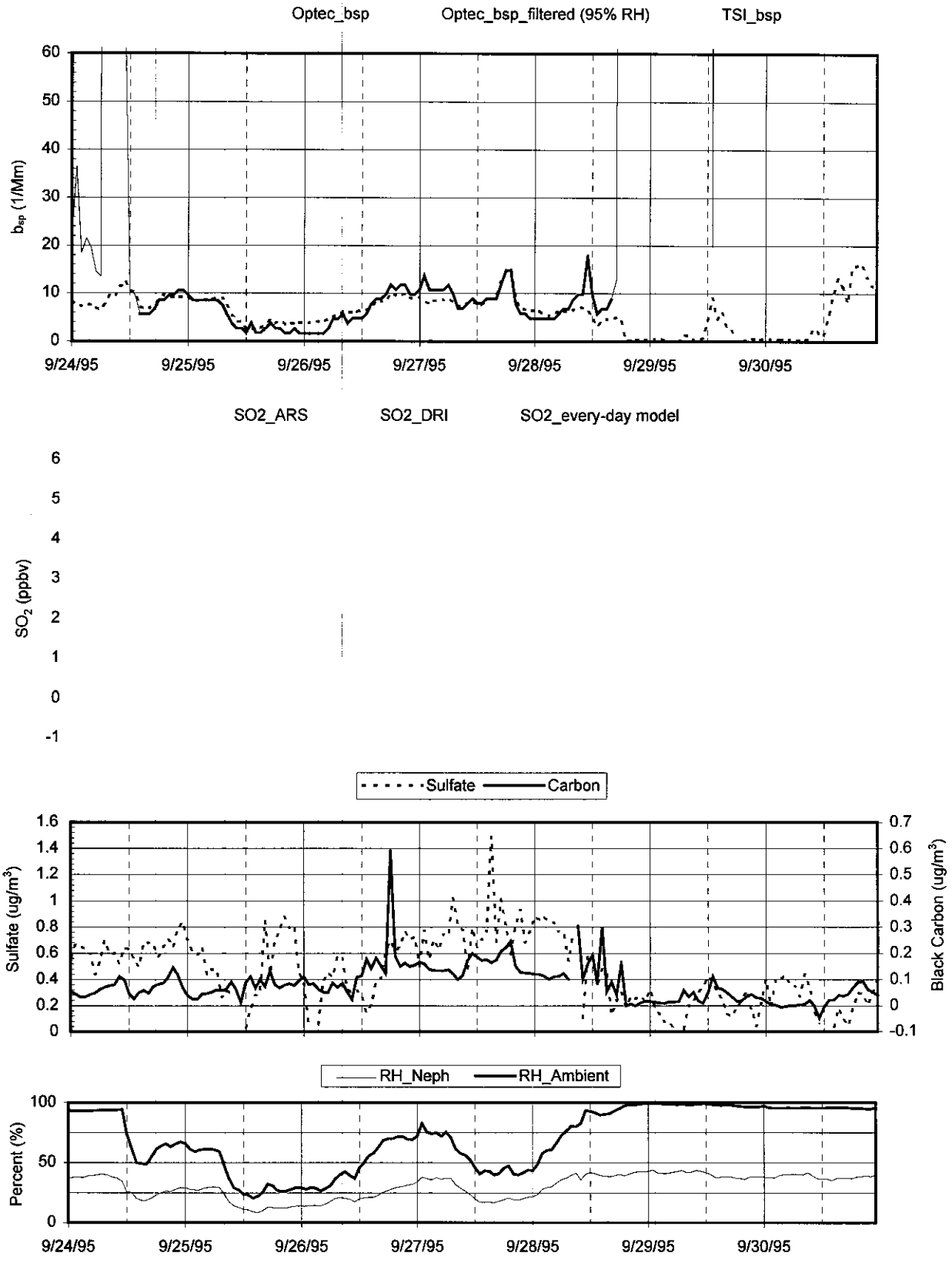


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