## Minutes for the 2016 Scientific, Technical & Modeling Peer Review (STMPR) Advisory Group Meeting # 6 Wednesday, May 25th, 2016 at 1:30 PM

# 1. Welcome and Meeting Purpose

Sang-Mi Lee, program supervisor of the Air Quality Modeling/Emissions Inventory Section of SCAQMD's Planning, Rule Development and Area Sources Division, called the meeting to order at 1:33 PM. She stated that SCAQMD staff is getting close to wrapping up the modeling effort for the 2016 AQMP and has a result that is almost ready to release to the public. She then asked for self-introductions of the Advisory Group members, audience, and SCAQMD staff. The minutes from the last meeting were approved due to the absence of any questions or comments of the committee.

# 2. 2016 AQMP Draft Model Runs: Performance Evaluation and RRF Day Selections

Sang-Mi Lee presented the results of the draft model runs. The presentation is available online at: <u>http://www.aqmd.gov/docs/default-source/Agendas/STMPR-Advisory-Group/may-</u>2016/mod/2\_draftruns.pdf?sfvrsn=8. The presentation gave an overview of the WRF model performance. Wind Speed and humidity are typically under-predicted, whereas temperature is predicted well. A performance analysis was conducted to assess model/measurement agreement in various regions throughout the Basin. The urban receptor region generally shows the lowest bias in predicted wind speeds, whereas prediction of wind speeds in the San Fernando Valley and the Coachella Valley show the highest gross bias. A qualitative analysis of the U and V components of the wind in Riverside indicate that the winds are stronger during the midafternoon and summer months in both the measurements and modelling data. Winds at LAX are generally slower, but the same temporal patterns are exhibited.

The presentation then evaluated the base-year ozone prediction performance. In Redlands, the model predicts day-peak concentrations relatively well, but fails to completely capture concentrations during two periods in early July and early September. Ozone prediction performance in Fontana is also good, with the exception of a period in early July, early September, and late August. This is likely due to the inability of WRF to accurately capture the meteorology of monsoonal periods. Density scatter plots of observed vs. predicted 8-hour ozone concentrations grouped by region show a one to one dependence. Some areas are slightly skewed about the one to one line. Plots showing observed vs. predicted daily max 8-hour ozone exhibit reasonable correlation. Further evaluation of 8-hour ozone performance in each month shows that the model performs fairly well.

PM2.5 model prediction performance was then addressed. Comparison of an entire year of PM2.5 predictions and FRM measurements taken every third day in Mira Loma shows that predictions are generally accurate. Quarters 2 and 3 exhibit lower concentrations and less variability then Quarters 1 and 4. Evaluation of predictions and observations in Central Los Angeles reveal that model predictions are biased high. Predictions at inland stations are more accurate. Measured species concentrations at the 4 SASS sites were then presented. The organic

fraction was calculated with the SANDWICH method. A predicted/observed comparison of sulfate, nitrate, elemental carbon, and organic carbon mass for each quarter of the years was then presented for Central Los Angeles and Riverside.

Xinqiu Zhang then presented the methodology used to develop the air toxic inventory. Comparison of emissions in base and future years reveal slight increases in stationary source toxics emissions. However, it is expected that mobile source emissions will decrease in future years. Toxic emissions normalized by cancer potential was then presented. Sang-Mi Lee clarified that the baseline inventory incorporates control measures that are already adopted. The control scenarios are associated with NOx and VOC reductions. Controls further accelerate toxic reductions. Xinqiu Zhang explained that toxic emission contributions are consistent with NOx emission contributions. The MATES IV inventory was then compared to the 2016 AQMP inventory; differences are related to modifications in off-road sources such as ocean-going vessels and harbor craft.

