**Table 1.** MPE products based on recommendations from EPA’s guidance document[[1]](#footnote-1) and mappings to current or planned visualization tools on the Intermountain West Data Warehouse (IWDW). Xs in the last three columns indicate whether the MPE “task” is handled exclusively by the modeling group, or if additional MPE “products” are generated by AMET (and served on the IWDW MPE plot browser) and/or other IWDW visualization tools.

| MPE Doc (section) | MPE Doc (sub-section) | Parameter | Aggregation | Graphical product | Notes | External dataset | Modeling Group | AMET | IWDW |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BCs |  |  |  |  |  |  |  |  |  |
|  | Global Model |  |  |  |  |  |  |  |  |
|  | a |  |  |  | MPE review |  | x |  |  |
|  | b |  |  |  | PGM Inert simulation |  | x |  |  |
|  | Quantitative BC assessment |  |  |  |  |  |  |  |  |
|  | a |  |  |  | PGM reactive tracer simulation - PSAT |  | x |  |  |
|  | b |  |  |  | PGM chem. simulation w/o U.S. anthro. emiss. |  | x |  |  |
|  | c |  |  |  | Full PGM chem & emis. |  | x |  |  |
| Emissions |  |  |  |  |  |  |  |  |  |
|  | QA checks |  |  |  |  |  |  |  |  |
|  | . | Inventory data |  |  | Checking data codes |  | x |  |  |
|  | . | Inventory data |  |  | Point vs. nonpoint reconciliation, etc. |  | x |  |  |
|  | . | Inventory data | Rankings by pollutant |  | Inventory intercomparisons; new DW ERT feature |  |  |  | [ERT](http://views.cira.colostate.edu/tsdw/Emissions/ReviewTool.aspx) |
|  | . | Inventory data | Mapping by SCC, SCC groupings, county level, differences between inventories | Graphical display: map | Look for spatial inconsistencies; new DW GIS tool |  |  |  | GIS |
|  | . | Inventory data | Inventory and regional comparisons | Absolute and percent difference | Inventory intercomparisons; new DW ERT feature |  |  |  | ERT |
|  | Recommended analyses |  |  |  |  |  |  |  |  |
|  | 1.a | SMOKE sectors |  |  | Check inventory data codes, SMOKE logs, etc. |  | X |  |  |
|  | 1.b | SMOKE merged |  |  | Check SMOKE logs, post-merge domain totals, etc. |  | X |  |  |
|  | 2 | Point and nonpoint sources |  |  | Check proper source identification, look for double counting, etc. |  | X |  |  |
|  | 3 | All source categories | annual, by source category, by county | Spatial plots with county level pie chart overlays for each source category | See Zac’s [example](http://vibe.cira.colostate.edu/wiki/Attachments/Images/UT_AQ_3SAQS_B11a_VOC.png); [fig 1](http://vibe.cira.colostate.edu/wiki/Attachments/planning%20documents/WSAQS_Emissions_Figures_10232015.pdf); new DW GIS feature; include relevant layers (identify key layers, e.g. monitoring sites, etc.) |  |  |  | GIS |
|  | 4 | All sectors | Annual, by source category, by county | Bar plots | Handled by [ERT](http://views.cira.colostate.edu/tsdw/Emissions/ReviewTool.aspx). Current aggregations are annual by parameter, source category, by state, county, SCC. [fig 2](http://vibe.cira.colostate.edu/wiki/Attachments/planning%20documents/WSAQS_Emissions_Figures_10232015.pdf) |  |  |  | ERT |
|  | 5 | All sectors | Annual, by SCC | Tabulated | Handled by ERT (current default sort for SCC table is desc. by emissions magnitude). Is there a need for additional displays? [table 1](http://vibe.cira.colostate.edu/wiki/Attachments/planning%20documents/WSAQS_Emissions_Figures_10232015.pdf) |  |  |  | ERT |
|  | 6 | Spatial, temporal, and chemical allocations | by source category by pollutant | Pie chart | ancillary emissions data. How is QA handled now? |  | X |  |  |
|  | Additional analyses |  |  |  |  |  |  |  |  |
|  | 1 | RTOG/TOG |  | Bar, spatial, pie charts | VOC Reactivity; could consider MIR values.  Bar, spatial plot [fig. 3](http://vibe.cira.colostate.edu/wiki/Attachments/planning%20documents/WSAQS_Emissions_Figures_10232015.pdf) |  | x |  |  |
