Appendix A

CSAPR-Type Analysis for 2008 Upwind State Highest Contribution to Average and Maximum Ozone Design Values at any Monitoring Site in up to 5 Downwind States using MATS

“Appendix_A_CSAPR_DVO3_5_States.xlsx” (0.4 Mb)

Cell B1 = Select Upwind State (Example for Nevada)

Cell B2 = Select NAAQS Threshold for Analysis (76 ppb for current NAAQS in example)

Cell B4 = Select Upwind State for Contributions (usually same as Cell B1)
States’ Contributions to Top 5 States Surrounding NEVADA, where DV is at or above 76.0 ppb Threshold

NEVADA’s Contributions to Top 5 States Surrounding NEVADA, where DV is at or above 76.0 ppb Threshold
Appendix B

State Contributions to Daily Maximum 8-Hour Ozone Concentrations on 10 Highest Modeled Ozone Days in 2008 by Monitoring Site

“Appendix_B_O3_10hi_Model_Days.xlsx” (20.0 Mb)

Sheet#1 = PiePlot

Cell B1 = State (Example for Nevada)

Cell B2 = County (Example for Clark County)

Cell B3 = Monitoring Site (Example for NV_Clar0021)

Cell B4 = Date of 10 Highest Modeled Ozone Days (Ranked 1 on 7/16/13 in example)
Sheet #2 = BarPlot

Cell B1 = Select State (Nevada in Example)

Cell B2 = Select County (Clark in Example)

Cell B3 = Select Monitoring Site (NV_Clark0021 in example)
Contributions to MDA8 Ozone [ppb]

Site: NV_Clark0021
Rank: 3 - 14 Jul, 2008
Total Ozone = 84.5 ppb
BC Ozone = 51.3 ppb (60.8%)

Top 10 MDA8 Ozone and Its Contributions at NV_Clark0021
Appendix C

Spatial Maps of State-Specific Anthropogenic Emissions Contributions to Highest and Fourth Highest Modeled Daily Maximum 8-Hour Ozone Concentrations during 2008 Greater than 76 (current NAAQS), 70, 65, 60 (potential future NAAQS) and 0 (maximum contribution) ppb across the 12 km WESTUS and 36 km CONUS Domains

“Appendix_C_Spatial_O3_Anthro_State.zip” (38.2 Mb)

Examples follow for Nevada and Fourth Highest DMAX8 Ozone
Appendix D

CSAPR-Type Analysis for 2008 Upwind State Highest Contribution to Annual PM$_{2.5}$ Design Values in up to Five Downwind States using MATS

“Appendix_D_CASAPR_DVannPM_5_States.xlsx” (12.6 Mb)

Plot 1—Up to 5 Downwind States with Maximum Total Annual PM2.5 DV Greater than Threshold with “Significant” Contribution
Cell B2 = Select Upwind State (Example for California)
Cell B3 = Select PM Species (Example for PM2.5)
Cell B4 = Select Annual PM$_{2.5}$ NAAQS Threshold for Analysis (12 µg/m$^3$ in Example)

Plot 2 – Total Concentration for Selected PM2.5 Species
Cell B4 = PM2.5 Species (PM2.5 in Example so same as Plot 1)

Plot 3 – Upwind State PM2.5 Contribution to Downwind State Annual PM2.5 DV
Cell B8 = Upwind State for Contribution (Example for California)

Plot 4 – Species Contributions from 17 Western States + Remainder
PM2.5 Contributions to Top 5 States Surrounding CALIFORNIA, where PM2.5 is at or above 12.00 ug/m3 Threshold

**Plot 1**

- AZ_Santa Cruz0004...
- #N/A
- #N/A
- #N/A
- #N/A

**Plot 2**

- AZ_Santa Cruz0004...
- #N/A
- #N/A
- #N/A
- #N/A
PM2.5 Contributions from CALIFORNIA to Top 5 States Surrounding CALIFORNIA, where PM2.5 is at or above 12.00 ug/m3 Threshold

Species Contributions from All 17 States to Top 5 States Surrounding CALIFORNIA, where PM2.5 is at or above 12.00 ug/m3 Threshold
Appendix E

