MANE-VU

Mid-Atlantic/Northeast Visibility Union

Source Apportionment Analysis of Air Quality Monitoring Data: Phase II

Final Report

APPENDICES 6.5 – 6.7

Comparison of Modeled and Measured Profiles, CMB Modeling, Conceptual Model

Prepared by
Desert Research Institute

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6.5 Comparison of Modeled and Measured Profiles

As was demonstrated in sections 6.2 and 6.4, the PMF and UNMIX receptor models were able to distinguish several source types for each of the data sets and sub-sets. Of the 180 profiles originally modeled by PMF, 120 (Table 6.6-24) were assigned specific source type names, based on comparisons with similar measured profiles from the DRI's data base (Figure 6.5-1) and other published measured and modeled sources (Braaten and Cahil, 1986, Engelbrecht *et al.*, 2002, Huang *et al.*, 1999, 2001, Maykut *et al.*, 2001, Perry *et al.*, 1997, Poirot, *et al.*, 2001, Watson, *et al.*, 1994, Eugene Kim, personal communication).

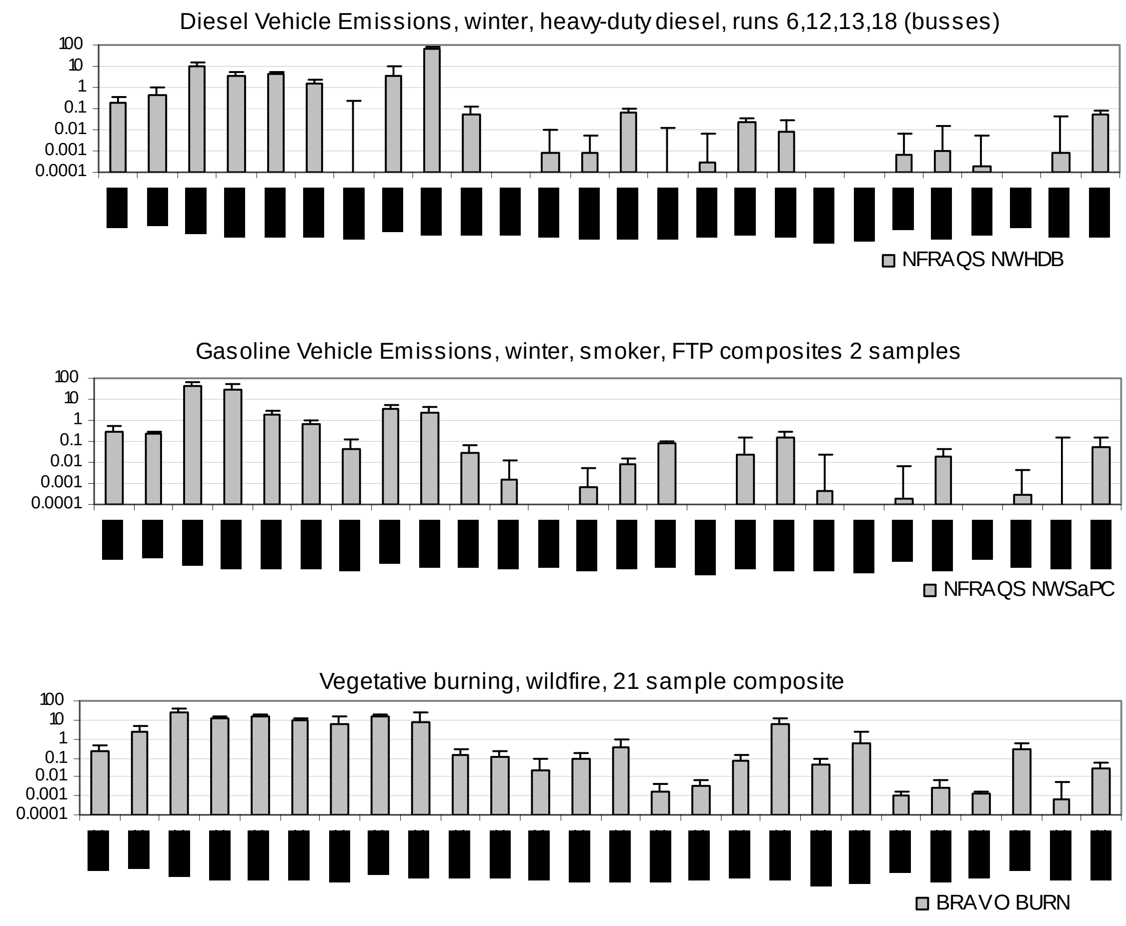


Figure 6.5-1a. Measured chemical source profiles from the DRI database

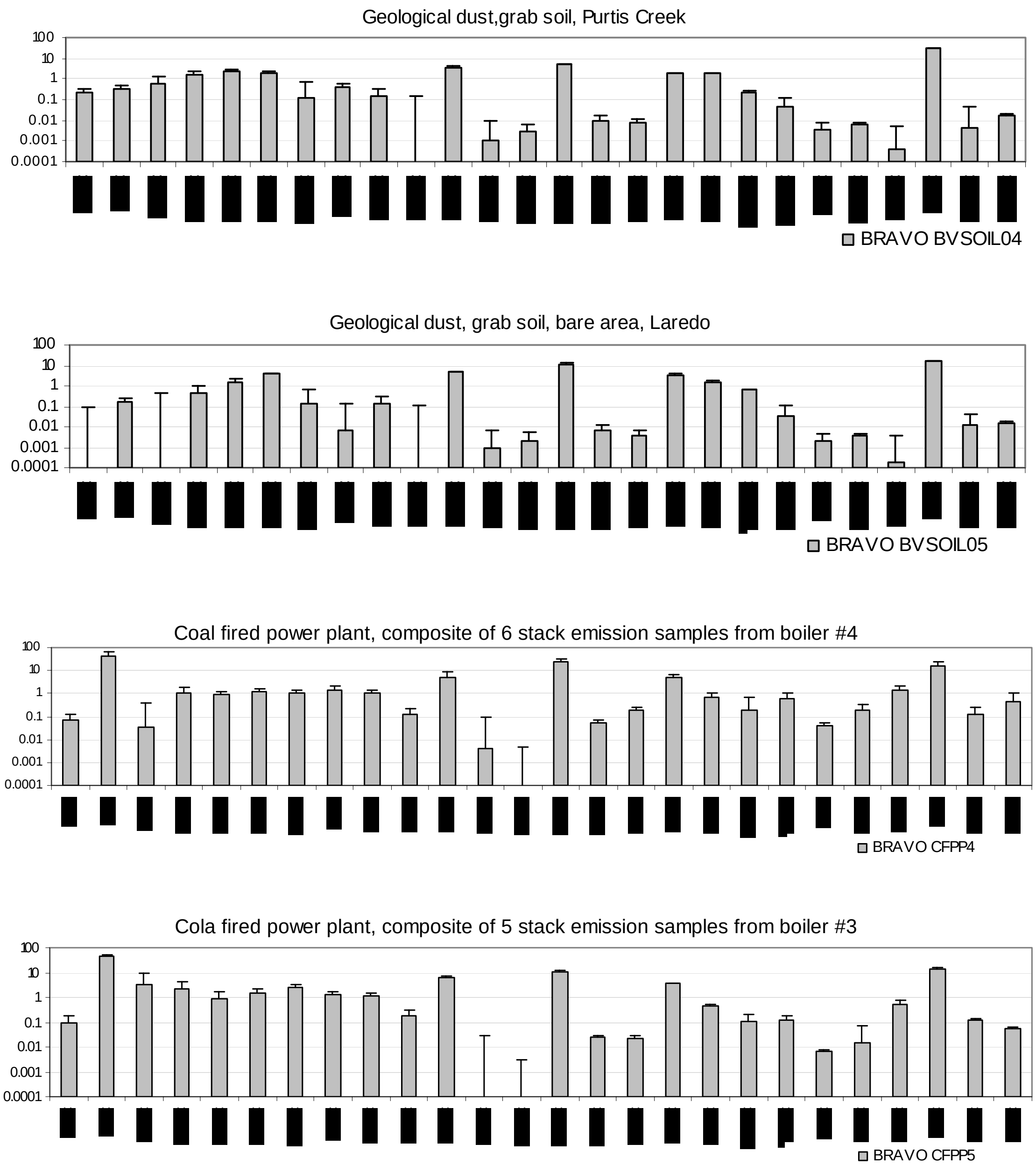


Figure 6.5-1b. Measured chemical source profiles from the DRI database

6.6 Chemical Mass Balance (CMB8) Receptor Modeling

The CMB receptor model (Friedlander, 1973; Cooper and Watson, 1980; Watson, 1984 consists of a solution to linear equations that express each receptor chemical concentration as a linear sum of products of source profile abundances and source contributions. The source profile abundances (i.e., the mass fraction of a chemical or other property 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 represented by a profile to the total mass and each chemical species. The CMB calculates values for the contributions from each source and the uncertainties of those values. The CMB is applicable to multi-species data sets, the most common of which are chemically characterized PM_{10} (suspended particles with aerodynamic diameters less than 10 µm), $PM_{2.5}$ (suspended particles with aerodynamic diameters less than 2.5 µm), and VOC (Volatile Organic Compounds).

The CMB modeling procedure requires: 1) identification of the contributing sources types; 2) selection of chemical species or other properties to be included in the calculation; 3) estimation of the fraction of each of the chemical species which is contained in each source type (source profiles); 4) estimation of the uncertainty in both ambient concentrations and source profiles; and 5) solution of the chemical mass balance equations.

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 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 CMB is intended to complement rather than replace other data analysis and modeling methods. It does not explicitly treat profiles that change between source and receptor. These models are often overly simplified, and require additional assumptions regarding chemical mechanisms, relative transformation and deposition rates, mixing volumes, and transport times. For this project, no appropriate measured source were available, and the PMF modeled profiles were used instead. These differ from measured profiles, in that they had aged, and had formed new secondary profiles by reactions in the ambient atmosphere.

The CMB model quantifies contributions from chemically distinct source-types rather than contributions from individual emitters. Sources with similar chemical and physical properties cannot be distinguished from each other by the CMB. The CMB model calculates source contribution estimates for each individual ambient sample. The combination of source profiles that best explains the ambient measurements may differ from one sample to the next owing to differences in emission rates (e.g., wild fires during the summer months), wind directions (e.g., a downwind point source would not be expected to be contributing at an upwind sampling site), and changes in emissions compositions (e.g., different gasoline characteristics and engine performance in winter and summer may result in different profiles).

Source contribution estimates are the main output of the CMB model. The sum of these concentrations approximates the total mass concentration. Negative source contribution estimates are not physically meaningful, but they can occur when a source profile is collinear with another profile or when the source contribution is close to zero. Collinearity is usually identified in the eligible sources display. When the absolute value of a positive or negative source contribution estimate is less than its standard error, the source contribution is undetectable. Two or three times the standard error may be taken as an upper limit of the source contribution in this case.

The standard errors reflect the precisions of the ambient data, the source profiles, and the amount of co linearity among different profiles. Standard errors should be reported with every source contribution estimate. The standard error is a single standard deviation. There is about a 66% probability that the true source contribution is within one standard error and about a 95% probability that the true contribution is within two standard errors of the source contribution estimate.

The T-statistic (TSTAT) is the ratio of the source contribution estimate to the standard error. A TSTAT value less than 2.0 indicates that the source contribution estimate is at or below a detection limit. Low TSTAT values for several source contributions may be caused by collinear ties among their profiles; this will be indicated by the Similarity/Uncertainty Clusters.

The reduced chi square, degrees of freedom, R square, percent mass, and fit measure are performance measures for the least squares calculation.

The chi-square is the weighted sum of squares of the differences between the calculated and measured fitting species concentrations. The weighting is inversely proportional to the squares of the precisions in the source profiles and ambient data for each species. Ideally, there would be no difference between calculated and measured species concentrations and chi-square would equal zero. A value less than 1 indicates a very good fit to the data, while values between 1 and 2 are acceptable. Chi-square values greater than 4 indicate that one or more species concentrations are not well explained by the source contribution estimates. The degrees of freedom equal the number of fitting species minus the number of fitting sources. The degrees of freedom is needed when statistical significance tests are applied to the chi-square value.

The R-square is the fraction of the variance in the measured concentrations that is explained by the variance in the calculated species concentrations. It is determined by a linear regression of measured versus model-calculated values for the fitting species. R-square ranges from 0 to 1.0. The closer the value is to 1.0, the better the source contribution estimates explain the measured concentrations. When R-square is less than 0.8, the source contribution estimates do not explain the observations very well with the fitting source profiles and/or species.

Percent mass is the percent ratio of the sum of the model-calculated source contribution estimates to the measured mass concentration. This ratio should equal 100%, although values ranging from 80 to 120% are acceptable. If the measured mass is very low (< 5 to 10 $\mu g/m^3$), percent mass may be outside of this range because the precision of the mass measurement is on the order of 1 to 2 $\mu g/m^3$.

6.6.1 Ambient Sample Sets

Average ambient sample compositions were calculated for the seasonal sub-sets as well as for the total (annual) IMPROVE data sets, for each of the four sites, *i.e.* 20 ambient samples in total (Table 6.6-1).

Table 6.6-1a Average seasonal and annual sample sub-sets used as input to the CMB model (μg/m³)

	MBWI	MBSP	MBSU	MBFA	MBAL	MLWI	MLSP
Mass	4.6513 ± 0.2263	4.5564 ± 0.2204	6.0382 ± 0.2519	3.9135 ± 0.2075	4.7497 ± 0.2257	4.4531 ± 0.2178	5.6809 ± 0.2441
ammNitr	1.2909 ± 0.1320	0.4730 ± 0.0624	0.1172 ± 0.0277	0.5143 ± 0.0649	0.6108 ± 0.0729	0.7765 ± 0.0834	0.4712 ± 0.0582
ammSulf	1.8832 ± 0.0333	2.0662 ± 0.0363	1.8894 ± 0.0332	1.4158 ± 0.0252	1.8055 ± 0.0319	2.1260 ± 0.0370	2.7575 ± 0.0473
OC1	0.0781 ± 0.0560	0.0721 ± 0.0473	0.1508 ± 0.0739	0.0880 ± 0.0567	0.0959 ± 0.0581	0.0942 ± 0.0632	0.0830 ± 0.0494
OC2	0.1339 ± 0.0569	0.1534 ± 0.0537	0.3398 ± 0.0919	0.1694 ± 0.0610	0.1955 ± 0.0652	0.1299 ± 0.0585	0.1646 ± 0.0557
OC3	0.1749 ± 0.0570	0.1908 ± 0.0563	0.5477 ± 0.0984	0.3121 ± 0.0748	0.3011 ± 0.0711	0.1864 ± 0.0589	0.1900 ± 0.0550
OC4	0.1681 ± 0.0335	0.1599 ± 0.0325	0.2797 ± 0.0507	0.2083 ± 0.0421	0.2024 ± 0.0395	0.2030 ± 0.0376	0.1981 ± 0.0364
OPT	0.1581 ± 0.0463	0.1674 ± 0.0488	0.3356 ± 0.0967	0.1967 ± 0.0588	0.2115 ± 0.0619	0.1596 ± 0.0468	0.1910 ± 0.0551
EC1	0.2694 ± 0.0398	0.2455 ± 0.0369	0.4190 ± 0.0612	0.3036 ± 0.0479	0.3070 ± 0.0462	0.3181 ± 0.0461	0.3182 ± 0.0464
EC2	0.0548 ± 0.0236	0.0553 ± 0.0250	0.0839 ± 0.0354	0.0666 ± 0.0307	0.0648 ± 0.0286	0.0589 ± 0.0242	0.0721 ± 0.0294
EC3	0.0130 ± 0.0088	0.0137 ± 0.0097	0.0162 ± 0.0114	0.0154 ± 0.0110	0.0146 ± 0.0102	0.0131 ± 0.0089	0.0168 ± 0.0110
Al	0.0092 ± 0.0022	0.0276 ± 0.0032	0.0139 ± 0.0023	0.0093 ± 0.0019	0.0149 ± 0.0024	0.0104 ± 0.0026	0.0270 ± 0.0037
As	0.0010 ± 0.0001	0.0007 ± 0.0001	0.0011 ± 0.0006	0.0010 ± 0.0007	0.0010 ± 0.0004	0.0003 ± 0.0001	0.0003 ± 0.0001
Br	0.0015 ± 0.0001	0.0019 ± 0.0004	0.0009 ± 0.0006	0.0010 ± 0.0006	0.0013 ± 0.0004	0.0017 ± 0.0001	0.0022 ± 0.0002
Ca	0.0187 ± 0.0016	0.0251 ± 0.0019	0.0201 ± 0.0017	0.0227 ± 0.0019	0.0217 ± 0.0018	0.0127 ± 0.0014	0.0236 ± 0.0020
Cr	0.0009 ± 0.0003	0.0009 ± 0.0004	0.0009 ± 0.0004	0.0009 ± 0.0004	0.0009 ± 0.0004	0.0010 ± 0.0004	0.0012 ± 0.0005
Cu	0.0005 ± 0.0001	0.0007 ± 0.0005	0.0005 ± 0.0003	0.0006 ± 0.0003	0.0006 ± 0.0003	0.0008 ± 0.0001	0.0007 ± 0.0001
Fe	0.0322 ± 0.0017	0.0364 ± 0.0019	0.0320 ± 0.0017	0.0315 ± 0.0017	0.0330 ± 0.0017	0.0140 ± 0.0008	0.0249 ± 0.0014
K	0.0260 ± 0.0020	0.0271 ± 0.0020	0.0278 ± 0.0020	0.0342 ± 0.0024	0.0289 ± 0.0021	0.0228 ± 0.0019	0.0275 ± 0.0023
Mg	0.0132 ± 0.0038	0.0110 ± 0.0030	0.0072 ± 0.0027	0.0077 ± 0.0027	0.0098 ± 0.0031	0.0126 ± 0.0047	0.0105 ± 0.0037
Na	0.0751 ± 0.0131	0.0560 ± 0.0089	0.0376 ± 0.0066	0.0353 ± 0.0069	0.0511 ± 0.0089	0.0595 ± 0.0137	0.0643 ± 0.0111
Ni	0.0001 ± 0.0001	0.0001 ± 0.0002	0.0004 ± 0.0003	0.0006 ± 0.0002	0.0003 ± 0.0002	0.0006 ± 0.0001	0.0005 ± 0.0001
Pb	0.0015 ± 0.0002	0.0013 ± 0.0003	0.0009 ± 0.0006	0.0011 ± 0.0005	0.0012 ± 0.0004	0.0022 ± 0.0002	0.0022 ± 0.0002
Se	0.0002 ± 0.0001	0.0002 ± 0.0005	0.0003 ± 0.0002	0.0003 ± 0.0003	0.0003 ± 0.0003	0.0006 ± 0.0001	0.0004 ± 0.0008
Si	0.0377 ± 0.0035	0.0766 ± 0.0050	0.0625 ± 0.0044	0.0547 ± 0.0041	0.0576 ± 0.0042	0.0332 ± 0.0036	0.0761 ± 0.0056
V	0.0011 ± 0.0004	0.0011 ± 0.0005	0.0012 ± 0.0005	0.0013 ± 0.0005	0.0011 ± 0.0005	0.0018 ± 0.0006	0.0018 ± 0.0007
Zn	0.0037 ± 0.0002	0.0026 ± 0.0004	0.0024 ± 0.0005	0.0026 ± 0.0003	0.0029 ± 0.0004	0.0050 ± 0.0003	0.0042 ± 0.0003

MBWI	Marama, Boundary Waters Canoe Area, winter mean ambient sample
MBSP	Marama, Boundary Waters Canoe Area, spring mean ambient sample
MBSU	Marama, Boundary Waters Canoe Area, summer mean ambient sample
MBFA	Marama, Boundary Waters Canoe Area, fall mean ambient sample
MBAL	Marama, Boundary Waters Canoe Area, annual mean ambient sample
MLWI	Marama, Lye Brook Wilderness Area, winter mean ambient sample
MLSP	Marama, Lye Brook Wilderness Area, spring mean ambient sample

Table 6.6-1b Average seasonal and annual sample sub-sets used as input to the CMB model (μg/m³)

	MLSU	MLFA	MLAL	MSWI	MSSP	MSSU
Mass	10.2242 ± 0.3597	5.6230 ± 0.2476	6.4667 ± 0.2667	5.8144 ± 0.2448	9.8709 ± 0.3446	18.8000 ± 0.5940
ammNitr	0.2480 ± 0.0342	0.4733 ± 0.0565	0.4916 ± 0.0581	1.0027 ± 0.1045	0.9027 ± 0.0988	0.3531 ± 0.0478
ammSulf	5.4312 ± 0.0906	2.9355 ± 0.0493	3.2996 ± 0.0558	3.0621 ± 0.0526	5.6186 ± 0.0950	11.6930 ± 0.1850
OC1	0.1477 ± 0.0735	0.1039 ± 0.0606	0.1070 ± 0.0616	0.0878 ± 0.0636	0.1353 ± 0.0671	0.2702 ± 0.1059
OC2	0.3130 ± 0.0873	0.1728 ± 0.0613	0.1943 ± 0.0656	0.1613 ± 0.0630	0.2865 ± 0.0738	0.5275 ± 0.1171
OC3	0.3610 ± 0.0762	0.2294 ± 0.0668	0.2412 ± 0.0643	0.2405 ± 0.0664	0.3041 ± 0.0688	0.3980 ± 0.0829
OC4	0.3137 ± 0.0530	0.2237 ± 0.0438	0.2342 ± 0.0427	0.2650 ± 0.0464	0.3626 ± 0.0580	0.5251 ± 0.0808
OPT	0.3443 ± 0.0984	0.1914 ± 0.0569	0.2206 ± 0.0640	0.2243 ± 0.0651	0.3166 ± 0.0898	0.6330 ± 0.1758
EC1	0.5130 ± 0.0733	0.3607 ± 0.0556	0.3768 ± 0.0553	0.4418 ± 0.0635	0.5660 ± 0.0792	0.8931 ± 0.1232
EC2	0.1025 ± 0.0411	0.0765 ± 0.0334	0.0775 ± 0.0320	0.0754 ± 0.0325	0.0965 ± 0.0382	0.1170 ± 0.0462
EC3	0.0193 ± 0.0126	0.0168 ± 0.0111	0.0165 ± 0.0109	0.0140 ± 0.0109	0.0175 ± 0.0126	0.0195 ± 0.0142
Al	0.0215 ± 0.0036	0.0109 ± 0.0026	0.0173 ± 0.0031	0.0138 ± 0.0028	0.0443 ± 0.0048	0.0487 ± 0.0058
As	0.0003 ± 0.0004	0.0002 ± 0.0002	0.0003 ± 0.0002	0.0003 ± 0.0001	0.0004 ± 0.0002	0.0003 ± 0.0003
Br	0.0014 ± 0.0004	0.0015 ± 0.0005	0.0017 ± 0.0003	0.0021 ± 0.0002	0.0028 ± 0.0002	0.0020 ± 0.0004
Ca	0.0179 ± 0.0020	0.0139 ± 0.0016	0.0170 ± 0.0018	0.0150 ± 0.0015	0.0313 ± 0.0025	0.0262 ± 0.0025
Cr	0.0013 ± 0.0006	0.0013 ± 0.0005	0.0012 ± 0.0005	0.0011 ± 0.0004	0.0012 ± 0.0005	0.0015 ± 0.0006
Cu	0.0007 ± 0.0006	0.0008 ± 0.0006	0.0007 ± 0.0003	0.0008 ± 0.0001	0.0010 ± 0.0001	0.0011 ± 0.0005
Fe	0.0219 ± 0.0012	0.0165 ± 0.0009	0.0193 ± 0.0011	0.0168 ± 0.0010	0.0383 ± 0.0020	0.0401 ± 0.0021
K	0.0254 ± 0.0024	0.0220 ± 0.0021	0.0243 ± 0.0022	0.0289 ± 0.0022	0.0400 ± 0.0028	0.0402 ± 0.0033
Mg	0.0117 ± 0.0046	0.0093 ± 0.0038	0.0110 ± 0.0042	0.0098 ± 0.0040	0.0117 ± 0.0041	0.0151 ± 0.0059
Na	0.0687 ± 0.0121	0.0559 ± 0.0102	0.0619 ± 0.0117	0.0519 ± 0.0118	0.0824 ± 0.0137	0.1146 ± 0.0195
Ni	0.0005 ± 0.0005	0.0006 ± 0.0005	0.0006 ± 0.0003	0.0002 ± 0.0001	0.0003 ± 0.0002	0.0005 ± 0.0004
Pb	0.0019 ± 0.0003	0.0020 ± 0.0004	0.0021 ± 0.0003	0.0022 ± 0.0002	0.0028 ± 0.0003	0.0025 ± 0.0004
Se	0.0006 ± 0.0004	0.0005 ± 0.0005	0.0005 ± 0.0004	0.0010 ± 0.0001	0.0009 ± 0.0005	0.0012 ± 0.0005
Si	0.0785 ± 0.0068	0.0486 ± 0.0046	0.0589 ± 0.0051	0.0448 ± 0.0041	0.1215 ± 0.0078	0.1452 ± 0.0103
V	0.0021 ± 0.0008	0.0023 ± 0.0008	0.0020 ± 0.0007	0.0014 ± 0.0005	0.0015 ± 0.0006	0.0018 ± 0.0008
Zn	0.0043 ± 0.0004	0.0045 ± 0.0004	0.0045 ± 0.0004	0.0055 ± 0.0005	0.0067 ± 0.0004	0.0063 ± 0.0005

MLSU	Marama, Lye Brook Wilderness Area, summer mean ambient sample
MLFA	Marama, Lye Brook Wilderness Area, fall mean ambient sample
MLAL	Marama, Lye Brook Wilderness Area, annual mean ambient sample
MSWI	Marama, Shenandoah National Park, winter mean ambient sample
MSSP	Marama, Shenandoah National Park, spring mean ambient sample
MSSU	Marama, Shenandoah National Park, summer mean ambient sample

Table 6.6-1c Average seasonal and annual sample sub-sets used as input to the CMB model (μg/m³)

	MSFA	MSAL	MWWI	MWSP	MWSU	MWFA	MWAL
Mass	10.0164 ± 0.3535	11.1349 ± 0.3843	15.8216 ± 0.5073	14.7898 ± 0.4776	20.6870 ± 0.6480	14.6890 ± 0.4776	16.4575 ± 0.5265
ammNitr	0.6527 ± 0.0745	0.7273 ± 0.0814	2.9953 ± 0.2903	1.9939 ± 0.1979	0.9640 ± 0.0991	1.6680 ± 0.1659	1.9001 ± 0.1878
ammSulf	6.0046 ± 0.0992	6.6005 ± 0.1081	4.9520 ± 0.0862	6.7899 ± 0.1172	11.0070 ± 0.1894	6.4380 ± 0.1118	7.2850 ± 0.1260
OC1	0.1410 ± 0.0744	0.1586 ± 0.0777	0.5019 ± 0.1642	0.3229 ± 0.1133	0.3619 ± 0.1280	0.3800 ± 0.1340	0.3907 ± 0.1346
OC2	0.3147 ± 0.0820	0.3231 ± 0.0840	0.5498 ± 0.1133	0.5204 ± 0.1064	0.7367 ± 0.1468	0.6111 ± 0.1232	0.6040 ± 0.1224
OC3	0.3676 ± 0.0813	0.3284 ± 0.0749	1.0197 ± 0.1401	0.6708 ± 0.1023	0.7455 ± 0.1144	0.8859 ± 0.1303	0.8296 ± 0.1217
OC4	0.4083 ± 0.0666	0.3910 ± 0.0630	1.0006 ± 0.1394	0.7193 ± 0.1029	0.8118 ± 0.1169	0.8758 ± 0.1254	0.8508 ± 0.1210
OPT	0.3824 ± 0.1079	0.3892 ± 0.1097	0.2068 ± 0.0653	0.1666 ± 0.0527	0.3041 ± 0.0928	0.2380 ± 0.0754	0.2286 ± 0.0715
EC1	0.6607 ± 0.0937	0.6411 ± 0.0900	1.5252 ± 0.2054	1.1958 ± 0.1620	1.4080 ± 0.1909	1.5651 ± 0.2123	1.4235 ± 0.1927
EC2	0.1090 ± 0.0435	0.0997 ± 0.0402	0.0883 ± 0.0331	0.1143 ± 0.0409	0.1050 ± 0.0423	0.1091 ± 0.0422	0.1044 ± 0.0397
EC3	0.0202 ± 0.0142	0.0178 ± 0.0130	0.0178 ± 0.0114	0.0191 ± 0.0127	0.0193 ± 0.0135	0.0179 ± 0.0124	0.0185 ± 0.0125
Al	0.0211 ± 0.0034	0.0321 ± 0.0042	0.0304 ± 0.0052	0.0498 ± 0.0058	0.0606 ± 0.0072	0.0351 ± 0.0053	0.0439 ± 0.0059
As	0.0003 ± 0.0001	0.0003 ± 0.0002	0.0007 ± 0.0002	0.0006 ± 0.0002	0.0005 ± 0.0002	0.0006 ± 0.0002	0.0006 ± 0.0002
Br	0.0030 ± 0.0003	0.0025 ± 0.0003	0.0060 ± 0.0004	0.0047 ± 0.0004	0.0034 ± 0.0003	0.0047 ± 0.0004	0.0047 ± 0.0004
Ca	0.0235 ± 0.0022	0.0242 ± 0.0022	0.0379 ± 0.0032	0.0482 ± 0.0036	0.0429 ± 0.0036	0.0448 ± 0.0037	0.0435 ± 0.0035
Cr	0.0013 ± 0.0005	0.0012 ± 0.0005	0.0014 ± 0.0006	0.0015 ± 0.0006	0.0017 ± 0.0008	0.0016 ± 0.0007	0.0016 ± 0.0007
Cu	0.0010 ± 0.0004	0.0010 ± 0.0003	0.0046 ± 0.0004	0.0033 ± 0.0003	0.0033 ± 0.0003	0.0044 ± 0.0003	0.0039 ± 0.0003
Fe	0.0246 ± 0.0014	0.0301 ± 0.0016	0.1147 ± 0.0059	0.1088 ± 0.0056	0.1035 ± 0.0054	0.1241 ± 0.0064	0.1129 ± 0.0059
K	0.0360 ± 0.0028	0.0364 ± 0.0028	0.0714 ± 0.0046	0.0580 ± 0.0040	0.0754 ± 0.0051	0.0599 ± 0.0044	0.0660 ± 0.0045
Mg	0.0095 ± 0.0041	0.0115 ± 0.0045	0.0155 ± 0.0066	0.0146 ± 0.0053	0.0182 ± 0.0072	0.0141 ± 0.0056	0.0156 ± 0.0062
Na	0.0764 ± 0.0130	0.0815 ± 0.0145	0.1243 ± 0.0238	0.1284 ± 0.0190	0.1576 ± 0.0264	0.1238 ± 0.0201	0.1334 ± 0.0223
Ni	0.0007 ± 0.0004	0.0004 ± 0.0003	0.0023 ± 0.0002	0.0018 ± 0.0002	0.0012 ± 0.0004	0.0016 ± 0.0004	0.0017 ± 0.0003
Pb	0.0024 ± 0.0003	0.0025 ± 0.0003	0.0064 ± 0.0005	0.0059 ± 0.0005	0.0058 ± 0.0005	0.0071 ± 0.0005	0.0063 ± 0.0005
Se	0.0012 ± 0.0004	0.0011 ± 0.0004	0.0026 ± 0.0002	0.0017 ± 0.0004	0.0020 ± 0.0004	0.0022 ± 0.0004	0.0021 ± 0.0003
Si	0.0808 ± 0.0063	0.0986 ± 0.0071	0.0796 ± 0.0067	0.1421 ± 0.0093	0.1660 ± 0.0115	0.1180 ± 0.0090	0.1265 ± 0.0091
V	0.0016 ± 0.0007	0.0016 ± 0.0007	0.0062 ± 0.0012	0.0043 ± 0.0010	0.0034 ± 0.0011	0.0040 ± 0.0011	0.0045 ± 0.0011
Zn	0.0060 ± 0.0005	0.0061 ± 0.0005	0.0195 ± 0.0011	0.0150 ± 0.0009	0.0123 ± 0.0007	0.0161 ± 0.0009	0.0157 ± 0.0009

MSFA	Marama, Shenandoah National Park, fall mean ambient sample
MSAL	Marama, Shenandoah National Park, annual mean ambient sample
MWWI	Marama, Washinton DC, winter mean ambient sample
MWSP	Marama, Washington DC, spring mean ambient sample
MWSU	Marama, Washington DC, summer mean ambient sample
MWFA	Marama, Washington DC, fall mean ambient sample
MWAL	Marama, Washington DC, annual mean ambient sample

6.6.2 Source Profiles Derived from PMF Modeled Profiles.

Of the 180 profiles originally modeled by PMF, 120 (Table 6.6-24) were assigned specific source type names, based on comparisons with similar measured profiles from the DRI's data base and other published measured and modeled sources (Braaten and Cahil, 1986, Engelbrecht *et al.*, 2002, Huang *et al.*, 1999, 2001, Perry *et al.*, 1997, Poirot, *et al.*, 2001, Watson, *et al.*, 1994, xxx personal communication). The PMF generated source profiles are expressed as relative mass abundances, and had to be recalculated to mass fractions, after adjusting for the ammonium sulfate, ammonium nitrate, sodium chloride (sea salt), oxides and hydrocarbons (component of OC), as is described below.