# **Comments/Questions from STMPR Advisory Group and Staff Response**

- Rob Farber asked what the number should read on the last row in the table on slide 3. Sang-Mi responded that the number represents root-mean-squared error and should be around 3.6.
- Ralph Morris asked if the bars on slide 17 were observations. Sang-Mi Lee confirmed that they are. He then asked if the model is evaluated based on species fraction. Sang-Mi Lee stated that the species fractions are relevant for the RRF calculation.
- Ralph Morris commented that it doesn't make sense to evaluate model performance based on species fraction. Scott Epstein confirmed that the bars in the plot on slide 18 represent species mass.
- Rob Farber stated that other researches find a dry bias from WRF predictions in California. Sang-Mi Lee stated that a dry bias is found on the coast and a wet bias is found in inland locations.
- Bill LaMarr asked for the definition of off-road sources used on slide 23. Xinqiu Zhang responded that the largest categories of off-road sources in the emission inventory are construction and mining equipment along with locomotives. Bill LaMarr then asked if the off-road source category includes federal sources. Xinqiu Zhang stated that Federal sources are such as locomotives, ships, and aircraft are included. Philip Fine commented that these sources can be broken down in any fashion desired. Xinqiu Zhang responded that the District has the equipment codes for each of these sources. Bill LaMarr then stated that parts of the on-road category are outside the jurisdiction of the SCAQMD. Xinqiu Zhang verified this statement.
- Ralph Morris then asked about adjustment of emissions from air toxics controls. Xinqiu Zhang responded that air toxics may be reduced at some emission sources without corresponding reductions in VOCs.
- Ralph Morris asked if toxics controls would help reduce VOC and NOx. Xinqiu Zhang stated that some reductions would increase VOC or NOx emissions such as coatings.

# 3. 1-Hour Ozone Modeling and RRF Calculations

Scott Epstein gave a presentation on the 1-hour ozone attainment demonstration. The presentation is available at: <a href="http://www.aqmd.gov/docs/default-source/Agendas/STMPR-Advisory-Group/may-2016/mod/3\_onehouro3.pdf?sfvrsn=4">http://www.aqmd.gov/docs/default-source/Agendas/STMPR-Advisory-Group/may-2016/mod/3\_onehouro3.pdf?sfvrsn=4</a>. The 1-hour design value was defined. Measurement data show that the 124.9 ppb standard was exceeded several times in 2012. Reseda, Santa Clarita, Glendora, Crestline, Fontana, Redlands, and Uplands all exceed the standard in 2012 when looking at 5-year weighted design values. The highest 1-hour ozone design values are seen in the San Fernando Valley and southwestern San Bernardino counties. This spatial profile is similar to the spatial distribution of 8-hour ozone concentrations. Details of the 8-hour and 1-hour attainment demonstration were explained. The top 3 highest days for 1-hour ozone were used to calculate the relative response factor to ensure that the responsiveness in the RRF reflects the behavior that we see on the days that determine the standard. Evaluation of the 2022 projected baseline design values shows that future design values are very close to the 1-hour attainment suggesting that the controls necessary for attainment of the 8-hour standards will likely lead to attainment of the 1-hour standard.

