

SOUTHEAST TEXAS PHOTOCHEMICAL MODELING TECHNICAL COMMITTEE

Meeting Summary
August 19, 2009

H-GAC Offices
3555 Timmons Avenue
Houston, Texas

Members and Guests Present:

Marise Textor, Susan Moore, Dan Baker, Rohit Sharma, Liz Hendler, Graciela Lubertino, J. Ben Finley, Lilly Wells, Catarina Cron, Erik Snyder, Jim Smith, Mark Estes, Steve Davis and Dick Karp, and Lola Brown, Judy Bigon, Jim Wilkinson, Tom Tesche, Steve Smith via telephone.

SIP Planning and Implementation Update – Lola Brown (TCEQ)

Lola reported that the TCEQ staff is preparing the documentation for the HGB Attainment Demonstration and Reasonable Further Progress SIP revisions for the 1997 eight-hour ozone standard and the associated rule revision projects. These documents are scheduled to be filed with the TCEQ's Chief Clerk's Office on September 4 for the September 23, 2009, agenda. Two hearings are scheduled in Houston at H-GAC on October 28 at 2:00 PM and 6:00 PM and one hearing is scheduled in Austin at TCEQ on October 29 at 2:00 PM pending commissioners' approval at agenda (September 23, 2009). The public comment period is anticipated to close on November 9, 2009.

Lola indicated the minutes and presentation from the July 2, 2009, HRVOC Stakeholder Group and from the Leak Detection and Repair Alternative Work Practice Stakeholder Group meetings held June 23, 25, and 26 are posted on the TCEQ Web site at:

http://www.tceq.state.tx.us/implementation/air/sip/hrvoc_stakeholders.html and
http://www.tceq.state.tx.us/implementation/air/rules/ldar/ldar_awp.html, respectively.

In addition, as part of continued efforts to improve emissions calculation methods, the TCEQ conducted a study to evaluate methods and models for estimating flash emissions from storage tank batteries. The study gathered process, operational, and measurement data from tank batteries servicing gas or oil wells across the state. To access this report and related information, please visit: <ftp://ftp.erg.com/FlashStudy/>. The user ID for this folder is "TCEQ" and the password is "Long45Beach". Please note that both the folder name and password are case-sensitive. Please also note that to access this FTP site through your Web browser, pop-ups must be enabled and FTP access must be configured properly. The TCEQ is accepting informal public comment on this report and its conclusions until August 31, 2009. Please address any questions or comments to Danielle Nesvacil at (512) 239-2102 or by e-mail at dnesvaci@tceq.state.tx.us.

For other questions or more information, please contact Lola at lbrown@tceq.state.tx.us.

H-GAC Update; Conformity Issues – Graciela Lubertino, Ph.D. (H-GAC)

(Note: Graciela's presentation is available on the SETPMTC Web site:

(http://www.tceq.state.tx.us/implementation/air/airmod/committee/pmtc_set.html.)

Graciela presented changes to the year 2035 Regional Transportation Plan (RTP) for on-road mobile source emissions. A public meeting for the revised 2035 RTP was held on August 13, 2009, and comment can be submitted until August 22, 2009.

From Graciela's presentation, it was pointed out that the VOC and NO_x emissions increase between 2025 and 2035. Graciela responded that by 2025 the replacement of older vehicles with new lower emitting vehicles will have been completed, and therefore the increase in emissions due to the increase in VMT between 2025 and 2035 is no longer off-set by replacement with lower emitting vehicles.

Graciela was also asked about assumptions regarding even lower emitting vehicles, such as a higher percentage of hybrids or electric cars. Graciela responded that the percentage of vehicle types projected to the future is based on current vehicle types and the assumptions regarding the replacement rate. These assumptions are built into Mobile 6 which is required for conformity analysis.

Dick pointed out that the VOC (46.14 tpd) and NO_x (50.08 tpd) emission projections in Graciela's presentation for 2019 are quite similar to the 2018 future year projected on-road mobile source modeling emissions 50.4 tpd and 50.8 tpd, respectively, which indicates consistency between the motor vehicle conformity budget and the attainment demonstration SIP.