Separate calculations were performed on each of the sample subsets, by season and site, since the hydrocarbon correction factors. The latter was calculated from the average ambient samples **(Table 6.6-1)** by equating the sum of all species mass (measured and not measured) to the measured mass, for each sample subset (IMPROVE, 2002; Sisler and Malm, 2000; Solomon, *et al.*, 1989; Turpin and Lim, 2001; Zhang, *et al.*, 1990) are that all sulfate is ammonium sulfate, all nitrate is ammonium nitrate, all sodium is sodium chloride and all crustal species (Al, Ca, Fe, K, Mg and Si) are silicates or oxides, and that all hydrogen and organic oxygen are part of OC. The other trace species and EC are added in as elemental mass.

Σ Species (ammNitr, ammSulf, (Fac).OC, EC, Al_2O_3, As, Br, CaO, Cr, Cu, Fe_2O_3, K_2O, MgO, NaCl, Ni, Pb, Se, SiO_2, V, Zn) mass = Measured mass, where Fac = hydrocarbon correction factor.

The hydrocarbon correction factor (Fac) calculated for each sample subset is given in Table 6.6-2. For the three rural sites, the lowest hydrocarbon correction factors were calculated for the winter season, while the highest for all four sites, is the summer season. This is ascribed to the higher proportion of hydrocarbons from seasonal sources such as vegetative burning and biogenic emissions during the summer months. Washington DC differs from the other three sites by having the lowest correction factor not in winter, but fall. This anomalous pattern is ascribed to the contribution of motor vehicle emissions and perhaps other urban emissions.

Table 6.6-2 Hydrocarbon correction factors (Fac) applied to the PMF modeled source profiles to reconstruct mass

	Annual	Winter	Spring	Summer	Fall
Boundary Waters Canoe Area	1.73	1.23	1.83	2.10	1.50
Lye Brook Wilderness Area	2.00	1.26	2.10	2.54	1.72
Shenandoah National Park	1.76	1.10	1.60	2.33	1.48
Washington DC	1.68	1.68	1.57	2.11	1.38

These same hydrocarbon correction factors were applied to the 120 identified PMF modeled source profiles, in order to reconstruct mass. In each case the ammonium nitrate, ammonium sulfate and sodium (marine) were considered not to be part of the source profiles. Derived PMF modeled profiles include one biogenic emissions profile, 14 coal fired power plant profiles, two diesel vehicle emissions, two gasoline vehicle emissions, seven motor vehicle emissions profiles, 28 geological dust profiles, five iron and steel industry profiles, 10 oil combustion profiles, five road dust profiles, 11 secondary organics profiles, 15 smelter emissions profiles, and 20 vegetative burning profiles.

Separate secondary ammonium sulfate, secondary ammonium nitrate and marine salt were included in the CMB model.

Various combinations from the 120 PMF modeled source profiles were evaluated for the CMB modeling, based on the performance measures previously described. For the 20 ambient samples, the sub-set of 18 PMF modeled source profiles proved to be those that best fitted the 20 ambient samples. These include four power plant emission profiles, one diesel vehicle emissions profile, two geological dust profiles, one iron and steel industry profile, one motor vehicle emissions profile, two oil combustion profiles, one smelter profile, and six vegetative burning profiles, as listed in Table 6.6-3 and portrayed in Figure 6.6-1. The two geological dust profiles (MGlDst01, 02) represent the more aluminous and more calcium siliceous end members of the actual dust found in the sampled region. These same profiles were used as CMB input to all 20 ambient samples, but modeled in variable ratios. The secondary organic profiles were not modeled as potential sources, because they were considered to be reacted mixtures of primary organic sources such as vegetative burning and motor vehicle emissions.

Table 6.6-3a. PMF source profiles used as input to the CMB model (μg/m³)

	MColPP08	MColPP10	MColPP11	MColPP14	MDsEmi02	MGlDst01
ammNitr	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010
ammSulf	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010
OC1	0.114658 ± 0.098560	0.047819 ± 0.032816	0.019571 ± 0.012304	0.032448 ± 0.007886	0.090055 ± 0.077132	0.000530 ± 0.013305
OC2	0.103101 ± 0.108310	0.212777 ± 0.050410	0.204694 ± 0.023889	0.162563 ± 0.016062	0.000400 ± 0.017925	0.001689 ± 0.030062
OC3	0.000204 ± 0.009648	0.000097 ± 0.004183	0.000049 ± 0.002237	0.018980 ± 0.010324	0.000916 ± 0.038447	0.000253 ± 0.007009
OC4	0.000833 ± 0.035313	0.176943 ± 0.033229	0.017006 ± 0.012746	0.136603 ± 0.011289	0.000939 ± 0.036270	0.000165 ± 0.004553
OPT	0.000103 ± 0.004651	0.000144 ± 0.005563	0.109127 ± 0.011710	0.016577 ± 0.002612	0.001536 ± 0.021972	0.007380 ± 0.006675
EC1	0.000166 ± 0.007838	0.000100 ± 0.004309	0.260797 ± 0.017149	0.154422 ± 0.015348	0.373417 ± 0.094844	0.000250 ± 0.006503
EC2	0.276578 ± 0.050100	0.087178 ± 0.023645	0.017780 ± 0.008771	0.002737 ± 0.003350	0.353117 ± 0.046730	0.000646 ± 0.012036
EC3	0.000267 ± 0.009485	0.000054 ± 0.002142	0.004648 ± 0.002544	0.002300 ± 0.000838	0.036014 ± 0.011736	0.000321 ± 0.002741
Al	0.000011 ± 0.000528	0.013470 ± 0.002611	0.002231 ± 0.000690	0.000087 ± 0.000481	0.000107 ± 0.002644	0.304975 ± 0.002372
As	0.000595 ± 0.000138	0.000000 ± 0.000006	0.000004 ± 0.000017	0.000013 ± 0.000011	0.000341 ± 0.000070	0.000000 ± 0.000008
Br	0.000004 ± 0.000152	0.005931 ± 0.000151	0.000303 ± 0.000031	0.000783 ± 0.000031	0.000226 ± 0.000172	0.003846 ± 0.000079
Ca	0.000008 ± 0.000398	0.000008 ± 0.000324	0.000001 ± 0.000052	0.000017 ± 0.000321	0.019322 ± 0.002452	0.000020 ± 0.000527
Cr	0.000004 ± 0.000139	0.003019 ± 0.000279	0.000055 ± 0.000096	0.000205 ± 0.000047	0.000315 ± 0.000191	0.002102 ± 0.000173
Cu	0.000001 ± 0.000033	0.000001 ± 0.000029	0.000204 ± 0.000019	0.000102 ± 0.000029	0.000312 ± 0.000109	0.000370 ± 0.000030
Fe	0.021928 ± 0.001875	0.023526 ± 0.001293	0.000003 ± 0.000148	0.000002 ± 0.000071	0.000009 ± 0.000355	0.019835 ± 0.000689
K	0.016244 ± 0.004617	0.000008 ± 0.000340	0.000002 ± 0.000070	0.000002 ± 0.000113	0.039186 ± 0.003693	0.046382 ± 0.001723
Mg	0.035511 ± 0.005391	0.041057 ± 0.002821	0.001971 ± 0.001097	0.005999 ± 0.000729	0.010668 ± 0.004205	0.023266 ± 0.001720
Na	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010
Ni	0.000272 ± 0.000118	0.000001 ± 0.000025	0.000030 ± 0.000016	0.000092 ± 0.000016	0.000043 ± 0.000074	0.000093 ± 0.000026
Pb	0.000003 ± 0.000133	0.002550 ± 0.000179	0.000001 ± 0.000026	0.000003 ± 0.000043	0.000002 ± 0.000078	0.000720 ± 0.000081
Se	0.004416 ± 0.000194	0.005705 ± 0.000077	0.001163 ± 0.000026	0.001089 ± 0.000019	0.000341 ± 0.000120	0.000000 ± 0.000002
Si	0.168167 ± 0.007404	0.025162 ± 0.004877	0.000017 ± 0.000599	0.032358 ± 0.001064	0.000041 ± 0.001787	0.131850 ± 0.003742
V	0.000006 ± 0.000223	0.002849 ± 0.000356	0.000019 ± 0.000120	0.000001 ± 0.000044	0.000421 ± 0.000238	0.000002 ± 0.000048
Zn	0.007036 ± 0.000737	0.011200 ± 0.000300	0.000054 ± 0.000087	0.000665 ± 0.000090	0.005865 ± 0.000548	0.000003 ± 0.000058

MSPWI8 -MColPP08 Marama, Coal Fired Power Plant Profile 05, Shanandoah National Park, winter
MSPSP8 -MColPP10 Marama, Coal Fired Power Plant Profile 10 , Shenandoah National Park, spring
MSPSU1 -MColPP11 Marama, Coal Fired Power Plant Profile 11, Shenandoah National Park, summer
MWPSU9 -MColPP14 Marama, Coal Fired Power Plant Profile 14, Washington DC, summer
MSPFA3 -MDsEmi02 Marama, Diesel Vehicle Emissions Profile 02, Shenandoah National Park, fall
MBPAL1 -MGlDst01 Marama, Geological Dust Profile 01, Boundary Waters Canoe Area, annual

Table 6.6-3b. PMF source profiles used as input to the CMB model (μg/m^3)

	MGlDst02	MIr&St03	MMvEmi07	MOilCo02	MOilCo03	MSmelt06
ammNitr	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010
ammSulf	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010
OC1	0.018116 ± 0.008663	0.000293 ± 0.010718	0.009248 ± 0.004049	0.042048 ± 0.181541	0.070248 ± 0.028485	0.000165 ± 0.008456
OC2	0.051846 ± 0.012748	0.069599 ± 0.019925	0.086002 ± 0.006610	0.000982 ± 0.050168	0.000187 ± 0.009627	0.000153 ± 0.006839
OC3	0.043950 ± 0.012151	0.090191 ± 0.022514	0.109680 ± 0.005342	0.591669 ± 0.179302	0.062741 ± 0.023382	0.000265 ± 0.010854
OC4	0.014336 ± 0.007466	0.080879 ± 0.013307	0.103380 ± 0.005136	0.002940 ± 0.108504	0.046677 ± 0.026954	0.004404 ± 0.042246
OPT	0.000044 ± 0.001068	0.147067 ± 0.018551	0.000007 ± 0.000335	0.000177 ± 0.009721	0.001308 ± 0.034596	0.000199 ± 0.010162
EC1	0.000026 ± 0.000713	0.205380 ± 0.016374	0.257761 ± 0.006868	0.002524 ± 0.103719	0.000117 ± 0.006321	0.546486 ± 0.106339
EC2	0.028106 ± 0.004722	0.018900 ± 0.008969	0.023680 ± 0.001895	0.000495 ± 0.025796	0.040204 ± 0.021794	0.000208 ± 0.010734
EC3	0.000005 ± 0.000139	0.005946 ± 0.002769	0.002294 ± 0.000395	0.034582 ± 0.022887	0.005768 ± 0.003662	0.006233 ± 0.010707
Al	0.000975 ± 0.000454	0.000085 ± 0.000892	0.000725 ± 0.000217	0.000829 ± 0.008350	0.000100 ± 0.000891	0.013465 ± 0.004293
As	0.000000 ± 0.000001	0.004646 ± 0.000063	0.000042 ± 0.000005	0.001309 ± 0.000210	0.000129 ± 0.000047	0.000001 ± 0.000006
Br	0.000197 ± 0.000028	0.000004 ± 0.000046	0.000384 ± 0.000014	0.000048 ± 0.000528	0.002299 ± 0.000262	0.019197 ± 0.000374
Ca	0.087521 ± 0.000531	0.000029 ± 0.000687	0.006895 ± 0.000171	0.000009 ± 0.000520	0.007550 ± 0.001265	0.002569 ± 0.003593
Cr	0.000001 ± 0.000021	0.000117 ± 0.000120	0.000116 ± 0.000025	0.000467 ± 0.000607	0.001337 ± 0.000299	0.000030 ± 0.000797
Cu	0.000000 ± 0.000001	0.000001 ± 0.000013	0.000998 ± 0.000017	0.017170 ± 0.000372	0.002340 ± 0.000197	0.006716 ± 0.000196
Fe	0.064117 ± 0.000341	0.123502 ± 0.001539	0.031858 ± 0.000317	0.052132 ± 0.002918	0.002495 ± 0.000344	0.145145 ± 0.002664
K	0.018551 ± 0.000679	0.006890 ± 0.000876	0.002244 ± 0.000205	0.000077 ± 0.003778	0.010521 ± 0.001531	0.066781 ± 0.005410
Mg	0.000006 ± 0.000170	0.008759 ± 0.001078	0.001612 ± 0.000283	0.000072 ± 0.003788	0.001674 ± 0.001660	0.000054 ± 0.002665
Na	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010
Ni	0.000020 ± 0.000010	0.000000 ± 0.000002	0.000000 ± 0.000003	0.024203 ± 0.000379	0.016294 ± 0.000257	0.000646 ± 0.000168
Pb	0.000694 ± 0.000030	0.000002 ± 0.000041	0.000000 ± 0.000007	0.002057 ± 0.000854	0.001589 ± 0.000096	0.033656 ± 0.000524
Se	0.000045 ± 0.000006	0.000127 ± 0.000011	0.000000 ± 0.000007	0.000006 ± 0.000189	0.000000 ± 0.000007	0.006530 ± 0.000171
Si	0.238300 ± 0.001428	0.000722 ± 0.002133	0.000001 ± 0.000049	0.000210 ± 0.008202	0.205000 ± 0.006460	0.000012 ± 0.000628
V	0.000111 ± 0.000044	0.000132 ± 0.000147	0.000207 ± 0.000030	0.028434 ± 0.001413	0.002338 ± 0.000402	0.002917 ± 0.001227
Zn	0.000535 ± 0.000044	0.000464 ± 0.000059	0.002004 ± 0.000043	0.008411 ± 0.001290	0.000001 ± 0.000071	0.051392 ± 0.00096

MBPAL2 - MGlDst02	Marama, Geologtical Dust Profile 02, Boundary Waters Canoe Area, annual
MBPSP8 - MIr&St03	Marama, Iron and Steel Industry Profile 03, Boundary Waters Canoe Area, spring
MWPSU5 - MMvEmi07	Marama, Motor Vehicle Emissions Profile 07, Washington DC, summer
MLPWI7 - MOilCo02	Marama, Oil Combustion Profile 02, Lye Brook Wilderness Area, winter
MLPSU7 - MOilCo03	Marama, Oil Combustion Profile 03, Lye Brook Wilderness Area, summer
MLPFA2 - MSmelt06	Marama, Smelter 06, Lye Brook Wilderness Area, fall

Table 6.6-3c. PMF source profiles used as input to the CMB model (μg/m³)

	MVgBrn08	MVgBrn10	MVgBrn12	MVgBrn15	MVgBrn19	MVgBrn20
ammNitr	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010
ammSulf	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010
OC1	0.028461 ± 0.003195	0.036522 ± 0.005075	0.023497 ± 0.002242	0.028016 ± 0.001961	0.018655 ± 0.002981	0.013024 ± 0.004301
OC2	0.073778 ± 0.004192	0.068233 ± 0.006176	0.083815 ± 0.002925	0.086867 ± 0.002917	0.101510 ± 0.005668	0.134080 ± 0.005050
OC3	0.108946 ± 0.004191	0.137660 ± 0.006045	0.182034 ± 0.002677	0.081489 ± 0.001990	0.141069 ± 0.004273	0.186034 ± 0.005137
OC4	0.098942 ± 0.002993	0.060629 ± 0.003723	0.162461 ± 0.002467	0.095060 ± 0.001865	0.116555 ± 0.004255	0.174870 ± 0.004518
OPT	0.128362 ± 0.003805	0.083037 ± 0.006361	0.000003 ± 0.000058	0.108077 ± 0.002454	0.006273 ± 0.001122	0.000004 ± 0.000178
EC1	0.170304 ± 0.004009	0.069856 ± 0.004942	0.168280 ± 0.002792	0.169787 ± 0.002570	0.177794 ± 0.006199	0.286013 ± 0.004206
EC2	0.022373 ± 0.002195	0.004936 ± 0.002538	0.006367 ± 0.001076	0.000966 ± 0.000995	0.004649 ± 0.001213	0.000011 ± 0.000473
EC3	0.005084 ± 0.000583	0.003022 ± 0.000779	0.001060 ± 0.000288	0.001045 ± 0.000330	0.000793 ± 0.000324	0.001792 ± 0.000304
Al	0.000291 ± 0.000252	0.000230 ± 0.000205	0.000012 ± 0.000105	0.000171 ± 0.000090	0.000543 ± 0.000182	0.000737 ± 0.000146
As	0.000000 ± 0.000004	0.000000 ± 0.000003	0.000042 ± 0.000003	0.000000 ± 0.000000	0.000000 ± 0.000003	0.000000 ± 0.000002
Br	0.000260 ± 0.000014	0.000094 ± 0.000009	0.001204 ± 0.000008	0.000132 ± 0.000005	0.000452 ± 0.000011	0.000326 ± 0.000018
Ca	0.000001 ± 0.000040	0.001781 ± 0.000126	0.003766 ± 0.000074	0.000000 ± 0.000015	0.002049 ± 0.000131	0.000002 ± 0.000075
Cr	0.000212 ± 0.000033	0.000182 ± 0.000032	0.000000 ± 0.000003	0.000004 ± 0.000012	0.000131 ± 0.000019	0.000000 ± 0.000004
Cu	0.000000 ± 0.000001	0.000025 ± 0.000005	0.000002 ± 0.000004	0.000000 ± 0.000003	0.000000 ± 0.000006	0.000000 ± 0.000005
Fe	0.000002 ± 0.000080	0.000001 ± 0.000030	0.000023 ± 0.000051	0.000000 ± 0.000009	0.000020 ± 0.000147	0.000003 ± 0.000113
K	0.004440 ± 0.000223	0.005455 ± 0.000179	0.016128 ± 0.000123	0.003991 ± 0.000086	0.006139 ± 0.000153	0.007140 ± 0.000193
Mg	0.001213 ± 0.000320	0.001455 ± 0.000282	0.001270 ± 0.000130	0.000005 ± 0.000114	0.000044 ± 0.000232	0.000001 ± 0.000064
Na	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010	0.000001 ± 0.000010
Ni	0.000006 ± 0.000006	0.000000 ± 0.000004	0.000024 ± 0.000003	0.000000 ± 0.000001	0.000000 ± 0.000004	0.000000 ± 0.000002
Pb	0.000375 ± 0.000019	0.000000 ± 0.000003	0.000000 ± 0.000000	0.000001 ± 0.000006	0.000000 ± 0.000007	0.000000 ± 0.000009
Se	0.000008 ± 0.000004	0.000000 ± 0.000001	0.000153 ± 0.000003	0.000001 ± 0.000003	0.000283 ± 0.000007	0.000000 ± 0.000005
Si	0.000036 ± 0.000479	0.005608 ± 0.000338	0.000001 ± 0.000030	0.000011 ± 0.000166	0.000001 ± 0.000053	0.000001 ± 0.000057
V	0.000345 ± 0.000043	0.000358 ± 0.000045	0.000054 ± 0.000014	0.000012 ± 0.000016	0.000249 ± 0.000026	0.000186 ± 0.000036
Zn	0.000575 ± 0.000029	0.000000 ± 0.000006	0.000765 ± 0.000014	0.000108 ± 0.000012	0.000158 ± 0.000029	0.000612 ± 0.000047

MLPSP2 -MVgBrn08 Marama, Vegatative Burning, Profile 08, Lye Brook Winderness Area, spring
MLPSU6 -MVgBrn10 Marama, Vegatative Burning, Profile 10, Lye Brook Winderness Area, summer
MSPAL6 -MVgBrn12 Marama, Vegatative Burning, Profile 12, Shenandoah National Park, annual
MSPSU6 -MVgBrn15 Marama, Vegatative Burning, Profile 15, Shenandoah National Park, summer
MWPSU8 -MVgBrn19 Marama, Vegatative Burning, Profile 19, Washington DC, summer
MWPFA6 -MVgBrn20 Marama, Vegatative Burning, Profile 20, Washington DC, fall

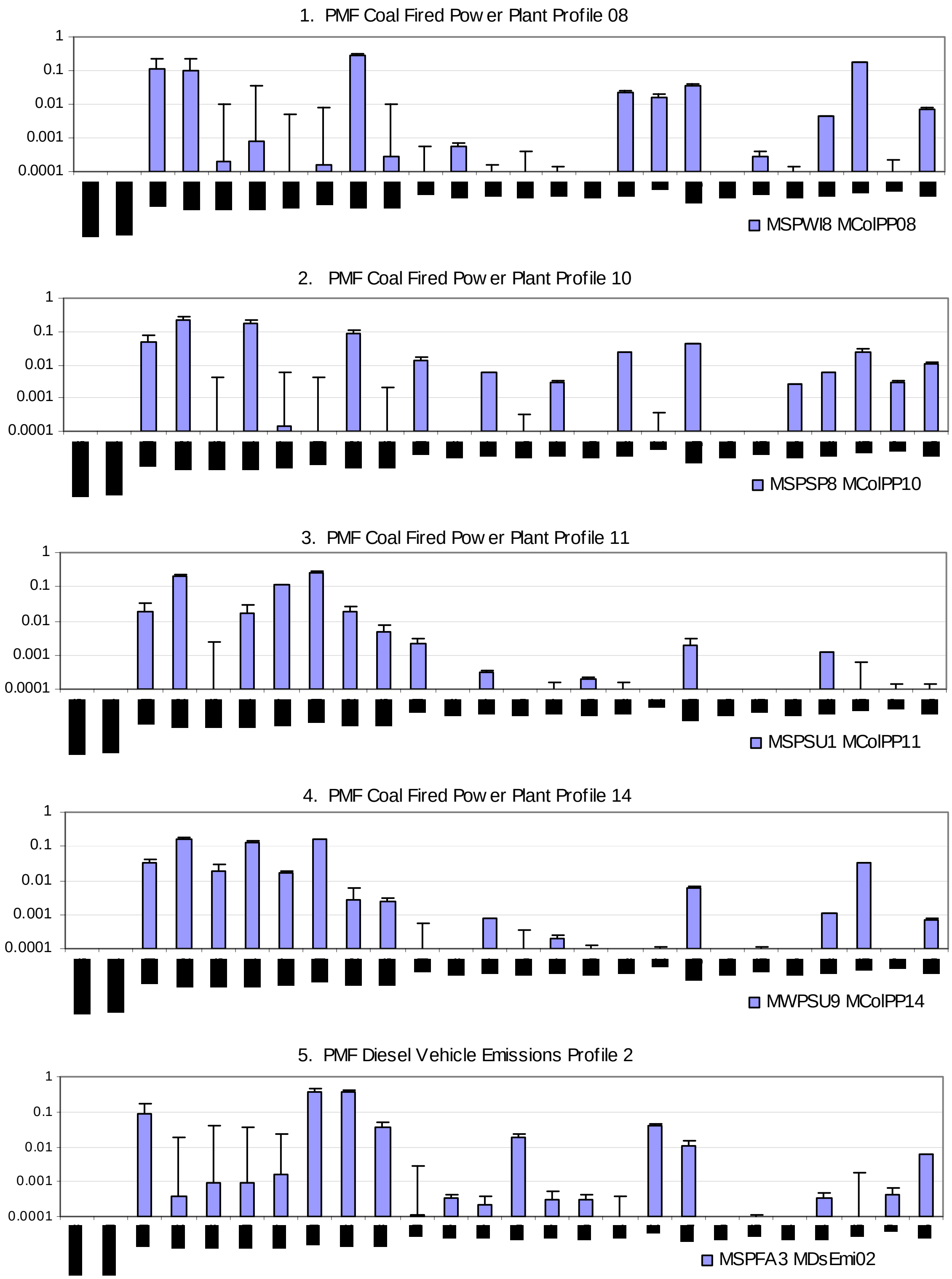


Figure 6.6-1a. PMFmodeled source profiles used as input to the CMB model

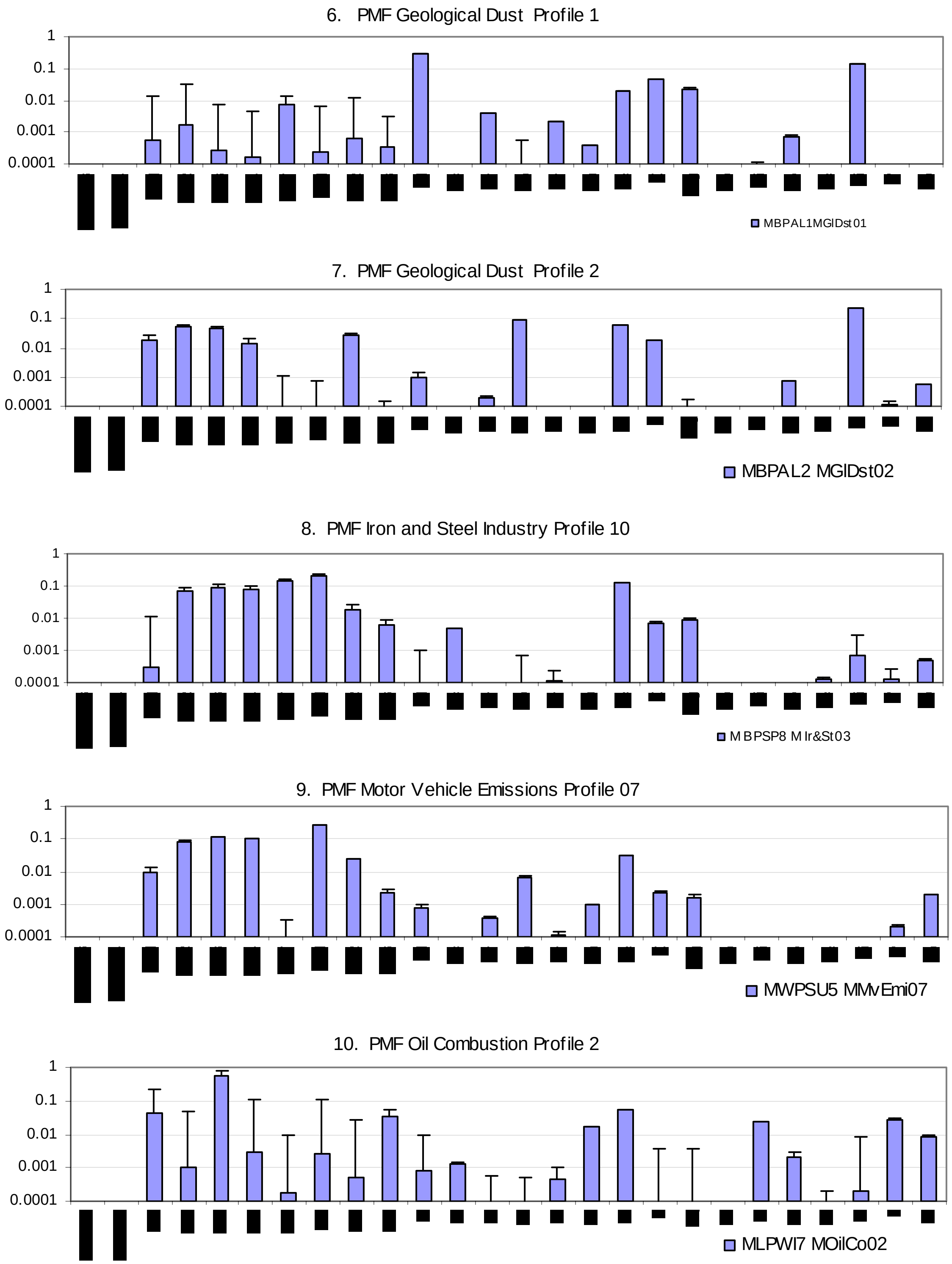


Figure 6.6-1b. PMFmodeled source profiles used as input to the CMB model

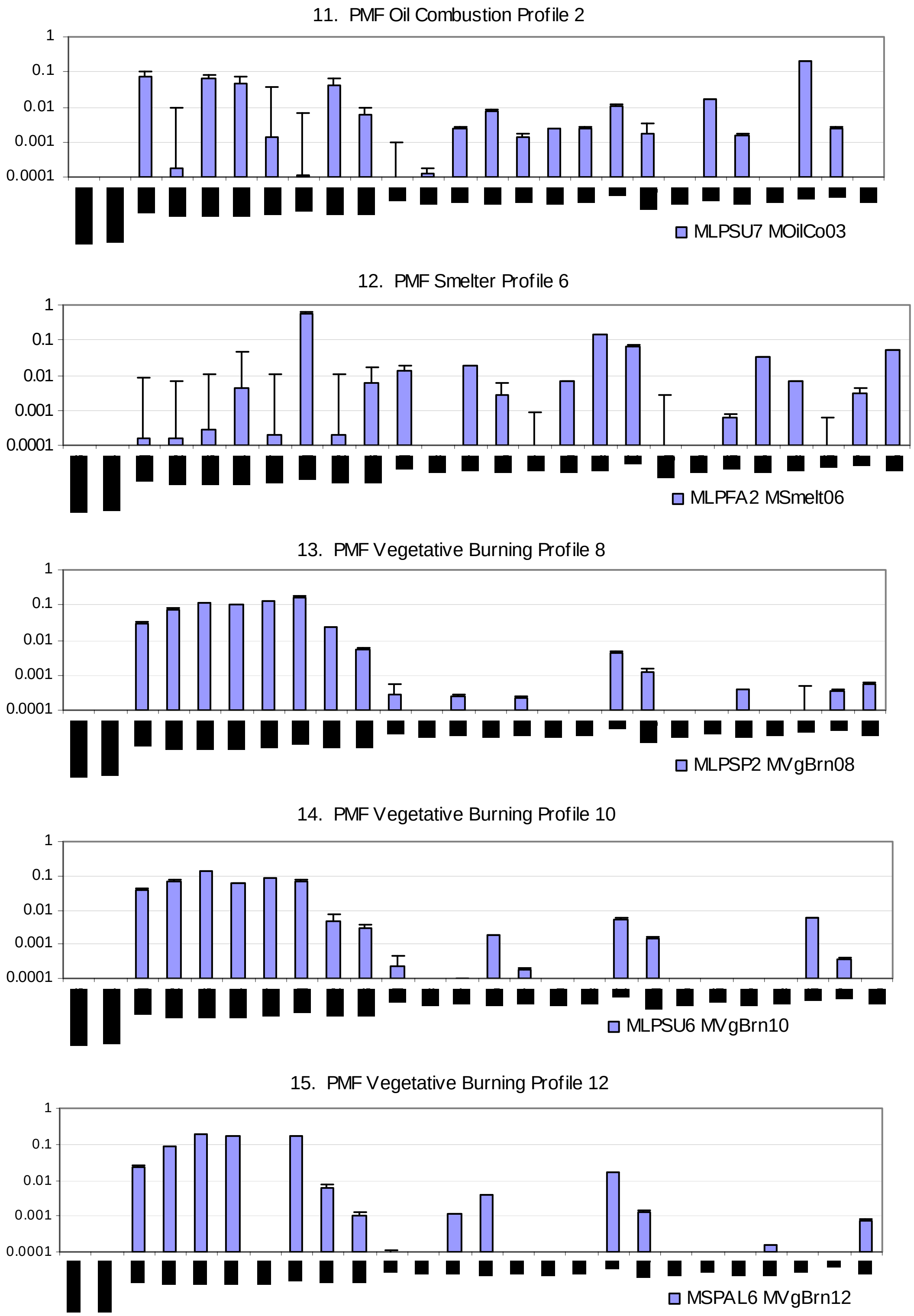
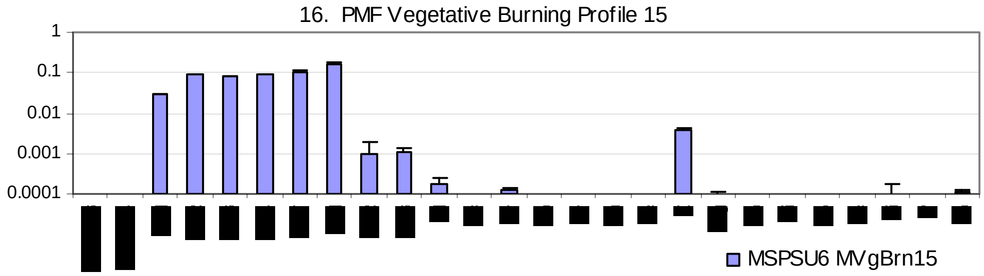
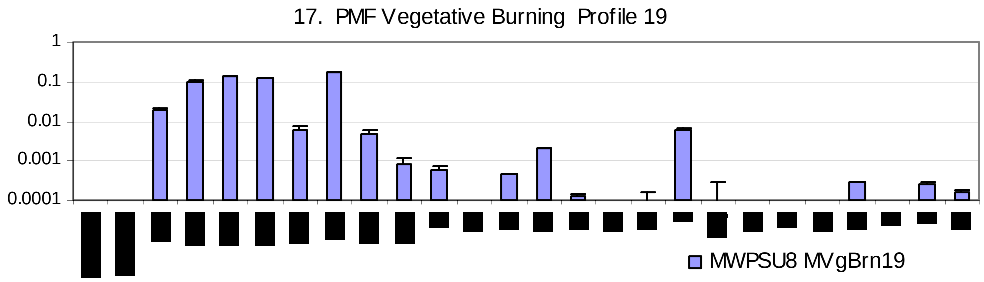


