Minutes of the BAAQMD 2004 SIP Modeling Advisory Committee (MAC)
Thirteenth Meeting

The thirteenth meeting of the MAC was held on
Tuesday, October 21, 2003, at 1:00 p.m.
at the District office, fourth floor Conference Room.

Attendees: see sign-up listing attached

Agenda: Posted with these minutes on project web site (www.environ.org/basip2004), enter user name (basip2004) and password (goldengate)

Next meeting: Monday, October 27, 2003 (1:30 PM by conference call)

Presentations and handouts (all are provided on project web site):

- Agenda
- ENVIRON/District's status summary
- Alpine's graphics and emission summary tables

Discussion items:

Status Report

Saffet Tanrikulu and Chris Emery gave a brief overview of project status to date, and summarized the discussion topics for the meeting.

CCOS Database

Saffet Tanrikulu began the discussion with meteorological data. Temperature is crucial for emissions and CAMx ozone simulations (it has been shown that simulated ozone levels increased markedly with a simple uniform increase in temperature). Sixteen CCOS sites were found to contain temperature conversion errors; they are now fixed. CARB had eliminated sites in the database with temperature > 50C, mostly in Monterey Bay Area and Mojave desert. The Bay Area was not greatly affected by this problem, but the SJV may have been. RASS temperature profiler data were cleaned up by Saffet as much as possible while he was at CARB, but they should be looked at more closely.

Ajith Kaduwela asked if CAMx was more temperature sensitive than other models. Given that the standard updated CB-IV mechanism is employed in CAMx, it should not be any more sensitive than other models (i.e., temperature-dependent reaction rates have not been modified in CAMx). A suggestion was made to compare CAMx impacts against published smog chamber data.

Jim Wilcak commented that his analyses suggest that MM5 is cool on average by ~1C compared against RASS temperature profiles. The District notes that MM5 surface temperatures are much cooler than measurements around the Bay Area, based on their runs with observational FDDA turned on. Bob Bornstein asked about the height of "surface" temperature probes in the data. Most (~2/3) are apparently at 10 m (as opposed to 2 m) given that many sites are NWS and District/agency-run sites. This could lead to a significant component of the overall bias when comparing against met model results. Bob Bornstein asked about soil moisture and sea-surface temperatures (SST) used in the District's MM5 runs. Saffet replied that the District has just completed revised MM5 runs with soil moisture reduced by ½ and deep soil temperature reduced by 4C. Simulated temperatures increased 2-3C in the central valley, but dropped ~1C in the Bay Area (likely due to stronger sea breeze with hotter inland temperatures). The SST come directly from the NCAR/EDAS input analyses.

Evan Shipp asked if temperature observations are used directly in CAMx as they are in MM5 and emissions processing. The ENVIRON/District CAMx simulations use temperatures from the met models only (no direct observation data is ingested). Bruce Jackson mentioned that in CARB's modeling, CAMx input temperatures are developed from an MM5/observation hybrid. Jim Wilkinson pointed out that the current CARB emissions are strictly based upon objective analyses of temperature measurements (no MM5 results are included). However, since our evaluation of those temperature fields show obvious problems related to the quality of CCOS temperature data, Alpine has developed new mobile and biogenic emissions using RAMS-only and RAMS/ observation hybrid temperature fields provided by the District and ENVIRON. RAMS-only results in much higher temperatures domain-wide (perhaps a bit too high), while RAMS/observation hybrid (using corrected CCOS temperature data) results in a more believable representation of temperature than the CARB objective analyses (especially over the Sierras). Of course there are still inconsistencies between temperatures used in CAMx and temperatures used for emissions estimation.

Saffet stated that for the CCOS temperature observations, the District will identify outliers, fix them, and send to CARB. Vernon anticipated a relatively quick turnaround of the CCOS database. Bruce Jackson does not believe that the gridded temperature fields will change much, or have much impact on CAMx. The District disagrees based on their experiences so far in their modeling.