EPA SIP Related Update – Erik Snyder (EPA)

Erik Snyder gave a verbal update of current SIP related issues. For questions or more information, please contact Erik at snyder.erik@epa.gov.

Erik reported on the newly proposed revision to the NO₂ NAAQS, which will add a short-term standard of 80 to 100 ppb.

Erik also reported that the RFP SIP related rule allowing credit for emission reductions in the areas adjacent to a nonattainment area (i.e, 100 km for VOC and 200 km for NO_x) has been revised to use net emissions change instead of total emission reductions, so that emission increases in the adjacent areas will need to be considered as well along with reductions.

Erik indicated that a decision concerning a review of the new 75 ppb ozone NAAQS is scheduled for September 19, 2009. Erik further indicated that if the decision is to review the level of the new ozone NAAQS, the decision may include the proposed level, which would be less than 75 ppb. Apparently NACAA, the organization of state air quality directors, is in favor of keeping the standard at 75 ppb.

Erik reported that EPA plans to send out "Failure to Submit" letters to those states that have not submitted a SIP revision, as per the regulatory 2006 submission date, in November 2009.

Erik also reported that EPA has recently completed a modeling analysis for replacing CAIR. The modeling uses a 2005 baseline year and a 2012 future year. In addition the modeling uses output from a new IPM run for EGU emissions in 2012. Erik was asked about the boundary conditions used in the recent modeling. Erik responded that he had not reviewed the modeling to that level of detail and one would have to contact RTP staff more familiar with the modeling.

Erik also indicated Region 6 is posting a modeling position, and the posting should be out very soon.

SIP Modeling Update: 2018 Control Strategy Modeling – Dick Karp (TCEQ)

Dick presented an update of the 2018 control strategy modeling. (Note: Dick's presentation is available on the SETPMTC Web site

http://www.tceq.state.tx.us/implementation/air/airmod/committee/pmtc_set.html.)

Dick was asked about the availability of the 2018 control strategy modeling, which includes both the 25% reduction in the HECT cap (2.7 tpd reduction in HRVOC) and the VMEP control measures (2.25 tpd reduction in NO_x). Dick responded that the modeling files will be posted to the TCEQ modeling web site

(<http://www.tceq.state.tx.us/implementation/air/airmod/data/hgb8h2/hgb8h2.html>) within a week.

It was pointed out that the 2018 projected design values at BAYP, DRPK and WALV for the control strategy modeling with 25% HECT and VMEP reductions are essentially the same as for the control strategy modeling with just the 25% HECT reduction (i.e., 25% HECT Reduction Modeling Sensitivity presented at the June 23, 2009, SETPMTC meeting). Dick responded that due to rounding and the EPA truncation provision for the calculation of the design value it does appear that there is no difference. However, before rounding the modeling with the HECT reduction plus VMEP showed lower projected concentrations than the modeling with the HECT reductions only. BAYP was further reduced by 0.15 ppb, DRPK by 0.02 ppb, and WALV by 0.03. It was also mentioned that with a 2018 projected design value of 87.9 ppb, DRPK is 3 ppb above the NAAQS (84.9 ppb).

Dick was also asked about conducting sensitivity modeling with less of a HECT reduction, since the modeling sensitivity to VOC reductions is not that great and may under-estimate the real ozone reduction. Dick responded that while modeling sensitivity to VOC reductions is typically not very large, the modeling sensitivity to HRVOC is typically quite notable. Dick also indicated that at this point, any additional modeling sensitivities will probably be dictated by the need to respond to comments. The comment was made that since the new ozone NAAQS is 75 ppb, the potential to over-control is unlikely.

It was also mentioned that 2008 was a “down” year for industrial activities due to the economy and hurricane Ike. And thus, presumably, the HRVOC emissions reported for the HECT rule for 2008 were lower than what otherwise may have occurred, suggesting that the current difference between the reported HRVOC and the HECT cap may not be typical. Dick was asked how much the HRVOC emissions were down due to the economy, and he indicated that he did not know,

but that, the 2007 and 2008 reported HRVOC emissions were notably less than those report for 2006. The 2006 reported HRVOC emissions were about 65 to 70% of the HECT cap.

