

SOUTHEAST TEXAS PHOTOCHEMICAL MODELING TECHNICAL REVIEW  
COMMITTEE

Meeting Summary  
February 27, 2007

HGAC Offices  
35555 Timmons Ave  
Houston Tx.

**Members & Guests Present:**

Rohit Shrama, Judy Bigon, Doug Deason, Shelly Whitworth, Fred Manhart, Bob Cameron, Paul Ajibogen, Steve Kirkpatrick, Graciela Lubertino, Christine Smith, Dan Baker, Susan Moore, Bruce Davis, Erik Snyder, Rebecca Rentz, Liz Hendler, Jim Smith, Ron Thomas, Doug Boyer and Dick Karp.

**HGAC Control Measure Update – Graciela Lubertino, PhD (HGAC)**

Dr. Graciela Lubertino presented a tabulation of draft potential additional state and local control measures. Although there were some additional control measures suggested for area and point sources, the majority of additional measures focused on mobile sources. The largest single additional NO<sub>x</sub> control measure is extending TERP through at least 2013, which was estimate to yield an additional 47 tpd of NO<sub>x</sub> reduction. Similar to extending TERP, a number of the additional control measures for the mobile sources would require legislative action. The presentation is posted on the SETPMTC website ([http://www.tceq.state.tx.us/implementation/air/airmod/committee/pmtc\\_set.html](http://www.tceq.state.tx.us/implementation/air/airmod/committee/pmtc_set.html)).

**EPA SIP Related Update – Eric Snyder (EPA)**

Erik gave a verbal update on the status of HGB SIP related issues. With regard to the court decision remanding the Eight-Hour Implementation Rule, Erik indicated that EPA was granted an extension to March 22<sup>nd</sup>. There are still on-going discussions within EPA as how to respond. However, Erik pointed out the June 15, 2007 submittal date is in Phase II, and therefore we should stay on schedule for now. A question was raised from the audience concerning the potential of putting the one-hour provision for non-attainment fees back in place, and if so what would be the base year for the fees. Erik wasn't sure.

With regard to the litigation on the one-hour SIP, the challengers are to file their brief by the end of March, unless they request and are granted an extension.

The new modeling guidance for PM and Haze (which also includes the current ozone guidance) is due to be released very soon.

In addition, last December EPA released its procedure for addressing un-monitored areas of modeled high ozone, required as a part of the SIP modeling. EPA's method is available from their website.

Erik also mentioned that EPA is under a court deadline to review the current eight-hour ozone NAAQS, and there is a likelihood that it will be revised.

Erik indicated that the other air quality SIP modeler at EPA (Quang Nguyen) will not be returning from his detail. So EPA has a position open for an air quality modeler.

### **2005/2006 Modeling Episodes Review – Jim Smith, PhD (TCEQ)**

Dr. Jim Smith presented a review of the candidate episodes for the next round of eight-hour ozone modeling for the HGB area. (Note: Jim's presentation is available on the SETPMTC web-site ([http://www.tceq.state.tx.us/implementation/air/airmod/committee/pmtc\\_set.html](http://www.tceq.state.tx.us/implementation/air/airmod/committee/pmtc_set.html))).

Jim explained that episodes from 2005 and 2006 can take advantage of the TexAQS II data and findings, especially during the intensive field campaign (August 1 – October 15). Finally, selecting a number of new episodes is useful, because the 8-hour attainment test, which uses the relative reduction factor approach, benefits from including a large number of days with high ozone concentrations.

Three candidate episodes have been identified in 2005 and one in 2006 that occurred before the intensive field monitoring portion of TexAQS II. Although these candidate episodes predate the TexAQS II field intensive, the level of routine monitoring data available in 2005 and 2006 has increased notably from 2000. Further, enhanced monitoring associated with TexAQS II began in May 2005. So there is a considerable amount of ambient air quality and meteorological data available to support meteorological and photochemical modeling of these episodes.

Jim presented a graphic which showed the time periods when each of the various monitoring platforms (e.g., aircraft, research vessel), as well as the special hourly point sources emissions inventory, were deployed during the TexAQS II field intensive.

Jim also showed the concurrence of eight-hour exceedance days in the Beaumont/Port Arthur (BPA) area with the candidate episodes identified for the HGB area. With the exception of the July 26 - August 8, 2005 episode, each of the candidate episodes has at least one exceedance day in the BPA area, although there are fewer days. In addition, there were only two exceedance days in the BPA area during the TexAQS II field intensive, although one did occur on September 1, which coincides with the major overlap of monitoring platforms. Jim was asked about the concurrence of eight-hour exceedance days in Dallas, Austin and San Antonio. Dick indicated that we hadn't checked on Austin and San Antonio, but that the June 2005 episode was a good one for DFW.