State Contributions to Modeled Annual PM$_{2.5}$ Concentrations in 2008 by Monitoring Site

Appendix_E_Annual_PM_State_Clobrib.xlsx (23.8 Mb)

Cell B2 = State (Example for Colorado)

Cell B1 = Monitor in State (B2) (Example for Mesa Verde)
PM2.5 @ Mesa Verde National Park

- **NAT**
  - AZ: 0.39%
  - CA: 0.11%
  - CO: 0.09%
  - KS: 0.01%
  - ID: 0.05%
  - MT: 0.02%
  - OK: 0.00%
  - OR: 0.10%
  - WA: 0.02%
  - WY: 0.01%
  - ND: 0.00%
  - SD: 0.01%
  - UT: 0.40%
  - TX: 0.02%
  - NM: 0.19%

- **AGF**
  - AZ: 0.00%
  - CA: 0.01%
  - CO: 0.00%
  - KS: 0.00%
  - ID: 0.00%
  - MT: 0.00%
  - OK: 0.00%
  - OR: 0.00%
  - WA: 0.00%
  - WY: 0.00%
  - ND: 0.00%
  - SD: 0.00%
  - NE: 0.00%
  - NV: 0.00%
  - UT: 0.00%
  - TX: 0.00%
  - NM: 0.00%

- **RXF**
  - AZ: 0.43%
  - CA: 0.01%
  - CO: 0.12%
  - KS: 0.00%
  - ID: 0.06%
  - MT: 0.02%
  - OK: 0.00%
  - OR: 0.06%
  - WA: 0.02%
  - WY: 0.03%
  - ND: 0.00%
  - SD: 0.00%
  - NE: 0.00%
  - NV: 0.00%
  - UT: 0.00%
  - TX: 0.00%
  - NM: 0.24%

- **WLF**
  - AZ: 0.05%
  - CA: 1.30%
  - CO: 0.14%
  - KS: 0.00%
  - ID: 0.02%
  - MT: 0.00%
  - OK: 0.00%
  - OR: 0.02%
  - WA: 0.00%
  - WY: 0.01%
  - ND: 0.00%
  - SD: 0.00%
  - NE: 0.00%
  - NV: 0.05%
  - UT: 0.05%
  - TX: 0.00%
  - NM: 0.01%

- **ANT**
  - AZ: 2.23%
  - CA: 1.64%
  - CO: 9.63%
  - KS: 0.03%
  - ID: 0.26%
  - MT: 0.04%
  - OK: 0.03%
  - OR: 0.11%
  - WA: 0.09%
  - WY: 0.41%
  - ND: 0.01%
  - SD: 0.00%
  - NE: 0.02%
  - NV: 0.45%
  - UT: 2.24%
  - TX: 0.25%
  - NM: 5.65%

- **Other** 6.19%

- **Eastern US** 0.14%

- **Canada** 0.17%

- **Mexico** 0.97%

PM2.5 @ Mesa Verde National Park 4.85ug/m3
Appendix F

CSAPR-Type Analysis for 2008 Upwind State Highest Contribution to 24-Hour PM$_{2.5}$ Design Values in up to Five Downwind States using MATS

“Appendix_F_CSAPR_DV24PM_5_States.xlsx” (12.8 Mb)

Plot 1—Up to 5 Downwind States with Maximum Total 24-Hour PM$_{2.5}$ DV Greater than Threshold with “Significant” Contribution
   Cell B2 = Select Upwind State (Example for California)
   Cell B3 = Select PM Species (Example for PM$_{2.5}$)
   Cell B4 = Select 24-Hour PM$_{2.5}$ NAAQS Threshold for Analysis (35 µg/m$^3$ in Example)

Plot 2 – Total Concentration for Selected PM$_{2.5}$ Species
   Cell B4 = Select PM2.5 Species (Organic Carbon in Example)

Plot 3 – Upwind State PM$_{2.5}$ Contribution to Downwind State 24-Hour PM$_{2.5}$ DV
   Cell B8 = Upwind State for Contribution (Example for California)