SIP Modeling Update: Base Case Model Performance Evaluations, Weekday vs Weekend Modeling – Jim Smith, Ph.D. (TCEQ)

Jim presented a diagnostic evaluation of the model's ability to replicate the observed response of ozone concentrations to changes in emissions. In particular, weekend emissions are typically lower than weekday emissions and the weekday versus weekend modeling provides an evaluation of the model's predicted ozone response to the measured ozone response between weekdays and weekends. (Note: Jim's presentation is available on the SETPMTC Web site http://www.tceq.state.tx.us/implementation/air/airmod/committee/pmtc_set.html.)

Jim was asked about the increase in 6 AM VOC emissions from Wednesday to Saturday for the HGB eight-county area. Jim responded that as shown in the Slide 8, the increase is predominately due to the sources in the non-road category (e.g. residential lawn and garden, recreational marine) and that for these sources we use general temporal profiles. He also noted that the model operates in local standard time, so that the increase noted actually occurs at 7:00 daylight-savings time.

It was pointed out that the 6 AM observed and modeled NO_x concentrations (Slide 9) compare more favorable for traffic-dominated monitoring sites (e.g., BAYP, HALC, HTCA) than for industrial-dominated monitoring sites (e.g., DRPK, HCHV).

Jim pointed out that the decrease in the mean observed peak one-hour ozone concentrations at most monitoring sites from Wednesday to Saturday and from Wednesday to Sunday suggests that the peak hourly ozone is NO_x limited. However, the increase in the mean modeled peak ozone concentrations at most monitoring sites from Wednesday to Saturday and from Wednesday to Sunday suggests that the model is less NO_x sensitive than the airshed. Jim also noted that this is based on a rather small sample set, i.e., the Wednesdays, Saturdays and Sundays included in the 2005 and 2006 episodes.

Jim presented an alternative approach to conducting a weekday versus weekend diagnostic evaluation, which involves modeling all the 2005/2006 episode days with Wednesday emissions, then again with Saturday emissions and a third time with Sunday emissions. The model-predicted ozone for these three consecutive sets (i.e., Wednesday, Saturday, Sunday) was compared to a similar consecutive set of observed ozone for Wednesdays, Saturdays and Sundays, compiled from the period of May 15 through October 15 for the years from 2005 through 2008. This approach also tends to suggest that the model is less NO_x sensitive than the airshed.

Jim was asked about the boundary conditions used in the alternative approach and responded that the hourly specific boundary conditions were used, somewhat consistent with the hourly specific meteorology.

Jim was also asked about any disparity between the model's performance on weekend days versus weekdays and how it might bias the conclusions regarding NO_x emission reduction sensitivity. Jim indicated he had not specifically looked at the model's performance on weekend days versus weekdays, but that could be done.

Jim was also asked about comparing weekday versus weekend for groups of monitors, such as those in industrial areas, those in the urban area, and those downwind of the industrial and/or urban areas. Again Jim indicated that considering groups of monitors could be done.

SIP Modeling Update: Base Case Model Performance Evaluations, PSCF Sensitivity Modeling – Jim Smith, Ph.D. (TCEQ)

Jim presented a comparison of ambient and modeling results with and without reconciling reported HRVOC emissions. (Note: Jim's presentation is available on the SETPMTC Web site http://www.tceq.state.tx.us/implementation/air/airmod/committee/pmtc_set.html.)

Jim reviewed the Potential Source Contribution Factor (PSCF) analysis as adapted by TCEQ for reconciling the HRVOC emissions.

Jim was asked about the "pollution rose type" plots (e.g., Slide 9), and explained that these plots depict the comparison between the median measured (red wedges) and median modeled (blue wedges) for each of 36 ten-degree wind directions for the various monitoring sites for an HRVOC constituent (e.g., propylene). Since the model (i.e., ISC) does not account for reactivity, the model should over predict the HRVOC concentrations. Since the model generally under predicts the median measured HRVOC concentrations, it suggests that the reported emissions are too low and there are likely notable amounts of non-reported and/or under-reported HRVOC emissions.