|  | 2 | Spatial, temporal, and chemical allocations |  | Plots and tables | how is this different for #6, above. Add tables? |  | X |  |  |
|  | 3 | All pollutants | Inventory intercomparisons | a. Bar plots of annual emissions,  b.trends tables,  c.bar plots of differences by state,  d.bar plots of changes from inventory years,  e.side-by-side pie charts of SCC contributions by pollutant and region | a, c in ERT  d in ERT if scenario intercomparisons are enabled.  New DW ERT feature to add trends (b), side-by-side pie charts (e).  Examples:  [WAQS examples, Fig 5, Table 2](http://vibe.cira.colostate.edu/wiki/Attachments/planning%20documents/WSAQS_Emissions_Figures_10232015.pdf);  WAQS wiki - [SMOKE 2011a emissions maps](http://vibe.cira.colostate.edu/wiki/wiki/1030" \l "Emissions-Maps) |  |  |  | ERT |
| MET |  |  |  |  |  |  |  |  |  |
|  | Recommended statistical analyses |  |  |  |  |  |  |  |  |
|  | 1 | temp., mixing ratio, wind speed and dir., precip. |  | Stats: n, mean, MB/E, NMB/E, MFB/E, r |  |  | X |  |  |
|  | 2 | temp., mixing ratio, wind speed and dir., precip. |  | Stats: n, mean, MB/E, NMB/E, MFB/E, r | Filter for high pollution episodes for O3 and PM2.5 |  | X |  |  |
|  | Recommended graphical analyses |  |  |  |  |  |  |  |  |
|  | 1 | temp., mixing ratio, wind speed and dir., precip. | Hourly, model-to-obs at individual monitoring sites | Time series | Identify sites w/ good/poor model performance  Have ability to look at model performance for neighboring grid cells. |  |  | x |  |
|  | 2 | temp., mixing ratio, wind speed and dir., precip. | Hourly, model-to-obs at individual monitoring sites | Scatter plots | Assess model performance across a range of magnitudes |  |  | x |  |
|  | 3 | temp, mixing ratio, wind speed and dir., precip. | Hourly, model & obs | Spatial plots | Look for crop circles produced by nudging. |  |  | x |  |
|  | 4 | temp., potential temp., wind speed and dir. | Model & obs | Vertical profiles | Assess atmos. profiles and BL heights |  |  | x |  |
|  | 5 | cloud cover and precip | Daily or monthly ave | Spatial plots |  | PRISM |  | x |  |
|  | 6 | albedo and snow depth | Winter daily and monthly | Spatial plots | Assess snow depth and placement in model |  |  | x |  |
|  | 7 | PBL height | Model & obs | Time series | Diurnal cycle |  |  | x |  |
|  | Additional graphical analyses |  |  |  |  |  |  |  |  |
|  | 1 | temp, mixing ratio, wind speed and dir., precip. | Hourly model-to-obs | Q-Q, Box and Whisker | Assess model dynamic range |  |  | x |  |
|  | 2 | SW downward radiation | Model & obs | Time series |  | SURFRAD, ISIS |  | x |  |
| PGM |  |  |  |  |  |  |  |  |  |
|  | Recommended statistical analyses for O3 and O3 Precursors |  |  |  |  |  |  |  |  |
|  | 1 | O3 | Hourly, MDA8 | Stats: n, mean, MB/E, NMB/E, MFB/E, r |  |  |  | x |  |
|  | 2 | O3 | Hourly, MDA8 > thresholds | Stats: n, mean, MB/E, NMB/E, MFB/E, r | e.g. > 60ppb  create custom report on DW? |  |  | x | Report |
|  | 3 | O3 precursors | Daily, monthly, model-to-obs | Stats: n, mean, MB/E, NMB/E, MFB/E, r | Compare at sites with O3 precursor obs. (NOx, NOy, VOC, speciated VOC, HNO3, NO, NO2, PAN, CO, CH4, SO2, NH3) | 2014 DISCOVER-AQ, FRAPPE, BAO, others? |  | x |  |
|  | 4 | O3 and precursors | Geographic/ temporal subsets | Stats: n, mean, MB/E, NMB/E, MFB/E, r | Possible GIS front end to browse AMET generated graphics? (e.g. 12km domain, 4km domain). Do we want to consider dynamic spatial aggregations (e.g custom box, county, etc.?) |  |  | x | GIS |
|  | Recommended graphical analyses for O3 |  |  |  |  |  |  |  |  |
|  | 1 | O3 | Hourly, MDA8 model & obs | Time series | Some functionality on DW MTO tool. See notes[[2]](#footnote-2) |  |  |  | [MTO](http://views.cira.colostate.edu/tsdw/Modeling/ModelObsComparison_IWDW.aspx) |