# **Comments/Questions from STMPR Advisory Group and Staff Response**

- Rob Farber asked if the one-hour ozone standard is still a standard. Sang-Mi Lee responded that the standard has been revoked, but we still must meet the standard. Philip Fine commented that any commitments we made in past approved SIPs are still commitments that we must meet. The 2016 AQMP is aimed at revisiting the attainment demonstration we conducted 3 years ago with updated emissions and meteorology. Rob Farber asked if there is still a timeline for meeting the standard. Sang-Mi Lee stated that we still have a timeline. Philip Fine stated that we must meet the standard by 2022. The largest commitment under the previous SIP is a black box commitment of 150 TPD.
- Ralph Morris asked if the design value definition was defined to be consistent with the 8hour criteria because it is not in any guidance. Carol Bohnenkamp said the SCAQMD has requested an update to the 1-hour guidance. Since there are not many requests for onehour guidance, EPA has decided to not update the guidance, but instead, will work closely with SCAQMD on a case-by-case basis.
- Rob Farber asked if any other air basins do not attain the 1-hour standard. CARB staff stated that San Joaquin Air Basin has submitted a claim of attainment to EPA.
- Rob Farber asked if we had more exceedances in the past two summers due to higher temperatures. Kevin Durkee commented that the number of exceedances were consistent with past years. Philip Fine then stated that the hottest days are not our worst ozone days since hot weather tends to promote more mixing.
- Rob Farber stated that the goal in this analysis is to determine the most cost effective way to meet the standard since the 1-hour standard is based on the number of exceedances in a three year period. Sang-Mi Lee asked Rob Farber to hold the comment until after presentation of the attainment scenario because reductions necessary to achieve the 8-hour standards will ensure attainment of the 1-hour standard without additional 1-hour controls.
- Ralph Morris stated that the EPA has done a lot of work looking at the effects of the number of days used for the RRF calculation on 8-hour ozone. They determined that the

analysis is more robust when using multiple days, but you do not want to use too many days because the model becomes less responsive. Ralph Morris suggested that SCAQMD staff could do a sensitivity analysis looking at predicted design values with the selection of different numbers of days. Philip Fine stated that SCAQMD staff has looked at different numbers of days and has found that the model becomes less responsive when more days are used.

- Carol Bohnenkamp said that EPA staff did not have any objections to this approach when presented initially without any details.
- John DeMassa stated that selection of 3 days are reasonable. The only hesitation is that we should ensure that the meteorological conditions that result in 1-hour exceedances are captured in the 3 days used for the RRF. Philip Fine asked if one hour exceedances typically occur during the same meteorological conditions. Kevin Durkee stated that exceedances occur in days with week offshore winds with strong high pressure.
- Rob Farber asked if exceedances occur in late October. Sang-Mi Lee stated the exceedances occur throughout the summer.
- Rob Farber said that it would be interesting to see how the model performs on the stagnant days. Tom Williams suggested that SCAQMD staff plots wind speed vs. ozone concentration. Sang-Mi Lee stated that looking at ventilation index along with ozone concentrations is informative. In general, model performance is fairly good and captures weather patterns in South Coast Air Basin well. Scott Epstein stated that the RRF approach cancels out many of the systematic biases. Sang-Mi Lee then stated that for the 2012 AQMP, the model predicted the highest 1-hour ozone days well on days with stagnant winds. However, the model does not predict monsoonal conditions well.

### 4. Updated Carrying Capacity Estimations and Attainment Demonstrations

Sang-Mi Lee recapped the predictions of future ozone design values in a presentation available at: http://www.aqmd.gov/docs/default-source/Agendas/STMPR-Advisory-Group/may-2016/mod/4 carryingcapacity.pdf?sfvrsn=4. 2023 8-hour isopleths were presented for Redlands, Fontana, Glendora, Azusa, and Central Los Angeles. Redlands is the design site. Approximately 170 TPD of NOx emissions will lead to attainment in Redlands. However, more reductions are needed to attain the 1997 8-hour standard in Fontana. Fontana is the future design site with a carrying capacity of approximately 150 TPD. These carrying capacities assume no VOC reductions, but co-reductions in VOCs from NOx control may increase NOx carrying capacity. In the past, Glendora was very resistant to emission reductions. However, the new emission inventories result in a higher carrying capacity in Glendora. Azusa is close to Glendora, but future ozone design values are predicted to be significantly less than the design values in Glendora. The 2023 baseline emissions show attainment in Central Los Angeles. NOx reductions will lead to a temporary increase in ozone concentrations, but will not exceed the standard. The VOC, NOx, and CO reductions by emissions source were then identified. Spatial projections of design values for 2012 and 2023 baseline and controlled emission scenarios. Fontana has the highest 2023 projected design value in the control scenario.