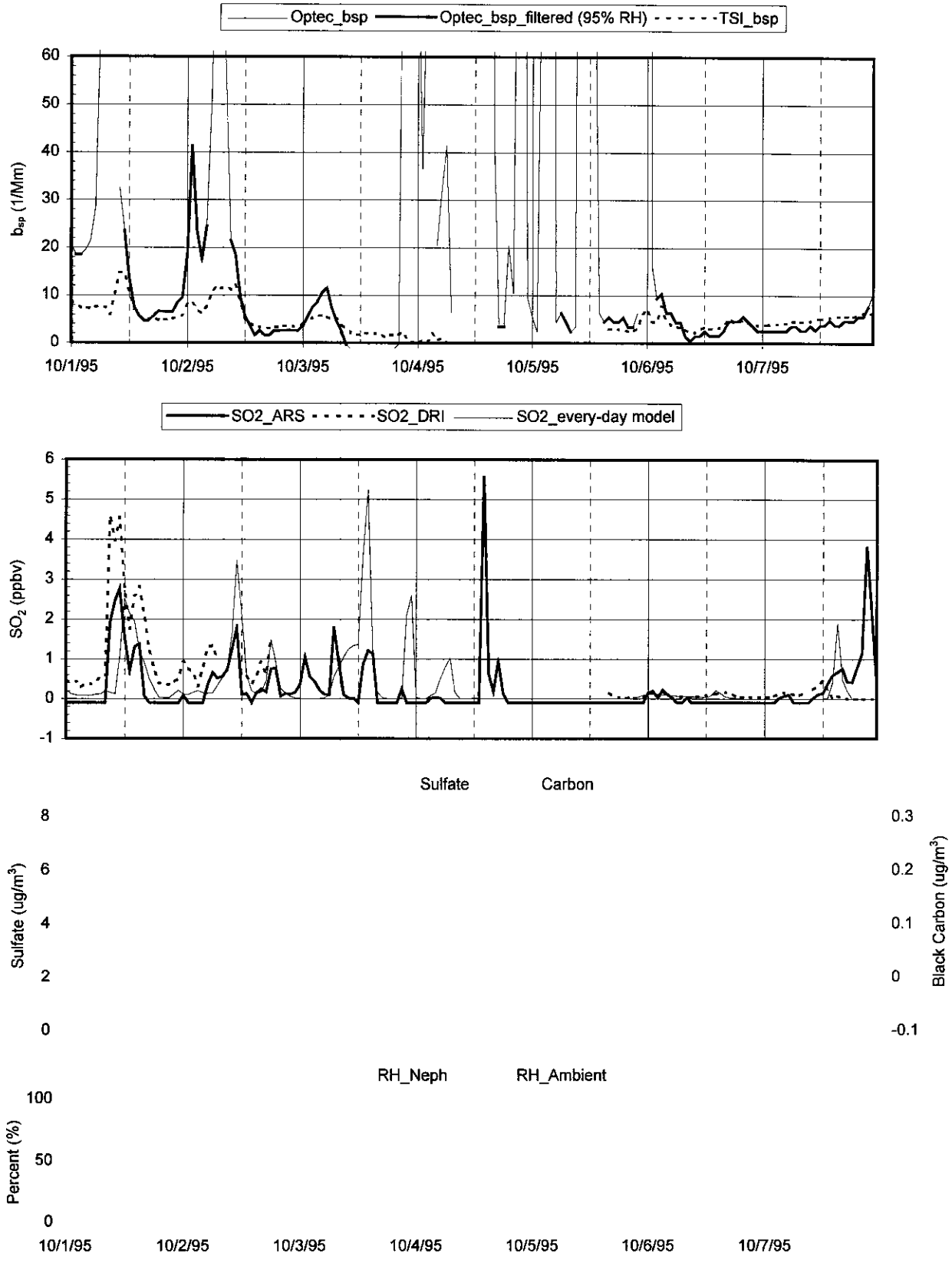