Figure 6.6-1c. PMFmodeled source profiles used as input to the CMB model





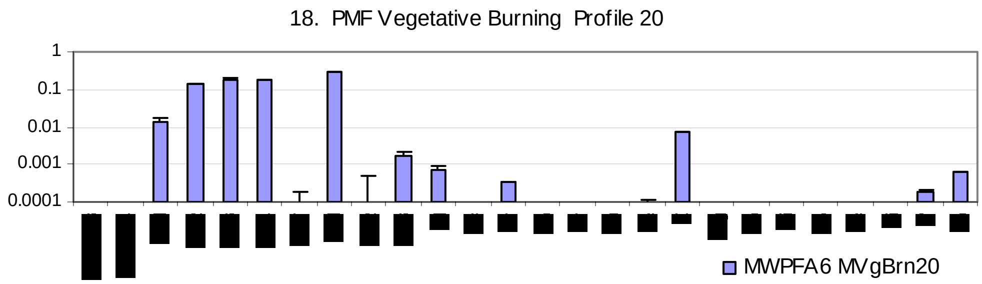


Table 6.6-1d. PMFmodeled source profiles used as input to the CMB model

6.6.3 Boundary Waters Canoe Area

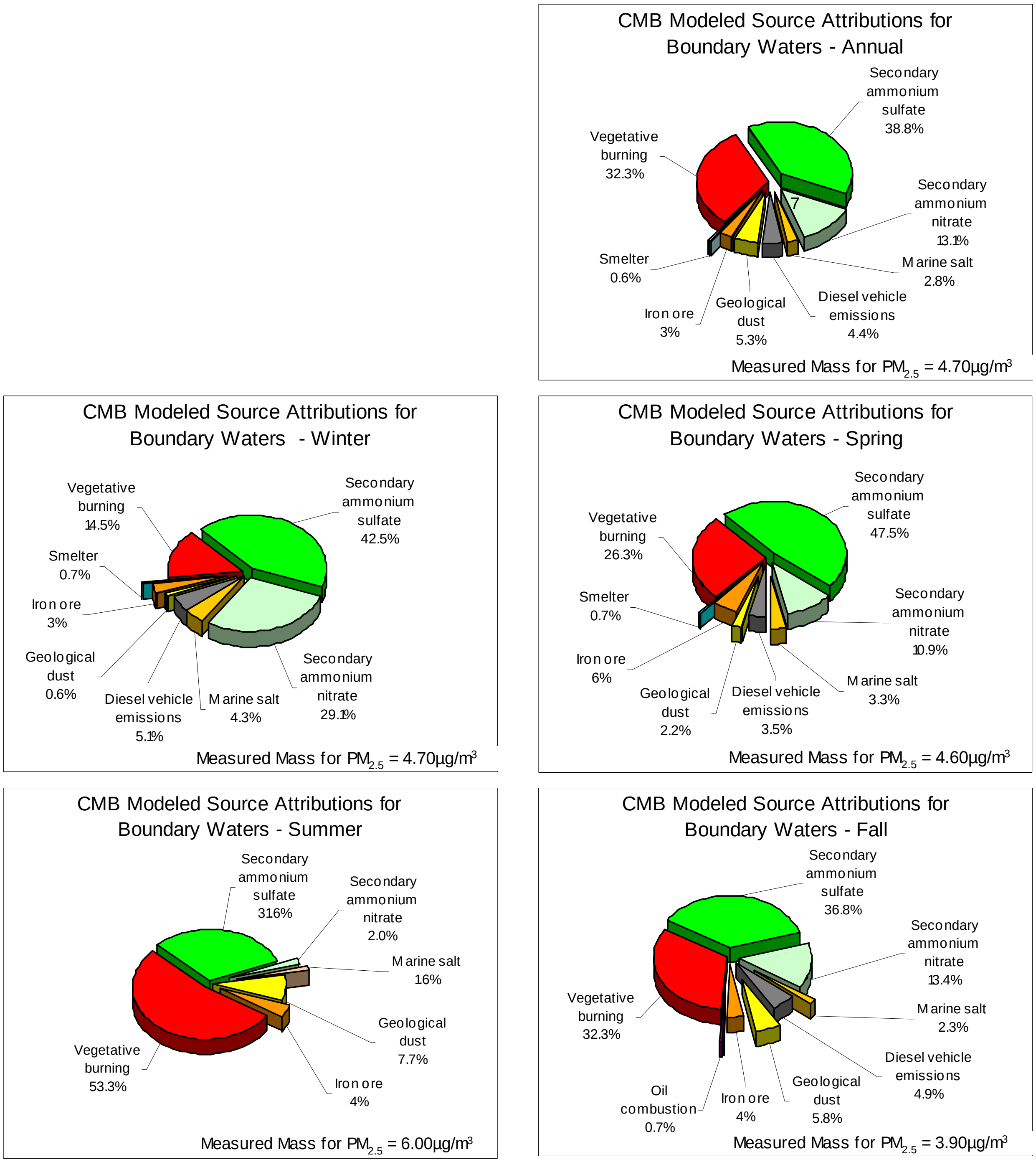


Figure 6.6-2 CMB modeled source attributions for annual and seasonal data subsets from Boundary Waters Canoe Area.

Table 6.6-4a CMB model output for Boundary Waters Canoe Area, winter

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MBWIMean1    DATE: 2/25/200  CMB8 (97350)
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      98.7
     CHI SQUARE      2.49              DF        17
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPFA3 MDsEmi02    0.22612    0.03447    6.55907
YES MBPAL1 MGlDst01    0.02879    0.00733    3.92604
YES MBPAL2 MGlDst02    0.13389    0.01207   11.09502
YES MBPSP8 MIr&St03    0.16269    0.01291   12.60391
YES MLPFA2 MSmelt06    0.03312    0.00377    8.78210
YES MSPAL6 MVgBrn12    0.64258    0.08406    7.64465
YES MAMSUL AMSUL       1.88324    0.03826   49.22682
YES MAMNIT AMNIT       1.29135    0.13263    9.73653
YES MNACL  NACL        0.19094    0.03839    4.97407
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
       4.7+-     0.2

ELIGIBLE SPACE DIM. =   9 FOR MAX. UNC. =  0.93026  (20.% OF TOTAL MEAS. MASS)

1 / SINGULAR VALUE
--------------------------------------------------------------------------------
 0.00287   0.00693   0.01021   0.01421   0.03235   0.03826   0.03839   0.08500
 0.13263
--------------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =   9 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
--------------------------------------------------------------------------------
1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MBPSP8  1.0000 MLPFA2
1.0000 MSPAL6  1.0000 MAMSUL  1.0000 MAMNIT  1.0000 MNACL
--------------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE        STD ERR
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
```

Table 6.6-4b CMB model output for Boundary Waters Canoe Area, winter

```
SPECIES CONCENTRATIONS -  SITE: MBWIMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION         24      START HOUR        0         SIZE:    PM2.5
       R SQUARE       0.99    PERCENT MASS      98.7
     CHI SQUARE       2.49              DF        17
```

SPECIES		I	MEAS	CALC	RATIO C/M	RATIO R/U
TMAC	TMAU		4.65130+- 0.22630	4.59273+- 0.16317	0.99+- 0.06	-0.2
N3IC	N3IU	*	1.29090+- 0.13200	1.29136+- 0.01291	1.00+- 0.10	0.0
S4IC	S4IU	*	1.88320+- 0.03330	1.88324+- 0.01883	1.00+- 0.02	0.0
OC1C	OC1U	*	0.07810+- 0.05600	0.03796+- 0.01763	0.49+- 0.42	-0.7
OC2C	OC2U	*	0.13390+- 0.05690	0.07227+- 0.00585	0.54+- 0.23	-1.1
OC3C	OC3U	*	0.17490+- 0.05700	0.13776+- 0.00974	0.79+- 0.26	-0.6
OC4C	OC4U	*	0.16810+- 0.03350	0.11984+- 0.00880	0.71+- 0.15	-1.4
OPTC	OPTU	*	0.15810+- 0.04630	0.02450+- 0.00583	0.15+- 0.06	-2.9
EC1C	EC1U	*	0.26940+- 0.03980	0.24410+- 0.02197	0.91+- 0.16	-0.6
EC2C	EC2U	*	0.05480+- 0.02360	0.09081+- 0.01072	1.66+- 0.74	1.4
EC3C	EC3U	*	0.01300+- 0.00880	0.01001+- 0.00272	0.77+- 0.56	-0.3
ALXC	ALXU	*	0.00920+- 0.00220	0.00941+- 0.00064	1.02+- 0.25	0.1
ASXC	ASXU	*	0.00100+- 0.00010	0.00086+- 0.00003	0.86+- 0.09	-1.3
BRXC	BRXU	*	0.00150+- 0.00010	0.00160+- 0.00005	1.07+- 0.08	0.9
CAXC	CAXU	*	0.01870+- 0.00160	0.01860+- 0.00058	0.99+- 0.09	-0.1
CRXC	CRXU	*	0.00090+- 0.00030	0.00016+- 0.00006	0.17+- 0.09	-2.4
CUXC	CUXU	*	0.00050+- 0.00010	0.00031+- 0.00003	0.62+- 0.14	-1.8
FEXC	FEXU	*	0.03220+- 0.00170	0.03408+- 0.00028	1.06+- 0.06	1.1
KPXC	KPXU	*	0.02600+- 0.00200	0.02638+- 0.00088	1.01+- 0.09	0.2
MGXC	MGXU	*	0.01320+- 0.00380	0.00533+- 0.00098	0.40+- 0.14	-2.0
NAXC	NAXU	*	0.07510+- 0.01310	0.07512+- 0.00751	1.00+- 0.20	0.0
NIXC	NIXU	*	0.00010+- 0.00010	0.00006+- 0.00003	0.55+- 0.62	-0.4
PBXC	PBXU	*	0.00150+- 0.00020	0.00123+- 0.00003	0.82+- 0.11	-1.3
SEXC	SEXU	*	0.00020+- 0.00010	0.00042+- 0.00004	2.11+- 1.07	2.1
SIXC	SIXU	*	0.03770+- 0.00350	0.03583+- 0.00058	0.95+- 0.09	-0.5
VAXC	VAXU	*	0.00110+- 0.00040	0.00027+- 0.00008	0.24+- 0.11	-2.0
ZNXC	ZNXU	*	0.00370+- 0.00020	0.00367+- 0.00013	0.99+- 0.06	-0.1

Table 6.6-5a CMB model output for Boundary Waters Canoe Area, spring

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MBSPMean1    DATE: 2/25/200  CMB8 (97350)
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      98.2
     CHI SQUARE      1.49              DF        17
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPFA3 MDsEmi02    0.15308    0.04189    3.65405
YES MBPAL1 MGlDst01    0.09506    0.01024    9.28751
YES MBPAL2 MGlDst02    0.24585    0.01543   15.92891
YES MBPSP8 MIr&St03    0.12648    0.01433    8.82467
YES MLPFA2 MSmelt06    0.02906    0.00603    4.81593
YES MWPSU8 MVgBrn19    1.14513    0.16087    7.11843
YES MAMSUL AMSUL       2.06622    0.04177   49.46834
YES MAMNIT AMNIT       0.47305    0.06258    7.55931
YES MNACL  NACL        0.14236    0.02673    5.32557
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
       4.6+-     0.2

ELIGIBLE SPACE DIM. =   9 FOR MAX. UNC. =  0.91128  (20.% OF TOTAL MEAS. MASS)

1 / SINGULAR VALUE
--------------------------------------------------------------------------------
 0.00504   0.00974   0.01245   0.01692   0.02673   0.03679   0.04177   0.06258
 0.16218
--------------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =   9 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
--------------------------------------------------------------------------------
1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MBPSP8  1.0000 MLPFA2
1.0000 MWPSU8  1.0000 MAMSUL  1.0000 MAMNIT  1.0000 MNACL
--------------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD ERR
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
```

Table 6.6-5b CMB model output for Bounndary Waters Canoe Area, spring

```
SPECIES CONCENTRATIONS -  SITE: MBSPMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION        24       START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      98.2
     CHI SQUARE      1.49              DF        17

SPECIES-------I---MEAS------------------CALC-------------RATIO C/M----RATIO R/U
TMAC   TMAU       4.55640+- 0.22040  4.47629+- 0.16536   0.98+- 0.06    -0.3
N3IC   N3IU   *  0.47300+- 0.06240  0.47306+- 0.00473   1.00+- 0.13     0.0
S4IC   S4IU   *  2.06620+- 0.03630  2.06623+- 0.02066   1.00+- 0.02     0.0
OC1C   OC1U   *  0.07210+- 0.04730  0.03970+- 0.01261   0.55+- 0.40    -0.7
OC2C   OC2U   *  0.15340+- 0.05370  0.13802+- 0.00860   0.90+- 0.32    -0.3
OC3C   OC3U   *  0.19080+- 0.05630  0.18393+- 0.00873   0.96+- 0.29    -0.1
OC4C   OC4U   *  0.15990+- 0.03250  0.14751+- 0.00790   0.92+- 0.19    -0.4
OPTC   OPTU   *  0.16740+- 0.04880  0.02674+- 0.00436   0.16+- 0.05    -2.9
EC1C   EC1U   *  0.24550+- 0.03690  0.30265+- 0.01660   1.23+- 0.20     1.4
EC2C   EC2U   *  0.05530+- 0.02500  0.06875+- 0.00756   1.24+- 0.58     0.5
EC3C   EC3U   *  0.01370+- 0.00970  0.00739+- 0.00191   0.54+- 0.41    -0.6
ALXC   ALXU   *  0.02760+- 0.00320  0.03027+- 0.00055   1.10+- 0.13     0.8
ASXC   ASXU   *  0.00070+- 0.00010  0.00064+- 0.00003   0.92+- 0.14    -0.6
BRXC   BRXU   *  0.00190+- 0.00040  0.00153+- 0.00004   0.80+- 0.17    -0.9
CAXC   CAXU   *  0.02510+- 0.00190  0.02690+- 0.00045   1.07+- 0.08     0.9
CRXC   CRXU   *  0.00090+- 0.00040  0.00042+- 0.00005   0.46+- 0.21    -1.2
CUXC   CUXU   *  0.00070+- 0.00050  0.00028+- 0.00003   0.40+- 0.29    -0.8
FEXC   FEXU   *  0.03640+- 0.00190  0.03751+- 0.00029   1.03+- 0.05     0.6
KPXC   KPXU   *  0.02710+- 0.00200  0.02481+- 0.00067   0.92+- 0.07    -1.1
MGXC   MGXU   *  0.01100+- 0.00300  0.00501+- 0.00073   0.46+- 0.14    -1.9
NAXC   NAXU   *  0.05600+- 0.00890  0.05600+- 0.00560   1.00+- 0.19     0.0
NIXC   NIXU   *  0.00010<  0.00020  0.00004<  0.00003   0.42<  0.87    -0.3
PBXC   PBXU   *  0.00130+- 0.00030  0.00122+- 0.00003   0.94+- 0.22    -0.3
SEXC   SEXU   *  0.00020<  0.00050  0.00060<  0.00003   2.98<  7.45     0.8
SIXC   SIXU   *  0.07660+- 0.00500  0.07122+- 0.00063   0.93+- 0.06    -1.1
VAXC   VAXU   *  0.00110+- 0.00050  0.00048+- 0.00007   0.44+- 0.21    -1.2
ZNXC   ZNXU   *  0.00260+- 0.00040  0.00277+- 0.00010   1.06+- 0.17     0.4
 ----------------------------------------------------------------------------
```

Table 6.6-6a CMB model output for Bounndary Waters Canoe Area, summer

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MBSUMean1    DATE: 2/25/200  CMB8 (97350)
SAMPLE DURATION        24      START HOUR       0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      94.4
     CHI SQUARE      1.52              DF        19
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MBPAL1 MGlDst01    0.04589    0.00785    5.84810
YES MBPAL2 MGlDst02    0.23687    0.01399   16.93118
YES MBPSP8 MIr&St03    0.13064    0.01564    8.35160
YES MLPSP2 MVgBrn08    3.18714    0.21297   14.96511
YES MAMSUL AMSUL       1.88942    0.03820   49.46151
YES MAMNIT AMNIT       0.11721    0.02772    4.22757
YES MNACL  NACL        0.09558    0.01931    4.94970
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
       6.0+-     0.3

ELIGIBLE SPACE DIM. =   7 FOR MAX. UNC. =  1.20764  (20.% OF TOTAL MEAS. MASS)

1 / SINGULAR VALUE
--------------------------------------------------------------------------------
 0.00753   0.01109   0.01792   0.01931   0.02772   0.03820   0.21297
--------------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =   7 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
--------------------------------------------------------------------------------
1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MBPSP8  1.0000 MLPSP2  1.0000 MAMSUL
1.0000 MAMNIT  1.0000 MNACL
--------------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE        STD ERR
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
```

Table 6.6-6b CMB model output for Bounndary Waters Canoe Area, summer

```
SPECIES CONCENTRATIONS -  SITE: MBSUMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION         24       START HOUR        0         SIZE:    PM2.5
       R SQUARE       0.99    PERCENT MASS      94.4
     CHI SQUARE       1.52              DF        19

SPECIES-------I---MEAS------------------CALC-------------RATIO C/M----RATIO R/U
TMAC   TMAU       6.03820+- 0.25190  5.70275+- 0.21786   0.94+- 0.05    -1.0
N3IC   N3IU   *  0.11720+- 0.02770  0.11721+- 0.00117   1.00+- 0.24     0.0
S4IC   S4IU   *  1.88940+- 0.03320  1.88943+- 0.01889   1.00+- 0.02     0.0
OC1C   OC1U   *  0.15080+- 0.07390  0.09507+- 0.01050   0.63+- 0.32    -0.7
OC2C   OC2U   *  0.33980+- 0.09190  0.25659+- 0.01401   0.76+- 0.21    -0.9
OC3C   OC3U   *  0.54770+- 0.09840  0.36943+- 0.01398   0.67+- 0.12    -1.8
OC4C   OC4U   *  0.27970+- 0.05070  0.32931+- 0.00986   1.18+- 0.22     1.0
OPTC   OPTU   *  0.33560+- 0.09670  0.42867+- 0.01237   1.28+- 0.37     1.0
EC1C   EC1U   *  0.41900+- 0.06120  0.56963+- 0.01296   1.36+- 0.20     2.4
EC2C   EC2U   *  0.08390+- 0.03540  0.08046+- 0.00720   0.96+- 0.41    -0.1
EC3C   EC3U   *  0.01620+- 0.01140  0.01700+- 0.00190   1.05+- 0.75     0.1
ALXC   ALXU   *  0.01390+- 0.00230  0.01517+- 0.00083   1.09+- 0.19     0.5
ASXC   ASXU   *  0.00110+- 0.00060  0.00061+- 0.00002   0.55+- 0.30    -0.8
BRXC   BRXU   *  0.00090+- 0.00060  0.00105+- 0.00005   1.17+- 0.78     0.3
CAXC   CAXU   *  0.02010+- 0.00170  0.02074+- 0.00020   1.03+- 0.09     0.4
CRXC   CRXU   *  0.00090+- 0.00040  0.00079+- 0.00011   0.88+- 0.41    -0.3
CUXC   CUXU   *  0.00050+- 0.00030  0.00002+- 0.00002   0.04+- 0.05    -1.6
FEXC   FEXU   *  0.03200+- 0.00170  0.03224+- 0.00034   1.01+- 0.05     0.1
KPXC   KPXU   *  0.02780+- 0.00200  0.02158+- 0.00074   0.78+- 0.06    -2.9
MGXC   MGXU   *  0.00720+- 0.00270  0.00608+- 0.00103   0.84+- 0.35    -0.4
NAXC   NAXU   *  0.03760+- 0.00660  0.03760+- 0.00376   1.00+- 0.20     0.0
NIXC   NIXU   *  0.00040+- 0.00030  0.00003+- 0.00003   0.08+- 0.09    -1.2
PBXC   PBXU   *  0.00090+- 0.00060  0.00139+- 0.00006   1.55+- 1.04     0.8
SEXC   SEXU   *  0.00030+- 0.00020  0.00005+- 0.00002   0.18+- 0.14    -1.2
SIXC   SIXU   *  0.06250+- 0.00440  0.06271+- 0.00160   1.00+- 0.08     0.0
VAXC   VAXU   *  0.00120+- 0.00050  0.00115+- 0.00014   0.95+- 0.41    -0.1
ZNXC   ZNXU   *  0.00240+- 0.00050  0.00202+- 0.00010   0.84+- 0.18    -0.7
 -------------------------------------------------------------------------------
```

Table 6.6-7a CMB model output for Bounndary Waters Canoe Area, fall

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MBFAMean1    DATE: 2/25/200  CMB8 (97350)
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      98.3
     CHI SQUARE      1.37              DF        17
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPFA3 MDsEmi02    0.18951    0.04793    3.95367
YES MBPAL1 MGlDst01    0.03166    0.00644    4.91461
YES MBPAL2 MGlDst02    0.19328    0.01431   13.50914
YES MBPSP8 MIr&St03    0.14057    0.01585    8.86769
YES MLPWI7 MOilCo02    0.02755    0.00687    4.00884
YES MSPAL6 MVgBrn12    1.24326    0.14840    8.37750
YES MAMSUL AMSUL       1.41580    0.02890   48.98151
YES MAMNIT AMNIT       0.51433    0.06510    7.90013
YES MNACL  NACL        0.08973    0.01970    4.55422
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
       3.9+-     0.2

ELIGIBLE SPACE DIM. =   9 FOR MAX. UNC. =  0.78270  (20.% OF TOTAL MEAS. MASS)

1 / SINGULAR VALUE
--------------------------------------------------------------------------------
 0.00623   0.00663   0.01110   0.01787   0.01970   0.02890   0.03458   0.06510
 0.15213
--------------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =   9 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
--------------------------------------------------------------------------------
1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MBPSP8  1.0000 MLPWI7
1.0000 MSPAL6  1.0000 MAMSUL  1.0000 MAMNIT  1.0000 MNACL
--------------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD ERR
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
```

Table 6.6-7b CMB model output for Bounndary Waters Canoe Area, fall

```
SPECIES CONCENTRATIONS -  SITE: MBFAMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      98.3
     CHI SQUARE      1.37              DF        17

SPECIES-------I---MEAS------------------CALC-------------RATIO C/M----RATIO R/U
TMAC   TMAU      3.91350+- 0.20750  3.84568+- 0.14147   0.98+- 0.06    -0.3
N3IC   N3IU   *  0.51430+- 0.06490  0.51433+- 0.00514   1.00+- 0.13     0.0
S4IC   S4IU   *  1.41580+- 0.02520  1.41581+- 0.01416   1.00+- 0.02     0.0
OC1C   OC1U   *  0.08800+- 0.05670  0.05100+- 0.01587   0.58+- 0.41    -0.6
OC2C   OC2U   *  0.16940+- 0.06100  0.12417+- 0.00644   0.73+- 0.27    -0.7
OC3C   OC3U   *  0.31210+- 0.07480  0.26397+- 0.01021   0.85+- 0.21    -0.6
OC4C   OC4U   *  0.20830+- 0.04210  0.21639+- 0.00844   1.04+- 0.21     0.2
OPTC   OPTU   *  0.19670+- 0.05880  0.02122+- 0.00493   0.11+- 0.04    -3.0
EC1C   EC1U   *  0.30360+- 0.04790  0.30894+- 0.01867   1.02+- 0.17     0.1
EC2C   EC2U   *  0.06660+- 0.03070  0.08296+- 0.00913   1.25+- 0.59     0.5
EC3C   EC3U   *  0.01540+- 0.01100  0.00994+- 0.00237   0.65+- 0.49    -0.5
ALXC   ALXU   *  0.00930+- 0.00190  0.00992+- 0.00059   1.07+- 0.23     0.3
ASXC   ASXU   *  0.00100+- 0.00070  0.00081+- 0.00002   0.81+- 0.57    -0.3
BRXC   BRXU   *  0.00100+- 0.00060  0.00170+- 0.00004   1.70+- 1.02     1.2
CAXC   CAXU   *  0.02270+- 0.00190  0.02527+- 0.00049   1.11+- 0.10     1.3
CRXC   CRXU   *  0.00090+- 0.00040  0.00016+- 0.00005   0.18+- 0.09    -1.8
CUXC   CUXU   *  0.00060+- 0.00030  0.00055+- 0.00003   0.91+- 0.46    -0.2
FEXC   FEXU   *  0.03150+- 0.00170  0.03185+- 0.00026   1.01+- 0.06     0.2
KPXC   KPXU   *  0.03420+- 0.00240  0.03350+- 0.00075   0.98+- 0.07    -0.3
MGXC   MGXU   *  0.00770+- 0.00270  0.00557+- 0.00084   0.72+- 0.28    -0.8
NAXC   NAXU   *  0.03530+- 0.00690  0.03530+- 0.00353   1.00+- 0.22     0.0
NIXC   NIXU   *  0.00060+- 0.00020  0.00071+- 0.00002   1.19+- 0.40     0.6
PBXC   PBXU   *  0.00110+- 0.00050  0.00022+- 0.00003   0.20+- 0.09    -1.8
SEXC   SEXU   *  0.00030+- 0.00030  0.00028+- 0.00003   0.95+- 0.95    -0.1
SIXC   SIXU   *  0.05470+- 0.00410  0.05035+- 0.00059   0.92+- 0.07    -1.0
VAXC   VAXU   *  0.00130+- 0.00050  0.00097+- 0.00007   0.75+- 0.29    -0.6
ZNXC   ZNXU   *  0.00260+- 0.00030  0.00247+- 0.00011   0.95+- 0.12    -0.4
 -------------------------------------------------------------------------------
```

Table 6.7-8a CMB model output for Bounndary Waters Canoe Area, annual

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MBALMean1    DATE: 2/25/200  CMB8 (97350)
SAMPLE DURATION        24      START HOUR       0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      98.0
     CHI SQUARE      1.74             DF        17
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPFA3 MDsEmi02    0.20372    0.04815    4.23144
YES MBPAL1 MGlDst01    0.04930    0.00798    6.18002
YES MBPAL2 MGlDst02    0.19517    0.01453   13.43490
YES MBPSP8 MIr&St03    0.13098    0.01784    7.34018
YES MLPFA2 MSmelt06    0.02621    0.00719    3.64557
YES MWPSU8 MVgBrn19    1.50233    0.19344    7.76625
YES MAMSUL AMSUL       1.80552    0.03666   49.25683
YES MAMNIT AMNIT       0.61087    0.07316    8.35024
YES MNACL  NACL        0.12990    0.02609    4.97911
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
       4.7+-     0.2

ELIGIBLE SPACE DIM. =   9 FOR MAX. UNC. =  0.94994  (20.% OF TOTAL MEAS. MASS)

1 / SINGULAR VALUE
--------------------------------------------------------------------------------
 0.00526   0.00777   0.01210   0.01836   0.02609   0.03666   0.04239   0.07316
 0.19497
--------------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =   9 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
--------------------------------------------------------------------------------
1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MBPSP8  1.0000 MLPFA2
1.0000 MWPSU8  1.0000 MAMSUL  1.0000 MAMNIT  1.0000 MNACL
--------------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD ERR
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
```

Table 6.7-8b CMB model output for Bounndary Waters Canoe Area, annual