Action Item: The District will first ensure that CCOS temperature observation data are correct and work with CARB to revise the database. ENVIRON will consider various tests to evaluate chemical sensitivity to temperature (e.g., box model runs compared against the literature, or similar CAMx sensitivity tests using the SAPRC99 mechanism).

Saffet moved on to CCOS ambient speciated concentration measurements. The District is looking at VOC data (aircraft mainly) and asked if anyone else is addressing these

data. Vernon stated that DRI did so a while back under the CCOS program, including QA/QC and "reasonableness" checks of ambient NOx and VOC measurements. John DaMassa stated that they are reviewing DRI's draft report now.

Bob Bornstein suggested that nobody seems to know what the sequence of events were that resulted in an ozone episode for July/August 2000. We need to understand the large to mesoscale to local sequence and forcings that occurred and to what extent these interactions are captured in the modeling. Even Shipp stated that the SJV has completed some analyses, while looking at episode representativeness, that may help. Steve Ziman suggested that similar analyses should be provided in the T&B reports (which do not appear to be on FTP or web sites).

Action Item: CARB will assist in locating the T&B reports on their FTP/web sites.

Saffet closed this portion of the meeting by noting that the District has been reviewing CCOS air quality, winds, temperatures, and aircraft ambient concentration data. They are currently documenting results, and need CARB and other districts to help evaluate and identify other problems. Vernon assured that Greg O'Brien can reflect any modification to the CCOS database in a couple of days.

Action Item: CARB to arrange an approach for integrating revised data into the CCOS database with version control. CARB and other districts to provide assistance in CCOS database QA/QC. Vernon Hughes to take the lead to add corrected data, as identified and modified, to the CCOS database. Data for the July 1999 episode needs to be handled similarly.

Emissions

Saffet opened the discussion by referring to the fuel-based inventory report developed by Rob Harley. This report suggests the EMFAC-based mobile inventory is low. How comfortable are we with this, and how do we fix the inventory if needed? Jim Wilkinson stated that we won't see much change unless we start with a micro-inventory analysis (bottom-up). Temperatures are important, and can lead to large emission differences; this suggests that temperature could be a large component of the underestimate for mobile and biogenics. However, there is no information for the non-road component to know the effect. Besides the Harley paper, other literature (e.g., Geron et al, 2001) suggests that emission rates could be 50% too low.

Bob Bornstein initiated an involved discussion on the appropriate heights above the ground to characterize temperature for various sources (e.g., vehicles vs. trees). Jim Wilkinson described the height levels available among the various temperature fields (ARB objective analysis, RAMS, RAMS/hybrid) and how they are used to estimate mobile and biogenics. He also discussed typical heights at which the bulk of forest emissions occur (80% emissions from upper 1/3 of canopy; 20-40 m in California). Tom Tesche asked if there would be a model sensitivity if some biogenics were put into

higher model layers than the surface. Chris Emery responded that it is highly unlikely given that key biogenic species are emitted during they daytime when the first few model layers are highly coupled via turbulence/diffusion. Steve Ziman asked if this concern is especially relevant given other more critical issues. Chris Emery agreed that it is probably not; sensitivity simulations with higher biogenic emissions suggest a minor effect on ozone due to the general VOC-rich/NOx-limited conditions throughout California (a modest effect is noticed in the Bay Area due to VOC-limited conditions, but the effect is not large since biogenics are not a large component of the overall Bay Area emissions inventory).

Jim Wilkinson proceeded to discuss the biogenics emissions table provided in the Alpine presentation, showing effects of various input temperature fields and improved photosynthetically active radiation (PAR) fields. He showed the problems identified with CARB's radiation estimates.

Action Item: ENVIRON will undertake CAMx sensitivity simulations to evaluate the ozone impacts from revised biogenic emissions stemming from improved temperature and PAR differences. We hope to report the result by the next emissions coordination meeting on October 29.

Jim Wilkinson proceeded to discuss the summary table for on-road mobile emissions provided in the Alpine presentation, showing effects of various input temperature and humidity fields. Effects on weekday mobile emissions are relatively small and reasonable. A major issue is noted for weekend emissions as Alpine cannot replicate CARB's weekend mobile source emissions inventory (Alpine processing results in much higher NOx emissions). The District needs this issue resolved quickly.