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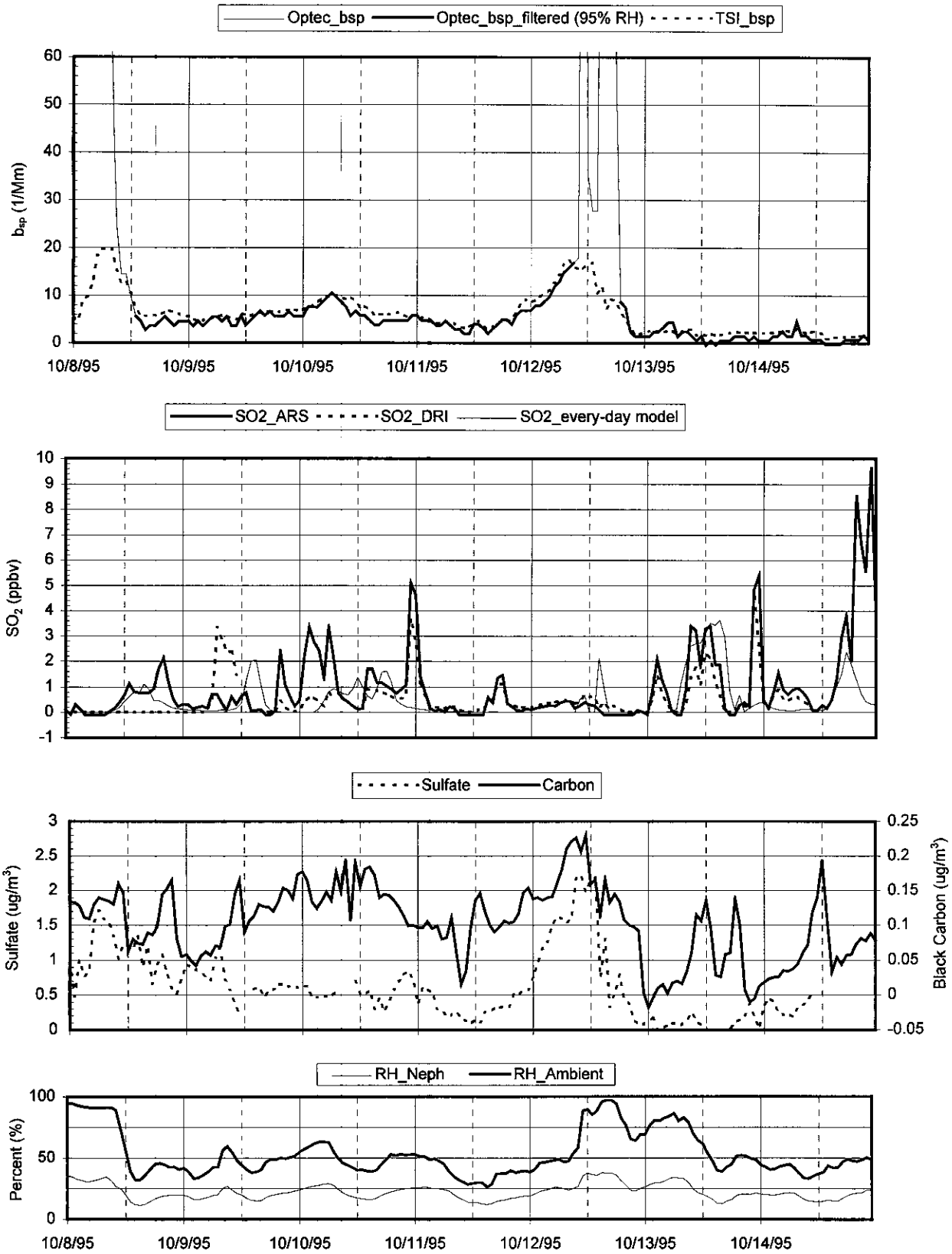


Figure E.5. (continued)