```
SPECIES CONCENTRATIONS -  SITE: MBALMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION        24       START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      98.0
     CHI SQUARE      1.74              DF        17
```

SPECIES		I	MEAS	CALC	RATIO C/M	RATIO R/U
TMAC	TMAU		4.74970+- 0.22570	4.65399+- 0.19401	0.98+- 0.06	-0.3
N3IC	N3IU	*	0.61080+- 0.07290	0.61087+- 0.00611	1.00+- 0.12	0.0
S4IC	S4IU	*	1.80550+- 0.03190	1.80552+- 0.01806	1.00+- 0.02	0.0
OC1C	OC1U	*	0.09590+- 0.05810	0.04998+- 0.01650	0.52+- 0.36	-0.8
OC2C	OC2U	*	0.19550+- 0.06520	0.17191+- 0.01005	0.88+- 0.30	-0.4
OC3C	OC3U	*	0.30110+- 0.07110	0.23253+- 0.01082	0.77+- 0.19	-1.0
OC4C	OC4U	*	0.20240+- 0.03950	0.18881+- 0.01009	0.93+- 0.19	-0.3
OPTC	OPTU	*	0.21150+- 0.06190	0.02938+- 0.00539	0.14+- 0.05	-2.9
EC1C	EC1U	*	0.30700+- 0.04620	0.38442+- 0.02174	1.25+- 0.20	1.5
EC2C	EC2U	*	0.06480+- 0.02860	0.08692+- 0.00983	1.34+- 0.61	0.7
EC3C	EC3U	*	0.01460+- 0.01020	0.00949+- 0.00249	0.65+- 0.48	-0.5
ALXC	ALXU	*	0.01490+- 0.00240	0.01643+- 0.00064	1.10+- 0.18	0.6
ASXC	ASXU	*	0.00100+- 0.00040	0.00068+- 0.00003	0.68+- 0.27	-0.8
BRXC	BRXU	*	0.00130+- 0.00040	0.00146+- 0.00005	1.12+- 0.35	0.4
CAXC	CAXU	*	0.02170+- 0.00180	0.02417+- 0.00056	1.11+- 0.10	1.3
CRXC	CRXU	*	0.00090+- 0.00040	0.00038+- 0.00006	0.43+- 0.20	-1.3
CUXC	CUXU	*	0.00060+- 0.00030	0.00026+- 0.00003	0.43+- 0.22	-1.1
FEXC	FEXU	*	0.03300+- 0.00170	0.03351+- 0.00032	1.02+- 0.05	0.3
KPXC	KPXU	*	0.02890+- 0.00210	0.02577+- 0.00082	0.89+- 0.07	-1.4
MGXC	MGXU	*	0.00980+- 0.00310	0.00454+- 0.00094	0.46+- 0.18	-1.6
NAXC	NAXU	*	0.05110+- 0.00890	0.05110+- 0.00511	1.00+- 0.20	0.0
NIXC	NIXU	*	0.00030+- 0.00020	0.00004+- 0.00003	0.12+- 0.12	-1.3
PBXC	PBXU	*	0.00120+- 0.00040	0.00106+- 0.00003	0.88+- 0.29	-0.4
SEXC	SEXU	*	0.00030+- 0.00030	0.00069+- 0.00003	2.31+- 2.32	1.3
SIXC	SIXU	*	0.05760+- 0.00420	0.05312+- 0.00057	0.92+- 0.07	-1.1
VAXC	VAXU	*	0.00110+- 0.00050	0.00058+- 0.00008	0.53+- 0.25	-1.0
ZNXC	ZNXU	*	0.00290+- 0.00040	0.00295+- 0.00012	1.02+- 0.15	0.1

6.6.4 Lye Brook Wilderness Area

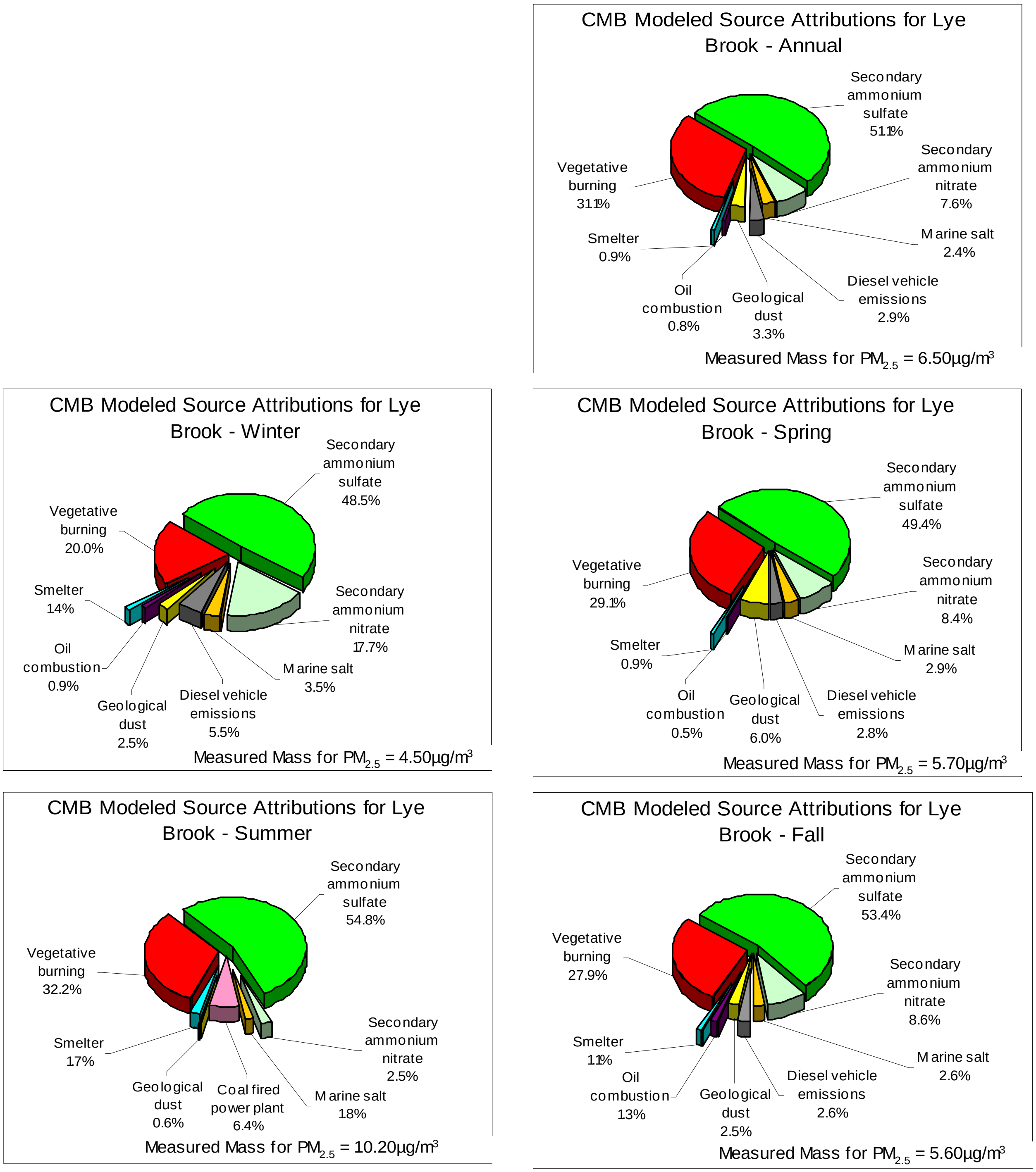


Figure 6.6-3. CMB modeled source attributions for annual and seasonal data subsets from Lye Brook Wilderness Area

Table 6.6-9a CMB model output for Lye Brook Wilderness area, winter

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MLWIMean1    DATE: 2/25/200  CMB8 (97350)
SAMPLE DURATION        24      START HOUR       0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      98.4
     CHI SQUARE      2.30              DF        17
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPFA3 MDsEmi02    0.24051    0.03594    6.69209
YES MBPAL1 MGlDst01    0.03070    0.00842    3.64413
YES MBPAL2 MGlDst02    0.08074    0.00982    8.21912
YES MLPSU7 MOilCo03    0.03727    0.00613    6.08306
YES MLPFA2 MSmelt06    0.06032    0.00339   17.82012
YES MWPFA6 MVgBrn20    0.87768    0.12292    7.14037
YES MAMSUL AMSUL       2.12609    0.04267   49.82224
YES MAMNIT AMNIT       0.77684    0.08376    9.27452
YES MNACL  NACL        0.15132    0.03797    3.98491
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
       4.5+-     0.2

ELIGIBLE SPACE DIM. =   9 FOR MAX. UNC. =  0.89062  (20.% OF TOTAL MEAS. MASS)

1 / SINGULAR VALUE
--------------------------------------------------------------------------------
 0.00286   0.00591   0.00802   0.01013   0.03259   0.03797   0.04267   0.08376
 0.12387
--------------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =   9 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
--------------------------------------------------------------------------------
1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MLPSU7  1.0000 MLPFA2
1.0000 MWPFA6  1.0000 MAMSUL  1.0000 MAMNIT  1.0000 MNACL
--------------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD ERR
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
```

Table 6.6-9b CMB model output for Lye Brook Wilderness area, winter

```
SPECIES CONCENTRATIONS -  SITE: MLWIMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      98.4
     CHI SQUARE      2.30              DF        17

SPECIES-------I---MEAS------------------CALC-------------RATIO C/M----RATIO R/U
TMAC   TMAU      4.45310+- 0.21780  4.38146+- 0.15173   0.98+- 0.06    -0.3
N3IC   N3IU   *  0.77650+- 0.08340  0.77685+- 0.00777   1.00+- 0.11     0.0
S4IC   S4IU   *  2.12600+- 0.03700  2.12609+- 0.02126   1.00+- 0.02     0.0
OC1C   OC1U   *  0.09420+- 0.06320  0.03720+- 0.01898   0.39+- 0.33    -0.9
OC2C   OC2U   *  0.12990+- 0.05850  0.12203+- 0.00636   0.94+- 0.43    -0.1
OC3C   OC3U   *  0.18640+- 0.05890  0.16941+- 0.01039   0.91+- 0.29    -0.3
OC4C   OC4U   *  0.20300+- 0.03760  0.15688+- 0.00999   0.77+- 0.15    -1.2
OPTC   OPTU   *  0.15960+- 0.04680  0.00067+- 0.00548   0.00+- 0.03    -3.4
EC1C   EC1U   *  0.31810+- 0.04610  0.37382+- 0.02398   1.18+- 0.19     1.1
EC2C   EC2U   *  0.05890+- 0.02420  0.08874+- 0.01131   1.51+- 0.65     1.1
EC3C   EC3U   *  0.01310+- 0.00890  0.01084+- 0.00291   0.83+- 0.60    -0.2
ALXC   ALXU   *  0.01040+- 0.00260  0.01093+- 0.00070   1.05+- 0.27     0.2
ASXC   ASXU   *  0.00030+- 0.00010  0.00009+- 0.00003   0.30+- 0.14    -2.0
BRXC   BRXU   *  0.00170+- 0.00010  0.00172+- 0.00006   1.01+- 0.07     0.2
CAXC   CAXU   *  0.01270+- 0.00140  0.01215+- 0.00064   0.96+- 0.12    -0.4
CRXC   CRXU   *  0.00100+- 0.00040  0.00020+- 0.00007   0.20+- 0.11    -2.0
CUXC   CUXU   *  0.00080+- 0.00010  0.00058+- 0.00004   0.73+- 0.10    -2.0
FEXC   FEXU   *  0.01400+- 0.00080  0.01464+- 0.00021   1.05+- 0.06     0.8
KPXC   KPXU   *  0.02280+- 0.00190  0.02304+- 0.00097   1.01+- 0.09     0.1
MGXC   MGXU   *  0.01260+- 0.00470  0.00335+- 0.00103   0.27+- 0.13    -1.9
NAXC   NAXU   *  0.05950+- 0.01370  0.05953+- 0.00595   1.00+- 0.25     0.0
NIXC   NIXU   *  0.00060+- 0.00010  0.00066+- 0.00003   1.11+- 0.19     0.6
PBXC   PBXU   *  0.00220+- 0.00020  0.00217+- 0.00004   0.99+- 0.09    -0.1
SEXC   SEXU   *  0.00060+- 0.00010  0.00048+- 0.00004   0.80+- 0.15    -1.1
SIXC   SIXU   *  0.03320+- 0.00360  0.03094+- 0.00052   0.93+- 0.10    -0.6
VAXC   VAXU   *  0.00180+- 0.00060  0.00054+- 0.00010   0.30+- 0.12    -2.1
ZNXC   ZNXU   *  0.00500+- 0.00030  0.00509+- 0.00015   1.02+- 0.07     0.3
 ------------------------------------------------------------------------------
```

Table 6.6-10a CMB model output for Lye Brook Wilderness Area, spring

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MLSPMean1    DATE: 2/25/200  CMB8 (97350)
SAMPLE DURATION        24      START HOUR       0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      98.3
     CHI SQUARE      1.43              DF        17
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT                            ---
-------------------------------------------------
YES MSPFA3 MDsEmi02    0.15580    0.04101    3.79858
YES MBPAL1 MGlDst01    0.09401    0.01165    8.06727
YES MBPAL2 MGlDst02    0.24173    0.01454   16.61958
YES MLPSU7 MOilCo03    0.02961    0.00632    4.68570
YES MLPFA2 MSmelt06    0.04750    0.00434   10.95614
YES MLPSP2 MVgBrn08    1.62536    0.18759    8.66444
YES MAMSUL AMSUL       2.75762    0.05475   50.36615
YES MAMNIT AMNIT       0.47134    0.05839    8.07213
YES MNACL  NACL        0.16349    0.03261    5.01324
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
       5.7+-     0.2

ELIGIBLE SPACE DIM. =   9 FOR MAX. UNC. =  1.13618  (20.% OF TOTAL MEAS. MASS)

1 / SINGULAR VALUE
--------------------------------------------------------------------------------
 0.00358   0.00626   0.01101   0.01478   0.03261   0.03729   0.05475   0.05839
 0.18840
--------------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =   9 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
--------------------------------------------------------------------------------
1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MLPSU7  1.0000 MLPFA2
1.0000 MLPSP2  1.0000 MAMSUL  1.0000 MAMNIT  1.0000 MNACL
--------------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD ERR
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
```

Table 6.6-10b CMB model output for Lye Brook Wilderness Area, spring

```
SPECIES CONCENTRATIONS -  SITE: MLSPMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION         24      START HOUR        0         SIZE:    PM2.5
       R SQUARE       0.99    PERCENT MASS      98.3
     CHI SQUARE       1.43              DF        17

SPECIES-------I---MEAS------------------CALC-------------RATIO C/M----RATIO R/U
TMAC   TMAU       5.68090+- 0.24410  5.58646+- 0.19500   0.98+- 0.05    -0.3
N3IC   N3IU   *  0.47120+- 0.05820  0.47134+- 0.00471   1.00+- 0.12     0.0
S4IC   S4IU   *  2.75750+- 0.04730  2.75762+- 0.02758   1.00+- 0.02     0.0
OC1C   OC1U   *  0.08300+- 0.04940  0.06681+- 0.01335   0.80+- 0.51    -0.3
OC2C   OC2U   *  0.16460+- 0.05570  0.13269+- 0.00848   0.81+- 0.28    -0.6
OC3C   OC3U   *  0.19000+- 0.05500  0.18974+- 0.00960   1.00+- 0.29     0.0
OC4C   OC4U   *  0.19810+- 0.03640  0.16604+- 0.00798   0.84+- 0.16    -0.9
OPTC   OPTU   *  0.19100+- 0.05510  0.20963+- 0.00719   1.10+- 0.32     0.3
EC1C   EC1U   *  0.31820+- 0.04640  0.36098+- 0.01693   1.13+- 0.17     0.9
EC2C   EC2U   *  0.07210+- 0.02940  0.09944+- 0.00831   1.38+- 0.57     0.9
EC3C   EC3U   *  0.01680+- 0.01100  0.01438+- 0.00214   0.86+- 0.57    -0.2
ALXC   ALXU   *  0.02700+- 0.00370  0.03004+- 0.00067   1.11+- 0.15     0.8
ASXC   ASXU   *  0.00030+- 0.00010  0.00006+- 0.00003   0.20+- 0.12    -2.3
BRXC   BRXU   *  0.00220+- 0.00020  0.00185+- 0.00005   0.84+- 0.08    -1.7
CAXC   CAXU   *  0.02360+- 0.00200  0.02452+- 0.00045   1.04+- 0.09     0.4
CRXC   CRXU   *  0.00120+- 0.00050  0.00064+- 0.00008   0.53+- 0.23    -1.1
CUXC   CUXU   *  0.00070+- 0.00010  0.00048+- 0.00003   0.68+- 0.11    -2.1
FEXC   FEXU   *  0.02490+- 0.00140  0.02434+- 0.00022   0.98+- 0.06    -0.4
KPXC   KPXU   *  0.02750+- 0.00230  0.02565+- 0.00076   0.93+- 0.08    -0.8
MGXC   MGXU   *  0.01050+- 0.00370  0.00588+- 0.00086   0.56+- 0.21    -1.2
NAXC   NAXU   *  0.06430+- 0.01110  0.06432+- 0.00643   1.00+- 0.20     0.0
NIXC   NIXU   *  0.00050+- 0.00010  0.00055+- 0.00003   1.09+- 0.23     0.4
PBXC   PBXU   *  0.00220+- 0.00020  0.00249+- 0.00005   1.13+- 0.11     1.4
SEXC   SEXU   *  0.00040<  0.00080  0.00039<  0.00004   0.98<  1.96     0.0
SIXC   SIXU   *  0.07610+- 0.00560  0.07614+- 0.00098   1.00+- 0.07     0.0
VAXC   VAXU   *  0.00180+- 0.00070  0.00086+- 0.00010   0.48+- 0.20    -1.3
ZNXC   ZNXU   *  0.00420+- 0.00030  0.00442+- 0.00011   1.05+- 0.08     0.7
 ------------------------------------------------------------------------------
```

Table 6.6-11a CMB model output for Lye Brook Wilderness Area, summer

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MLSUMean1    DATE: 2/25/200  CMB8 (97350)
SAMPLE DURATION        24      START HOUR       0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      97.6
     CHI SQUARE      1.65              DF        18
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPSU1 MColPP11    0.63654    0.20561    3.09585
YES MBPAL1 MGlDst01    0.06113    0.01181    5.17504
YES MBPAL2 MGlDst02    0.17131    0.01551   11.04175
YES MLPFA2 MSmelt06    0.06507    0.00529   12.30021
YES MLPSU6 MVgBrn10    3.19484    0.31161   10.25273
YES MAMSUL AMSUL       5.43118    0.10563   51.41600
YES MAMNIT AMNIT       0.24799    0.03429    7.23212
YES MNACL  NACL        0.17462    0.03537    4.93673
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
      10.2+-     0.4

ELIGIBLE SPACE DIM. =   8 FOR MAX. UNC. =  2.04484  (20.% OF TOTAL MEAS. MASS)

1 / SINGULAR VALUE
--------------------------------------------------------------------------------
 0.00464   0.01125   0.01528   0.03429   0.03537   0.10563   0.18413   0.32481
--------------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =   8 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
--------------------------------------------------------------------------------
1.0000 MSPSU1  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MLPFA2  1.0000 MLPSU6
1.0000 MAMSUL  1.0000 MAMNIT  1.0000 MNACL
--------------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD ERR
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
```

Table 6.6-11b CMB model output for Lye Brook Wilderness Area, summer

```
SPECIES CONCENTRATIONS -  SITE: MLSUMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      97.6
     CHI SQUARE      1.65              DF        18
```

SPECIES		I	MEAS	CALC	RATIO C/M	RATIO R/U
TMAC	TMAU		10.22420+- 0.35970	9.98266+- 0.32288	0.98+- 0.05	-0.5
N3IC	N3IU	*	0.24800+- 0.03420	0.24800+- 0.00248	1.00+- 0.14	0.0
S4IC	S4IU	*	5.43120+- 0.09060	5.43118+- 0.05431	1.00+- 0.02	0.0
OC1C	OC1U	*	0.14770+- 0.07350	0.13229+- 0.01809	0.90+- 0.46	-0.2
OC2C	OC2U	*	0.31300+- 0.08730	0.35729+- 0.02508	1.14+- 0.33	0.5
OC3C	OC3U	*	0.36100+- 0.07620	0.44740+- 0.01949	1.24+- 0.27	1.1
OC4C	OC4U	*	0.31370+- 0.05300	0.20728+- 0.01472	0.66+- 0.12	-1.9
OPTC	OPTU	*	0.34430+- 0.09840	0.33523+- 0.02166	0.97+- 0.29	-0.1
EC1C	EC1U	*	0.51300+- 0.07330	0.42477+- 0.02041	0.83+- 0.12	-1.2
EC2C	EC2U	*	0.10250+- 0.04110	0.03196+- 0.00993	0.31+- 0.16	-1.7
EC3C	EC3U	*	0.01930+- 0.01260	0.01305+- 0.00306	0.68+- 0.47	-0.5
ALXC	ALXU	*	0.02150+- 0.00360	0.02185+- 0.00085	1.02+- 0.17	0.1
ASXC	ASXU	*	0.00030< 0.00040	0.00001< 0.00006	0.03< 0.19	-0.7
BRXC	BRXU	*	0.00140+- 0.00040	0.00202+- 0.00007	1.44+- 0.41	1.5
CAXC	CAXU	*	0.01790+- 0.00200	0.02086+- 0.00048	1.17+- 0.13	1.4
CRXC	CRXU	*	0.00130+- 0.00060	0.00075+- 0.00014	0.58+- 0.29	-0.9
CUXC	CUXU	*	0.00070+- 0.00060	0.00068+- 0.00006	0.96+- 0.83	0.0
FEXC	FEXU	*	0.02190+- 0.00120	0.02165+- 0.00024	0.99+- 0.06	-0.2
KPXC	KPXU	*	0.02540+- 0.00240	0.02779+- 0.00069	1.09+- 0.11	1.0
MGXC	MGXU	*	0.01170+- 0.00460	0.00734+- 0.00116	0.63+- 0.27	-0.9
NAXC	NAXU	*	0.06870+- 0.01210	0.06870+- 0.00687	1.00+- 0.20	0.0
NIXC	NIXU	*	0.00050+- 0.00050	0.00008+- 0.00006	0.15+- 0.19	-0.8
PBXC	PBXU	*	0.00190+- 0.00030	0.00236+- 0.00007	1.24+- 0.20	1.5
SEXC	SEXU	*	0.00060+- 0.00040	0.00118+- 0.00006	1.96+- 1.31	1.4
SIXC	SIXU	*	0.07850+- 0.00680	0.06682+- 0.00120	0.85+- 0.08	-1.7
VAXC	VAXU	*	0.00210+- 0.00080	0.00137+- 0.00019	0.65+- 0.26	-0.9
ZNXC	ZNXU	*	0.00430+- 0.00040	0.00348+- 0.00010	0.81+- 0.08	-2.0

Table 6.6-12a CMB model output for Lye Brook Wilderness Area, fall

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MLFAMean1    DATE: 2/25/200  CMB8 (97350)
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      97.8
     CHI SQUARE      1.78              DF        17
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPFA3 MDsEmi02    0.14554    0.04475    3.25218
YES MBPAL1 MGlDst01    0.03198    0.00856    3.73450
YES MBPAL2 MGlDst02    0.10512    0.01350    7.78417
YES MLPSU7 MOilCo03    0.07272    0.02106    3.45338
YES MLPFA2 MSmelt06    0.05973    0.00561   10.63964
YES MWPSU8 MVgBrn19    1.53416    0.20664    7.42423
YES MAMSUL AMSUL       2.93551    0.05738   51.16103
YES MAMNIT AMNIT       0.47330    0.05670    8.34783
YES MNACL  NACL        0.14209    0.02957    4.80566
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
       5.6+-     0.2

ELIGIBLE SPACE DIM. =   9 FOR MAX. UNC. =  1.12460  (20.% OF TOTAL MEAS. MASS)

1 / SINGULAR VALUE
--------------------------------------------------------------------------------
 0.00436   0.00822   0.01152   0.02251   0.02957   0.03777   0.05670   0.05738
 0.20804
--------------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =   9 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
--------------------------------------------------------------------------------
1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MLPSU7  1.0000 MLPFA2
1.0000 MWPSU8  1.0000 MAMSUL  1.0000 MAMNIT  1.0000 MNACL
--------------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD ERR
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
```

Table 6.6-12b CMB model output for Lye Brook Wilderness Area, fall

```
SPECIES CONCENTRATIONS -  SITE: MLFAMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      97.8
     CHI SQUARE      1.78              DF        17
```

SPECIES		I	MEAS	CALC	RATIO C/M	RATIO R/U
TMAC	TMAU		5.62300+- 0.24760	5.50015+- 0.20518	0.98+- 0.06	-0.4
N3IC	N3IU	*	0.47330+- 0.05650	0.47331+- 0.00473	1.00+- 0.12	0.0
S4IC	S4IU	*	2.93550+- 0.04930	2.93551+- 0.02936	1.00+- 0.02	0.0
OC1C	OC1U	*	0.10390+- 0.06060	0.04877+- 0.01235	0.47+- 0.30	-0.9
OC2C	OC2U	*	0.17280+- 0.06130	0.16132+- 0.00926	0.93+- 0.34	-0.2
OC3C	OC3U	*	0.22940+- 0.06680	0.22577+- 0.00890	0.98+- 0.29	-0.1
OC4C	OC4U	*	0.22370+- 0.04380	0.18412+- 0.00902	0.82+- 0.17	-0.9
OPTC	OPTU	*	0.19140+- 0.05690	0.01020+- 0.00447	0.05+- 0.03	-3.2
EC1C	EC1U	*	0.36070+- 0.05560	0.35977+- 0.01793	1.00+- 0.16	0.0
EC2C	EC2U	*	0.07650+- 0.03340	0.06444+- 0.00728	0.84+- 0.38	-0.4
EC3C	EC3U	*	0.01680+- 0.01110	0.00726+- 0.00191	0.43+- 0.31	-0.8
ALXC	ALXU	*	0.01090+- 0.00260	0.01152+- 0.00055	1.06+- 0.26	0.2
ASXC	ASXU	*	0.00020+- 0.00020	0.00006+- 0.00003	0.31+- 0.35	-0.7
BRXC	BRXU	*	0.00150+- 0.00050	0.00219+- 0.00005	1.46+- 0.49	1.4
CAXC	CAXU	*	0.01390+- 0.00160	0.01586+- 0.00048	1.14+- 0.14	1.2
CRXC	CRXU	*	0.00130+- 0.00050	0.00042+- 0.00007	0.32+- 0.14	-1.7
CUXC	CUXU	*	0.00080+- 0.00060	0.00063+- 0.00004	0.79+- 0.59	-0.3
FEXC	FEXU	*	0.01650+- 0.00090	0.01626+- 0.00029	0.99+- 0.06	-0.3
KPXC	KPXU	*	0.02200+- 0.00210	0.02331+- 0.00069	1.06+- 0.11	0.6
MGXC	MGXU	*	0.00930+- 0.00380	0.00249+- 0.00074	0.27+- 0.14	-1.8
NAXC	NAXU	*	0.05590+- 0.01020	0.05590+- 0.00559	1.00+- 0.21	0.0
NIXC	NIXU	*	0.00060+- 0.00050	0.00124+- 0.00004	2.06+- 1.72	1.3
PBXC	PBXU	*	0.00200+- 0.00040	0.00223+- 0.00005	1.11+- 0.22	0.6
SEXC	SEXU	*	0.00050+- 0.00050	0.00088+- 0.00004	1.76+- 1.77	0.8
SIXC	SIXU	*	0.04860+- 0.00460	0.04419+- 0.00058	0.91+- 0.09	-1.0
VAXC	VAXU	*	0.00230+- 0.00080	0.00080+- 0.00010	0.35+- 0.13	-1.9
ZNXC	ZNXU	*	0.00450+- 0.00040	0.00423+- 0.00011	0.94+- 0.09	-0.7

Table 6.6-13a CMB model output for Lye Brook Wilderness Area, annual

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MLALMean1    DATE: 2/25/200  CMB8 (97350)
SAMPLE DURATION        24      START HOUR       0          SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      99.9
     CHI SQUARE      1.11              DF        17
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPFA3 MDsEmi02    0.18872    0.04290    4.39894
YES MBPAL1 MGlDst01    0.05512    0.01004    5.49155
YES MBPAL2 MGlDst02    0.15749    0.01374   11.46462
YES MLPSU7 MOilCo03    0.04888    0.01581    3.09264
YES MLPFA2 MSmelt06    0.05653    0.00521   10.85684
YES MSPSU6 MVgBrn15    2.00752    0.23031    8.71655
YES MAMSUL AMSUL       3.29964    0.06483   50.90010
YES MAMNIT AMNIT       0.49163    0.05831    8.43170
YES MNACL  NACL        0.15735    0.03365    4.67636
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
       6.5+-     0.3

ELIGIBLE SPACE DIM. =   9 FOR MAX. UNC. =  1.29334  (20.% OF TOTAL MEAS. MASS)

1 / SINGULAR VALUE
--------------------------------------------------------------------------------
 0.00437   0.00942   0.01242   0.01723   0.03365   0.03955   0.05831   0.06483
 0.23093
--------------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =   9 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
--------------------------------------------------------------------------------
1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MLPSU7  1.0000 MLPFA2
1.0000 MSPSU6  1.0000 MAMSUL  1.0000 MAMNIT  1.0000 MNACL
--------------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD ERR
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
```

Table 6.6-13b CMB model output for Lye Brook Wilderness Area, annual

```
SPECIES CONCENTRATIONS -  SITE: MLALMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION        24      START HOUR       0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      99.9
     CHI SQUARE      1.11              DF        17
```

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
TMAC	TMAU		6.46670+-	0.26670	6.46290+-	0.23674	1.00+-	0.06	0.0
N3IC	N3IU	*	0.49160+-	0.05810	0.49164+-	0.00492	1.00+-	0.12	0.0
S4IC	S4IU	*	3.29960+-	0.05580	3.29965+-	0.03300	1.00+-	0.02	0.0
OC1C	OC1U	*	0.10700+-	0.06160	0.07957+-	0.01523	0.74+-	0.45	-0.4
OC2C	OC2U	*	0.19430+-	0.06560	0.18274+-	0.00727	0.94+-	0.32	-0.2
OC3C	OC3U	*	0.24120+-	0.06430	0.17379+-	0.00861	0.72+-	0.20	-1.0
OC4C	OC4U	*	0.23420+-	0.04270	0.19581+-	0.00835	0.84+-	0.16	-0.9
OPTC	OPTU	*	0.22060+-	0.06400	0.21775+-	0.00669	0.99+-	0.29	0.0
EC1C	EC1U	*	0.37680+-	0.05530	0.44224+-	0.01958	1.17+-	0.18	1.1
EC2C	EC2U	*	0.07750+-	0.03200	0.07502+-	0.00918	0.97+-	0.42	-0.1
EC3C	EC3U	*	0.01650+-	0.01090	0.00955+-	0.00240	0.58+-	0.41	-0.6
ALXC	ALXU	*	0.01730+-	0.00310	0.01810+-	0.00060	1.05+-	0.19	0.3
ASXC	ASXU	*	0.00030+-	0.00020	0.00007+-	0.00004	0.25+-	0.20	-1.1
BRXC	BRXU	*	0.00170+-	0.00030	0.00175+-	0.00005	1.03+-	0.18	0.2
CAXC	CAXU	*	0.01700+-	0.00180	0.01795+-	0.00052	1.06+-	0.12	0.5
CRXC	CRXU	*	0.00120+-	0.00050	0.00025+-	0.00007	0.21+-	0.11	-1.9
CUXC	CUXU	*	0.00070+-	0.00030	0.00058+-	0.00004	0.82+-	0.36	-0.4
FEXC	FEXU	*	0.01930+-	0.00110	0.01952+-	0.00018	1.01+-	0.06	0.2
KPXC	KPXU	*	0.02430+-	0.00220	0.02518+-	0.00080	1.04+-	0.10	0.4
MGXC	MGXU	*	0.01100+-	0.00420	0.00340+-	0.00085	0.31+-	0.14	-1.8
NAXC	NAXU	*	0.06190+-	0.01170	0.06191+-	0.00619	1.00+-	0.21	0.0
NIXC	NIXU	*	0.00060+-	0.00030	0.00085+-	0.00004	1.42+-	0.71	0.8
PBXC	PBXU	*	0.00210+-	0.00030	0.00214+-	0.00005	1.02+-	0.15	0.1
SEXC	SEXU	*	0.00050+-	0.00040	0.00045+-	0.00004	0.89+-	0.72	-0.1
SIXC	SIXU	*	0.05890+-	0.00510	0.05485+-	0.00065	0.93+-	0.08	-0.8
VAXC	VAXU	*	0.00200+-	0.00070	0.00040+-	0.00010	0.20+-	0.09	-2.3
ZNXC	ZNXU	*	0.00450+-	0.00040	0.00432+-	0.00012	0.96+-	0.09	-0.4

