DALLAS-FORT WORTH PHOTOCHEMICAL MODELING TECHNICAL MEETING

North Central Texas Council of Governments
616 Six Flags Drive
Arlington, Texas

January 31, 2014 10:00 A.M. – 12:00 P.M.

MINUTES

Chris Klaus with the North Central Texas Council of Governments (NCTCOG) welcomed the group and started the meeting. The agenda for the meeting is available on the NCTCOG Web site, http://www.nctcog.org/trans/committees/AQTC/013114/Agenda.pdf. The agenda includes links to the different presentations. The TCEQ presentations are also available at the TCEQ Dallas-Fort Worth (DFW) Photochemical Modeling Technical Committee Web site, http://www.tceq.texas.gov/airquality/airmod/committee/pmtc_dfw.html.

Regional Update – Jenny Narvaez (NCTCOG)

Jenny gave an overview of NCTCOG's plans for the 2014 ozone season and collection of ideas for new emission reduction strategies.

Development of 2018 Future Case Emission Inventory Inputs for DFW Area Photochemical Modeling – Chris Kite (TCEQ)

Chris gave a detailed overview of the 2018 emission inventory inputs for the ten-county DFW area that are currently being used for future case ozone modeling. The presentation included: an overview of emission totals by aggregate source category; ongoing fleet turnover reduction in on-road and non-road mobile emissions; oil and gas production trends in both the Barnett Shale and nationally; and an overview of the ozone formation reactivity of different volatile organic compounds (VOC). The 35-slide presentation portion took about 30 minutes, and there was an extensive question-and-answer session that took roughly 60 minutes. Provided below is a summary of the questions (in bold) received and the responses provided by TCEQ staff:

1. **How did TCEQ develop the on-road inventory and how might it change in the future?** We had the Texas Transportation Institute (TTI) develop 2018 on-road emission inventories for every Texas county using the 2010b version of the Motor Vehicle Emission Simulator (MOVES2010b) model and vehicle miles traveled (VMT) estimates from the Highway Performance Monitoring System (HPMS). All of the electronic files associated with this work are available on the TCEQ FTP site at ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/Statewide/. We took the 2012 link-based inventory developed by NCTCOG for the last State Implementation Plan (SIP) with MOVES2010a and adjusted those totals by county, pollutant, vehicle, and roadway type to be equivalent to the 2018 MOVES2010b analysis. This is a temporary measure that provides very decent emission totals while still maintaining the excellent spatial and temporal resolution that link-based inventories provide. Once the MOVES2014 version of the model is released by the U.S. Environmental Protection Agency (EPA), we will

have new link-based inventories developed for 2018 based on travel demand modeling from NCTCOG.

2. **Why are the 2018 emission totals you're presenting now about 5 nitrogen oxides (NO_X) tons per day (tpd) higher than those presented during the November 5, 2013 meeting?** Our best estimate of 2018 electric utility NO_X emissions was 10.22 tpd, but is now 15.02 tpd. The change had to do with reallocating emissions from electric generating units (EGUs) around the state based on banking/trading patterns since 2009 when Clean Air Interstate Rule (CAIR) Phase I caps first went into effect. Some EGUs regularly operate above their cap and some below. Our 2018 estimates of the statewide CAIR Phase II cap did not change, but the allocation per individual EGU did, resulting in a 4.8 NOx tpd increase within the DFW area. More stringent CAIR Phase II caps will start in 2015 and we certainly don't know how EGUs around the state will respond, but we have to use some basis for projection purposes, and the best approach is to use historical banking/trading trends under CAIR Phase I.

3. **Why are you showing just NO_X and VOC emission totals rather than particulate matter (PM) as well, which can have a substantial impact on ozone formation? If you don't account for PM emissions to begin with, how can you know if it has an effect?** NO_X and VOC are the primary ozone precursors, so these have been presented today. We have included anthropogenic $PM_{2.5}$ categories into our modeling, but they have a miniscule impact on modeled ozone formation. Naturally occurring PM is very difficult both to quantify and to model, and the DFW area monitored $PM_{2.5}$ levels are currently well below the applicable standard. We can include $PM_{2.5}$ emission estimates for any anthropogenic source category of interest.