The attainment demonstration for the 2008 ozone standard was then presented. Isopleths in Redlands, Fontana, Glendora, Azusa, and Central Los Angeles were discussed. Fontana is the

design site in 2031 with a carrying capacity of approximately 100 TPD. Less than 20 TPD of reductions below the 2031 baseline will lead to attainment in Asusa. The VOC, NOx, and CO reductions by emissions source were then identified. The design value in Fontana is 74 ppb in the 2031 control scenario, giving approximately 2 ppb of flexibility with the final control measures. The projections of baseline 2023 design values from the 2012 and 2016 AQMP were compared. Projected design values differ due to changes in the attainment demonstration methodology and the emission inventory.

Isopleths for the 1-hour ozone standard were then presented. Attainment of the 1-hour standard is expected in 2022 in Redlands and Glendora with the baseline emissions scenario. Fontana will not attain the standard, but only slight reductions are needed to achieve attainment. Philip Fine commented that approximately 50 TPD of NOx reductions or 30 to 40 TPD of VOC reductions will lead to attainment. Sang-Mi Lee then stated that the 8-hr ozone plan will ensure 1-hour attainment.

Sang-Mi Lee then presented the attainment scenario for PM2.5. Projections indicate that the 24hour PM2.5 standard will be attained by 2019 in the absence of additional controls. However, annual PM2.5 will not meet the standard by 2021. With a bump-up to serious non-attainment status, it is projected that the Basin will meet the annual standard by 2025 with the presence of limited PM2.5 controls. The O3 attainment strategy cannot be applied directly for PM2.5 attainment because of the black box measures in the O3 strategy. Attainment of the annual standard may be possible when applying only the non-black box measures.

Marc Carreras-Sospedra then talked about the effects of drought on PM2.5 concentrations. An increase in 24-hour PM2.5 98<sup>th</sup> percentile coincides with a decrease in the number of rain days even though emissions decreased. Two multiple linear regression models were used to determine the contribution of the number of rain days to 24-hour PM2.5. These multiple linear regressions provide a rough estimate of the increase in PM2.5 that can be attributed to the drought. The "drought penalty" was estimated to be between 2 and 8  $\mu$ g/m<sup>3</sup> for the 24-hour PM2.5 standard and ~0.5  $\mu$ g/m<sup>3</sup> for the annual PM2.5 standard.

# **Comments/Questions from STMPR Group and Staff Response**

- David Rothbart asked how likely it is that all reductions in the control strategy outside the jurisdiction of the District are made. Philip Fine responded that the first step is to lay out how reductions will lead to attainment of the standard before having the policy discussions of how to get federal reductions or the money needed for incentive programs.
- Bill LaMarr asked where VOC reductions would come from. Philip Fine responded that the SCAQMD is not proposing any VOC reductions beyond the co-reductions arising from NOx control. Sang-Mi Lee then gave the example of VOC reductions arising from replacement of gasoline-powered small equipment with electric alternatives.
- Rob Farber asked how accurate the ozone isopleths are. Sang-Mi Lee responded that the first air quality forecasts were performed in Southern California. California started regional modeling before other locations. Projections from previous AQMPs are consistent with trends. The big picture is moving in the right direction. Philip Fine added that we can only use the best information at the time to model future air quality.

- Ralph Morris asked if the SCAQMD was worried about the PM2.5 design site moving around. Philip Fine responded that it has not moved around in the past, but the near-road site near Mira Loma may be the highest station in the future.
- Ralph Morris asked about local control measures. Philip Fine said that we are looking at three attainment scenarios, but we need to ensure that we attain the standard as soon as practicable and determine what O3-control measures are creditable for PM2.5 attainment. One idea, if possible, is to use all non-black-box O3 control measures for PM2.5 attainment and use the open-fired charbroiler measure to serve as a contingency measure.
- Rob Farber commented that he likes the idea of using the number of days of rain. He commented that winter rain keeps the soil moist for a longer period of time than in the summer. Marc Carreras commented that the instability that coincides with rainfall has a much larger effect than the contribution towards soil moisture. Payam Pakbin then commented that crustal material from soil and dust is only 10% of total PM2.5 mass. Rob Farber said that the District should work with the Metropolitan Water District to ensure that lawns, parks, and golf courses aren't replaced with bare ground if the drought continues.
- Bill LaMarr asked how the lawnmower exchange participation has tracked with the drought. Xinqiu Zhang responded that the lawnmower exchange is supply-limited, rather than a function of demand.