6.6.5 Shenandoah National Park

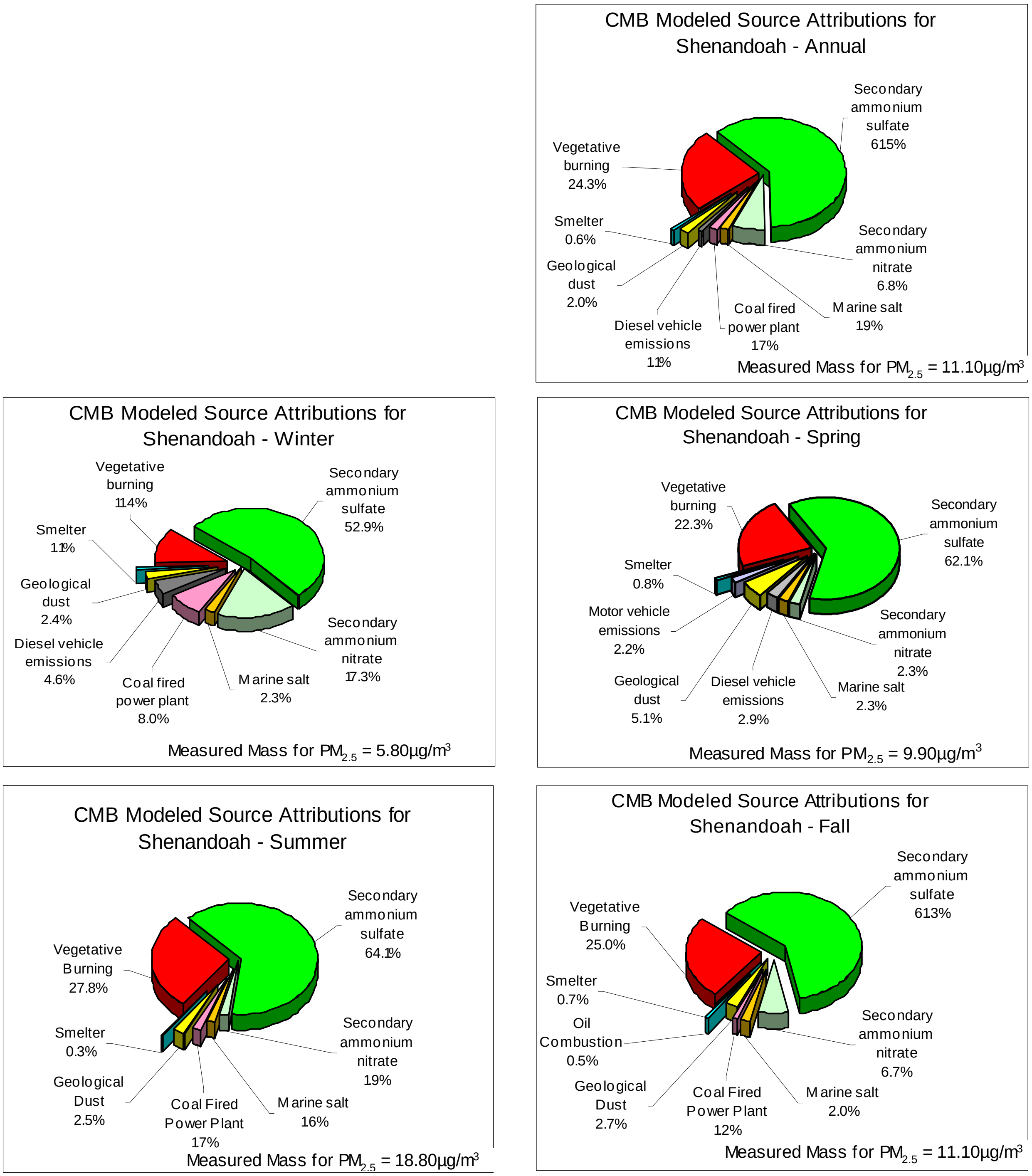


Figure 6.6-4 CMB modeled source attributions for mean annual and seasonal data subsets from Shenandoah National Park

Table 6.6-14a CMB model output for Shenandoah National Park, winter

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MSWIMean1    DATE: 2/25/200  CMB8
(97350)
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      99.6
     CHI SQUARE      2.67              DF        17
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MWPSU9 MColPP14    0.46165    0.08220    5.61633
YES MSPFA3 MDsEmi02    0.26900    0.05099    5.27572
YES MBPAL1 MGlDst01    0.04170    0.00927    4.50004
YES MBPAL2 MGlDst02    0.09960    0.01165    8.54639
YES MLPFA2 MSmelt06    0.06121    0.00422   14.50120
YES MSPAL6 MVgBrn12    0.65936    0.13330    4.94638
YES MAMSUL AMSUL       3.06222    0.06086   50.31211
YES MAMNIT AMNIT       1.00305    0.10498    9.55462
YES MNACL  NACL        0.13195    0.03277    4.02657
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
       5.8+-     0.2

ELIGIBLE SPACE DIM. =   9 FOR MAX. UNC. =  1.16288  (20.% OF TOTAL MEAS.
MASS)

1 / SINGULAR VALUE
-----------------------------------------------------------------------------
 0.00365   0.00863   0.01153   0.03277   0.03919   0.06086   0.07593
0.10498
 0.14087
-----------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =   9 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
-----------------------------------------------------------------------------
1.0000 MWPSU9  1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MLPFA2
1.0000 MSPAL6  1.0000 MAMSUL  1.0000 MAMNIT  1.0000 MNACL
-----------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD
ERR
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
```

Table 6.6-14b CMB model output for Shenandoah National Park, winter

SPECIES CONCENTRATIONS - SITE: MSWIMean1 DATE: 2/25/200 CMB 8.0
SAMPLE DURATION 24 START HOUR 0 SIZE: PM2.5
R SQUARE 0.99 PERCENT MASS 99.6
CHI SQUARE 2.67 DF 17

SPECIES		I	MEAS	CALC	RATIO C/M	RATIO R/U
TMAC	TMAU		5.81440+- 0.24480	5.78974+- 0.16758	1.00+- 0.05	-0.1
N3IC	N3IU	*	1.00270+- 0.10450	1.00305+- 0.01003	1.00+- 0.10	0.0
S4IC	S4IU	*	3.06210+- 0.05260	3.06222+- 0.03062	1.00+- 0.02	0.0
OC1C	OC1U	*	0.08780+- 0.06360	0.05654+- 0.02115	0.64+- 0.52	-0.5
OC2C	OC2U	*	0.16130+- 0.06300	0.13567+- 0.00924	0.84+- 0.33	-0.4
OC3C	OC3U	*	0.24050+- 0.06640	0.13344+- 0.01161	0.55+- 0.16	-1.6
OC4C	OC4U	*	0.26500+- 0.04640	0.17214+- 0.01150	0.65+- 0.12	-1.9
OPTC	OPTU	*	0.22430+- 0.06510	0.00840+- 0.00607	0.04+- 0.03	-3.3
EC1C	EC1U	*	0.44180+- 0.06350	0.31616+- 0.02733	0.72+- 0.12	-1.8
EC2C	EC2U	*	0.07540+- 0.03250	0.10329+- 0.01272	1.37+- 0.61	0.8
EC3C	EC3U	*	0.01400+- 0.01090	0.01185+- 0.00326	0.85+- 0.70	-0.2
ALXC	ALXU	*	0.01380+- 0.00280	0.01372+- 0.00080	0.99+- 0.21	0.0
ASXC	ASXU	*	0.00030+- 0.00010	0.00013+- 0.00004	0.43+- 0.19	-1.6
BRXC	BRXU	*	0.00210+- 0.00020	0.00258+- 0.00006	1.23+- 0.12	2.3
CAXC	CAXU	*	0.01500+- 0.00150	0.01657+- 0.00072	1.10+- 0.12	0.9
CRXC	CRXU	*	0.00110+- 0.00040	0.00027+- 0.00008	0.25+- 0.12	-2.0
CUXC	CUXU	*	0.00080+- 0.00010	0.00056+- 0.00005	0.70+- 0.11	-2.1
FEXC	FEXU	*	0.01680+- 0.00100	0.01612+- 0.00020	0.96+- 0.06	-0.7
KPXC	KPXU	*	0.02890+- 0.00220	0.02905+- 0.00106	1.01+- 0.08	0.1
MGXC	MGXU	*	0.00980+- 0.00400	0.00745+- 0.00120	0.76+- 0.33	-0.6
NAXC	NAXU	*	0.05190+- 0.01180	0.05191+- 0.00519	1.00+- 0.25	0.0
NIXC	NIXU	*	0.00020+- 0.00010	0.00012+- 0.00004	0.60+- 0.36	-0.7
PBXC	PBXU	*	0.00220+- 0.00020	0.00217+- 0.00005	0.98+- 0.09	-0.2
SEXC	SEXU	*	0.00100+- 0.00010	0.00110+- 0.00005	1.10+- 0.12	0.9
SIXC	SIXU	*	0.04480+- 0.00410	0.04419+- 0.00072	0.99+- 0.09	-0.1
VAXC	VAXU	*	0.00140+- 0.00050	0.00034+- 0.00011	0.25+- 0.12	-2.1
ZNXC	ZNXU	*	0.00550+- 0.00050	0.00559+- 0.00017	1.02+- 0.10	0.2

Table 6.6-15a CMB model output for Shenandoah National Park, spring

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MSSPMean1    DATE: 2/25/200  CMB8
(97350)
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      98.6
     CHI SQUARE      2.82              DF        17
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPFA3 MDsEmi02    0.26305    0.05380    4.88910
YES MBPAL1 MGlDst01    0.14702    0.01522    9.66076
YES MBPAL2 MGlDst02    0.31017    0.02284   13.58242
YES MWPSU5 MMvEmi07    0.19459    0.07754    2.50944
YES MLPFA2 MSmelt06    0.07436    0.00662   11.22776
YES MWPSU8 MVgBrn19    2.01545    0.23452    8.59378
YES MAMSUL AMSUL       5.61884    0.11037   50.90791
YES MAMNIT AMNIT       0.90289    0.09921    9.10064
YES MNACL  NACL        0.20948    0.04064    5.15426
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
       9.9+-     0.3

ELIGIBLE SPACE DIM. =   9 FOR MAX. UNC. =  1.97418  (20.% OF TOTAL MEAS.
MASS)

1 / SINGULAR VALUE
-----------------------------------------------------------------------------
 0.00482   0.01434   0.01929   0.04064   0.04982   0.07824   0.09921
0.11037
 0.23559
-----------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =   9 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
-----------------------------------------------------------------------------
1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MWPSU5  1.0000 MLPFA2
1.0000 MWPSU8  1.0000 MAMSUL  1.0000 MAMNIT  1.0000 MNACL
-----------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE        STD
ERR
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
```

Table 6.6-15b CMB model output for Shenandoah National Park, spring

SPECIES CONCENTRATIONS - SITE: MSSPMean1 DATE: 2/25/200 CMB 8.0
SAMPLE DURATION 24 START HOUR 0 SIZE: PM2.5
R SQUARE 0.99 PERCENT MASS 98.6
CHI SQUARE 2.82 DF 17

SPECIES		I	MEAS	CALC	RATIO C/M	RATIO R/U
TMAC	TMAU		9.87090+- 0.34460	9.73585+- 0.26900	0.99+- 0.04	-0.3
N3IC	N3IU	*	0.90270+- 0.09880	0.90290+- 0.00903	1.00+- 0.11	0.0
S4IC	S4IU	*	5.61860+- 0.09500	5.61885+- 0.05619	1.00+- 0.02	0.0
OC1C	OC1U	*	0.13530+- 0.06710	0.06880+- 0.02144	0.51+- 0.30	-0.9
OC2C	OC2U	*	0.28650+- 0.07380	0.23778+- 0.01378	0.83+- 0.22	-0.6
OC3C	OC3U	*	0.30410+- 0.06880	0.31960+- 0.01391	1.05+- 0.24	0.2
OC4C	OC4U	*	0.36260+- 0.05800	0.26008+- 0.01346	0.72+- 0.12	-1.7
OPTC	OPTU	*	0.31660+- 0.08980	0.01417+- 0.00634	0.04+- 0.02	-3.4
EC1C	EC1U	*	0.56600+- 0.07920	0.54741+- 0.02905	0.97+- 0.14	-0.2
EC2C	EC2U	*	0.09650+- 0.03820	0.11570+- 0.01277	1.20+- 0.49	0.5
EC3C	EC3U	*	0.01750+- 0.01260	0.01204+- 0.00328	0.69+- 0.53	-0.4
ALXC	ALXU	*	0.04430+- 0.00480	0.04741+- 0.00093	1.07+- 0.12	0.6
ASXC	ASXU	*	0.00040+- 0.00020	0.00010+- 0.00006	0.26+- 0.20	-1.4
BRXC	BRXU	*	0.00280+- 0.00020	0.00311+- 0.00008	1.11+- 0.08	1.4
CAXC	CAXU	*	0.03130+- 0.00250	0.03790+- 0.00077	1.21+- 0.10	2.5
CRXC	CRXU	*	0.00120+- 0.00050	0.00069+- 0.00011	0.57+- 0.25	-1.0
CUXC	CUXU	*	0.00100+- 0.00010	0.00084+- 0.00007	0.84+- 0.11	-1.4
FEXC	FEXU	*	0.03830+- 0.00200	0.03985+- 0.00041	1.04+- 0.06	0.8
KPXC	KPXU	*	0.04000+- 0.00280	0.04066+- 0.00115	1.02+- 0.08	0.2
MGXC	MGXU	*	0.01170+- 0.00410	0.00664+- 0.00125	0.57+- 0.23	-1.2
NAXC	NAXU	*	0.08240+- 0.01370	0.08241+- 0.00824	1.00+- 0.19	0.0
NIXC	NIXU	*	0.00030+- 0.00020	0.00009+- 0.00006	0.29+- 0.28	-1.0
PBXC	PBXU	*	0.00280+- 0.00030	0.00283+- 0.00007	1.01+- 0.11	0.1
SEXC	SEXU	*	0.00090+- 0.00050	0.00117+- 0.00007	1.30+- 0.72	0.5
SIXC	SIXU	*	0.12150+- 0.00780	0.09332+- 0.00086	0.77+- 0.05	-3.6
VAXC	VAXU	*	0.00150+- 0.00060	0.00091+- 0.00014	0.61+- 0.26	-1.0
ZNXC	ZNXU	*	0.00670+- 0.00040	0.00625+- 0.00018	0.93+- 0.06	-1.0

Table 6.6-16a CMB model output for Shenandoah National Park, summer

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MSSUMean1    DATE: 2/25/200  CMB8
(97350)
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      1.00    PERCENT MASS      97.0
     CHI SQUARE      0.84              DF        18
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPWI8 MColPP08    0.30988    0.05102    6.07398
YES MBPAL1 MGlDst01    0.15066    0.01836    8.20445
YES MBPAL2 MGlDst02    0.30858    0.02320   13.30325
YES MLPFA2 MSmelt06    0.06367    0.00800    7.95735
YES MSPSU6 MVgBrn15    5.07401    0.40168   12.63187
YES MAMSUL AMSUL      11.69326    0.21886   53.42900
YES MAMNIT AMNIT       0.35310    0.04793    7.36683
YES MNACL  NACL        0.29130    0.05750    5.06629
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
      18.8+-     0.6

ELIGIBLE SPACE DIM. =   8 FOR MAX. UNC. =  3.76000  (20.% OF TOTAL MEAS.
MASS)

1 / SINGULAR VALUE
-----------------------------------------------------------------------------
 0.00670   0.01729   0.02142   0.04793   0.05225   0.05750   0.21886
0.40169
-----------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =   8 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
-----------------------------------------------------------------------------
1.0000 MSPWI8  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MLPFA2  1.0000 MSPSU6
1.0000 MAMSUL  1.0000 MAMNIT  1.0000 MNACL
-----------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD
ERR
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
```

Table 6.6-16b CMB model output for Shenandoah National Park, summer

```
SPECIES CONCENTRATIONS -  SITE: MSSUMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION        24       START HOUR        0         SIZE:    PM2.5
       R SQUARE      1.00    PERCENT MASS      97.0
     CHI SQUARE      0.84              DF        18

SPECIES-------I---MEAS------------------CALC-------------RATIO C/M----RATIO
R/U
TMAC   TMAU     18.80000+- 0.59400 18.24445+- 0.46188   0.97+- 0.04    -0.7
N3IC   N3IU   *  0.35310+- 0.04780  0.35311+- 0.00353   1.00+- 0.14     0.0
S4IC   S4IU   * 11.69300+- 0.18500 11.69327+- 0.11693   1.00+- 0.02     0.0
OC1C   OC1U   *  0.27020+- 0.10590  0.18338+- 0.03230   0.68+- 0.29    -0.8
OC2C   OC2U   *  0.52750+- 0.11710  0.48899+- 0.03717   0.93+- 0.22    -0.3
OC3C   OC3U   *  0.39800+- 0.08290  0.42717+- 0.01125   1.07+- 0.23     0.3
OC4C   OC4U   *  0.52510+- 0.08080  0.48733+- 0.01491   0.93+- 0.15    -0.5
OPTC   OPTU   *  0.63300+- 0.17580  0.54957+- 0.01260   0.87+- 0.24    -0.5
EC1C   EC1U   *  0.89310+- 0.12320  0.89640+- 0.01493   1.00+- 0.14     0.0
EC2C   EC2U   *  0.11700+- 0.04620  0.09940+- 0.01650   0.85+- 0.36    -0.4
EC3C   EC3U   *  0.01950+- 0.01420  0.00584+- 0.00348   0.30+- 0.28    -0.9
ALXC   ALXU   *  0.04870+- 0.00580  0.04799+- 0.00069   0.99+- 0.12    -0.1
ASXC   ASXU   *  0.00030+- 0.00030  0.00020+- 0.00012   0.66+- 0.78    -0.3
BRXC   BRXU   *  0.00200+- 0.00040  0.00255+- 0.00013   1.27+- 0.26     1.3
CAXC   CAXU   *  0.02620+- 0.00250  0.02719+- 0.00035   1.04+- 0.10     0.4
CRXC   CRXU   *  0.00150+- 0.00060  0.00035+- 0.00015   0.24+- 0.14    -1.9
CUXC   CUXU   *  0.00110+- 0.00050  0.00050+- 0.00012   0.45+- 0.23    -1.2
FEXC   FEXU   *  0.04010+- 0.00210  0.03882+- 0.00064   0.97+- 0.05    -0.6
KPXC   KPXU   *  0.04020+- 0.00330  0.04226+- 0.00158   1.05+- 0.09     0.6
MGXC   MGXU   *  0.01510+- 0.00590  0.01455+- 0.00180   0.96+- 0.39    -0.1
NAXC   NAXU   *  0.11460+- 0.01950  0.11461+- 0.01146   1.00+- 0.20     0.0
NIXC   NIXU   *  0.00050+- 0.00040  0.00016+- 0.00012   0.32+- 0.35    -0.8
PBXC   PBXU   *  0.00250+- 0.00040  0.00248+- 0.00013   0.99+- 0.17     0.0
SEXC   SEXU   *  0.00120+- 0.00050  0.00182+- 0.00013   1.51+- 0.64     1.2
SIXC   SIXU   *  0.14520+- 0.01030  0.14558+- 0.00255   1.00+- 0.07     0.0
VAXC   VAXU   *  0.00180+- 0.00080  0.00030+- 0.00018   0.16+- 0.12    -1.8
ZNXC   ZNXU   *  0.00630+- 0.00050  0.00618+- 0.00027   0.98+- 0.09    -0.2
 ----------------------------------------------------------------------------
```

Table 6.6-17a CMB model output for Shenandoah National Park, fall

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MSFAMean1    DATE: 2/25/200  CMB8
(97350)
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      97.8
     CHI SQUARE      2.68              DF        17
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPWI8 MColPP08    0.11868    0.03916    3.03095
YES MBPAL1 MGlDst01    0.06258    0.01105    5.66115
YES MBPAL2 MGlDst02    0.20528    0.01923   10.67687
YES MLPSU7 MOilCo03    0.04531    0.02172    2.08641
YES MLPFA2 MSmelt06    0.06682    0.00606   11.03243
YES MWPFA6 MVgBrn20    2.44501    0.18355   13.32071
YES MAMSUL AMSUL       6.00500    0.11596   51.78527
YES MAMNIT AMNIT       0.65286    0.07479    8.72973
YES MNACL  NACL        0.19424    0.03833    5.06704
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
      10.0+-     0.4

ELIGIBLE SPACE DIM. =   9 FOR MAX. UNC. =  2.00328  (20.% OF TOTAL MEAS.
MASS)

1 / SINGULAR VALUE
-----------------------------------------------------------------------------
 0.00515   0.01053   0.01436   0.02214   0.03833   0.04105   0.07479
0.11596
 0.18359
-----------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =   9 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
-----------------------------------------------------------------------------
1.0000 MSPWI8  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MLPSU7  1.0000 MLPFA2
1.0000 MWPFA6  1.0000 MAMSUL  1.0000 MAMNIT  1.0000 MNACL
-----------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD
ERR
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
```

Table 6.6-17b CMB model output for Shenandoah National Park, fall

SPECIES CONCENTRATIONS - SITE: MSFAMean1 DATE: 2/25/200 CMB 8.0
SAMPLE DURATION 24 START HOUR 0 SIZE: PM2.5
R SQUARE 0.99 PERCENT MASS 97.8
CHI SQUARE 2.68 DF 17

SPECIES		I	MEAS		CALC		RATIO C/M		RATIO R/U
TMAC	TMAU		10.01640+-	0.35350	9.79576+-	0.23180	0.98+-	0.04	-0.5
N3IC	N3IU	*	0.65270+-	0.07450	0.65287+-	0.00653	1.00+-	0.11	0.0
S4IC	S4IU	*	6.00460+-	0.09920	6.00500+-	0.06005	1.00+-	0.02	0.0
OC1C	OC1U	*	0.14100+-	0.07440	0.05240+-	0.01591	0.37+-	0.23	-1.2
OC2C	OC2U	*	0.31470+-	0.08200	0.35084+-	0.01812	1.11+-	0.30	0.4
OC3C	OC3U	*	0.36760+-	0.08130	0.46678+-	0.01293	1.27+-	0.28	1.2
OC4C	OC4U	*	0.40830+-	0.06660	0.43303+-	0.01231	1.06+-	0.18	0.4
OPTC	OPTU	*	0.38240+-	0.10790	0.00057+-	0.00191	0.00+-	0.01	-3.5
EC1C	EC1U	*	0.66070+-	0.09370	0.73587+-	0.01255	1.11+-	0.16	0.8
EC2C	EC2U	*	0.10900+-	0.04350	0.04050+-	0.00630	0.37+-	0.16	-1.6
EC3C	EC3U	*	0.02020+-	0.01420	0.00512+-	0.00155	0.25+-	0.19	-1.1
ALXC	ALXU	*	0.02110+-	0.00340	0.02200+-	0.00050	1.04+-	0.17	0.3
ASXC	ASXU	*	0.00030+-	0.00010	0.00008+-	0.00006	0.28+-	0.23	-1.8
BRXC	BRXU	*	0.00300+-	0.00030	0.00247+-	0.00008	0.82+-	0.09	-1.7
CAXC	CAXU	*	0.02350+-	0.00220	0.01849+-	0.00034	0.79+-	0.08	-2.2
CRXC	CRXU	*	0.00130+-	0.00050	0.00020+-	0.00008	0.16+-	0.09	-2.2
CUXC	CUXU	*	0.00100+-	0.00040	0.00058+-	0.00006	0.58+-	0.24	-1.0
FEXC	FEXU	*	0.02460+-	0.00140	0.02683+-	0.00041	1.09+-	0.06	1.5
KPXC	KPXU	*	0.03600+-	0.00280	0.03104+-	0.00083	0.86+-	0.07	-1.7
MGXC	MGXU	*	0.00950+-	0.00410	0.00576+-	0.00070	0.61+-	0.27	-0.9
NAXC	NAXU	*	0.07640+-	0.01300	0.07642+-	0.00764	1.00+-	0.20	0.0
NIXC	NIXU	*	0.00070+-	0.00040	0.00083+-	0.00006	1.19+-	0.68	0.3
PBXC	PBXU	*	0.00240+-	0.00030	0.00252+-	0.00008	1.05+-	0.13	0.4
SEXC	SEXU	*	0.00120+-	0.00040	0.00098+-	0.00007	0.81+-	0.28	-0.6
SIXC	SIXU	*	0.08080+-	0.00630	0.08642+-	0.00101	1.07+-	0.08	0.9
VAXC	VAXU	*	0.00160+-	0.00070	0.00079+-	0.00014	0.49+-	0.23	-1.1
ZNXC	ZNXU	*	0.00600+-	0.00050	0.00588+-	0.00017	0.98+-	0.09	-0.2

Table 6.6-18a CMB model output for Shenandoah National Park, annual

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MSALMean1    DATE: 2/25/200  CMB8
(97350)
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      97.3
     CHI SQUARE      1.82              DF        17
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPWI8 MColPP08    0.18780    0.04098    4.58234
YES MSPFA3 MDsEmi02    0.12008    0.05910    2.03176
YES MBPAL1 MGlDst01    0.09818    0.01356    7.24012
YES MBPAL2 MGlDst02    0.21040    0.02003   10.50491
YES MLPFA2 MSmelt06    0.06650    0.00629   10.56456
YES MWPSU8 MVgBrn19    2.61191    0.26569    9.83060
YES MAMSUL AMSUL       6.60059    0.12666   52.11330
YES MAMNIT AMNIT       0.72733    0.08172    8.89976
YES MNACL  NACL        0.20716    0.04228    4.89940
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
      11.1+-     0.4

ELIGIBLE SPACE DIM. =   9 FOR MAX. UNC. =  2.22698  (20.% OF TOTAL MEAS.
MASS)

1 / SINGULAR VALUE
-----------------------------------------------------------------------------
 0.00540   0.01276   0.01686   0.04019   0.04228   0.05378   0.08172
0.12666
 0.26722
-----------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =   9 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
-----------------------------------------------------------------------------
1.0000 MSPWI8  1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MLPFA2
1.0000 MWPSU8  1.0000 MAMSUL  1.0000 MAMNIT  1.0000 MNACL
-----------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD
ERR
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
```

Table 6.6-18b CMB model output for Shenandoah National Park, annual

```
SPECIES CONCENTRATIONS -  SITE: MSALMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION        24       START HOUR        0          SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      97.3
     CHI SQUARE      1.82              DF        17

SPECIES-------I---MEAS------------------CALC-------------RATIO C/M----RATIO
R/U
TMAC   TMAU      11.13490+- 0.38430 10.82995+- 0.29086   0.97+- 0.04    -0.6
N3IC   N3IU   *  0.72730+- 0.08140  0.72734+- 0.00727   1.00+- 0.11     0.0
S4IC   S4IU   *  6.60050+- 0.10810  6.60059+- 0.06601   1.00+- 0.02     0.0
OC1C   OC1U   *  0.15860+- 0.07770  0.08495+- 0.02223   0.54+- 0.30    -0.9
OC2C   OC2U   *  0.32310+- 0.08400  0.29564+- 0.02557   0.92+- 0.25    -0.3
OC3C   OC3U   *  0.32840+- 0.07490  0.37791+- 0.01252   1.15+- 0.27     0.7
OC4C   OC4U   *  0.39100+- 0.06300  0.30803+- 0.01404   0.79+- 0.13    -1.3
OPTC   OPTU   *  0.38920+- 0.10970  0.01734+- 0.00415   0.04+- 0.02    -3.4
EC1C   EC1U   *  0.64110+- 0.09000  0.54563+- 0.02108   0.85+- 0.12    -1.0
EC2C   EC2U   *  0.09970+- 0.04020  0.11249+- 0.01153   1.13+- 0.47     0.3
EC3C   EC3U   *  0.01780+- 0.01300  0.00690+- 0.00254   0.39+- 0.32    -0.8
ALXC   ALXU   *  0.03210+- 0.00420  0.03248+- 0.00070   1.01+- 0.13     0.1
ASXC   ASXU   *  0.00030+- 0.00020  0.00016+- 0.00007   0.53+- 0.43    -0.7
BRXC   BRXU   *  0.00250+- 0.00030  0.00291+- 0.00008   1.16+- 0.14     1.3
CAXC   CAXU   *  0.02420+- 0.00220  0.02627+- 0.00053   1.09+- 0.10     0.9
CRXC   CRXU   *  0.00120+- 0.00050  0.00060+- 0.00011   0.50+- 0.23    -1.2
CUXC   CUXU   *  0.00100+- 0.00030  0.00053+- 0.00007   0.53+- 0.17    -1.5
FEXC   FEXU   *  0.03010+- 0.00160  0.02927+- 0.00056   0.97+- 0.05    -0.5
KPXC   KPXU   *  0.03640+- 0.00280  0.03670+- 0.00114   1.01+- 0.08     0.1
MGXC   MGXU   *  0.01150+- 0.00450  0.01036+- 0.00131   0.90+- 0.37    -0.2
NAXC   NAXU   *  0.08150+- 0.01450  0.08150+- 0.00815   1.00+- 0.20     0.0
NIXC   NIXU   *  0.00040+- 0.00030  0.00012+- 0.00007   0.30+- 0.29    -0.9
PBXC   PBXU   *  0.00250+- 0.00030  0.00246+- 0.00008   0.99+- 0.12    -0.1
SEXC   SEXU   *  0.00110+- 0.00040  0.00206+- 0.00008   1.87+- 0.69     2.4
SIXC   SIXU   *  0.09860+- 0.00710  0.09468+- 0.00149   0.96+- 0.07    -0.5
VAXC   VAXU   *  0.00160+- 0.00070  0.00093+- 0.00014   0.58+- 0.27    -0.9
ZNXC   ZNXU   *  0.00610+- 0.00050  0.00598+- 0.00019   0.98+- 0.09    -0.2
 ----------------------------------------------------------------------------
```

6.6.6 Washington DC

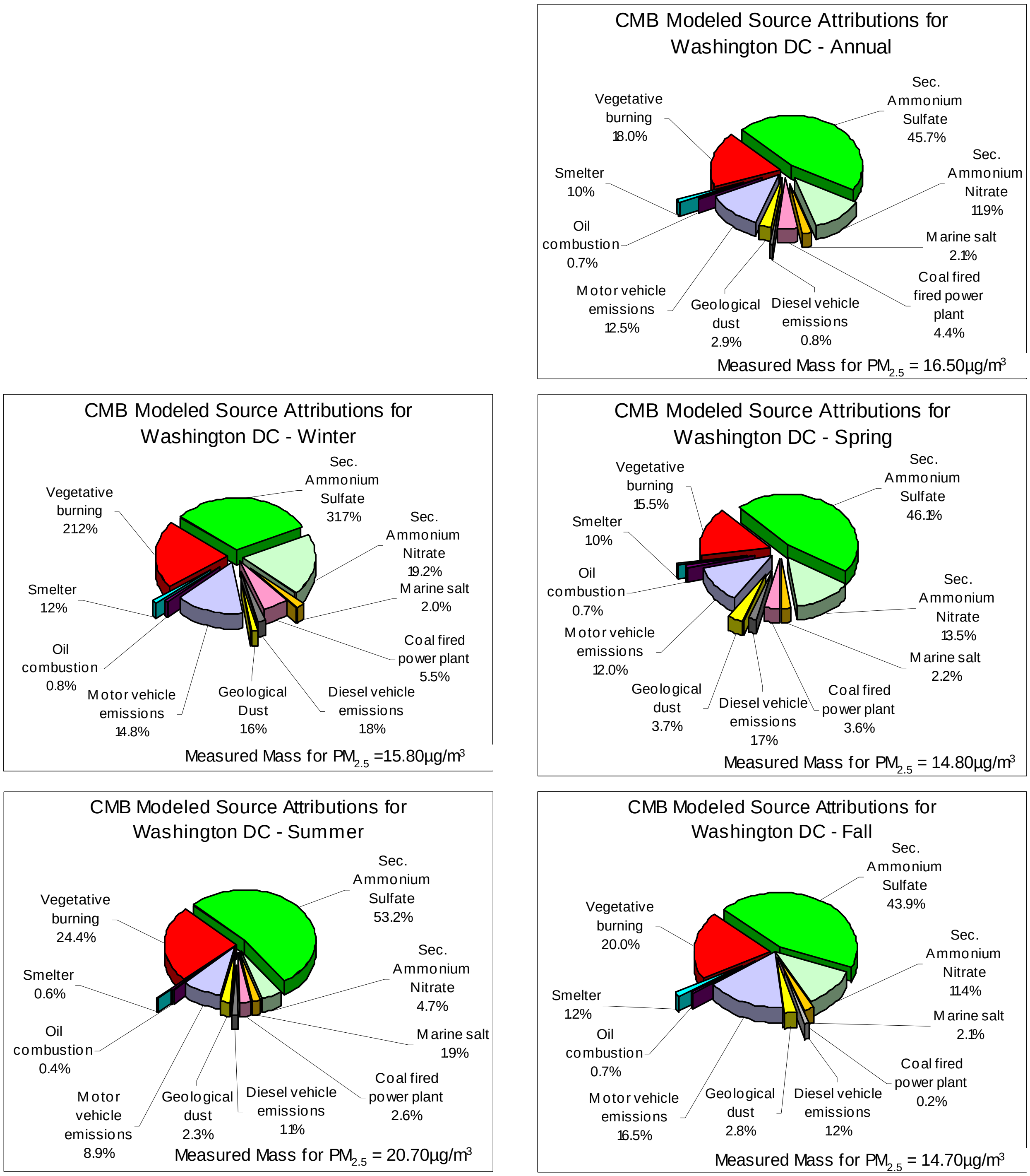


Figure 6.6-5 CMB modeled source attributions for mean annual and seasonal data subsets from Washington DC

Table 6.6-19a CMB model output for Washington DC, winter

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MWWIMean1    DATE: 2/25/200  CMB8 (97350)
SAMPLE DURATION        24      START HOUR       0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      98.7
     CHI SQUARE      3.70              DF        15
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPSU1 MColPP11    0.87355    0.17639    4.95235
YES MSPFA3 MDsEmi02    0.28566    0.07539    3.78901
YES MBPAL1 MGlDst01    0.07472    0.01729    4.32120
YES MBPAL2 MGlDst02    0.17857    0.02688    6.64216
YES MWPSU5 MMvEmi07    2.31658    0.18429   12.57019
YES MLPSU7 MOilCo03    0.13153    0.01295   10.15493
YES MLPFA2 MSmelt06    0.19148    0.01176   16.28795
YES MWPFA6 MVgBrn20    3.30333    0.37266    8.86427
YES MAMSUL AMSUL       4.95217    0.09941   49.81433
YES MAMNIT AMNIT       2.99680    0.29184   10.26854
YES MNACL  NACL        0.31603    0.06826    4.62982
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
      15.8+-     0.5

ELIGIBLE SPACE DIM. =  11 FOR MAX. UNC. =  3.16432  (20.% OF TOTAL MEAS. MASS)

1 / SINGULAR VALUE
--------------------------------------------------------------------------------
 0.00963   0.01205   0.01654   0.02490   0.06826   0.07035   0.09941   0.17346
 0.18039   0.29184   0.37716
--------------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =  11 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
--------------------------------------------------------------------------------
1.0000 MSPSU1  1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MWPSU5
1.0000 MLPSU7  1.0000 MLPFA2  1.0000 MWPFA6  1.0000 MAMSUL  1.0000 MAMNIT
1.0000 MNACL
--------------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD ERR
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
```