4. **What is the average age of the current on-road fleet and why do you regularly skew the data to make the future fleet look newer than it really will be to artificially lower the NO_X and VOC levels?** This is not an accurate reflection of how future year on-road emission inventories are developed. The best practice specified by EPA guidance is to take the latest available mid-year "snapshot" age profile of the vehicle registration database and apply it to the future year you are modeling. So if we were doing that today, this latest profile would be from July 2013 with figures of X% for 0-1 years old, Y% for 1-2 years old, etc. Of course, we don't know the exact age distribution of the 2014-2018 model year vehicles that will be operating in the 2018 calendar year, but we need to use some type of age distribution and the latest available snapshot data is always the best way to go. We will be happy to review any superior technical approaches that anyone provides for projecting the number of new vehicle sales in the DFW area between now and 2018.

5. **How can you be so sure that non-road equipment age profiles and turnover are going to look like what you have presented today? Do you have specific age profiles for non-road?** Unlike with on-road, there is no registration database for non-road equipment from which you can extract an area-specific age distribution. Our inventory estimates could be improved if such data existed, but it does not and we cannot mandate that equipment owners of portable engines report information to the state about age, operational history, use, etc. These projections are based on the scrappage curve in EPA's non-road model and there is plenty of documentation available on the NONROAD model Web site (http://www.epa.gov/otaq/nonrdmdl.htm) about that. The bottom line is that an engine deteriorates a little more each time it operates. The more the engine is used, the sooner the owner will need a replacement so older higher-emitting equipment cannot last indefinitely.

6. **At the November 5, 2013 meeting, you presented that lower sulfur gasoline information about how on-road mobile emissions would be reduced. How is that supposed to work? There's still a lot of old cars on the road that it will not work for. And does it apply to non-road as well?** EPA's proposal is to lower gasoline sulfur levels from 30 ppm down to 10 ppm. This makes in-use catalytic converters on existing vehicles more effective at reducing emissions. Slide 9 of the November presentation showed NO_X reductions by model year resulting from the lower sulfur levels. Catalytic converters first started appearing on cars in the mid-1970's so almost all of the current on-road vehicles have them. Gasoline had a sulfur level of roughly 300 ppm back in the 1990's and it has been down to 30 ppm for almost ten years. Non-road emission estimates are not affected by this latest proposal because most of the non-road NO_X is from diesel engines and not gasoline ones. On-road diesel sulfur levels dropped from roughly 500 ppm down to 15 ppm back in 2006.

7. **You have only provided the NOx and VOC emission totals for the point EGU, non-EGU (NEGU), and cement kiln categories. We want these broken down by each facility for all pollutants.** We can provide all that detail. Within the DFW area, there are roughly twelve EGUs and three cement kilns, so this information can be readily summarized for these facilities. However, the number of non-cement kiln NEGUs is quite large (roughly 370 facilities for the ten-county DFW area), so there will inevitably be aggregation in our reporting for presentation purposes. If that is not sufficient detail, we will happily provide you with the very large Emission Processor System Version 3 (EPS3) input files that report estimates for each pollutant (NOx, VOC, etc.) by facility and equipment type on separate lines. These files have a fixed-column format that will readily load into spreadsheet software such as Excel so that individuals can aggregate to any level of detail they choose.

8. **I do not agree with your claim that the DFW area is NO_X limited and that VOC controls will not be effective. It is widely known that methane is a highly significant contributor to ozone formation.** The best available scientific information from experts such as Dr. Carter from the University of California at Riverside show that highly reactive isoprene (very abundant and emitted by oak trees) makes 738 times more ozone per unit of VOC than methane. In addition, the reaction rate for making ozone from isoprene interacting with NOx is 15,056 times faster than that for methane. If you have any scientific data to refute this, please provide it to us or feel free to contact Dr. Carter directly with your findings. Methane does contribute to worldwide background ozone levels, but has little effect on local/regional ozone formation due to the abundance of much more reactive VOC in eastern Texas.

   Note: EPA commented during this part of the discussion that they concurred with TCEQ's findings that ozone formation in the DFW area is NO_X-limited. EPA referenced both their monitoring and modeling analyses to substantiate this position.