# 5. CARB's Modeling for the South Coast Air Basin

Jeremy Avise said that they had hoped to have corroborative modeling available by the current meeting date but they move a bit slower than the SCAQMD modeling group. He said that corroboration is unprecedented for this AQMP. Sang-Mi has shared the modeling results and ARB has corroborated the information presented at today's meeting. ARB will continue to evaluate the carrying capacity with their updated emission inventory. They will provide updated boundary conditions. Sang-Mi Lee commented that ARB modeling serves as a weight-of-evidence for the SCAQMD modeling. Philip Fine said that the final updates from ARB will likely not arrive before the Draft AQMP is released, but staff anticipates that these changes will be small, on the order of ½ ppb or 1 TPD in the inventory and the strategy presented in the draft AQMP will not change significantly for the Final AQMP.

# **Comments/Questions from STMPR Group and Staff Response**

- Bill LaMarr asked if the ARB updates will come out during the comment period. Philip Fine said that the ARB updates will be incorporated into the SCAQMD modeling that will be used for the Final AQMP.
- Rob Farber asked how similar the modeling approaches are between the two agencies. Sang-Mi Lee responded that both approaches are the same, and are consistent with EPA guidance. Jeremy Avise said that ARB worked with SCAQMD three years ago to determine the model parameters that best reproduce behavior in the South Coast Air Basin to standardize the modeling between the two agencies.
- Rob Farber asked whether ARB and SCAQMD had more or less success in modeling the convergence zones in the Basin. Jeremy Avise responded that both ARB and SCAQMD

worked hard to determine the optimal meteorological parameters to accurately reflect the Basin. The selected meteorology performed best for the prediction of ozone.

• Rob Farber asked if attempts were made to reduce the grid size to 1 km. Sang-Mi Lee stated that we do not use a 1 km grid cell. She stated that there is a concern about the validity of the parameterization when using such a fine resolution. Jeremy Avise said ARB used 1 km grid cells to simulate the Basin and did not see an appreciable model performance improvement.

### 6. Other Business and Public Comment

Sang-Mi Lee asked the STMPR group if another meeting was needed. The group did not reach a consensus on this issue. Sang-Mi Lee then stated that the next meeting will be posted if necessary.

## **Comments/Questions from STMPR Group and Staff Response**

The meeting adjourned at approximately 12:05 PM.

## **MEMBERS PRESENT**

Ralph Morris, Ramboll Environ John DeMassa, California Air Resources Board Rob Farber, Consultant

### On the phone:

Carol Bohnenkamp, U.S. Environmental Protection Agency, Region IX Gabriella Pfister, NCAR/UCAR

### **PUBLIC PRESENT**

Tom Williams, Citizens Coalition for a Safe Community Scott Weaver, Environmental Resources Management Allyson Teramoto, Port of Long Beach Bill Lamarr, California Small Business Alliance David Rothbart, Los Angeles County Sanitation District Chenxia Cai, California Air Resources Board Jeremy Avise, California Air Resources Board

### SCAQMD STAFF

Sang-Mi Lee, Program Supervisor Scott Epstein, Air Quality Specialist Xinqiu Zhang, Air Quality Specialist Kevin Durke, Program Supervisor Payam Pakbin, Air Quality Specialist Anthony Oliver, Air Quality Specialist Elaine Shen, Program Supervisor Richard Carlson, Air Quality Specialist Philip Fine, Deputy Executive Officer, Planning, Rules, and Area Sources