Table 6.6-19b CMB model output for Washington DC, winter

```
SPECIES CONCENTRATIONS -  SITE: MWWIMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION        24       START HOUR        0          SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      98.7
     CHI SQUARE      3.70              DF        15
```

SPECIES		I	MEAS	CALC	RATIO C/M	RATIO R/U
TMAC	TMAU		15.82160+- 0.50730	15.62041+- 0.48894	0.99+- 0.04	-0.3
N3IC	N3IU	*	2.99530+- 0.29030	2.99681+- 0.02997	1.00+- 0.10	0.0
S4IC	S4IU	*	4.95200+- 0.08620	4.95218+- 0.04952	1.00+- 0.02	0.0
OC1C	OC1U	*	0.50190+- 0.16420	0.11982+- 0.03018	0.24+- 0.10	-2.3
OC2C	OC2U	*	0.54980+- 0.11330	0.83051+- 0.03143	1.51+- 0.32	2.4
OC3C	OC3U	*	1.01970+- 0.14010	0.88510+- 0.02417	0.87+- 0.12	-0.9
OC4C	OC4U	*	1.00060+- 0.13940	0.84183+- 0.02599	0.84+- 0.12	-1.1
OPTC	OPTU	*	0.20680+- 0.06530	0.09657+- 0.01303	0.47+- 0.16	-1.7
EC1C	EC1U	*	1.52520+- 0.20540	1.98110+- 0.04266	1.30+- 0.18	2.2
EC2C	EC2U	*	0.08830+- 0.03310	0.18170+- 0.01651	2.06+- 0.79	2.5
EC3C	EC3U	*	0.01780+- 0.01140	0.02757+- 0.00474	1.55+- 1.03	0.8
ALXC	ALXU	*	0.03040+- 0.00520	0.03165+- 0.00147	1.04+- 0.18	0.2
ASXC	ASXU	*	0.00070+- 0.00020	0.00022+- 0.00006	0.32+- 0.13	-2.3
BRXC	BRXU	*	0.00600+- 0.00040	0.00660+- 0.00013	1.10+- 0.08	1.4
CAXC	CAXU	*	0.03790+- 0.00320	0.03862+- 0.00111	1.02+- 0.09	0.2
CRXC	CRXU	*	0.00140+- 0.00060	0.00075+- 0.00020	0.54+- 0.27	-1.0
CUXC	CUXU	*	0.00460+- 0.00040	0.00421+- 0.00009	0.91+- 0.08	-1.0
FEXC	FEXU	*	0.11470+- 0.00590	0.11488+- 0.00099	1.00+- 0.05	0.0
KPXC	KPXU	*	0.07140+- 0.00460	0.06094+- 0.00170	0.85+- 0.06	-2.1
MGXC	MGXU	*	0.01550+- 0.00660	0.01049+- 0.00178	0.68+- 0.31	-0.7
NAXC	NAXU	*	0.12430+- 0.02380	0.12433+- 0.01243	1.00+- 0.22	0.0
NIXC	NIXU	*	0.00230+- 0.00020	0.00232+- 0.00008	1.01+- 0.09	0.1
PBXC	PBXU	*	0.00640+- 0.00050	0.00684+- 0.00013	1.07+- 0.09	0.9
SEXC	SEXU	*	0.00260+- 0.00020	0.00238+- 0.00008	0.92+- 0.08	-1.0
SIXC	SIXU	*	0.07960+- 0.00670	0.07941+- 0.00121	1.00+- 0.09	0.0
VAXC	VAXU	*	0.00620+- 0.00120	0.00213+- 0.00031	0.34+- 0.08	-3.3
ZNXC	ZNXU	*	0.01950+- 0.00110	0.01833+- 0.00032	0.94+- 0.06	-1.0

Table 6.6-20a CMB model output for Washington DC, spring

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MWSPMean1    DATE: 2/25/200  CMB8 (97350)
SAMPLE DURATION        24      START HOUR       0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      99.6
     CHI SQUARE      2.09              DF        15
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPSU1 MColPP11    0.52347    0.24382    2.14690
YES MSPFA3 MDsEmi02    0.24434    0.07673    3.18458
YES MBPAL1 MGlDst01    0.14595    0.01882    7.75423
YES MBPAL2 MGlDst02    0.39399    0.03252   12.11578
YES MWPSU5 MMvEmi07    1.76143    0.17461   10.08770
YES MLPSU7 MOilCo03    0.10445    0.01306    7.99529
YES MLPFA2 MSmelt06    0.15237    0.01141   13.35121
YES MWPFA6 MVgBrn20    2.28669    0.31627    7.23024
YES MAMSUL AMSUL       6.79007    0.13545   50.13024
YES MAMNIT AMNIT       1.99428    0.19890   10.02642
YES MNACL  NACL        0.32640    0.05830    5.59913
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
      14.8+-     0.5

ELIGIBLE SPACE DIM. =  11 FOR MAX. UNC. =  2.95796  (20.% OF TOTAL MEAS. MASS)

1 / SINGULAR VALUE
--------------------------------------------------------------------------------
 0.00933   0.01271   0.01818   0.02884   0.05830   0.07155   0.13545   0.16384
 0.19890   0.23221   0.33207
--------------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =  11 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
--------------------------------------------------------------------------------
1.0000 MSPSU1  1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MWPSU5
1.0000 MLPSU7  1.0000 MLPFA2  1.0000 MWPFA6  1.0000 MAMSUL  1.0000 MAMNIT
1.0000 MNACL
--------------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD ERR
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
```

Table 6.6-20b CMB model output for Washington DC, spring

```
SPECIES CONCENTRATIONS -  SITE: MWSPMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION        24       START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      99.6
     CHI SQUARE      2.09              DF        15
```

SPECIES		I	MEAS	CALC	RATIO C/M	RATIO R/U
TMAC	TMAU		14.78980+- 0.47760	14.72344+- 0.40470	1.00+- 0.04	-0.1
N3IC	N3IU	*	1.99390+- 0.19790	1.99429+- 0.01994	1.00+- 0.10	0.0
S4IC	S4IU	*	6.78990+- 0.11720	6.79008+- 0.06790	1.00+- 0.02	0.0
OC1C	OC1U	*	0.32290+- 0.11330	0.09291+- 0.02388	0.29+- 0.13	-2.0
OC2C	OC2U	*	0.52040+- 0.10640	0.58606+- 0.02216	1.13+- 0.23	0.6
OC3C	OC3U	*	0.67080+- 0.10230	0.64280+- 0.01868	0.96+- 0.15	-0.3
OC4C	OC4U	*	0.71930+- 0.10290	0.60233+- 0.01924	0.84+- 0.12	-1.1
OPTC	OPTU	*	0.16660+- 0.05270	0.05879+- 0.00914	0.35+- 0.12	-2.0
EC1C	EC1U	*	1.19580+- 0.16200	1.41915+- 0.03347	1.19+- 0.16	1.4
EC2C	EC2U	*	0.11430+- 0.04090	0.15273+- 0.01335	1.34+- 0.49	0.9
EC3C	EC3U	*	0.01910+- 0.01270	0.02098+- 0.00373	1.10+- 0.76	0.1
ALXC	ALXU	*	0.04980+- 0.00580	0.05112+- 0.00118	1.03+- 0.12	0.2
ASXC	ASXU	*	0.00060+- 0.00020	0.00018+- 0.00007	0.30+- 0.16	-2.0
BRXC	BRXU	*	0.00470+- 0.00040	0.00545+- 0.00012	1.16+- 0.10	1.8
CAXC	CAXU	*	0.04820+- 0.00360	0.05255+- 0.00092	1.09+- 0.08	1.2
CRXC	CRXU	*	0.00150+- 0.00060	0.00077+- 0.00017	0.51+- 0.23	-1.2
CUXC	CUXU	*	0.00330+- 0.00030	0.00327+- 0.00009	0.99+- 0.09	-0.1
FEXC	FEXU	*	0.10880+- 0.00560	0.10667+- 0.00077	0.98+- 0.05	-0.4
KPXC	KPXU	*	0.05800+- 0.00400	0.05522+- 0.00141	0.95+- 0.07	-0.7
MGXC	MGXU	*	0.01460+- 0.00530	0.01007+- 0.00139	0.69+- 0.27	-0.8
NAXC	NAXU	*	0.12840+- 0.01900	0.12841+- 0.01284	1.00+- 0.18	0.0
NIXC	NIXU	*	0.00180+- 0.00020	0.00186+- 0.00008	1.03+- 0.12	0.3
PBXC	PBXU	*	0.00590+- 0.00050	0.00568+- 0.00011	0.96+- 0.08	-0.4
SEXC	SEXU	*	0.00170+- 0.00040	0.00171+- 0.00008	1.01+- 0.24	0.0
SIXC	SIXU	*	0.14210+- 0.00930	0.13458+- 0.00118	0.95+- 0.06	-0.8
VAXC	VAXU	*	0.00430+- 0.00100	0.00164+- 0.00024	0.38+- 0.11	-2.6
ZNXC	ZNXU	*	0.01500+- 0.00090	0.01444+- 0.00025	0.96+- 0.06	-0.6

Table 6.6-21a CMB model output for Washington DC, summer

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MWSUMean1    DATE: 2/25/200  CMB8 (97350)
SAMPLE DURATION        24      START HOUR       0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS     100.0
     CHI SQUARE      4.07              DF        15
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPSU1 MColPP11    0.52801    0.29278    1.80342
YES MSPFA3 MDsEmi02    0.21801    0.08267    2.63701
YES MBPAL1 MGlDst01    0.18072    0.02310    7.82199
YES MBPAL2 MGlDst02    0.29805    0.03781    7.88240
YES MWPSU5 MMvEmi07    1.83832    0.17394   10.56867
YES MLPSU7 MOilCo03    0.07689    0.02416    3.18272
YES MLPFA2 MSmelt06    0.12833    0.01101   11.65760
YES MLPSU6 MVgBrn10    5.05338    0.56896    8.88177
YES MAMSUL AMSUL      11.00700    0.21906   50.24630
YES MAMNIT AMNIT       0.96398    0.09957    9.68168
YES MNACL  NACL        0.40059    0.07816    5.12529
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
      20.7+-     0.6

ELIGIBLE SPACE DIM. =  11 FOR MAX. UNC. =  4.13740  (20.% OF TOTAL MEAS. MASS)

1 / SINGULAR VALUE
--------------------------------------------------------------------------------
 0.00837   0.02057   0.02417   0.03268   0.07816   0.07820   0.09957   0.17309
 0.21906   0.27659   0.57834
--------------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =  11 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
--------------------------------------------------------------------------------
1.0000 MSPSU1  1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MWPSU5
1.0000 MLPSU7  1.0000 MLPFA2  1.0000 MLPSU6  1.0000 MAMSUL  1.0000 MAMNIT
1.0000 MNACL
--------------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD ERR
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
```

Table 6.6-21b CMB model output for Washington DC, summer

```
SPECIES CONCENTRATIONS -  SITE: MWSUMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION        24       START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS     100.0
     CHI SQUARE      4.07              DF        15
```

SPECIES		I	MEAS	CALC	RATIO C/M	RATIO R/U
TMAC	TMAU		20.68700+- 0.64800	20.69329+- 0.58823	1.00+- 0.04	0.0
N3IC	N3IU	*	0.96400+- 0.09910	0.96400+- 0.00964	1.00+- 0.10	0.0
S4IC	S4IU	*	11.00700+- 0.18940	11.00701+- 0.11007	1.00+- 0.02	0.0
OC1C	OC1U	*	0.36190+- 0.12800	0.24246+- 0.03250	0.67+- 0.25	-0.9
OC2C	OC2U	*	0.73670+- 0.14680	0.62688+- 0.03662	0.85+- 0.18	-0.7
OC3C	OC3U	*	0.74550+- 0.11440	0.91552+- 0.03348	1.23+- 0.19	1.4
OC4C	OC4U	*	0.81180+- 0.11690	0.51408+- 0.02430	0.63+- 0.10	-2.5
OPTC	OPTU	*	0.30410+- 0.09280	0.47907+- 0.03324	1.58+- 0.49	1.8
EC1C	EC1U	*	1.40800+- 0.19090	1.11617+- 0.03848	0.79+- 0.11	-1.5
EC2C	EC2U	*	0.10500+- 0.04230	0.16647+- 0.01770	1.59+- 0.66	1.3
EC3C	EC3U	*	0.01930+- 0.01350	0.03111+- 0.00516	1.61+- 1.16	0.8
ALXC	ALXU	*	0.06060+- 0.00720	0.06085+- 0.00149	1.00+- 0.12	0.0
ASXC	ASXU	*	0.00050+- 0.00020	0.00018+- 0.00011	0.35+- 0.27	-1.4
BRXC	BRXU	*	0.00340+- 0.00030	0.00480+- 0.00014	1.41+- 0.13	4.2
CAXC	CAXU	*	0.04290+- 0.00360	0.05290+- 0.00103	1.23+- 0.11	2.7
CRXC	CRXU	*	0.00170+- 0.00080	0.00173+- 0.00024	1.02+- 0.50	0.0
CUXC	CUXU	*	0.00330+- 0.00030	0.00326+- 0.00012	0.99+- 0.10	-0.1
FEXC	FEXU	*	0.10350+- 0.00540	0.10010+- 0.00073	0.97+- 0.05	-0.6
KPXC	KPXU	*	0.07540+- 0.00510	0.06354+- 0.00150	0.84+- 0.06	-2.2
MGXC	MGXU	*	0.01820+- 0.00720	0.01804+- 0.00193	0.99+- 0.41	0.0
NAXC	NAXU	*	0.15760+- 0.02640	0.15760+- 0.01576	1.00+- 0.20	0.0
NIXC	NIXU	*	0.00120+- 0.00040	0.00140+- 0.00012	1.16+- 0.40	0.5
PBXC	PBXU	*	0.00580+- 0.00050	0.00479+- 0.00013	0.83+- 0.07	-1.9
SEXC	SEXU	*	0.00200+- 0.00040	0.00155+- 0.00012	0.78+- 0.17	-1.1
SIXC	SIXU	*	0.16600+- 0.01150	0.13899+- 0.00202	0.84+- 0.06	-2.3
VAXC	VAXU	*	0.00340+- 0.00110	0.00289+- 0.00032	0.85+- 0.29	-0.4
ZNXC	ZNXU	*	0.01230+- 0.00070	0.01176+- 0.00023	0.96+- 0.06	-0.7

Table 6.6-22a CMB model output for Washington DC, fall

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MWFAMean1    DATE: 2/25/200  CMB8 (97350)
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      99.8
     CHI SQUARE      3.21              DF        15
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPSP8 MColPP10    0.02979    0.05699    0.52264
YES MSPFA3 MDsEmi02    0.17574    0.08058    2.18111
YES MBPAL1 MGlDst01    0.09318    0.01765    5.27889
YES MBPAL2 MGlDst02    0.31692    0.03369    9.40699
YES MWPSU5 MMvEmi07    2.41460    0.18797   12.84571
YES MLPSU7 MOilCo03    0.10642    0.02337    4.55340
YES MLPFA2 MSmelt06    0.16921    0.01509   11.21369
YES MWPFA6 MVgBrn20    2.93393    0.36214    8.10173
YES MAMSUL AMSUL       6.43826    0.12901   49.90396
YES MAMNIT AMNIT       1.66843    0.16674   10.00638
YES MNACL  NACL        0.31473    0.06001    5.24450
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
      14.7+-     0.5

ELIGIBLE SPACE DIM. =  11 FOR MAX. UNC. =  2.93780  (20.% OF TOTAL MEAS. MASS)

1 / SINGULAR VALUE
--------------------------------------------------------------------------------
 0.00933   0.01641   0.02091   0.03187   0.05722   0.06001   0.07546   0.12901
 0.16674   0.18338   0.36610
--------------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =  11 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
--------------------------------------------------------------------------------
1.0000 MSPSP8  1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MWPSU5
1.0000 MLPSU7  1.0000 MLPFA2  1.0000 MWPFA6  1.0000 MAMSUL  1.0000 MAMNIT
1.0000 MNACL
--------------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD ERR
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
```

Table 6.6-22b CMB model output for Washington DC, fall

```
SPECIES CONCENTRATIONS -  SITE: MWFAMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      99.8
     CHI SQUARE      3.21              DF        15

SPECIES-------I---MEAS------------------CALC-------------RATIO C/M----RATIO R/U
TMAC   TMAU     14.68900+- 0.47760 14.66121+- 0.40787   1.00+- 0.04     0.0
N3IC   N3IU   *  1.66800+- 0.16590  1.66845+- 0.01668   1.00+- 0.10     0.0
S4IC   S4IU   *  6.43800+- 0.11180  6.43827+- 0.06438   1.00+- 0.02     0.0
OC1C   OC1U   *  0.38000+- 0.13400  0.09110+- 0.02144   0.24+- 0.10    -2.1
OC2C   OC2U   *  0.61110+- 0.12320  0.62409+- 0.02265   1.02+- 0.21     0.1
OC3C   OC3U   *  0.88590+- 0.13030  0.83149+- 0.02154   0.94+- 0.14    -0.4
OC4C   OC4U   *  0.87580+- 0.12540  0.77839+- 0.02089   0.89+- 0.13    -0.8
OPTC   OPTU   *  0.23800+- 0.07540  0.00119+- 0.00573   0.00+- 0.02    -3.1
EC1C   EC1U   *  1.56510+- 0.21230  1.61968+- 0.03209   1.03+- 0.14     0.3
EC2C   EC2U   *  0.10910+- 0.04220  0.13515+- 0.01015   1.24+- 0.49     0.6
EC3C   EC3U   *  0.01790+- 0.01240  0.01884+- 0.00308   1.05+- 0.75     0.1
ALXC   ALXU   *  0.03510+- 0.00530  0.03536+- 0.00114   1.01+- 0.16     0.0
ASXC   ASXU   *  0.00060+- 0.00020  0.00018+- 0.00007   0.31+- 0.15    -2.0
BRXC   BRXU   *  0.00470+- 0.00040  0.00602+- 0.00012   1.28+- 0.11     3.2
CAXC   CAXU   *  0.04480+- 0.00370  0.04904+- 0.00091   1.09+- 0.09     1.1
CRXC   CRXU   *  0.00160+- 0.00070  0.00078+- 0.00017   0.49+- 0.24    -1.1
CUXC   CUXU   *  0.00440+- 0.00030  0.00389+- 0.00009   0.88+- 0.06    -1.6
FEXC   FEXU   *  0.12410+- 0.00640  0.12464+- 0.00096   1.00+- 0.05     0.1
KPXC   KPXU   *  0.05990+- 0.00440  0.05588+- 0.00139   0.93+- 0.07    -0.9
MGXC   MGXU   *  0.01410+- 0.00560  0.00936+- 0.00115   0.66+- 0.28    -0.8
NAXC   NAXU   *  0.12380+- 0.02010  0.12382+- 0.01238   1.00+- 0.19     0.0
NIXC   NIXU   *  0.00160+- 0.00040  0.00187+- 0.00008   1.17+- 0.30     0.7
PBXC   PBXU   *  0.00710+- 0.00050  0.00624+- 0.00012   0.88+- 0.06    -1.7
SEXC   SEXU   *  0.00220+- 0.00040  0.00136+- 0.00008   0.62+- 0.12    -2.1
SIXC   SIXU   *  0.11800+- 0.00900  0.11040+- 0.00099   0.94+- 0.07    -0.8
VAXC   VAXU   *  0.00400+- 0.00110  0.00199+- 0.00026   0.50+- 0.15    -1.8
ZNXC   ZNXU   *  0.01610+- 0.00090  0.01687+- 0.00027   1.05+- 0.06     0.8
 ------------------------------------------------------------------------------
```

Table 6.6-23a CMB model output for Washington DC, annual

```
SOURCE CONTRIBUTION ESTIMATES -  SITE: MWALMean1    DATE: 2/25/200  CMB8 (97350)
SAMPLE DURATION        24      START HOUR        0         SIZE:    PM2.5
       R SQUARE      0.99    PERCENT MASS      97.6
     CHI SQUARE      2.74              DF        15
B and L: No   SRC ELIM: No
WEIGHTS:  CHISQR   1.000   R SQR   1.000  PCMASS   1.000  FRCEST   1.000

SOURCE
EST CODE   NAME     SCE(UG/M3)    STD ERR      TSTAT
----------------------------------------------------
YES MSPSU1 MColPP11    0.70974    0.22836    3.10807
YES MSPFA3 MDsEmi02    0.23609    0.07915    2.98282
YES MBPAL1 MGlDst01    0.12498    0.01922    6.50117
YES MBPAL2 MGlDst02    0.33393    0.03267   10.22273
YES MWPSU5 MMvEmi07    1.99798    0.17998   11.10111
YES MLPSU7 MOilCo03    0.10426    0.01842    5.66027
YES MLPFA2 MSmelt06    0.15948    0.01153   13.83131
YES MWPFA6 MVgBrn20    2.87873    0.35476    8.11453
YES MAMSUL AMSUL       7.28522    0.14555   50.05473
YES MAMNIT AMNIT       1.90048    0.18876   10.06826
YES MNACL  NACL        0.33912    0.06606    5.13371
----------------------------------------------------

MEASURED CONCENTRATION FOR SIZE: PM2.5
      16.5+-     0.5

ELIGIBLE SPACE DIM. =  11 FOR MAX. UNC. =  3.29150  (20.% OF TOTAL MEAS. MASS)

1 / SINGULAR VALUE
--------------------------------------------------------------------------------
 0.00940   0.01648   0.01932   0.02942   0.06606   0.07402   0.14555   0.17393
 0.18876   0.22309   0.36259
--------------------------------------------------------------------------------

NUMBER ESTIMABLE SOURCES =  11 FOR MIN. PROJ. =  0.95
 PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE   PROJ. SOURCE
--------------------------------------------------------------------------------
1.0000 MSPSU1  1.0000 MSPFA3  1.0000 MBPAL1  1.0000 MBPAL2  1.0000 MWPSU5
1.0000 MLPSU7  1.0000 MLPFA2  1.0000 MWPFA6  1.0000 MAMSUL  1.0000 MAMNIT
1.0000 MNACL
--------------------------------------------------------------------------------

ESTIMABLE LINEAR COMBINATIONS OF INESTIMABLE SOURCES
COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE  COEFF. SOURCE   SCE         STD ERR
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
```

Table 6.6-23b CMB model output for Washington DC, annual

```
SPECIES CONCENTRATIONS -  SITE: MWALMean1    DATE: 2/25/200       CMB 8.0
SAMPLE DURATION         24       START HOUR        0         SIZE:    PM2.5
       R SQUARE       0.99    PERCENT MASS      97.6
     CHI SQUARE       2.74              DF        15

SPECIES-------I---MEAS------------------CALC-------------RATIO C/M----RATIO R/U
TMAC   TMAU      16.45750+- 0.52650 16.07001+- 0.43767   0.98+- 0.04    -0.6
N3IC   N3IU   *  1.90010+- 0.18780  1.90049+- 0.01900   1.00+- 0.10     0.0
S4IC   S4IU   *  7.28500+- 0.12600  7.28523+- 0.07285   1.00+- 0.02     0.0
OC1C   OC1U   *  0.39070+- 0.13460  0.10460+- 0.02546   0.27+- 0.11    -2.1
OC2C   OC2U   *  0.60400+- 0.12240  0.72076+- 0.02694   1.19+- 0.25     0.9
OC3C   OC3U   *  0.82960+- 0.12170  0.77623+- 0.02106   0.94+- 0.14    -0.4
OC4C   OC4U   *  0.85080+- 0.12100  0.73263+- 0.02212   0.86+- 0.13    -1.0
OPTC   OPTU   *  0.22860+- 0.07150  0.07896+- 0.01064   0.35+- 0.12    -2.1
EC1C   EC1U   *  1.42350+- 0.19270  1.69883+- 0.03568   1.19+- 0.16     1.4
EC2C   EC2U   *  0.10440+- 0.03970  0.15703+- 0.01377   1.50+- 0.59     1.3
EC3C   EC3U   *  0.01850+- 0.01250  0.02319+- 0.00394   1.25+- 0.87     0.4
ALXC   ALXU   *  0.04390+- 0.00590  0.04579+- 0.00126   1.04+- 0.14     0.3
ASXC   ASXU   *  0.00060+- 0.00020  0.00019+- 0.00008   0.32+- 0.17    -1.9
BRXC   BRXU   *  0.00470+- 0.00040  0.00583+- 0.00013   1.24+- 0.11     2.7
CAXC   CAXU   *  0.04350+- 0.00350  0.04878+- 0.00094   1.12+- 0.09     1.5
CRXC   CRXU   *  0.00160+- 0.00070  0.00076+- 0.00018   0.48+- 0.24    -1.2
CUXC   CUXU   *  0.00390+- 0.00030  0.00358+- 0.00010   0.92+- 0.07    -1.0
FEXC   FEXU   *  0.11290+- 0.00590  0.11097+- 0.00086   0.98+- 0.05    -0.3
KPXC   KPXU   *  0.06600+- 0.00450  0.05804+- 0.00145   0.88+- 0.06    -1.7
MGXC   MGXU   *  0.01560+- 0.00620  0.01024+- 0.00149   0.66+- 0.28    -0.8
NAXC   NAXU   *  0.13340+- 0.02230  0.13342+- 0.01334   1.00+- 0.19     0.0
NIXC   NIXU   *  0.00170+- 0.00030  0.00186+- 0.00009   1.09+- 0.20     0.5
PBXC   PBXU   *  0.00630+- 0.00050  0.00587+- 0.00012   0.93+- 0.08    -0.8
SEXC   SEXU   *  0.00210+- 0.00030  0.00197+- 0.00009   0.94+- 0.14    -0.4
SIXC   SIXU   *  0.12650+- 0.00910  0.11746+- 0.00114   0.93+- 0.07    -1.0
VAXC   VAXU   *  0.00450+- 0.00110  0.00182+- 0.00027   0.40+- 0.12    -2.4
ZNXC   ZNXU   *  0.01570+- 0.00090  0.01557+- 0.00028   0.99+- 0.06    -0.1
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6.7 Conceptual Model

The conceptual model of the sources influencing the four receptor sites is assembled from the analyses of emissions inventories, back trajectories, and receptor modeling. It examines the weight of evidence from several assessment projects, including those undertaken as part of this study and those previously published. The integrated analysis increases confidence in findings that are corroborated by multiple analysis methods and highlight gaps in our knowledge when results are not consistent.

Although each site is analyzed individually in the subsections below, some observations are applicable for all sites. The three secondary profiles, ammonium sulfate, ammonium nitrate and secondary organics, in variable proportions, make up close to three quarters of all ambient sample sets. The extent to which secondary sources evolve is very much a seasonal phenomenon. All four monitoring sites show increases in summertime sulfate concentrations due to increased sunlight and more efficient photochemical conversion of SO_2 to SO_4. This effect is also observed with the secondary organic component of the aerosol mass. Conversely, ammonium nitrate forms reversibly from the combination of nitric acid gas and ammonia. This reaction is favored by colder temperatures and less prevailing sunlight, consequently ammonium nitrate forms predominantly during the colder winter months.

6.7.1 Boundary Waters Canoe Area.

The Boundary Waters Canoe Area site is located in a remote area of northern Minnesota on the US/Canadian border. The closest urban areas to the site are Duluth (pop 87,000) ~200 km to the south and the twin cities Minneapolis-St. Paul (pop 700,000) ~400 km to the south. Nearby PM point sources include iron ore mining and steel processing operations within 100 km to the south west. With respect to the more eastern visibility protected areas, there are few sulfur dioxide sources within 200 km of the site. The proximity to the Canadian wilderness region, and the prevailing wind direction, makes this site susceptible to smoke from forest wild fires, more so during the summer and fall.

Based on the above observations, the following trends are expected to be observed at the site:

- Secondary sulfate should originate from warmer southerly areas where SO_2 and NH_3 sources are more plentiful and photochemical conversion is more efficient. This was confirmed by the back trajectory analysis.
- Secondary nitrate should form during colder winter period, perhaps when air arrives from the Arctic, with shorter daylight hours. This was confirmed by the back trajectory analysis.
- Secondary organics should originate during dry warmer periods, when primary organic sources such as forest fires are more prevalent and photochemical conversion is more efficient. PMF modeling showed this to be more evident at Boundary Waters Canoe Area and Washington DC
- Smoke from vegetative burning in the densely forested areas of Canada (to the northwest of the site) in the late summer when conditions are dry, and lightning could ignite fires. Time series plots, historic data on events and back trajectory analysis confirmed this.