Plot 4 – Species Contributions from 17 Western States + Remainder
PM2.5 Contributions to Top 5 States Surrounding CALIFORNIA, where PM2.5 is at or above 35.00 ug/m3 Threshold

Plot 1

Organic PM Contributions to Top 5 States Surrounding CALIFORNIA, where PM2.5 is at or above 35.00 ug/m3 Threshold

Plot 2
PM2.5 Contributions from CALIFORNIA to Top 5 States Surrounding CALIFORNIA, where PM2.5 is at or above 35.00 ug/m3 Threshold

Species Contributions from All 17 States to Top 5 States Surrounding CALIFORNIA, where PM2.5 is at or above 35.00 ug/m3 Threshold
Appendix G

Spatial Maps of Modeled State-Specific Anthropogenic Emissions Contributions to Highest (1stmax) and Eighth (8thmax) Highest 24-Hour PM$_{2.5}$ Concentrations during 2008 greater than 35 (current NAAQS), 30, 25, 20 and 0 (maximum contribution) µg/m$^3$.

“Appendix_G_Spatial_24PM_Anthro_State.zip” (13.4 Mb)

Example follow for 8th High 24-Hour PM$_{2.5}$ and California
Appendix H

Source Category-Specific Contributions to 8-Hour Ozone Design Values at Monitoring Sites in the 4 km Detailed Source Apportionment Domain (DSAD) using MATS

Cell B1 = Select Monitor in the DSAD Domain (CO_Jefferson0006 in example)

Maximum Contribution to 8-Hour Ozone Design Values in Each DSAD State (CO, NM, UT and WY) due to Major Source Categories using MATS

Cell N1 = Source Category Selected (Upstream Oil and Gas in example)

Cell N2 = Rank 1 through 4 (Example selects state with highest O&G contribution)

Cell N4 = Identifies monitor with highest source category contribution (CO_Weld0009 in example)

“Appendix_H_DVO3_4kmDSAD_SrcCat.xlsx” (0.09 Mb)
Appendix I

Source Category-Specific Contributions to Ten Highest Modeled Daily Maximum 8-Hour Ozone Concentrations at Monitoring Sites in the 4 km Detailed Source Apportionment Domain (DSAD)

“Appendix_I_10hiO3_4kmDSAD_SrcCat.xlsx” (2.3 Mb)

Cell B1 = Select Monitor in the DSAD Domain (CO_Jefferson0006 in example)

Cell B2 = Select Rank 1 through 10 (2 in example that gives 08/05/08 date)
Contributions to MDA8 Ozone [ppb] at CO_Jefferson0006
Rank (2) 08/05/08; Model = 75.8 ppb; Obs = 71.6 ppb; Bias = +5.8%; BC = 23.0 ppb (30.4%)
Appendix J

Source Category-Specific Contributions to Annual PM$_{2.5}$ Design Values at Monitoring Sites in the 12 km WESTUS Domain using MATS

“Appendix_J_DVannPM_12kmWESTUS_SrcCat.xlsx” (1.8 Mb)

Cell B1 = Select Monitor in the 12 km WESTUS Domain for Contributions to Annual PM$_{2.5}$ Design Value (AZ_SantaCruz0004 in example)

Cell B2 = Select Source Category that will give second plot of contributions for that Source Category (Mobile in example)

Cell B3 = Select PM Species that will give third plot of contributions for that Species (EC in example)
Source Contribution to PM2.5
AZ_Santa Cruz0004
Total Annual PM2.5 = 12.9 ug/m3

Source Contribution to EC
AZ_Santa Cruz0004
Total Annual PM2.5 = 12.9 ug/m3
Total Annual EC = 0.2 ug/m3 (1.5%)

Species Composition of PM2.5 from Mobile
AZ_Santa Cruz0004
Total Annual PM2.5 = 12.9 ug/m3
Total Annual PM2.5 from Mobile = 0.8 ug/m3 (6.1%)
Appendix K

Source Category-Specific Contributions to Modeled Annual PM$_{2.5}$ Concentrations (µg/m$^3$) at Monitoring Sites in the 12 km WESTUS Domain