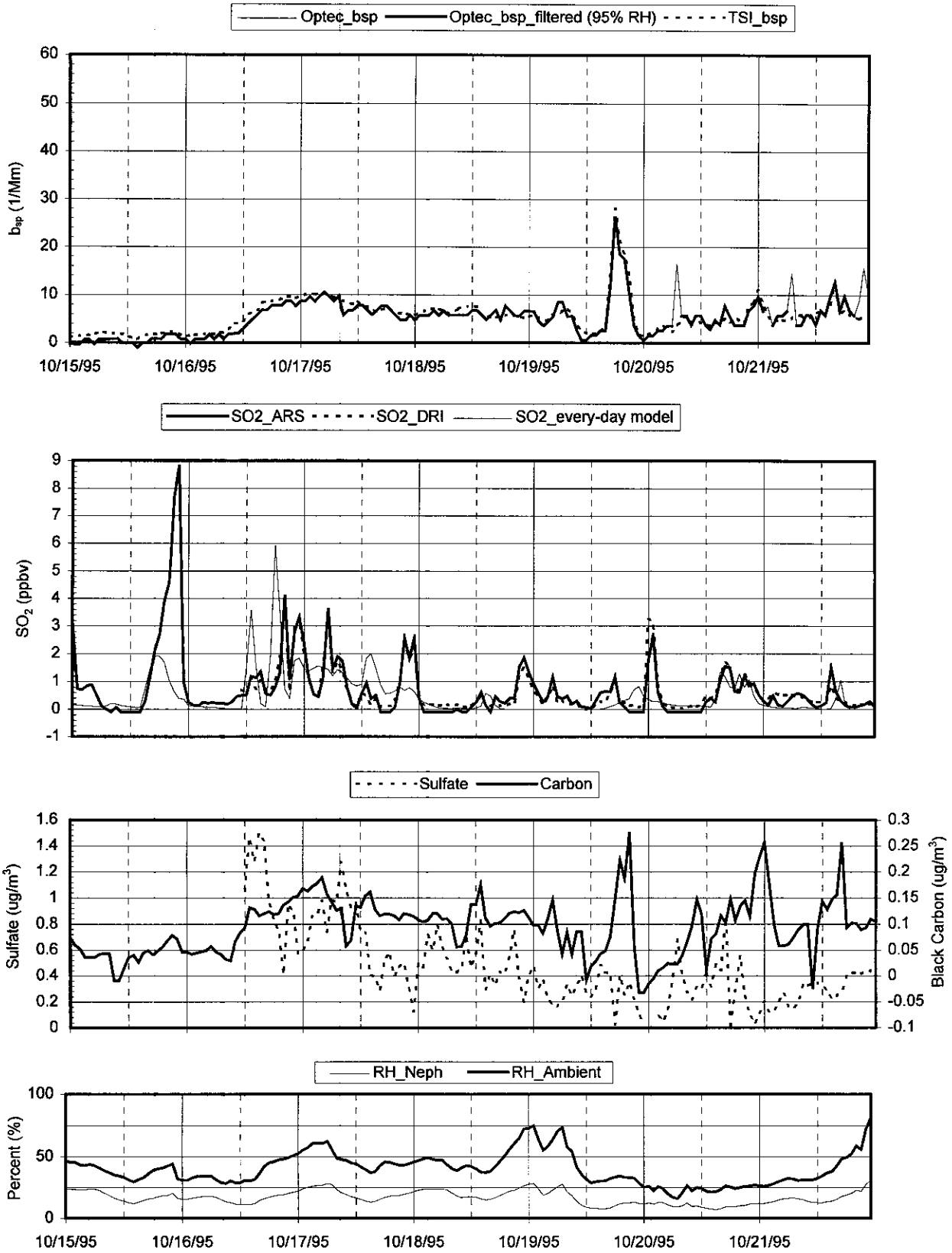


Figure E.5. (continued)