### **2005/2006 Meteorological Modeling – Doug Boyer (TCEQ)**

Doug presented a graphic showing the MM5 modeling domains which are different than those used in modeling the 2000 episode. In particular, the 4-km grid takes in most of the eastern half of Texas. This was intentional, so that the meteorological fields would be available for other modeling projects, such as regional haze. (Note: Doug's presentation is available on the SETPMTC web-site

([http://www.tceq.state.tx.us/implementation/air/airmod/committee/pmtc\\_set.html](http://www.tceq.state.tx.us/implementation/air/airmod/committee/pmtc_set.html))).

Doug presented some of the meteorological modeling results for the June 2005 and July/August 2005 episodes. In particular Doug showed some statistical comparisons of surface monitored versus modeled wind speed, wind direction and temperature produced by the Met-Stat procedure developed by ENVIRON. As Doug pointed out, the typical bias statistics (i.e., from Met-Stat) used to gauge model performance are conducted comparing area-wide averages from a number of monitors. However, for the HGB area and its more complex meteorology it has been demonstrated that model performance needs to be gauged at particular monitors.

Doug also showed monitored versus modeled statistics for nudged and un-nudged cases. Nudging has been performed for these episodes using winds from radar profilers (no temperature nudging) and shows a notable improvement in the performance, more so on the area-wide basis than at individual monitors.

Since the Met-Stat procedure compares monitored versus modeled wind speed and wind direction separately, TCEQ has developed a graphical presentation termed a “whisker plot” which compares the monitored versus modeled wind flow vector (i.e pointing in the direction the wind is going toward) by hour at a station. Doug showed a number of these whisker plots for selected sites in the HGB area. Doug pointed out that from the whisker plots one can determine the timing of wind shifts, such as a flow reversal and see how well the model is replicating this feature typically associated with high ozone in HGB.

Doug indicated that there are additional model performance evaluations to be conducted, including plots of monitored versus modeled PBLs and animated plume plots. Further, the met-modeling staff will be testing the modeling using different PBL schemes, updated land use and land cover data, and incorporating horizontal varying sea surface temperatures. (Note: MM5 typically uses a constant sea surface temperature).

The 2006 radar profiler data needed for nudging of the June 2006 episode, as well as the episodes during the TexAQS II field intensive have not yet been processed. TCEQ is currently processing a work order for TAMU to process the 2006 radar profiler data. Nudging files for the 2006 episodes are expected to be completed by this summer.

Some suggestions from the audience were to compare the whisker plots with the diurnal temperature plots, and to investigate changing the modeling time-step during those periods when the meteorology is notably changing (e.g., flow reversal).

### **2005/2006 Emissions Modeling – Ron Thomas (TCEQ)**

Ron briefly went over the CAMx modeling input requirements and the emissions development and processing tools used at TCEQ. In particular, CAMx requires spatially, temporally and chemically speciated hourly emissions inputs. (Note: Ron’s presentation is available on the SETPMTTC web-site

[http://www.tceq.state.tx.us/implementation/air/airmod/committee/pmttc\\_set.html](http://www.tceq.state.tx.us/implementation/air/airmod/committee/pmttc_set.html)).

Ron indicated that the development uses the highest resolution available emissions data in a hierarchal approach. That is the most detail in the non-attainment area (i.e., the finest grid resolution), with somewhat lesser detail in the remainder of Texas and surrounding states (e.g.,

Louisiana) and the least amount of detail in the areas furthest from Texas (i.e., the large grid-sized domain).

Ron indicated that TCEQ uses version 3 of the Emissions Preprocessing System (EPS3). TCEQ staff has used EPS3 and previous versions for many years and has developed a number of computerized routines for quality assuring the processing steps. In addition, Ron pointed out that EPS3 can be used to develop chemically speciated emissions for the various chemical mechanisms used in CAMx (i.e., CB-IV, CB05 and SAPRC). Ron was asked about the chemical speciation for the carbon-bond (CB) mechanisms, and responded that researchers specializing in air chemistry provide the information needed to partition actual chemical species into the CB species.