“Appendix_K_AnnPM_12kmWESTUS_SrcCat.xlsx” (4.0 Mb)

Cell B2 = Select State for Monitoring Site (Colorado in example)

Cell B1 = Select Monitoring Site (CO_ElPaso0011)

Cell D2 = Select PM Species for Source Apportionment Pie Chart (PM2.5 in example)

Cell F1 = Select Source Category for Additional Pie Chart (Mobile in example)
Appendix L

Source Category-Specific Contributions to 24-Hour PM$_{2.5}$ Design Values at Monitoring Sites in the 12 km WESTUS Domain using MATS

“Appendix_L_DV24PM_12kmWESTUS_SrcCat.xlsx” (2.0 Mb)

Cell B1 = Select Monitor in the 12 km WESTUS Domain for Contributions to 24-Hour PM$_{2.5}$ Design Value (AZ_SantaCruz0004 in example)

Cell B2 = Select Source Category that will give second plot of contributions for that Source Category (Mobile in example)

Cell B3 = Select PM Species that will give third plot of contributions for that Species (SO4 in example)
Source Contribution to PM2.5
AZ_Santa Cruz0004
Total Annual PM2.5 = 34.5 ug/m^3

Source Contribution to SO4
AZ_Santa Cruz0004
Total Annual PM2.5 = 34.5 ug/m^3
Total Annual SO4 = 0.9 ug/m^3 (2.7%)

Species Composition of PM2.5 from Mobile
AZ_Santa Cruz0004
Total Annual PM2.5 = 34.5 ug/m^3
Total Annual PM2.5 from Mobile = 2.0 ug/m^3 (5.8%)
Appendix M

Source Category-Specific Contributions to Ten Highest Modeled 24-Hour PM$_{2.5}$ Concentrations (µg/m$^3$) at Monitoring Sites in the 12 km WESTUS Domain

“Appendix_M_24PM_12kmWESTUS_SrcCat.xlsx” (4.0 Mb)

Cell B2 = Select State for Monitoring Site (Arizona in example)

Cell B1 = Select Monitoring Site (Hopi Point #1 in example)

Cell D1 = Selection One of 10 Highest Dates (Rank #1 on 04/29/08 in example)

Cell D2 = Select PM Species for Separate Source Category Apportionment Pie Chart (PM2.5 in example)

Cell F2 = Select Source Category for Additional Pie Chart (Fires in example)
Source Contribution to Daily PM2.5 in ug/m3
Hopi Point #1, (1) 04/29/08
PM2.5 = 19.13 ug/m3; PM2.5 = 19.13 ug/m3 (100.0%)

Composition of Daily PM2.5 in ug/m3
Hopi Point #1, (1) 04/29/08
PM2.5 = 19.13 ug/m3

Composition of Daily PM2.5 from Fires in ug/m3
Hopi Point #1, (1) 04/29/08
PM2.5 = 19.13 ug/m3; Fires = 9.10 ug/m3 (47.6%)

Source Contribution and Species Composition of Daily PM2.5 (19.1 ug/m3)
Hopi Point #1, (1) 04/29/08
Appendix N

Annual Sulfur and Nitrogen Wet and Dry Deposition at IMPROVE Monitors by Species

“Appendix_N_N&S_Deposition_IMPROVE_SrcCat.xlsx” (1.3 Mb)

First Pie Chart

Cell B1 = Select IMPROVE Monitoring Site (ROMO1 in example)

Cell B2: Select whether want Wet, Dry or Total Deposition (Total in example)

Second Pie Chart

Cell D1 = Select IMPROVE Monitoring Site (ROMO1 in example)

Cell D2 = Select whether want Sulfur or Nitrogen (Sulfur in example)

Cell D3 = Select whether want by Wet and Dry or by Total Deposition
Total Nitrogen = 4,394.3 g-N/ha