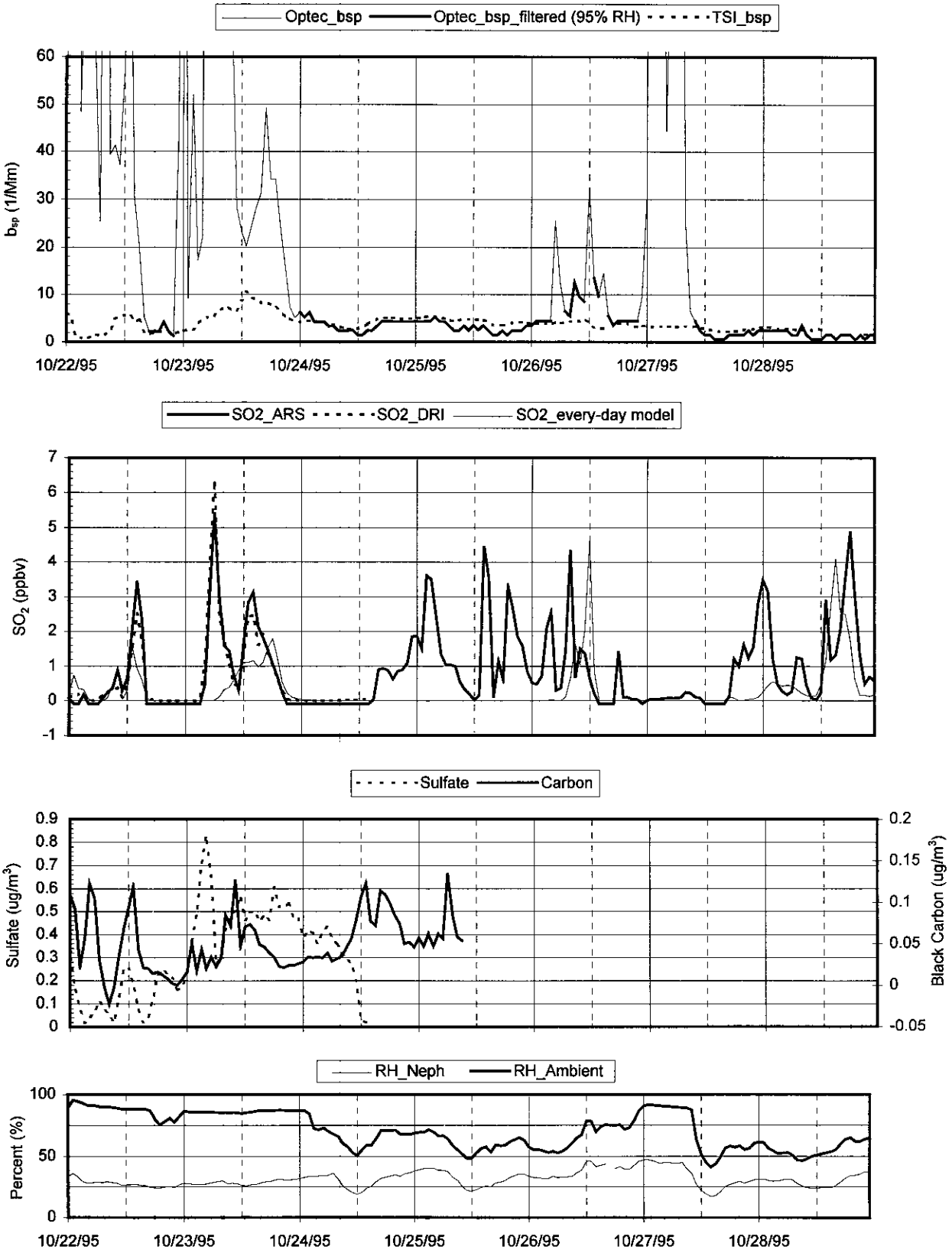


Figure E.5. (continued)