Action Item: CARB agreed and will work with Alpine immediately to resolve this problem.

Jim Wilkinson gave specific numbers regarding the differences between CARB and Harley-estimated mobile emissions. In the Bay Area, the report suggests that NOx is 6% low while TOG is 23% low. NOx is 40-60% low in the SJV and up to 40% low in Sacramento. Overall, TOG appears to be 40% too low over the entire domain. CARB has issues with the Harley report and plans to submit a response to comments by the end of the month. Saffet Tanrikulu pointed out 3 issues: (1) Harley report suggests the current inventory may be too low; (2) there are uncertainties in the Harley approach, which must be considered with discretion (limited sampling, etc.); and (3) we can scale current emissions for sensitivity runs, but what would we do for the actual SIP runs? At some point we need to go back into the inventory to make modifications. Tom Tesche mentioned an approach used in Houston to adjust mobile emissions based on surface and aircraft data, which helped tremendously. Steve Ziman stated that this problem is typical; the inventory is always too low, and we need to evaluate the reason for the low estimates.

Vernon Hughes wants the group to recognize that the mobile inventory and procedures have improved dramatically since SARMAP. There are other issues to consider, the biggest of which is conformity – the need for consistency with EMFAC is significant. Dave Souten suggested that while true, the SIP modeling should proceed with the best technical approach possible. Saffet Tanrikulu pushed for some closure on an approach to investigate further. Vernon Hughes stated that the Harley paper is on the agenda for the next emission coordination call. Several members discussed approaches for sensitivity modeling, bringing in additional experts. Dave Schonbrun brought up additional issues surrounding VMT effects on volume to capacity (V/C) ratios; basically, the emissions estimates are derived through the use of DTIM, EMFAC and the MTC model output. However, in order to reconcile MTC output with other VMT related data, VMT is scaled up but speeds are not adjusted to reflect the effect that would have on congestion and thus emissions. A discussion ensued on the way DTIM and EMFAC are used in preparing mobile emissions for modeling.

Action Item: Vernon will circulate a write-up on the DTIM/EMFAC approach to MAC members so that everyone can be clear on the approach. Doug Thompson and Ed Yotter (CARB) will be invited to participate in as many future mobile source discussions as possible to address uncertainty issues and potential methodological improvements.

Action Item: Jim Wilkinson and Dave Schonbrun will develop a statement of the VMT vs. V/C issue (with MTC input), and recommended action to be taken in the form of methodology improvements and/or emissions estimates changes.

Finally, Jim Wilkson touched on non-road issues: what is the lineage of the estimates, and what updates have been made? Vernon Hughes suggested contacting Mark Carlock at CARB to get answers. Jim Wilkinson suggested that there is likely plenty of room for improvement, especially in regards to NOx from diesels and other smaller engines. Vernon Hughes stated that there are many issues that need prioritization, and suggested the need to balance feasible alternatives with available time. Dave Souten agreed, but also stated that we need to list and address the uncertainties so as not to give the idea that we simply accept the non-road inventory as "gold".

Next Meeting

There was insufficient time to complete all topics on the agenda. Remaining issues include point sources, fires, and meteorological performance problems. The District requested an additional conference call to cover the remaining topics:

Monday, October 27, 1:30 – 3:00 PM

Rob Harley and Charlie Blanchard will be invited onto this call.

The District will discuss meteorological modeling/data issues with Jim Wilzcak separately and report to the MAC.

The format of the meeting was discussed. All agreed that it is very helpful for us to offer the "crib sheet" of questions and topics that we expect the MAC members to be prepared to discuss. It is also helpful to identify in that document, as we did for this meeting, the likely contributors to answer the question.

Action Item: ENVIRON will assure that this format is used in upcoming meetings. We should also strive to use same format for MAC telephone conference calls. For Monday, October 27, the background information/questions handed out at the meeting will be used.

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Sign-up Sheet
Bay Area Modeling Advisory Committee 10/21/03

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