Ron indicated the sources of emissions data that will be used in developing the episode specific modeling input. For Texas, including the HGB non-attainment area, point source emissions data will be extracted from the 2005 STARS data base, and where appropriate substituted with data from the EPA Acid Rain Program Data Base and any special emissions data (e.g., 2006 Special Hourly Emissions Inventory, CCEDS, EMRS). Ron was asked if default stack parameter were used, and responded that there are defaults that can be set. Ron was also asked how elevated fugitive emissions were handled, and replied that all fugitives even those from overhead piping are still low enough to be treated as low-level, i.e., less than 30 meters. Area and non-road emissions data for Texas will be extracted from the latest TexAER data base and the NONROAD2004 model. For on-road emissions in the HGB non-attainment area, TTI provides link-based emissions by coupling the emission rates output from MOBILE6.2 with VMT data derived from the Travel Demand Model (TDM). For on-road emissions in the surrounding states and beyond, the EPA NMIM model and Federal Highways State/County VMT data is used. Biogenic emissions will be modeled using the GloBEIS3 with episode-specific kriged temperatures, satellite-derived photosynthetically-active solar radiation data, and the latest land-cover and vegetation data.

Ron indicated that the 2005 STARS database should be available shortly and the EPA ARPDB data for the 2005 episode has already been obtained. Special emissions data from CCEDS and EMRS is difficult to handle since it is not emission point specific and/or compatible with the naming convention used in STARS. So at present none of this data has been investigated for use. A comment was made that TCEQ needs to alert the SETPMTC of issues like this, so they have an input into how to proceed. For the two modeling episodes currently being addressed (i.e., June 2005 & July/August 2005) there is no special hourly emissions data. For the surrounding states, Ron indicated that 2005 point source data have been received from Oklahoma and 2004 point source data from Louisiana. (Note: 2005 point source data for Louisiana is compromised due to Katrina). Recent point source emissions data from Arkansas is not yet available. Point source emissions data for the regional domain beyond Texas and surrounding states will be developed from the 2002 NEI and possibly the 2002 CENRAP/RPO emissions inventories. Erik Snyder with EPA asked about the usefulness of the 2002 CENRAP/RPO emissions inventory for ozone modeling, and Ron responded that we were currently looking into that. No updates to the 2000 emissions from Canada (security issues), Mexico or the Gulf of Mexico (MMS GWEI) are currently available. Bob Cameron with MMS indicated that they

were working on a 2005 update, but it will likely be odd due to Katrina, but he will let us know when it is available.

Ron indicated that we will be using the Plume-in-Grid algorithm for some elevated point source emissions in a slightly different manner. A few test runs with EPS3 will be made to refine the method before using it in CAMx.

Ron indicated that the area and non-road episode-specific emissions for the two modeling episodes currently being addressed (i.e., June 2005 & July/August 2005) have been completed. These emissions were developed using the latest (2002) TexAER database, the NONROAD2004 for 2005 and 2006, and the 2002 NEI with EGAS. As was the case for the 2000 episode, aircraft, locomotive and marine vessel (ships) emissions, which are not included in the NONROAD2004, are developed separately, again using TexAER or NEI 2002 data with EGAS.

Ron indicated that we are receptive to receiving any new updates for these source categories. Ron was asked to what extent we are using any of the information from the Routine Vessel Study and the HARC report on locomotive base emissions, and responded that we would have to check on those. New for this 2005/2006 modeling is the inclusion of emissions from ocean-going ships in the Gulf of Mexico and the Atlantic Ocean. (Note: Ships are treated as pseudo point sources with stack parameters to facilitate their typically elevated emissions.) Erik asked if we were including emissions from deep-water ports (e.g., LOOP) and whether we would be forecasting any additional ports in modeling a future case. Ron responded that we are not considering future base years at this point. Bob Cameron responded that the LOOP is included in the MMS GWEL.

Ron indicated that the on-road link-based episode-specific emissions should be available from TTI in four to six months. TCEQ is currently processing a work order for TTI to develop these emissions. As an example of the complexity of developing emission for an episode, Ron pointed out that the May/June 2005 episode spans school and non-school days, as well as the Memorial Day weekend. The emissions files for the various episodes are expected to be completed by the end of the summer. As a place holder, the projected 2007 on-road link-based emissions previously developed by TTI have been adjusted for the differences between the 2000 episode and each of the two modeling episodes currently being addressed. Development of on-road emissions for the surrounding states and beyond has also been completed using the EPA NMIM model and Federal Highways State/County 2005 VMT data.

Ron indicated that TCEQ has received the new land cover data for the eastern part of Texas from the UT-CSR. This is being processed for input to GloBEIS. Additionally, the satellite data for the PAR has been downloaded and is being processed for input to GloBEIS. The temperature data has been processed (kriged) and is ready for GloBEIS input.

### **Closing Remarks**

Dick indicated that the next meeting is scheduled for 10 am to 3 pm on April 18<sup>th</sup> at the HGAC offices. At that meeting, TCEQ expects to present updates to both the meteorological and emissions modeling. Dick also indicated that if there were additional items for the agenda to please contact him.