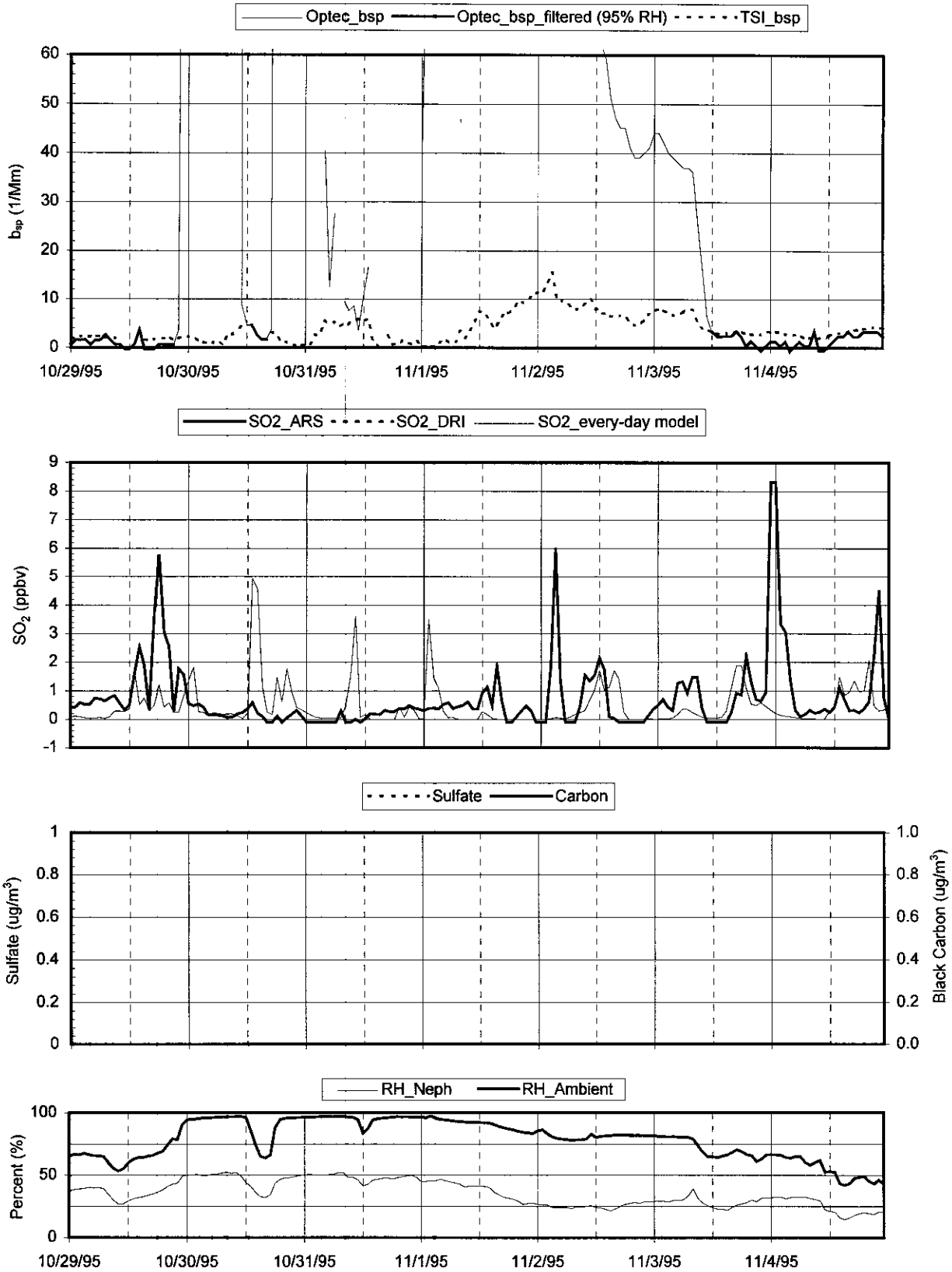


Figure E.5. (continued)