- Iron oxides and crustal species should originate from iron ore mining and processing to the southwest. This should have a greater impact at this site during the dry summer months. PMF modeling of the Boundary Waters Canoe Area showed this profile.
- Motor vehicle exhaust, road dust including road salt contributions to aerosol mass should be present during southerly flow from the population centers of the twin cities and beyond. This was picked up with the PMF modeling but better time resolved CMB modeling needs to be done.
- Road dust and road salt from road de-icing was identified from PMF modeling and compared to measured source profiles.
- Geological dust from remote sources, such as Saharan and Asian dust could impact on the site, especially during the dry summer months. Comparing the modeled profiles with published chemical profiles and with back trajectories confirmed this hypothesis.
- Smelter emissions from Canadian sources could impact on this site, should this be favored by northwesterly winds. The PMF modeling from Boundary Waters, but also from the other three sites could confirm this.
- If local sources (i.e., within 200 km of the site) control the abundance of secondary sulfate and organics, there should be less sulfate and nitrate at Boundary Waters Canoe Area than at the other sites. Comparative ammonium sulfate seasonal plots for each of the sites clearly showed this difference.

6.7.2 Lye Brook Wilderness Area

The Lye Brook site is located in the south western corner of the state of Vermont. The closest population centers to the site are Boston (pop 590,000) 200 km to the southeast, Montreal (pop 1,000,000) 250 km to the north, and Toronto (pop 2,500,000) and Buffalo (pop 1,100,000) ~350 km to the west. Nearby point sources include a large cement kiln 100 km to the south west and several smaller coal fired power plants to the west, south, and east. The site is located ~200 km west of the coast of New Hampshire.

Based on this information, the following hypotheses are constructed about the aerosol trends at the site.

- Marine influence should occur under westerly flow from the Atlantic Ocean and after winter snowstorms when salt was applied as a road de-icer. Marine salt was modeled consistently at each of the sites and all seasons, and it is not possible to distinguish sea salt from road salt.
- The influence of the cement kiln (increase in calcium) should be observed when trajectories are from the southwest. This profile could not be modeled, and may be masked by calcium which commonly occurs in the geological dust profiles.
- Aside from the cement kiln influence, the lack of large nearby point sources should generate an ambient aerosol that has the properties of well mixed, aged urban emissions (*i.e.* road dust with motor vehicle emissions). In general the Lye

Brook Wilderness Area data are more difficult to model and profiles are not as clearly resolved by the PMF model. This anomalous situation is ascribed to the fact that the site is at a high elevation and not able to clearly detect the local sources.

- Summertime vegetative burning signatures should be observed during northwesterly wind flows from Canada. Back trajectory analysis and recorded dates of wild fires confirmed this
- There are only a few large coal fired power plants close by. If sulfate aerosol is a local issue, there should be substantially less sulfate at Lye Brook Wilderness Area than at either the Shenandoah National Park or Washington DC sites. Comparative seasonal plots of ammonium nitrate confirmed that this is the case.

6.7.3 Shenandoah National Park and Washington DC.

The Shenandoah National Park IMPROVE site is located in northern Virginia, approximately 150 km west-southwest of the urban Washington D.C. IMPROVE site. The Shenandoah site is located in a forested area while the Washington D.C. site is in an urban center. There are substantially more sources of SO_2 (coal fired power plants) in the vicinity of these two sites than at the other two sites. Several iron and steel blast furnaces, and smelters are in the region surrounding these two sites.

The following trends are expected for the Shenandoah National Park and Washington D.C. sites.

- Contributions from local motor vehicle emissions such as organics and nitrogen oxides, as well as road dust should dominate at both sites, being greater at Washington D.C. than at Shenandoah National Park. PMF modeling did show this to be the case.
- Contributions from forest fires should be less at these two sites than at the two more northerly sites. CMB modeling shows that this is true, being more evident for the summer months. However, the vegetative burning profiles at Washington DC and Shenandoah National Park are not well resolved and may contain some vegetative burning components.
- Secondary sulfate and primary emissions from coal fired power plants should originate from distant (>300 km away) facilities in Pennsylvania and Ohio. The ammonium sulfate contributions are highest at Shenandoah National Park.
- The Washington D.C. site should have greater secondary organic aerosol because it is closer to urban sources such as motor vehicle emissions.
- Marine salt from the Atlantic ocean should be more at these sites than at the more inland sites in Vermont and Minnesota. CMB modeling showed that marine salt at Washington DC was similar to the other sites.
- Contributions from iron and steel blast furnaces as well as aluminum smelters may not have a strong directional bias since several smaller facilities are located

in all directions. The iron and steel plant emissions were not detected at Washington DC or Shenandoah National Park.

- The urban site will have larger contributions of trace metals from poorly characterized sources such as motor vehicle brake and clutch wear, foundries and plating operations. This was can be seen in the PMF modeled road dust profiles from Washington DC.

Table 6.6-24a PMF modeled chemical source profiles (Mass fractions)

	PNO	SID	Profile Description	OC1	OC2	OC3	OC4
1	MWPSP1	MBiEmi01	Biogenic emissions, PMF modeled profile, Marama, Washington DC, spring	0.058844	0.338893	0.000072	0.000335
2	MBPWI8	MColPP01	Coal fired power plant, PMF modeled profile, Marama, Boundary Waters Canoe Area, winter	0.000264	0.093261	0.110291	0.135247
3	MBPSU8	MColPP02	Coal fired power plant, PMF modeled profile, Marama, Boundary Waters Canoe Area, summer	0.111074	0.000364	0.109781	0.000428
5	MLPAL6	MVgBrn24	Vegetative burning, PMF modeled profile, Marama, Lye Brook Wilderness Area, annual	0.022505	0.067941	0.142444	0.152791
6	MLPWI6	MColPP05	Coal fired power plant, PMF modeled profile, Marama, Lye Brook Wilderness Area, winter	0.000194	0.119245	0.176025	0.214970
7	MLPSU5	MColPP06	Coal fired power plant, PMF modeled profile, Marama, Lye Brook Wilderness Area, summer	0.023604	0.140830	0.008558	0.115440
8	MSPWI5	MColPP07	Coal fired power plant, PMF modeled profile, Marama, Shenandoah National Park, winter	0.028940	0.142984	0.233484	0.280774
9	**MSPWI8**	**MColPP08**	Coal fired power plant, PMF modeled profile, Marama, Shenandoah National Park, winter	0.114658	0.103101	0.000204	0.000833
10	MSPSP4	MColPP09	Coal fired power plant, PMF modeled profile, Marama, Shenandoah National Park, spring	0.000528	0.000244	0.000134	0.000560
11	**MSPSP8**	**MColPP10**	Coal fired power plant, PMF modeled profile, Marama, Shenandoah National Park, spring	0.047819	0.212777	0.000097	0.176943
12	**MSPSU1**	**MColPP11**	Coal fired power plant, PMF modeled profile, Marama, Shenandoah National Park, summer	0.019571	0.204694	0.000049	0.017006
13	MSPSU2	MColPP12	Coal fired power plant, PMF modeled profile, Marama, Shenandoah National Park, summer	0.019428	0.158063	0.036501	0.000557
14	MWPSP2	MColPP13	Coal fired power plant, PMF modeled profile, Marama, Washington DC, spring	0.138766	0.109967	0.028695	0.234290
15	**MWPSU9**	**MColPP14**	Coal fired power plant, PMF modeled profile, Marama, Washington DC, summer	0.032448	0.162563	0.018980	0.136603
17	**MSPFA3**	**MDsEmi02**	Diesel vehicle emissions, PMF modeled profile, Marama, Shenandoah National Park, fall	0.090055	0.000400	0.000916	0.000939
18	MSPSU5	MGaEmi01	Motor vehicle emissions, PMF modeled profile, Marama, Shenandoah National Park, summer	0.034979	0.106693	0.073984	0.201197
20	MBPAL1	**MGlDst01**	Geological dust, PMF modeled profile, Marama, Boundary Waters Canoe Area, annual	0.000530	0.001689	0.000253	0.000165
21	MBPAL2	**MGlDst02**	Geological dust, PMF modeled profile, Marama, Boundary Waters Canoe Area, annual	0.018116	0.051846	0.043950	0.014336
22	MBPWI4	MGlDst03	Geological dust, PMF modeled profile, Marama, Boundary Waters Canoe Area, winter	0.034631	0.004819	0.226729	0.136153
23	MBPSP6	MVgBrn26	Vegetative burning, PMF modeled profile, Marama, Boundary Waters Canoe Area, spring	0.8583	4.6640	9.6791	5.5179
24	MBPSP9	MGlDst05	Geological dust, PMF modeled profile, Marama, Boundary Waters Canoe Area, spring	0.002853	0.014667	0.003510	0.000155
25	MBPSU4	MGlDst06	Geological dust, PMF modeled profile, Marama, Boundary Waters Canoe Area, summer	0.000709	0.020017	0.000102	0.014802
26	MBPFA5	MGlDst07	Geological dust, PMF modeled profile, Marama, Boundary Waters Canoe Area, fall	0.000452	0.072086	0.143432	0.070046
27	MLPAL9	MGlDst08	Geological dust, PMF modeled profile, Marama, Lye Brook Wilderness Area, annual	0.001115	0.000267	0.000757	0.001084
29	MLPWI2	MGlDst10	Geological dust, PMF modeled profile, Marama, Lye Brook Wilderness Area, spring	0.000167	0.000069	0.000091	0.000078
30	MLPSP1	MGlDst11	Geological dust, PMF modeled profile, Marama, Lye Brook Wilderness Area, spring	0.000295	0.000190	0.000067	0.000071
31	MLPSP3	MGlDst12	Geological dust, PMF modeled profile, Marama, Lye Brook Wilderness Area, spring	0.010314	0.008497	0.027054	0.024296
32	MLPSU2	MGlDst13	Geological dust, PMF modeled profile, Marama, Lye Brook Wilderness Area, summer	0.000062	0.000264	0.013468	0.007168
33	MLPSU9	MGlDst14	Geological dust, PMF modeled profile, Marama, Lye Brook Wilderness Area, summer	0.000046	0.000748	0.000007	0.000051
34	MSPAL3	MGlDst15	Geological dust, PMF modeled profile, Marama, Shenandoah National Park, annual	0.009035	0.000771	0.000103	0.000064
35	MSPAL9	MGlDst16	Geological dust, PMF modeled profile, Marama, Shenandoah National Park, annual	0.000353	0.005618	0.000142	0.001377
36	MSPWI4	MGlDst17	Geological dust, PMF modeled profile, Marama, Shenandoah National Park, winter	0.000478	0.002683	0.000320	0.000194
37	MSPSP2	MGlDst18	Geological dust, PMF modeled profile, Marama, Shenandoah National Park, spring	0.030162	0.000428	0.000321	0.000141
38	MSPSP9	MGlDst19	Geological dust, PMF modeled profile, Marama, Shenandoah National Park, spring	0.000495	0.000306	0.067882	0.001631
39	MSPSU3	MGlDst20	Geological dust, PMF modeled profile, Marama, Shenandoah National Park, summer	0.044631	0.001436	0.000058	0.000237
40	MSPSU9	MGlDst21	Geological dust, PMF modeled profile, Marama, Shenandoah National Park, summer	0.000041	0.008825	0.000026	0.000238
41	MSPFA5	MGlDst22	Geological dust, PMF modeled profile, Marama, Shenandoah National Park, fall	0.039080	0.000149	0.000640	0.019439
42	MWPAL3	MGlDst23	Geological dust, PMF modeled profile, Marama, Washington DC, annual	0.000711	0.000065	0.000111	0.000026
43	MWPWI4	MGlDst24	Geological dust, PMF modeled profile, Marama, Washington DC, winter	0.030702	0.015968	0.000144	0.009306
44	MWPWI9	MGlDst25	Geological dust, PMF modeled profile, Marama, Washington DC, winter	0.137275	0.146930	0.001444	0.000734

Table 6.6-24a PMF modeled chemical source profiles (Mass fractions)

	PNO	SID	Profile Description	OC1	OC2	OC3	OC4
45	MWPSP6	MGlDst26	Geological dust, PMF modeled profile, Marama, Washington DC, spring	0.000125	0.036249	0.000589	0.000115
46	MWPSU2	MGlDst27	Geological dust, PMF modeled profile, Marama, Washington DC, summer	0.100652	0.000142	0.059767	0.000180
47	MWPFA4	MGlDst28	Geological dust, PMF modeled profile, Marama, Washington DC, fall	0.126129	0.000687	0.000051	0.000052
48	MBPAL7	Mir&St01	Iron and steel industry, PMF modeled profile, Marama, Boundary Waters Canoe Area, annual	0.004481	0.002414	0.004622	0.011933
49	MBPWI6	Mir&St02	Iron and steel industry, PMF modeled profile, Marama, Boundary Waters Canoe Area, winter	0.087262	0.144723	0.025758	0.000764
50	**MBPSP8**	**Mir&St03**	Iron and steel industry, PMF modeled profile, Marama, Boundary Waters Canoe Area, spring	0.000293	0.069599	0.090191	0.080879
51	MBPSU6	Mir&St04	Iron and steel industry, PMF modeled profile, Marama, Boundary Waters Canoe Area, summer	0.000665	0.032640	0.000626	0.000657
52	MBPFA8	Mir&St05	Iron and steel industry, PMF modeled profile, Marama, Boundary Waters Canoe Area, fall	0.059241	0.015974	0.003458	0.049126
55	MLPFA9	MsecOr19	Secondary organics, PMF modeled profile, Marama, Lye Brook Wilderness Area, fall	1.888600	1.941100	5.101100	1.734000
56	MWPAL4	MVgBrn21	Vegetative burning, PMF modeled profile, Marama, Washington DC, annual	5.108000	11.39400	21.62200	21.26100
57	MWPSP3	MVgBrn23	Vegetative burning, PMF modeled profile, Marama, Washington DC, spring	2.960000	20.74200	27.16800	27.77000
58	MWPSP9	MmvEmi06	Motor vehicle emissions, PMF modeled profile, Marama, Washington DC, spring	0.071022	0.000467	0.201983	0.308498
59	MWPSU5	MmvEmi07	Motor vehicle emissions, PMF modeled profile, Marama, Washington DC, summer	0.009248	0.086002	0.109680	0.103380
60	MLPAL5	MoilCo01	Oil combustion, PMF modeled profile, Marama, Lye Brook Wilderness Area, annual	0.000585	0.000560	0.028590	0.009879
61	MLPWI7	**MoilCo02**	Oil combustion, PMF modeled profile, Marama, Lye Brook Wilderness Area, winter	0.042048	0.000982	0.591669	0.002940
62	MLPSU7	MoilCo03	Oil combustion, PMF modeled profile, Marama, Lye Brook Wilderness Area, summer	0.070248	0.000187	0.062741	0.046677
63	MLPFA6	MsecOr15	Secondary organics, PMF modeled profile, Marama, Lye Brook Wilderness Area, fall	4.635300	1.697700	4.099200	1.436300
64	MSPAL1	MdvEmi05	Diesel vehicle emissions, PMF modeled profile, Marama, Shenandoah National Park, annual	1.504800	1.772700	1.570800	2.208600
65	MWPAL8	MoilCo06	Oil combustion, PMF modeled profile, Marama, Washington DC, annual	0.392832	0.000336	0.001914	0.000544
66	MWPWI2	MoilCo07	Oil combustion, PMF modeled profile, Marama, Washington DC, winter	0.189839	0.000795	0.153286	0.085822
67	MWPSP8	MoilCo08	Oil combustion, PMF modeled profile, Marama, Washington DC, spring	0.261354	0.001120	0.002702	0.078461
68	MWPSU6	MoilCo09	Oil combustion, PMF modeled profile, Marama, Washington DC, summer	0.167807	0.002047	0.000621	0.215921
69	MWPFA8	MoilCo10	Oil combustion, PMF modeled profile, Marama, Washington DC, fall	0.110129	0.000663	0.001594	0.000737
72	MBPWI2	MoilCo11	Oil combustion, PMF modeled profile, Marama, Boundary Waters Canoe Area, winter	1.401300	0.361400	0.457200	1.011000
75	MBPAL9	MsecOr01	Secondary organics, PMF modeled profile, Marama, Boundary Waters Canoe Area, annual	0.024186	0.125234	0.136104	0.093897
76	MBPWI1	MsecOr02	Secondary organics, PMF modeled profile, Marama, Boundary Waters Canoe Area, winter	0.014706	0.086052	0.165945	0.178685
77	MBPSU1	MsecOr03	Secondary organics, PMF modeled profile, Marama, Boundary Waters Canoe Area, summer	0.014671	0.097943	0.159424	0.082599
78	MBPFA1	MsecOr04	Secondary organics, PMF modeled profile, Marama, Boundary Waters Canoe Area, fall	0.039237	0.128811	0.112406	0.104234
79	MLPAL3	MsecOr05	Secondary organics, PMF modeled profile, Marama, Lye Brook Wilderness Area, annual	0.043768	0.072906	0.128452	0.083031
80	MLPSU1	MsecOr06	Secondary organics, PMF modeled profile, Marama, Lye Brook Wilderness Area, summer	0.023388	0.055610	0.033132	0.065673
81	MSPAL4	MsecOr07	Secondary organics, PMF modeled profile, Marama, Shenandoah National Park, annual	0.037199	0.136974	0.075414	0.121199
82	MSPWI9	MdvEmi05	Diesel vehicle emissions, PMF modeled profile, Marama, Shenandoah National Park, winter	1.990000	4.624100	0.442500	3.274400
83	MSPSP7	MsecOr09	Secondary organics, PMF modeled profile, Marama, Shenandoah National Park, spring	0.036534	0.119311	0.080363	0.123884
84	MSPFA1	MsecOr10	Secondary organics, PMF modeled profile, Marama, Shenandoah National Park, fall	0.051721	0.112201	0.075724	0.103122
85	MWPWI1	MVgBrn22	Vegetative burning, PMF modeled profile, Marama, Washington DC, winter	9.58230	15.00100	29.59100	24.89900
86	MBPAL8	Msmelt01	Smelter, PMF modeled profile, Marama, Boundary Waters Canoe Area, annual	0.077369	0.054803	0.001141	0.104426
87	MBPWI7	MVgBrn25	Vegetative burning, PMF modeled profile, Marama, Boundary Waters Canoe Area, winter	1.071500	1.585900	0.748600	0.001900
88	MBPSU2	Msmelt03	Smelter, PMF modeled profile, Marama, Boundary Waters Canoe Area, summer	0.142916	0.170008	0.000559	0.082646
89	MLPAL2	Msmelt04	Smelter, PMF modeled profile, Marama, Lye Brook Wilderness Area, annual	0.000550	0.000344	0.000922	0.008889
91	**MLPFA2**	**Msmelt06**	Smelter, PMF modeled profile, Marama, Lye Brook Wilderness Area, fall	0.000165	0.000153	0.000265	0.004404
92	MLPFA8	Msmelt07	Smelter, PMF modeled profile, Marama, Lye Brook Wilderness Area, fall	0.112856	0.017381	0.135951	0.099242
93	MSPWI2	Msmelt08	Smelter, PMF modeled profile, Marama, Shenandoah National Park, winter	0.012226	0.000778	0.002138	0.001850

Table 6.6-24a PMF modeled chemical source profiles (Mass fractions)

	PNO	SID	Profile Description	OC1	OC2	OC3	OC4
94	MSPSU7	MSmelt09	Smelter, PMF modeled profile, Marama, Shenandoah National Park, summer	0.058575	0.000669	0.000263	0.198224
95	MSPFA4	MSmelt10	Smelter, PMF modeled profile, Marama, Shenandoah National Park, fall	0.140921	0.000370	0.004149	0.002023
96	MWPAL1	MSmelt11	Smelter, PMF modeled profile, Marama, Washington DC, annual	0.063398	0.000263	0.056202	0.000105
97	MWPAL5	MSmelt12	Smelter, PMF modeled profile, Marama, Washington DC, annual	0.104567	0.000231	0.000227	0.000128
98	MWPWI3	MDvEmi07	Diesel vehicle emissions, PMF modeled profile, Marama, Washington DC, winter	0.55317	5.37470	1.22790	0.89352
99	MWPSP4	MSmelt14	Smelter, PMF modeled profile, Marama, Washington DC, spring	0.141972	0.031493	0.000278	0.000141
100	MWPFA5	MSmelt15	Smelter, PMF modeled profile, Marama, Washington DC, fall	0.032805	0.000270	0.000156	0.000143
101	MBPAL5	MVgBrn01	Vegetative burning, PMF modeled profile, Marama, Boundary Waters Canoe Area, annual	0.019971	0.057589	0.223824	0.150508
102	MBPSP1	MVgBrn02	Vegetative burning, PMF modeled profile, Marama, Boundary Waters Canoe Area, spring	0.011993	0.098727	0.222530	0.126012
103	MBPSP7	MSecOr12	Secondary organics, PMF modeled profile, Marama, Boundary Waters Canoe Area, spring	0.8206	5.2013	1.7970	3.1523
104	MBPFA2	MVgBrn04	Vegetative burning, PMF modeled profile, Marama, Boundary Waters Canoe Area, fall	0.027207	0.083972	0.269803	0.151603
105	MLPWI4	MVgBrn05	Vegetative burning, PMF modeled profile, Marama, Lye Brook Wilderness Area, winter	0.038615	0.088697	0.125540	0.154698
106	MLPWI5	MSecOr13	Secondary organics, PMF modeled profile, Marama, Lye Brook Wilderness Area, winter	1.5954	4.0273	0.7027	2.3620
107	MLPWI8	MVgBrn07	Vegetative burning, PMF modeled profile, Marama, Lye Brook Wilderness Area, winter	0.021662	0.122357	0.223754	0.235049
108	**MLPSP2**	**MVgBrn08**	Vegetative burning, PMF modeled profile, Marama, Lye Brook Wilderness Area, spring	0.028461	0.073778	0.108946	0.098942
109	MLPSU3	MVgBrn09	Vegetative burning, PMF modeled profile, Marama, Lye Brook Wilderness Area, summer	0.012781	0.087968	0.146263	0.099102
110	**MLPSU6**	**MVgBrn10**	Vegetative burning, PMF modeled profile, Marama, Lye Brook Wilderness Area, summer	5.4472	10.1770	20.5320	9.0428
111	MLPFA5	MVgBrn11	Vegetative burning, PMF modeled profile, Marama, Lye Brook Wilderness Area, fall	0.002380	0.080636	0.173574	0.130004
112	**MSPAL6**	**MVgBrn12**	Vegetative burning, PMF modeled profile, Marama, Shenandoah National Park, annual	0.023497	0.083815	0.182034	0.162461
113	MSPWI6	MVgBrn13	Vegetative burning, PMF modeled profile, Marama, Shenandoah National Park, winter	0.032750	0.100654	0.266387	0.204895
114	MSPSP1	MVgBrn14	Vegetative burning, PMF modeled profile, Marama, Shenandoah National Park, spring	0.029984	0.090164	0.145763	0.158499
115	**MSPSU6**	**MVgBrn15**	Vegetative burning, PMF modeled profile, Marama, Shenandoah National Park, summer	0.028016	0.086867	0.081489	0.095060
116	MSPFA2	MVgBrn16	Vegetative burning, PMF modeled profile, Marama, Shenandoah National Park, fall	0.020969	0.113542	0.215656	0.197525
117	MWPAL6	MVgBrn17	Vegetative burning, PMF modeled profile, Marama, Washington DC, annual	0.028817	0.091056	0.120957	0.113482
118	MWPWI7	MGvEmi04	Motor vehicle emissions, PMF modeled profile, Marama, Washington DC, winter	3.75930	7.26680	25.30800	25.99600
119	**MWPSU8**	**MVgBrn19**	Vegetative burning, PMF modeled profile, Marama, Washington DC, summer	0.018655	0.101510	0.141069	0.116555
120	**MWPFA6**	**MVgBrn20**	Vegetative burning, PMF modeled profile, Marama, Washington DC, fall	0.013024	0.134080	0.186034	0.174870
121	MLPSP9	MDvEmi03	Diesel vehicle emissions, PMF modeled profile, Marama, Lye Brook Wilderness Area, spring	0.0082	0.0006	0.0004	0.0007
122	MLPSU8	MDvEmi04	Diesel vehicle emissions, PMF modeled profile, Marama, Lye Brook Wilderness Area, summer	0.0360	0.0037	0.0398	0.0038
123	MLPWI9	MColPP16	Coal fired power plant, PMF modeled profile, Marama, Lye Brook Wilderness Area, winter	5.4139	4.5302	5.8169	4.9737
124	MSPAL8	MColPP15	Coal fired power plant, PMF modeled profile, Marama, Shenandoah National Park, annual	0.0093	3.9784	0.0118	3.0760
125	MSPFA6	MSecOr18	Secondary organics, PMF modeled profile, Marama, Shenandoah National Park, fall	0.1555	2.4262	5.0271	4.6220
126	MWPFA2	MGvEmi07	Motor vehicle emissions, PMF modeled profile, Marama, Washington DC, fall	4.9196	1.5154	4.4172	3.7694
127	MWPSP7	MGvEmi05	Motor vehicle emissions, PMF modeled profile, Marama, Washington DC, spring	0.809	2.359	4.287	3.595
128	MWPSU3	MGvEmi06	Motor vehicle emissions, PMF modeled profile, Marama, Washington DC, summer	2.051	0.760	1.887	0.017
129	MWPWI6	MGvEmi03	Motor vehicle emissions, PMF modeled profile, Marama, Washington DC, winter	8.48570	6.09100	7.36780	5.91500
130	MSPWI1	MVgBrn27	Vegetative burning, PMF modeled profile, Marama, Shenandoah National Park, winter	1.3104	2.3893	2.8011	3.0833
131	MSPWI3	MGvEmi09	Motor vehicle emissions, PMF modeled profile, Marama, Shenandoah National Park, winter	0.0956	0.8807	1.6581	2.0935

Table 6.6-24a PMF modeled chemical source profiles (Mass fractions)

	PNO	SID	OPT	EC1	EC2	EC3	Al	As	Br	Ca	Cr	Cu	Fe	K
1	MWPSP1	MbiEmi01	0.000010	0.000717	0.000184	0.000061	0.007175	0.000526	0.001009	0.000412	0.000855	0.000001	0.000011	0.000007
2	MBPWI8	McolPP01	0.244292	0.344733	0.038793	0.006972	0.002542	0.008564	0.000002	0.002932	0.000818	0.000395	0.036074	0.000025
3	MBPSU8	McolPP02	0.000115	0.000174	0.079181	0.005781	0.001740	0.044970	0.000001	0.000069	0.001479	0.000226	0.000238	0.046051
5	MLPAL6	MVgBrn24	0.001629	0.000013	0.181805	0.017472	0.000001	0.000027	0.000564	0.002632	0.000000	0.000000	0.004285	0.010049
6	MLPWI6	McolPP05	0.000019	0.224941	0.000287	0.000027	0.011270	0.000000	0.005194	0.000002	0.000001	0.000000	0.014337	0.020137
7	MLPSU5	McolPP06	0.023992	0.199664	0.018046	0.000471	0.001108	0.000002	0.000286	0.000000	0.000000	0.000000	0.005480	0.000002
8	MSPWI5	McolPP07	0.000036	0.191749	0.000083	0.000099	0.000004	0.000016	0.003135	0.000002	0.000036	0.000000	0.006913	0.017839
9	**MSPWI8**	**McolPP08**	0.000103	0.000166	0.276578	0.000267	0.000011	0.000595	0.000004	0.000008	0.000004	0.000001	0.021928	0.016244
10	MSPSP4	McolPP09	0.001098	0.639530	0.092629	0.049208	0.000175	0.000000	0.002949	0.013485	0.000008	0.005962	0.082570	0.000029
11	**MSPSP8**	**McolPP10**	0.000144	0.000100	0.087178	0.000054	0.013470	0.000000	0.005931	0.000008	0.003019	0.000001	0.023526	0.000008
12	**MSPSU1**	**McolPP11**	0.109127	0.260797	0.017780	0.004648	0.002231	0.000004	0.000303	0.000001	0.000055	0.000204	0.000003	0.000002
13	MSPSU2	McolPP12	0.000013	0.000112	0.171492	0.012911	0.001882	0.000000	0.006060	0.096482	0.004848	0.000000	0.029887	0.052736
14	MWPSP2	McolPP13	0.003833	0.000120	0.074562	0.004984	0.004693	0.000000	0.009710	0.002669	0.002733	0.002573	0.000012	0.031852
15	**MWPSU9**	**McolPP14**	0.016577	0.154422	0.002737	0.002300	0.000087	0.000013	0.000783	0.000017	0.000205	0.000102	0.000002	0.000002
17	**MSPFA3**	**MdsEmi02**	0.001536	0.373417	0.353117	0.036014	0.000107	0.000341	0.000226	0.019322	0.000315	0.000312	0.000009	0.039186
18	MSPSU5	MgaEmi01	0.000078	0.000179	0.000069	0.003312	0.003672	0.000000	0.000313	0.000001	0.000189	0.000000	0.000329	0.000011
20	MBPAL1	**MGlDst01**	0.007380	0.000250	0.000646	0.000321	0.304975	0.000000	0.003846	0.000020	0.002102	0.000370	0.019835	0.046382
21	MBPAL2	**MGlDst02**	0.000044	0.000026	0.028106	0.000005	0.000975	0.000000	0.000197	0.087521	0.000001	0.000000	0.064117	0.018551
22	MBPWI4	MGlDst03	0.000018	0.000292	0.040370	0.004611	0.001660	0.000001	0.000021	0.065085	0.000000	0.000000	0.000090	0.046524
23	MBPSP6	MVgBrn26	0.0031	3.0955	1.8337	0.0004	0.0028	0.0000	0.0271	2.0327	0.0114	0.0000	1.8101	1.3126
24	MBPSP9	MGlDst05	0.198799	0.162740	0.006020	0.003699	0.175318	0.000000	0.000003	0.020815	0.000259	0.000133	0.024566	0.014419
25	MBPSU4	MGlDst06	0.000026	0.000031	0.000760	0.000016	0.001667	0.000003	0.000626	0.115150	0.000846	0.000001	0.044236	0.027812
26	MBPFA5	MGlDst07	0.000029	0.057380	0.044585	0.000019	0.001694	0.000000	0.000292	0.069178	0.000188	0.000002	0.009033	0.009099
27	MLPAL9	MGlDst08	0.000013	0.000084	0.000076	0.002932	0.033934	0.000011	0.002471	0.080585	0.000204	0.000000	0.088188	0.044809
29	MLPWI2	MGlDst10	0.000226	0.121207	0.000083	0.000036	0.016131	0.000000	0.000382	0.096406	0.000001	0.000390	0.106533	0.029375
30	MLPSP1	MGlDst11	0.000204	0.000831	0.080707	0.014616	0.398050	0.000004	0.000001	0.000025	0.001085	0.000969	0.009121	0.033433
31	MLPSP3	MGlDst12	0.000045	0.000058	0.025573	0.000005	0.007944	0.000135	0.001874	0.074742	0.000195	0.000000	0.075209	0.040787
32	MLPSU2	MGlDst13	0.001162	0.000216	0.000081	0.001435	0.169104	0.000000	0.000217	0.022341	0.000001	0.000014	0.066235	0.018589
33	MLPSU9	MGlDst14	0.002448	0.001752	0.009238	0.000011	0.000010	0.000062	0.001535	0.055487	0.002030	0.000000	0.032865	0.034263
34	MSPAL3	MGlDst15	0.000009	0.000017	0.029877	0.000006	0.000083	0.000060	0.000362	0.065241	0.000429	0.000000	0.064722	0.039351
35	MSPAL9	MGlDst16	0.000044	0.000044	0.000355	0.005185	0.445939	0.000000	0.000000	0.000009	0.000000	0.000001	0.052262	0.010675
36	MSPWI4	MGlDst17	0.010150	0.000597	0.059478	0.036791	0.329364	0.000003	0.001252	0.014370	0.008760	0.005207	0.030048	0.000037
37	MSPSP2	MGlDst18	0.002310	0.000093	0.043467	0.016942	0.435595	0.000000	0.000002	0.000027	0.000003	0.000873	0.020759	0.020583
38	MSPSP9	MGlDst19	0.000035	0.000021	0.014966	0.000004	0.000609	0.000039	0.000756	0.073216	0.000234	0.000000	0.072594	0.043482
39	MSPSU3	MGlDst20	0.000025	0.000743	0.061777	0.002352	0.000006	0.000104	0.000089	0.029296	0.000067	0.000000	0.048931	0.015777
40	MSPSU9	MGlDst21	0.005444	0.002114	0.003588	0.000169	0.173796	0.000005	0.000048	0.020760	0.000082	0.000000	0.056883	0.024164
41	MSPFA5	MGlDst22	0.000067	0.036748	0.046041	0.002146	0.007576	0.000095	0.000627	0.080005	0.000421	0.000000	0.055546	0.045109
42	MWPAL3	MGlDst23	0.000004	0.000026	0.007205	0.000006	0.200258	0.000030	0.000278	0.041537	0.000001	0.000002	0.060671	0.029754
43	MWPWI4	MGlDst24	0.000565	0.000170	0.002175	0.000090	0.010117	0.000000	0.000000	0.097468	0.000000	0.001128	0.123985	0.046010
44	MWPWI9	MGlDst25	0.000098	0.000271	0.000046	0.000289	0.205530	0.000000	0.011751	0.000076	0.002937	0.000010	0.032170	0.014562