|  | 2 | O3 | Hourly, MDA8 model-to-obs, spatial aggregations | Scatter plots | Assess model performance across a range of values/regions. New chart option on DW MTO? How to handle spatial aggregation? |  |  |  | MTO |
|  | 3 | O3 | MDA8 model and obs | Spatial plots | Assess model performance on particular days (e.g. relevant to NAAQS issues)  [TCEQ CMAS poster](https://www.cmascenter.org/conference/2015/slides/boyer_interactive_photochemical_2015.pdf) |  |  |  | GIS |
|  | 4 | O3 | model and obs | Vertical profiles | Assess O3 representation aloft and vertical transport | Ozonesondes |  | x |  |
|  | Additional graphical analyses for O3 |  |  |  |  |  |  |  |  |
|  | 1 | O3 bias | Hourly, MDA8 model-to-obs | Box plots | New chart option on DW MTO? |  |  | x |  |
|  | 2 | O3 | Hourly, MDA8 | Q-Q plots | New chart option on DW MTO? |  |  | x |  |
|  | 3 | O3 | Hourly model and obs at individual monitoring sites | Time series | Flag sites with poor performance. This is not in MPE doc, but maybe spatial maps of stats (e.g. r, NMB)? |  |  | x | MTO |
|  | 4 | O3 | Hourly, model and obs | Spatial maps | Identify specific hours/locations with good MP |  |  | X | GIS |
|  | 5 | O3 | model and obs, spatial/ temporal subsets | Spatial maps | Assess O3 formation under certain conditions (e.g. w/ snow cover). Good candidate for dynamic GIS app. |  |  | x | GIS |
|  | Recommended statistical analyses for total PM2.5 and PM2.5 components |  |  |  |  |  |  |  |  |
|  | 1 | PM2.5 total, speciated | Daily, monthly | Stats: n, mean, MB/E, NMB/E, MFB/E, r | Use RCFM or gravimetric PM2.5 for obs? |  |  | x |  |
|  | 2 |  | Geographic/ temporal subsets | Stats: n, mean, MB/E, NMB/E, MFB/E, r | Possible GIS interface to set of AMET generated graphics? (e.g. 12km domain, 4km domain). Do we want to consider dynamic spatial aggregations (e.g custom box, county, etc.?) |  |  | x | GIS |
|  | Recommended graphical analyses for total PM2.5 and PM2.5 components |  |  |  |  |  |  |  |  |
|  | 1 | PM2.5 tot, speciated | Daily; at monitoring sites | Time-series | Include NH3 from AMON where possible | AMON, speciation networks |  | x | MTO |
|  | 2 | PM2.5 tot, speciated | model-to-obs, daily; at monitoring sites | Scatter plots | New chart option on DW MTO? |  |  | x | MTO |
|  | 3 | PM2.5 tot, speciated | model-to-obs, hourly, 24hr total | Q-Q plots | New chart option on DW MTO? |  |  | x | MTO |
|  | 4 | PM2.5 tot | hourly, 24hr total | Bulge plots | New chart option on DW MTO? |  |  | x | MTO |
|  | Recommended Statistical analyses for SO4, NO3, and NH4 deposition |  |  |  |  |  |  |  |  |
|  | 1 | Wet and dry dep | model and obs, weekly | spatial | Units (rate or total dep)? New DW GIS feature? | NADP, CASTNet |  | x | GIS |
|  | 2 | wet dep | model and obs, weekly and seasonal at monitoring site | scatter | Include dry dep? |  |  | x | MTO |
|  | PGM diagnostic evaluation |  |  |  |  |  |  |  |  |
|  | Indicator ratios | VOC/NOx, etc. |  |  |  |  | x |  |  |
|  | Process analysis | O3, O3 production rates, etc. |  |  | Compare processes for chemical regimes, e.g. NOx limited |  | x |  |  |

1. Recommendations for Evaluating the Performance of the WSAQS Photochemical Grid Model Platform, August 17, 2015. [PDF](http://vibe.cira.colostate.edu/wiki/Attachments/Modeling/FINAL_Recommended_PGM_MPE_Analyses_WSAQS_v08172015.pdf) [↑](#footnote-ref-1)
2. O3 1hr, 8hr max (single and 9 cell) available for AQS and CASTNet daily networks. W126 available for AQS daily. Difficult to discern which sites have data; would be helpful to show ‘n’ (number of sites) on by-network chart data table. Does by-network chart bring in all available data? Can DW develop a GIS that shows available obs at monitoring sites? [↑](#footnote-ref-2)