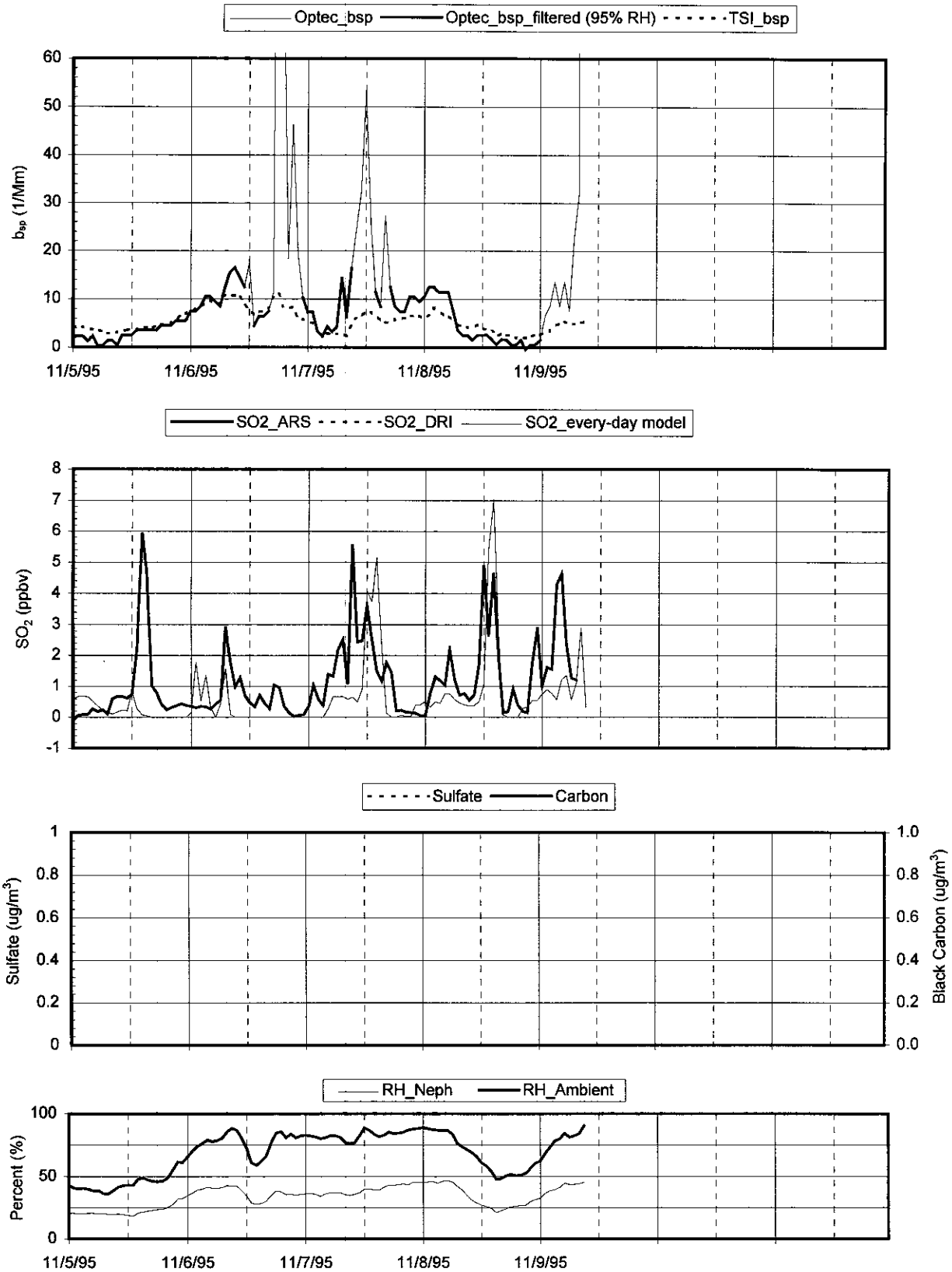


Figure E.5. (continued)

Mt. Zirkel Wilderness Area
Reasonable Attribution Study of Visibility Impairment

Volume II: Results of Data Analysis and Modeling
Final Report

July 1, 1996

APPENDIX F

REFERENCES

F.0 REFERENCES

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