Annual Total (Dry+Wet) Deposition of Nitrogen
Rocky Mountain National Park

<table>
<thead>
<tr>
<th>Name</th>
<th>Total Nitrogen (g-N/ha)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD_NO</td>
<td>16.4</td>
<td>0%</td>
</tr>
<tr>
<td>TD_NO2</td>
<td>196.6</td>
<td>4%</td>
</tr>
<tr>
<td>TD_NO3</td>
<td>4.8</td>
<td>0%</td>
</tr>
<tr>
<td>TD_N2O5</td>
<td>64.7</td>
<td>1%</td>
</tr>
<tr>
<td>TD_HNO3</td>
<td>1984.6</td>
<td>45%</td>
</tr>
<tr>
<td>TD_HONO</td>
<td>1.6</td>
<td>0%</td>
</tr>
<tr>
<td>TD_PAN</td>
<td>69.5</td>
<td>2%</td>
</tr>
<tr>
<td>TD_PANX</td>
<td>26.5</td>
<td>1%</td>
</tr>
<tr>
<td>TD_NTR</td>
<td>116.8</td>
<td>3%</td>
</tr>
<tr>
<td>TD_PNA</td>
<td>2.0</td>
<td>0%</td>
</tr>
<tr>
<td>TD_NH3</td>
<td>557.6</td>
<td>13%</td>
</tr>
<tr>
<td>TD_PNO3</td>
<td>307.3</td>
<td>7%</td>
</tr>
<tr>
<td>TD_PNH4</td>
<td>1045.9</td>
<td>24%</td>
</tr>
<tr>
<td>TD_HNO3</td>
<td>1984.6</td>
<td>45%</td>
</tr>
</tbody>
</table>

Total Sulfur = 1,651.4 g-S/ha

Annual Total of Sulfur Deposition
Rocky Mountain National Park

<table>
<thead>
<tr>
<th>Name</th>
<th>Total Sulfur (g-S/ha)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD_SO2</td>
<td>164.0</td>
<td>10%</td>
</tr>
<tr>
<td>DD_PSO4</td>
<td>152.2</td>
<td>9%</td>
</tr>
<tr>
<td>DD_SULF</td>
<td>0.7</td>
<td>0%</td>
</tr>
<tr>
<td>WD_SO2</td>
<td>1.3</td>
<td>0%</td>
</tr>
<tr>
<td>WD_PSO4</td>
<td>1333.2</td>
<td>81%</td>
</tr>
<tr>
<td>WD_SULF</td>
<td>0.0</td>
<td>0%</td>
</tr>
</tbody>
</table>
Appendix O

Western State-Specific Modeled Contributions to Visibility Impairment at IMPROVE Monitoring Sites for Modeled Worst (W20) and Best (B20) 20% Days during 2008

“Appendix_O_Vis_FLAG_IMPROVE_State-xlsm” (3.0 Mb)

Cell B1 = Path where site-specific .crv files are stored

Cell B7 = State for monitor desired (Arizona in example)

Cell B6 = Monitoring Site in State (Hopi Point in example, GRCA)

Once a new monitoring site is selected data needs to be imported through the pink “Import Data” button

Cell B5 = Select whether want W20 or B20 days (W20 in example)

Cell B4 = Select individual day or average for display (avgW20 in example)
Pie Chart displays are just for the 17 western states
Total extinction without Rayleigh is in cell L8 (29.9 Mm\(^{-1}\) in example)
Background Sources (i.e., EUSA, Mexico, Canada, Off-Shore and SOA) extinction is in cell L10 (11.1 Mm\(^{-1}\))
Boundary Condition (BC) contribution is in plots (9.7 Mm\(^{-1}\) in example)
Pie Chart breaks down 17 state contributions to extinction either by Source Category and Species (left plot) or by State and Species (right plot). Three Source Categories are used:
  o NAT = Natural Emissions (Biogenic, Lightning, Sea Salt and WBD)
  o WLF = Wild Fires
  o CON = Controllable Emissions (Anthropogenic and Rx and Ag fires)
Contribution to Total Extinction (Mm-1) at Hopi Point #1, W20 = 8.99 DV, avgW20

Total Extinction = 29.9 (Mm-1), Haze Index = 10.7 DV
BC = 9.7 Mm-1 (32.5%), 4.6 DV (43.1%)