9. **Have you directly contacted anyone in Colorado about the proper way to account for VOC reactivity in your modeling?** No. This is the third straight DFW technical meeting where the claim has been made that Colorado has an improved method for handling VOC reactivity. At each of the previous two meetings, the TCEQ requested that either a contact person and/or substantive report be provided that discusses an alternate method for handling VOC reactivity in photochemical modeling. This has not been done to date. As explained during the November meeting, Colorado's most recent ozone SIP (http://www.colorado.gov/airquality/documents/deno308/) from 2008 relied on the use of the Comprehensive Air Quality Model with Extensions

(CAMx) and the carbon bond 05 (CB05) chemical mechanism, which are the same tools that TCEQ used for our ozone modeling at the time. We are now using updated versions of both these tools. A few weeks ago, an NCTCOG staff person sent TCEQ a 2006 presentation from Colorado that discusses VOC levels from monitoring data. We reviewed it and, though it is a fine presentation, there is nothing substantive in it we can use to change our modeling inputs, specifically with respect to VOC reactivity. Here is the first slide of that presentation on the overhead. We can go through it slide-by-slide, and anyone is welcome to show us the specific slide where such alternative VOC reactivity information is located. All of our files are publicly available on the web and FTP links provided on the second to last slide of this presentation. If anyone has additional information that will improve our efforts, please provide substantive report or analysis for our review. TCEQ phone and e-mail contact information is always included on the last slide of each presentation.

Note: NCTCOG staff commented that the author of the Colorado presentation being referenced stated that its contents could not be used for the purposes of altering photochemical modeling inputs and algorithms.

Condensate Storage Tank Emissions Factor Update – Michael Ege (TCEQ)

Michael provided an overview of how VOC emission factors for condensate tanks have improved based on a recent study that included use of 1,833 data points instead of the older one that relied only on 22 such data points. The 14-slide presentation portion took about 15 minutes, and there was a question-and-answer session that took roughly 15 minutes. Provided below is a summary of the questions asked and the responses provided by TCEQ staff:

1. **What is the basis for calculating emission levels from all the different types of equipment and operations in the oil and gas sector?** We have various emission factors for each type of operation and control level. So a gas compressor in a county subject to controls has a much lower NO_X emission rate than one in a county without such requirements. We do not base these estimates on the number of operating wells. Instead, the emission estimates are generally based on the level of production either known (from the past) or expected to occur (for the future). There are numerous reports and studies available on the TCEQ Web page that address individual categories of the oil and gas sector, http://www.tceq.state.tx.us/airquality/airmod/project/pj_report_ei.html.

2. **The level of detail provided here for the oil and gas emissions is completely unacceptable. TCEQ used to provide a lot of information about this subject and now provides very little, which shows that they are hiding a lot of information.** The TCEQ will provide whatever level of detail is requested. All of the emission inventory modeling inputs are available on-line for public access. TCEQ staff referred to the links provided both in this presentation and the one given back in November. TCEQ committed to providing an added level of detail at the next meeting. Staff also noted that it would be helpful to know in advance what level of detail is being requested. It was pointed out that the publically available emission modeling input files include several hundred thousand lines of itemized information. Due to time considerations, it was suggest that it would be impractical to provide all of it during the meeting.

Heavy-Duty Diesel Inspection and Maintenance (I/M) Project – Joe Zeitsman (TTI)

Joe provided an overview of a heavy-duty diesel I/M test case study that was performed at a truck stop along I-45 between Dallas and Houston. Eighteen-wheeler trucks were recruited from the highway and their tailpipe exhaust was measured with both a portable emission measurement system (PEMS) and a remote sensing device (RSD).

Control Strategy Development – Chris Klaus (NCTCOG)

Transportation Control Strategies – Jody Laza (NCTCOG)

Due to the unexpected length of time taken by the first four presentations plus question-and-answer sessions, these final two presentations were postponed to a future date.

Next Meeting

The next meeting has been scheduled for Thursday April 17, 2014 from 10:00-12:00 PM at the same NCTCOG location. Additional emissions inventory detail was requested of TCEQ for the 2018 future year for the source categories of point and oil/gas operations.