During the portion of Jim's presentation showing the scatter plot comparison between the CAMx (i.e., CB05 species ETH, OLE and IOLE) and observed HRVOC, a question was asked about the speciation of 1,3-butadiene. Mark Estes responded that 1,3-butadiene speciates to IOLE, as do cis- and trans-butenes.

Jim was also asked about the modeled concentration compared to the monitored measurement, i.e. whether the modeled concentration was the value for the grid cell containing the monitor. Presumably the question related to the large spatial concentration gradients that are typically associated with HRVOC. Jim indicated that the modeled concentrations were bi-linearly interpolated values from the four grid cells around the monitor.

Jim was also asked about trying to quantify the amount of emissions that would be necessary to account for the chemical reactivity of the HRVOC. Jim and other TCEQ staff indicated that consideration had been given to trying to come up with a factor, but it became complicated, since the reactivity can vary substantially from very low at night to very high during the day, and even varying from day to day. It was suggested that considering night-time periods only, when there would not be much chemistry, for several years might provide better reconciliation factors.

Jim was asked if the TCEQ was going to continue to work on the emissions reconciliation between the SIP proposal and the final submissions. Jim indicated the TCEQ was going to continue to work on refining the emissions reconciliation, however, any change in the SIP modeling from the current application will depend on the need to address comments on the proposed SIP.

SIP Modeling Update: Base Case Model Performance Evaluations, Chemical Process Analysis Modeling – Mark Estes, TCEQ

Mark presented a diagnostic evaluation of the model's ability to quantitatively track the chemical atmospheric processes. (Note: Mark's presentation is available on the SETPMTC Web site http://www.tceq.state.tx.us/implementation/air/airmod/committee/pmtc_set.html.)

Mark briefly discussed the chemistry of ozone formation, focusing on the sources/sinks and propagation of HO_x radicals (e.g., OH*, HO₂*). During TexAQS II radical concentrations were measured at the Moody Tower on the U of H campus, from which radical formation and loss rates were calculated. Implementing the chemical process analysis option, CAMx calculates formation and loss rates for the radicals based on the modeled inputs, which can be compared to those calculated from ambient measurements.

In general, as Mark showed, the model tends to under-predict the OH* production, although this is a common short-fall in most of the chemical mechanisms, not just the carbon bond mechanism. In addition, resolving the under-prediction in OH* production is an active area of research and many hypotheses are currently being tested to correct the under prediction. The TCEQ is working with the developers of the CB05 chemical mechanism to incorporate some of these hypotheses that prove reliable. However, as Mark explained, it is unlikely that an update to the CB05 chemical mechanism will be available for the current SIP modeling.

In addition, as Mark explained, the loss rates for these radicals can indicate the degree of VOC- or NO_x-sensitivity. For example, when the OH radical loss rate, due to the reaction with NO₂, is large, then VOC sensitive conditions prevail, whereas when the HO₂ radical loss rate due to the reaction with other HO₂ radicals or other organic peroxides (RO₂) is large, then NO_x sensitive conditions prevail.

Mark showed that based on the radical measurements made at Moody Tower, both VOC-sensitive and NO_x-sensitive conditions occur, with VOC sensitivity occurring in the morning and NO_x sensitivity occurring in the afternoon. In addition, the process analysis indicates that the model is replicating this feature at Moody Tower quite well. The modeling process analysis for other locations indicates that the VOC-sensitive conditions occur more often and to a greater degree in the industrial and urban core.

Concluding Discussion

Dick indicated that one more SETPMTC meeting is planned for September 17, 2009. This will be the week before the Commissioners' Agenda meeting on September 23, 2009, when the HGB Attainment Demonstration SIP is scheduled to be proposed. The focus of the September 17, 2009, SETPMTC meeting will be on the corroborative analyses supporting the weight of

evidence. The corroborative analyses will include qualitative analyses (e.g., unquantifiable and unmodeled control measures), trends in ozone and ozone precursors, and modeling sensitivities.