Table 6.6-24a PMF modeled chemical source profiles (Mass fractions)

	PNO	SID	OPT	EC1	EC2	EC3	Al	As	Br	Ca	Cr	Cu	Fe	0.026647
45	MWPSP6	MGlDst26	0.000006	0.000107	0.000045	0.000012	0.265719	0.000061	0.001805	0.030173	0.000529	0.000002	0.039664	0.053404
46	MWPSU2	MGlDst27	0.000008	0.000042	0.018787	0.000518	0.000095	0.000000	0.000314	0.041051	0.000222	0.000361	0.067436	0.037846
47	MWPFA4	MGlDst28	0.001814	0.000118	0.060035	0.001212	0.000003	0.000055	0.000249	0.082640	0.000617	0.000000	0.088159	0.021197
48	MBPAL7	MIr&St01	0.000087	0.000153	0.000154	0.004591	0.000127	0.021000	0.000006	0.000020	0.001219	0.000000	0.573705	0.030810
49	MBPWI6	MIr&St02	0.000049	0.000220	0.005428	0.000106	0.000036	0.001662	0.000108	0.000057	0.000392	0.000000	0.440041	0.006890
50	**MBPSP8**	**MIr&St03**	0.147067	0.205380	0.018900	0.005946	0.000085	0.004646	0.000004	0.000029	0.000117	0.000001	0.123502	0.000057
51	MBPSU6	MIr&St04	0.000053	0.000099	0.000073	0.000113	0.008272	0.000239	0.000869	0.001516	0.000311	0.000002	0.617345	0.012293
52	MBPFA8	MIr&St05	0.000080	0.165399	0.024182	0.009419	0.000052	0.000671	0.000762	0.000020	0.000334	0.000009	0.369541	0.2693
55	MLPFA9	MSecOr19	11.5870	5.4680	3.2779	0.6002	0.4354	0.0143	0.0000	0.0002	0.0001	0.0594	0.0461	1.155
56	MWPAL4	MVgBrn21	0.104	32.811	0.832	0.277	0.088	0.000	0.160	0.101	0.017	0.035	0.000	0.476
57	MWPSP3	MVgBrn23	0.301	56.101	1.731	0.409	0.001	0.000	0.042	0.361	0.000	0.000	1.156	0.0238093
58	MWPSP9	MMvEmi06	4.941E-06	0.0001481	2.005E-05	5.899E-06	0.0013654	0.0002653	0.0019727	0.0011097	6.701E-05	6.793E-07	0.0269563	0.0022437
59	MWPSU5	MMvEmi07	7.224E-06	0.2577614	0.0236804	0.002294	0.0007253	4.178E-05	0.0003839	0.0068946	0.0001158	0.0009977	0.0318578	0.031306
60	MLPAL5	MOilCo01	0.000065	0.000245	0.000258	0.211560	0.000012	0.001142	0.012394	0.000049	0.005247	0.008517	0.000011	0.000077
61	MLPWI7	**MOilCo02**	0.000177	0.002524	0.000495	0.034582	0.000829	0.001309	0.000048	0.000009	0.000467	0.017170	0.052132	0.010521
62	MLPSU7	MOilCo03	0.001308	0.000117	0.040204	0.005768	0.000100	0.000129	0.002299	0.007550	0.001337	0.002340	0.002495	0.9996
63	MLPFA6	MSecOr15	12.4830	6.7657	4.0925	0.8387	0.2749	0.0015	0.0221	0.5245	0.0959	0.0000	0.0000	0.2166
64	MSPAL1	MDvEmi05	13.1550	16.7490	1.8170	0.5544	0.0007	0.0000	0.0088	0.0000	0.0217	0.0611	0.3989	0.066628
65	MWPAL8	MOilCo06	0.001106	0.002175	0.000272	0.003209	0.002490	0.000201	0.006538	0.036323	0.002470	0.005884	0.000129	0.025355
66	MWPWI2	MOilCo07	0.006279	0.000490	0.000110	0.008227	0.000019	0.000311	0.003780	0.014985	0.000454	0.002645	0.000091	0.025714
67	MWPSP8	MOilCo08	0.000214	0.001634	0.000518	0.000150	0.008269	0.000530	0.006339	0.031513	0.000012	0.015621	0.002474	0.034690
68	MWPSU6	MOilCo09	0.000149	0.000959	0.001537	0.000058	0.000068	0.001616	0.000284	0.000050	0.000012	0.001403	0.000228	0.125557
69	MWPFA8	MOilCo10	0.010193	0.000756	0.000542	0.002317	0.000126	0.000530	0.005687	0.153399	0.000473	0.003414	0.000083	0.4411
72	MBPWI2	MOilCo11	1.2558	2.3834	0.4286	0.3477	0.2929	0.0000	0.0002	0.3706	0.0742	0.0021	0.0023	0.001005
75	MBPAL9	MSecOr01	0.179822	0.176610	0.021383	0.005016	0.000505	0.000013	0.000000	0.000002	0.000204	0.000033	0.000000	0.020153
76	MBPWI1	MSecOr02	0.189977	0.317288	0.020925	0.004699	0.004523	0.000000	0.000160	0.000002	0.000000	0.000096	0.000016	0.001398
77	MBPSU1	MSecOr03	0.102210	0.121826	0.012988	0.003200	0.000157	0.000000	0.000080	0.000000	0.000044	0.000000	0.000003	0.000006
78	MBPFA1	MSecOr04	0.233684	0.231002	0.042233	0.009623	0.003760	0.000000	0.000433	0.000000	0.000338	0.000002	0.000008	0.006782
79	MLPAL3	MSecOr05	0.006830	0.144206	0.133331	0.030735	0.000001	0.000015	0.000028	0.001971	0.000602	0.000000	0.000000	0.007364
80	MLPSU1	MSecOr06	0.175556	0.214156	0.034348	0.008994	0.000075	0.000000	0.000430	0.000001	0.000514	0.000000	0.000104	0.002289
81	MSPAL4	MSecOr07	0.140827	0.214558	0.012247	0.002010	0.000011	0.000024	0.000000	0.000000	0.000027	0.000037	0.000874	0.1999
82	MSPWI9	MDvEmi05	20.5390	21.1740	1.9973	0.4303	0.0001	0.0035	0.0000	0.0000	0.0056	0.0222	0.0352	0.002977
83	MSPSP7	MSecOr09	0.177731	0.245585	0.015515	0.003940	0.000013	0.000000	0.000000	0.001832	0.000029	0.000000	0.003941	0.005409
84	MSPFA1	MSecOr10	0.235589	0.285598	0.021259	0.007161	0.001120	0.000000	0.000000	0.000747	0.000179	0.000000	0.000000	1.73560
85	MWPWI1	MVgBrn22	0.04929	52.93700	0.80929	0.15344	0.12957	0.01615	0.04527	0.09783	0.00958	0.03492	0.00127	0.000010
86	MBPAL8	MSmelt01	0.042232	0.026884	0.082562	0.011428	0.002022	0.000002	0.000006	0.009587	0.000723	0.037808	0.000006	0.3469
87	MBPWI7	MVgBrn25	0.0012	0.8007	0.8568	0.1561	0.0001	0.0000	0.0058	0.1887	0.0000	0.0482	0.0004	0.000115
88	MBPSU2	MSmelt03	0.033455	0.003376	0.061134	0.014816	0.001262	0.000202	0.000325	0.002687	0.000031	0.022829	0.000157	0.075653
89	MLPAL2	MSmelt04	0.009586	0.000413	0.643928	0.000983	0.000008	0.000000	0.010804	0.000008	0.000405	0.010696	0.058691	0.066781
91	**MLPFA2**	**MSmelt06**	0.000199	0.546486	0.000208	0.006233	0.013465	0.000000	0.019197	0.002569	0.000030	0.006716	0.145145	0.020061

Table 6.6-24a PMF modeled chemical source profiles (Mass fractions)

	PNO	SID	OPT	EC1	EC2	EC3	Al	As	Br	Ca	Cr	Cu	Fe	0.026647
92	MLPFA8	Msmelt07	0.000158	0.245719	0.049100	0.014523	0.000006	0.000000	0.000003	0.007835	0.000714	0.000000	0.003297	0.106811
93	MSPWI2	Msmelt08	0.000326	0.000435	0.000588	0.031534	0.000033	0.000001	0.017158	0.064704	0.001315	0.008679	0.339468	0.000008
94	MSPSU7	Msmelt09	0.000076	0.001097	0.000388	0.013158	0.010736	0.000000	0.001455	0.000576	0.000370	0.006576	0.162261	0.037501
95	MSPFA4	Msmelt10	0.000388	0.001536	0.175528	0.019034	0.001839	0.000001	0.030501	0.030660	0.012598	0.000002	0.117124	0.000011
96	MWPAL1	Msmelt11	0.000008	0.000047	0.057401	0.000014	0.000013	0.000241	0.001100	0.043084	0.000119	0.015205	0.432106	0.092684
97	MWPAL5	Msmelt12	0.043006	0.367609	0.000475	0.031019	0.000065	0.000000	0.008720	0.018531	0.000716	0.009109	0.000898	0.87376
98	MWPWI3	MdvEmi07	0.29183	40.53900	0.57553	0.20859	0.00021	0.00000	0.05305	0.11077	0.01747	0.02738	0.00197	0.000018
99	MWPSP4	Msmelt14	0.000005	0.000242	0.099829	0.000011	0.005184	0.000355	0.002741	0.031493	0.001817	0.010196	0.299426	0.080989
100	MWPFA5	Msmelt15	0.015004	0.410065	0.033179	0.025919	0.000015	0.000000	0.003142	0.005702	0.000002	0.010972	0.144366	0.032530
101	MBPAL5	MVgBrn01	0.003419	0.150869	0.013646	0.003297	0.000587	0.000026	0.000565	0.002445	0.000000	0.000000	0.000000	0.007746
102	MBPSP1	MVgBrn02	0.000333	0.069189	0.002286	0.036876	0.008090	0.000285	0.000003	0.002833	0.000003	0.007488	0.000003	0.0055
103	MBPSP7	MsecOr12	0.6477	5.2104	0.7788	0.1237	0.0015	0.0000	0.0000	0.0001	0.0098	0.0000	0.0002	0.046695
104	MBPFA2	MVgBrn04	0.000012	0.133956	0.000341	0.003342	0.001170	0.000000	0.000435	0.000001	0.000260	0.000001	0.000014	0.019341
105	MLPWI4	MVgBrn05	0.227890	0.331659	0.043393	0.009290	0.001736	0.000000	0.000119	0.000001	0.000216	0.001091	0.002745	0.1173
106	MLPWI5	MsecOr13	8.7643	11.9430	2.2173	0.2194	0.0000	0.0043	0.0001	0.0000	0.0000	0.0000	0.0909	0.009181
107	MLPWI8	MVgBrn07	0.000008	0.195745	0.018580	0.000021	0.000002	0.000073	0.000000	0.000006	0.000000	0.000104	0.005946	0.004440
108	**MLPSP2**	**MVgBrn08**	0.128362	0.170304	0.022373	0.005084	0.000291	0.000000	0.000260	0.000001	0.000212	0.000000	0.000002	0.003545
109	MLPSU3	MVgBrn09	0.000009	0.093496	0.000545	0.000382	0.000003	0.000020	0.000584	0.007370	0.000000	0.000003	0.007148	0.8136
110	**MLPSU6**	**MVgBrn10**	12.3850	10.4190	0.7362	0.4507	0.0343	0.0001	0.0139	0.2656	0.0271	0.0037	0.0001	0.015574
111	MLPFA5	MVgBrn11	0.000032	0.131110	0.000031	0.000003	0.002224	0.000045	0.000334	0.019826	0.000114	0.000000	0.020476	0.016128
112	**MSPAL6**	**MVgBrn12**	0.000003	0.168280	0.006367	0.001060	0.000012	0.000042	0.001204	0.003766	0.000000	0.000002	0.000023	0.015658
113	MSPWI6	MVgBrn13	0.004153	0.302920	0.003845	0.002160	0.000001	0.000130	0.000487	0.000002	0.000015	0.000297	0.000002	0.013022
114	MSPSP1	MVgBrn14	0.076896	0.235313	0.012340	0.001592	0.000900	0.000047	0.001042	0.002503	0.000200	0.000000	0.000009	0.003991
115	**MSPSU6**	**MVgBrn15**	0.108077	0.169787	0.000966	0.001045	0.000171	0.000000	0.000132	0.000000	0.000004	0.000000	0.000000	0.014914
116	MSPFA2	MVgBrn16	0.000010	0.164896	0.000015	0.000532	0.000002	0.000064	0.001137	0.000820	0.000144	0.000002	0.000698	0.011096
117	MWPAL6	MVgBrn17	0.001162	0.280341	0.011964	0.001625	0.000001	0.000023	0.000239	0.010890	0.000112	0.000000	0.012173	1.21020
118	MWPWI7	MgvEmi04	0.00021	0.00323	0.35236	0.15015	0.00005	0.00001	0.16916	0.00479	0.00001	0.03128	0.00551	0.006139
119	**MWPSU8**	**MVgBrn19**	0.006273	0.177794	0.004649	0.000793	0.000543	0.000000	0.000452	0.002049	0.000131	0.000000	0.000020	0.007140
120	**MWPFA6**	**MVgBrn20**	0.000004	0.286013	0.000011	0.001792	0.000737	0.000000	0.000326	0.000002	0.000000	0.000000	0.000003	1.0202
121	MLPSP9	MdvEmi03	0.0023	0.6030	1.6547	0.0730	0.0010	0.0000	0.1472	0.3358	0.0608	0.0313	0.0001	0.5292
122	MLPSU8	MdvEmi04	9.6321	7.0640	5.1054	0.4232	0.0612	0.0247	0.0037	0.0801	0.0316	0.0128	0.0001	0.9654
123	MLPWI9	McolPP16	0.4387	0.2006	1.8066	0.5334	0.1857	0.0118	0.0275	0.4808	0.1063	0.0000	0.0000	0.0001
124	MSPAL8	McolPP15	0.0008	0.4281	0.3428	0.0006	0.0008	0.0003	0.0000	0.0000	0.0000	0.0038	0.1793	0.3793
125	MSPFA6	MsecOr18	9.8414	19.5120	1.7576	0.2538	0.0137	0.0000	0.0000	0.0070	0.0000	0.0752	0.5937	0.4769
126	MWPFA2	MgvEmi07	0.0004	0.0014	0.0011	0.0027	0.0024	0.0000	0.1519	0.0001	0.0381	0.0405	0.0014	2.801
127	MWPSP7	MgvEmi05	0.000	0.045	0.247	0.000	0.029	0.003	0.008	3.085	0.006	0.009	2.300	0.152
128	MWPSU3	MgvEmi06	0.000	0.007	0.001	0.046	0.003	0.000	0.026	0.000	0.000	0.046	0.172	0.00019
129	MWPWI6	MgvEmi03	0.00027	0.02709	0.65273	0.00267	0.00024	0.00012	0.00002	0.43863	0.00055	0.21053	5.85760	1.0993
130	MSPWI1	MVgBrn27	0.4290	4.6504	1.7595	0.2125	0.1243	0.0009	0.0381	1.3183	0.0000	0.0000	0.7938	0.4848
131	MSPWI3	MgvEmi09	0.0010	0.0045	0.0012	0.0004	0.0002	0.0004	0.0652	0.2038	0.0000	0.0000	0.0275	K

Table 6.6-24a PMF modeled chemical source profiles (Mass fractions)

	PNO	SID	Mg	Ni	Pb	Se	Si	V	Zn
1	MWPSP1	MBiEmi01	0.014255	0.000265	0.000012	0.001503	0.154228	0.000001	0.001718
2	MBPWI8	MColPP01	0.001432	0.000004	0.000000	0.000190	0.029146	0.000962	0.000001
3	MBPSU8	MColPP02	0.005152	0.000002	0.000610	0.000014	0.155113	0.002074	0.000002
5	MLPAL6	MVgBrn24	0.001613	0.000001	0.000036	0.000411	0.000002	0.000000	0.002080
6	MLPWI6	MColPP05	0.000011	0.000001	0.003461	0.003448	0.020312	0.000420	0.009477
7	MLPSU5	MColPP06	0.000527	0.000018	0.000000	0.000290	0.000003	0.000000	0.000839
8	MSPWI5	MColPP07	0.005812	0.000044	0.000003	0.002294	0.000740	0.000118	0.005004
9	**MSPWI8**	**MColPP08**	0.035511	0.000272	0.000003	0.004416	0.168167	0.000006	0.007036
10	MSPSP4	MColPP09	0.000016	0.001534	0.024316	0.002074	0.000087	0.000494	0.040727
11	**MSPSP8**	**MColPP10**	0.041057	0.000001	0.002550	0.005705	0.025162	0.002849	0.011200
12	**MSPSU1**	**MColPP11**	0.001971	0.000030	0.000001	0.001163	0.000017	0.000019	0.000054
13	MSPSU2	MColPP12	0.027526	0.000000	0.000013	0.002947	0.000046	0.005215	0.005942
14	MWPSP2	MColPP13	0.020281	0.000001	0.000002	0.005322	0.000107	0.003614	0.005937
15	**MWPSU9**	**MColPP14**	0.005999	0.000092	0.000003	0.001089	0.032358	0.000001	0.000665
17	**MSPFA3**	**MDsEmi02**	0.010668	0.000043	0.000002	0.000341	0.000041	0.000421	0.005865
18	MSPSU5	MGaEmi01	0.003689	0.000001	0.000413	0.000350	0.004438	0.000255	0.000505
20	MBPAL1	**MGlDst01**	0.023266	0.000093	0.000720	0.000000	0.131850	0.000002	0.000003
21	MBPAL2	**MGlDst02**	0.000006	0.000020	0.000694	0.000045	0.238300	0.000111	0.000535
22	MBPWI4	MGlDst03	0.000010	0.000000	0.001309	0.000000	0.142843	0.000001	0.002283
23	MBPSP6	MVgBrn26	0.0002	0.0019	0.0000	0.0024	6.7757	0.0103	0.0432
24	MBPSP9	MGlDst05	0.007880	0.000000	0.000944	0.000000	0.091476	0.000440	0.000001
25	MBPSU4	MGlDst06	0.002359	0.000063	0.000000	0.000000	0.306443	0.000284	0.001416
26	MBPFA5	MGlDst07	0.002715	0.000002	0.000136	0.000000	0.158628	0.000311	0.000027
27	MLPAL9	MGlDst08	0.004147	0.000087	0.001438	0.000000	0.289416	0.000366	0.002255
29	MLPWI2	MGlDst10	0.000658	0.000004	0.000782	0.000079	0.241939	0.000001	0.004178
30	MLPSP1	MGlDst11	0.025408	0.000001	0.003972	0.000000	0.018365	0.000003	0.008994
31	MLPSP3	MGlDst12	0.000440	0.000089	0.000002	0.000001	0.255454	0.000650	0.000000
32	MLPSU2	MGlDst13	0.001226	0.000001	0.000001	0.000050	0.220764	0.000001	0.000120
33	MLPSU9	MGlDst14	0.021539	0.000284	0.002855	0.001593	0.357281	0.002728	0.005282
34	MSPAL3	MGlDst15	0.003170	0.000007	0.000000	0.000000	0.333480	0.000482	0.000446
35	MSPAL9	MGlDst16	0.001936	0.000000	0.000112	0.000088	0.022021	0.000002	0.000001
36	MSPWI4	MGlDst17	0.021736	0.000305	0.000002	0.002481	0.064975	0.012065	0.007074
37	MSPSP2	MGlDst18	0.000087	0.000000	0.003115	0.000000	0.000581	0.000007	0.005074
38	MSPSP9	MGlDst19	0.002390	0.000034	0.000073	0.000000	0.283392	0.000398	0.000360
39	MSPSU3	MGlDst20	0.001951	0.000116	0.000179	0.000000	0.323753	0.000025	0.000001
40	MSPSU9	MGlDst21	0.003193	0.000000	0.000013	0.000025	0.229752	0.000110	0.000000
41	MSPFA5	MGlDst22	0.004811	0.000009	0.000000	0.000006	0.258998	0.000355	0.003135
42	MWPAL3	MGlDst23	0.002354	0.000002	0.000053	0.000179	0.199630	0.000001	0.000005
43	MWPWI4	MGlDst24	0.002732	0.000032	0.003000	0.000131	0.234488	0.000001	0.003709
44	MWPWI9	MGlDst25	0.000043	0.000449	0.000005	0.000187	0.004097	0.008666	0.033154

Table 6.6-24a PMF modeled chemical source profiles (Mass fractions)

	PNO	SID	Mg	Ni	Pb	Se	Si	V	Zn
45	MWPSP6	MGlDst26	0.003362	0.000001	0.000001	0.000138	0.139984	0.000001	0.000401
46	MWPSU2	MGlDst27	0.003717	0.000016	0.000005	0.000000	0.194061	0.000442	0.000001
47	MWPFA4	MGlDst28	0.006213	0.000000	0.000001	0.000170	0.216221	0.000168	0.000926
48	MBPAL7	Mir&St01	0.009282	0.000001	0.000530	0.000545	0.030301	0.001252	0.003129
49	MBPWI6	Mir&St02	0.000024	0.000130	0.001753	0.000037	0.000061	0.000006	0.005216
50	**MBPSP8**	**Mir&St03**	0.008759	0.000000	0.000002	0.000127	0.000722	0.000132	0.000464
51	MBPSU6	Mir&St04	0.013339	0.000035	0.000004	0.000525	0.000135	0.000857	0.000763
52	MBPFA8	Mir&St05	0.001233	0.000006	0.001262	0.000264	0.026576	0.000465	0.002927
55	MLPFA9	MsecOr19	0.0673	0.0068	0.0209	0.0000	0.0001	0.0000	0.1382
56	MWPAL4	MVgBrn21	0.175	0.000	0.000	0.090	0.000	0.064	0.081
57	MWPSP3	MVgBrn23	0.047	0.000	0.000	0.000	0.000	0.007	0.085
58	MWPSP9	MmvEmi06	1.625E-05	1.024E-06	0.0012233	0.0005092	1.107E-05	0.0019609	0.0086962
59	MWPSU5	MmvEmi07	0.0016121	6.529E-08	1.453E-07	3.942E-07	1.035E-06	0.0002074	0.0020041
60	MLPAL5	MoilCo01	0.028012	0.049542	0.000374	0.001701	0.235431	0.041301	0.000011
61	MLPWI7	**MoilCo02**	0.000072	0.024203	0.002057	0.000006	0.000210	0.028434	0.008411
62	MLPSU7	MoilCo03	0.001674	0.016294	0.001589	0.000000	0.205000	0.002338	0.000001
63	MLPFA6	MsecOr15	0.4897	0.0009	0.0781	0.0000	1.8736	0.1554	0.0131
64	MSPAL1	MdvEmi05	0.0001	0.0098	0.1319	0.0000	0.0002	0.0290	0.2264
65	MWPAL8	MoilCo06	0.000044	0.067779	0.000151	0.000001	0.000035	0.087797	0.022005
66	MWPWI2	MoilCo07	0.000013	0.026042	0.004520	0.000001	0.055070	0.042514	0.015052
67	MWPSP8	MoilCo08	0.000062	0.138831	0.006819	0.001351	0.000185	0.148913	0.044923
68	MWPSU6	MoilCo09	0.000026	0.033772	0.005304	0.004045	0.028354	0.026334	0.006139
69	MWPFA8	MoilCo10	0.039625	0.055001	0.000035	0.000001	0.117906	0.067293	0.019605
72	MBPWI2	MoilCo11	0.1745	0.0041	0.0000	0.0008	0.1063	0.0864	0.0000
75	MBPAL9	MsecOr01	0.000858	0.000006	0.000000	0.000023	0.002928	0.000302	0.000000
76	MBPWI1	MsecOr02	0.000027	0.000020	0.000000	0.000204	0.013975	0.000032	0.002227
77	MBPSU1	MsecOr03	0.000461	0.000005	0.000000	0.000006	0.000868	0.000073	0.000000
78	MBPFA1	MsecOr04	0.003845	0.000001	0.000001	0.000057	0.003753	0.000332	0.000562
79	MLPAL3	MsecOr05	0.002816	0.000005	0.000023	0.000000	0.005400	0.000684	0.000062
80	MLPSU1	MsecOr06	0.004614	0.000009	0.001470	0.000102	0.000011	0.000863	0.000298
81	MSPAL4	MsecOr07	0.000867	0.000000	0.000000	0.000000	0.002724	0.000012	0.000174
82	MSPWI9	MdvEmi05	0.0002	0.0022	0.0447	0.0000	0.5327	0.0087	0.0001
83	MSPSP7	MsecOr09	0.000411	0.000015	0.000166	0.000000	0.018295	0.000001	0.000298
84	MSPFA1	MsecOr10	0.002183	0.000000	0.000224	0.000000	0.024135	0.000220	0.000000
85	MWPWI1	MVgBrn22	0.02502	0.00010	0.00002	0.00129	0.00161	0.00002	0.00014
86	MBPAL8	Msmelt01	0.002580	0.002858	0.108987	0.011599	0.028509	0.000744	0.192268
87	MBPWI7	MVgBrn25	0.1324	0.0028	0.1550	0.0026	0.0002	0.0007	0.2221
88	MBPSU2	Msmelt03	0.003398	0.000098	0.000849	0.000000	0.000032	0.000355	0.015103
89	MLPAL2	Msmelt04	0.000127	0.000007	0.049398	0.001837	0.000012	0.001527	0.073633
91	**MLPFA2**	**Msmelt06**	0.000054	0.000646	0.033656	0.006530	0.000012	0.002917	0.051392

Table 6.6-24a PMF modeled chemical source profiles (Mass fractions)

	PNO	SID	Mg	Ni	Pb	Se	Si	V	Zn
92	MLPFA8	MSmelt07	0.007344	0.000310	0.000670	0.000085	0.000004	0.002642	0.005538
93	MSPWI2	MSmelt08	0.000019	0.002010	0.075527	0.000008	0.000059	0.000024	0.138944
94	MSPSU7	MSmelt09	0.000070	0.001491	0.047247	0.001830	0.000126	0.000015	0.072128
95	MSPFA4	MSmelt10	0.060335	0.001235	0.053087	0.027181	0.000148	0.016237	0.085152
96	MWPAL1	MSmelt11	0.014550	0.000001	0.000002	0.000002	0.000009	0.003997	0.017697
97	MWPAL5	MSmelt12	0.000011	0.000009	0.097317	0.000001	0.000019	0.000002	0.140069
98	MWPWI3	MDvEmi07	0.00006	0.00614	0.35077	0.02128	0.00461	0.00007	0.54409
99	MWPSP4	MSmelt14	0.019378	0.000001	0.000002	0.000886	0.036388	0.003519	0.015113
100	MWPFA5	MSmelt15	0.000011	0.000981	0.059673	0.000010	0.000050	0.001083	0.090976
101	MBPAL5	MVgBrn01	0.001944	0.000020	0.000001	0.000000	0.000005	0.000000	0.001262
102	MBPSP1	MVgBrn02	0.005816	0.000077	0.000005	0.000085	0.000125	0.000106	0.004364
103	MBPSP7	MSecOr12	0.0488	0.0014	0.0000	0.0060	0.9381	0.0102	0.0180
104	MBPFA2	MVgBrn04	0.001070	0.000002	0.000000	0.000000	0.000828	0.000431	0.000309
105	MLPWI4	MVgBrn05	0.000522	0.000000	0.004636	0.000000	0.000002	0.000000	0.005449
106	MLPWI5	MSecOr13	0.1518	0.0018	0.0000	0.0022	0.0459	0.0001	0.0216
107	MLPWI8	MVgBrn07	0.001362	0.000000	0.000631	0.000405	0.000003	0.000000	0.003038
108	**MLPSP2**	**MVgBrn08**	0.001213	0.000006	0.000375	0.000008	0.000036	0.000345	0.000575
109	MLPSU3	MVgBrn09	0.000009	0.000000	0.000000	0.000033	0.000013	0.000011	0.000931
110	**MLPSU6**	**MVgBrn10**	0.2170	0.0000	0.0000	0.0000	0.8364	0.0534	0.0000
111	MLPFA5	MVgBrn11	0.000243	0.000000	0.000000	0.000019	0.056693	0.000002	0.001589
112	**MSPAL6**	**MVgBrn12**	0.001270	0.000024	0.000000	0.000153	0.000001	0.000054	0.000765
113	MSPWI6	MVgBrn13	0.000910	0.000120	0.000000	0.000000	0.001261	0.000097	0.001275
114	MSPSP1	MVgBrn14	0.001402	0.000003	0.000000	0.000079	0.000007	0.000258	0.000688
115	**MSPSU6**	**MVgBrn15**	0.000005	0.000000	0.000001	0.000001	0.000011	0.000012	0.000108
116	MSPFA2	MVgBrn16	0.001033	0.000015	0.000000	0.000190	0.000001	0.000191	0.000392
117	MWPAL6	MVgBrn17	0.000505	0.000000	0.000000	0.000000	0.029331	0.000000	0.000001
118	MWPWI7	MGvEmi04	0.33444	0.00000	0.00004	0.12341	0.00062	0.00006	0.04811
119	**MWPSU8**	**MVgBrn19**	0.000044	0.000000	0.000000	0.000283	0.000001	0.000249	0.000158
120	**MWPFA6**	**MVgBrn20**	0.000001	0.000000	0.000000	0.000000	0.000001	0.000186	0.000612
121	MLPSP9	MDvEmi03	0.4876	0.0001	0.1331	0.0016	0.3461	0.0749	0.1154
122	MLPSU8	MDvEmi04	0.1807	0.0021	0.0000	0.0000	0.2089	0.0113	0.0489
123	MLPWI9	MColPP16	0.5520	0.0094	0.0049	0.0000	2.0596	0.1382	0.0001
124	MSPAL8	MColPP15	0.0425	0.0006	0.0000	0.0173	0.1453	0.0000	0.0197
125	MSPFA6	MSecOr18	0.0001	0.0090	0.0954	0.0010	0.0002	0.0000	0.2138
126	MWPFA2	MGvEmi07	0.0923	0.0000	0.0369	0.1123	0.0020	0.0347	0.0001
127	MWPSP7	MGvEmi05	0.008	0.007	0.063	0.001	9.791	0.000	0.000
128	MWPSU3	MGvEmi06	0.000	0.000	0.374	0.000	0.000	0.000	0.405
129	MWPWI6	MGvEmi03	0.09499	0.00002	0.00002	0.00330	0.50552	0.07081	0.22534
130	MSPWI1	MVgBrn27	0.0004	0.0000	0.0236	0.0000	3.6344	0.0000	0.0448
131	MSPWI3	MGvEmi09	0.1987	0.0003	0.0000	0.0000	0.0001	0.0000	0.0155

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